Master Planning Report

For The

Milltown Water Utility

And The

Marengo Water Utility

Town of Milltown
and
Town of Marengo

January, 1997

COMMONWEALTH
ENGINEERS, INC.

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SECTION I - ADDENDUM TO REPORT

A. Contract Water Supply Option

At the request of the Towns of Milltown and Marengo, the alternative of Milltown developing it's water supply and treatment capacity to provide water supply service to the Marengo Water Utility on a wholesale basis has been analyzed.

1. Project Description

In the Contract Water Supply Project, the Milltown Phase I Project is combined with the treatment plant improvements necessary to supply the Marengo Water Utility with a wholesale source of water supply.

The Milltown Phase I Project included the hydrogeological investigations and well development activities are intended to provide the utility with a well supply sufficient to reliably meet the existing water treatment plant's capacity. The utility's water tank will also be rehabilitated in accordance with the tank inspection report and resolution of the problems with the well and treatment plant controls.

The Contract Water Supply Project adds to the Milltown Phase I Project by including three additional water supply wells (in addition to the well included in the Milltown Phase I Project) and improvements to the utility's water treatment plant adequate to increase the plant's output from 200 gpm to 500 gpm (240,000 gpd to 600,000 gpd)

2. Utility Needs Satisfied

The Contract Water Supply Project has been developed to satisfy the utility's most pressing current needs, including:

a. increasing the water supply capacity,
b. increasing the usable capacity in the existing water tank,
c. rehabilitating the existing tank, and
d. providing treatment plant and well control upgrades,

and also provides adequate capacity in the Milltown Water Utility's water treatment plant to provide all of the Marengo Water Utility's current needs, as well as a small amount of capacity for expansion into the Milltown Service Area.

3. Estimated Contract Water Supply Project Costs

The following **Table No. 1A** provides a detailed breakdown of the estimated project costs for the Contract Water Supply Project.

Table 1A
Estimated Project Costs-Contract Water Supply Improvements

Work Item	Quantity/Units	Unit Cost	Extension Cost	
WELLFIELD INVESTIGATIONS				
Test Well Development	9 LS	$12,000	$108,000	
Subtotal				$108,000
WELLFIELD DEVELOPMENT				
Well Install, Testing and Development	4 LS	$65,000	$260,000	
Well Pump	4 EA	$12,000	$48,000	
Well House, Power	4 LS	$50,000	$200,000	
Piping and Connections	1 LS	$220,000	$220,000	
Sitework	1 LS	$80,000	$80,000	
Subtotal				$808,000
WATER TANK REHABILITATION				
Pressure Sustaining Valve & Vault	1 LS	$12,000	$12,000	
Int./Ext. Paint, Misc. Repairs	1 LS	$52,800	$52,800	
Cathodic Protection System	1 LS	$10,000	$10,000	
Subtotal				$74,800
EXISTING TREATMENT PLANT IMPROVEMENTS				
Control System	1 LS	$40,000	$40,000	
Iron Removal Aerator (increased cap.)	1 LS	$65,000	$65,000	
Subtotal				$105,000
TREATMENT PLANT EXPANSION				
Iron Removal Aerator (inc. above)			$0	
Direct Filtration Modifications (fr. Ph. II)	1 LS	$1,200	$1,200	
Post Chlorination System (fr. Ph. II)	1 LS	$25,000	$25,000	
Filter Cells (3 Additional)	1 LS	$300,000	$300,000	
High Service Pumps	3 EA	$12,000	$36,000	
Clearwell	1 LS	$80,000	$80,000	
Filter Building and Piping	1 LS	$140,000	$140,000	
Subtotal				$582,200
TOTAL ESTIMATED CONSTRUCTION COSTS				**$1,678,000**

Table 1A
Estimated Project Costs-Contract Water Supply Improvements (con't)

Service Item	Cost	
NON-CONSTRUCTION COSTS[1]		
Administrative		
Administrative	$3,500	
Labor Standards (DOC)	$5,000	
Environmental Review (DOC)	$2,000	
Grant Administration (DOC)	$20,000	
Legal Services	$7,000	
Financial Advisor (Rate Consultant)	$10,000	
Bond Counsel	$30,000	
Subtotal		$77,500
Basic Engineering Services		
Basic Design & Const. Administration		$150,000
Land/Easement Acquisition		
Appraisal	$5,000	
Description Preparation	$3,000	
Purchase	$45,000	
Subtotal		$53,000
Inspection Services		
Construction Inspection		$77,000
Other Technical Services		
Hydrogeological Investigations	$10,000	
WHPA Delineation, Potential Sources ID	$45,000	
Surf. Water Influence Pilot Study	$15,000	
Soils Borings (Water Line from Well)	$4,000	
Environmental Information Preparation (RD)	$5,000	
Subtotal		$79,000
Total Estimated Construction Costs		**$1,678,000**
Total Estimated Non-Construction Costs		**$436,500**
TOTAL ESTIMATED PROJECT COST		**$2,114,500**

(1) Line items where funding sources are indicated in parentheses are only required with the indicated funding source

a. Contract Water Supply Project Schedule

The following **Table No. 2A** presents the estimated project time schedule for the Contract Water Supply Project. This schedule is representative if all parties respond promptly when called upon to proceed with their tasks. However, following phases would follow a similar time schedule.

Table 2A
Milestones and Time Schedule-Contract Water Supply Project

Task	Estimated Date
Town Approves & Accepts Report	January, 1997
Rate Consultant Analysis Completed (Fin. Analysis based on Prelim. Project Costs)	February, 1997
RD Pre-Application Prepared & Submitted	March, 1997
RD Environmental Assessment Authorized	March, 1997
Conduct Public Hearing	March, 1997
Submit IDOC Grant Proposal	March, 1997
Submit RD Full Application	March, 1997
Conduct Second Public Hearing	April, 1997
Submit Full IDOC Grant Application	April, 1997
Receive RD Letter of Conditions	May, 1997
Receive IDOC Grant Award	May, 1997
Town Procures Professional Services	May, 1997
Town Hires Engineer, Administrator for DOC Portion	June, 1997
Town Approves Plans & Specifications	September, 1997
Town Submits Plans & Specifications to IDEM	September, 1997
Town Receives IDEM Construction Permit	November, 1997
Town Advertises for Bid	November, 1997
Town Conducts Pre-Bid Meeting	November, 1997
Town Opens Bids	December, 1997
Town Obtains Release of Funds from IDOC	December, 1997
RD Loan Closing	February, 1998
Town Conducts Pre-Construction Meeting	February, 1998
Town Issues Notice to Proceed	February, 1998
Construction Begins	February, 1998
Construction Complete	August, 1998
Grant Administratively Closed	September, 1998
RD Final Inspection	September, 1998

b. Additional Work Required During Contract Water Supply Project

In order to effectively proceed with the work needed to meet each utility's goals, it is imperative that both utilities develop a wholesale water supply agreement **prior to the application for financing** for the Contract Water Supply Project. This contract will be used as the basis for the financing and rate analyses for the work.

The Milltown Water Utility should also proceed as soon after the financing application as possible with the surface water influence pilot study to obtain the information needed for the design calculations and regulatory approval of the treatment plant.

c. Allocation of Costs

Milltown would be selling water to Marengo from the proposed plant expansion, and not from excess capacity in the existing plant. The wellfield investigations and development costs in the Milltown Phase I project, which are to bring the water supply to the current plant capacity, would not be allocable to a wholesale service to Marengo. Similarly, the water tank rehabilitation and treatment plant improvements work in Phase I would not be allocable to wholesale service to Marengo. This work comprises the whole of the Milltown Phase I Project. The remainder of the construction costs for the Contract Water Supply Improvements Project should be allocable in pro-rata proportion of the capacity for the Marengo wholesale water supply to the total capacity of the proposed plant expansion. Therefore, the costs allocable to Marengo's wholesale service should be the difference between the total estimated construction costs and the Milltown Phase I Project construction costs, divided by the proportion of the capacity of the plant expansion allocable to Marengo as follows:

Table 3A
Calculation of Marengo's Share of Contract Water Supply Project

Total Const. Cost for Additional Capacity			
Total Construction Cost	$1,678,000		
Less Milltown Phase I Const. Cost	$382,800		
Const. Cost for Additional Capacity			**$1,295,200**
Proportion of Construction Costs Allocable to Marengo			
Total Additional Plant Capacity	300 gpm	360,000 gpd	
Capacity Allocable to Marengo	270 gpm	324,000 gpd	
Proportion Allocable to Marengo			90.00%
Total Const. Costs Allocable to Marengo			**$1,166,000**
Proportion of Non-Construction Costs Allocable to Marengo			
Total Project Const. Costs	$1,678,000		
Project Const. Costs Allocable to Marengo	$1,166,000		
Proportion of Total Non-Construction Costs Allocable to Marengo			69.49%
Total Non-Construction Costs			$436,500
Total Non-Const. Costs Allocable to Marengo			**$303,300**
Total Project Costs Allocable to Marengo			**$1,469,300**

d. Contract Water Supply Project

The following **Table No. 3A** presents the estimated average monthly water rates for the Milltown Water Utility's retail customers and for the wholesale water supply to the Marengo Water Utility.

Table 4A
Estimated Annual Revenue Requirements and Monthly Rate Increases for Various Financing Alternatives-
Contract Water Supply Project

Est. Increases in Annual Revenue Requirements and Water Billings	Option I RD Loan	Option II DOC Grant/ RD Loan	Option III RD Grant/ Loan	Option IV DOC Grant/ Local Loan	Option V DOC Grant RD Grant/ Loan
Projected O & M Expense	$137,000	$137,000	$137,000	$137,000	$137,000
Annual Principal & Interest Payments (Existing)	$20,050	$20,050	$20,050	$20,050	$20,050
Annual Principal & Interest Payments (Proposed)	$113,942	$86,638	$74,062	$282,498	$57,308
Debt Service Reserve - Annual Funding (Proposed)	$11,394	$8,664	$7,406	25% ---	$5,731
Depreciation Reserve Funding (Proposed)	$5,257	$5,257	$5,257	$5,257	$5,257
Total Projected Annual Revenue Requirements	**$287,643**	**$257,609**	**$243,775**	**$444,805**	**$225,346**
Water Revenue at Existing Rates	$173,419	$173,419	$173,419	$173,419	$173,419
Other Operating Revenue	$17,161	$17,161	$17,161	$17,161	$17,161
Other Non-Operating Revenue	$986	$986	$986	$986	$986
Excess (Deficit)	**($96,077)**	**($66,043)**	**($52,209)**	**($253,239)**	**($33,780)**
Estimated Monthly Retail Water Billing Increase[1] Over 1996 Rates	**$4.25**	**$2.89**	**$2.26**	**$11.39**	**$1.42**
Estimated Wholesale Water Rate[2]	**$1.96**	**$1.37**	**$1.08**	**$5.16**	**$0.69**

[1] Average Per Equivalent Dwelling Unit
[2] Per 1,000 gallons

B. Example Regional Water District Improvements Project

The following **Table No. 4A** provides an estimate of the rates for the example Regional Water District Improvements Project.

Table 5A
Estimated Annual Revenue Requirements and Monthly Rate Increases for Various Financing Alternatives-
Example Regional Water District Improvements Project

	Option I	Option II	Option III	Option IV	Option V
Est. Increases in Annual Revenue Requirements and Water Billings	RD Loan	DOC Grant/RD Loan	RD Grant/ Loan	DOC Grant/ Local Loan	DOC Grant RD Grant/ Loan (35%)
Projected O & M Expense	$187,987	$187,987	$187,987	$187,987	$187,987
Annual Principal & Interest Payments (Existing)	$20,050	$20,050	$20,050	$20,050	$20,050
Annual Principal & Interest Payments (Proposed)	$140,974	$86,365	$42,292	$281,607	$56,137
Debt Service Reserve - Annual Funding (Proposed)	$14,097	$8,636	$4,229	---	$5,614
Depreciation Reserve Funding (Proposed)	$10,703	$10,703	$10,703	$10,703	$10,703
Total Projected Annual Revenue Requirements	**$373,811**	**$313,741**	**$265,261**	**$500,347**	**$280,491**
Water Revenue at Existing Rates	$212,250	$212,250	$212,250	$212,250	$212,250
Other Operating Revenue	$19,161	$19,161	$19,161	$19,161	$19,161
Other Non-Operating Revenue	$1,940	$1,940	$1,940	$1,940	$1,940
Excess (Deficit)	**($140,460)**	**($80,390)**	**($31,910)**	**($266,996)**	**($47,140)**
Estimated Monthly Retail Water Billing Increase Over 1996 Rate	**$11.48**	**$6.57**	**$2.61**	**$21.81**	**$3.85**

(1) Average Per Equivalent Dwelling Unit

C. Lumped Projects Options

The lumping of the Milltown Phase I Project and the Milltown Phase II Project may offer some benefits to the utility. Likewise, the lumping of the Marengo Phase I Project and the Marengo Phase II Project may offer some benefits to the Marengo Water Utility. The following Tables 5A and 6A provide an analysis of the effects on the rates of these two alternatives.

Table 6A
Estimated Annual Revenue Requirements and Monthly Rate Increases for Various Financing Alternatives-
Milltown Lumped Phase I and II Project

Est. Increases in Annual Revenue Requirements and Water Billings	Option I RD Loan	Option II DOC Grant/RD Loan	Option III RD Grant/ Loan	Option IV DOC Grant/ Local Loan	Option V DOC Grant RD Grant/ Loan
Projected O & M Expense	$100,373	$100,373	$100,373	$100,373	$100,373
Annual Principal & Interest Payments (Existing)	$20,050	$20,050	$20,050	$20,050	$20,050
Annual Principal & Interest Payments (Proposed)	$60,303	$32,998	$39,197	$107,597	$21,449
Debt Service Reserve - Annual Funding (Proposed)	$6,030	$3,300	$3,920	---	$2,145
Depreciation Reserve Funding (Proposed)	$5,379	$5,379	$5,379	$5,379	$5,379
Total Projected Annual Revenue Requirements	**$192,135**	**$162,100**	**$168,919**	**$233,399**	**$149,396**
Water Revenue at Existing Rates	$91,472	$91,472	$91,472	$91,472	$91,472
Other Operating Revenue	$17,161	$17,161	$17,161	$17,161	$17,161
Other Non-Operating Revenue	$986	$986	$986	$986	$986
Excess (Deficit)	($82,516)	($52,481)	($59,300)	($123,780)	($39,775)
Estimated Monthly Retail Water Billing Increase[1] Over 1996 Rates	**$15.64**	**$9.95**	**$11.24**	**$23.46**	**$7.54**

[1] Average Per Equivalent Dwelling Unit

Table 7A
Estimated Annual Revenue Requirements and Monthly Rate Increases for Various Financing Alternatives-
Marengo Lumped Phase I and II Project

Est. Increases in Annual Revenue Requirements and Water Billings	Option I RD Loan	Option II DOC Grant/RD Loan	Option III RD Grant/ Loan	Option IV DOC Grant/ Local Loan	Option V DOC Grant RD Grant/ Loan
Projected O & M Expense	$90,868	$90,868	$90,868	$90,868	$90,868
Annual Principal & Interest Payments (Proposed)	$88,194	$60,889	$57,326	$198,541	$39,578
Debt Service Reserve - Annual Funding (Proposed)	$8,819	$6,089	$5,733	---	$3,958
Depreciation Reserve Funding (Proposed)	$5,599	$5,599	$5,599	$5,599	$5,599
Total Projected Annual Revenue Requirements	**$193,480**	**$163,445**	**$159,526**	**$295,008**	**$140,000**
Water Revenue at Existing Rates	$108,648	$108,648	$108,648	$108,648	$108,643
Other Operating Revenue	$2,000	$2,000	$2,000	$2,000	$2,000
Excess (Deficit)	($82,832)	($52,797)	($48,878)	($184,360)	($29,355)
Estimated Monthly Retail Water Billing Increase[1] Over 1996 Rates	$13.10	$8.35	$7.73	$29.15	$4.64

[1] Average Per Equivalent Dwelling Unit

SECTION I - EXECUTIVE SUMMARY

This Master Planning Report ("Report") presents the results of an engineering investigation of the two interconnected waterworks facilities separately owned and operated, one by the Town of Milltown and the other by the Town of Marengo. This Report, in essence, includes three separate utility development options: (1) the Milltown Water Utility as a separate utility, (2) the Marengo Water Utility as a separate utility, and (3) a Regional Water Utility where the Milltown and Marengo Water Utilities join in a regional water system. Since the possibility exists that a riverboat will be located in the county, investigations and recommendations are included in each utility development option for both situations-with and without the riverboat.

A. Milltown Water Utility

1. Existing System

The existing well's capacities are marginally adequate to provide the Town's existing customers with water, and less than the treatment plant capacity. Clearly, the Milltown Water Utility must increase its water supplies to serve its current customers and to maximize the use of the treatment plant.

The possibility of surface water influence on the groundwater pumped from the wells remains a major area of concern. If it is determined that the groundwater is under the influence of surface water, a pilot plant study (small-scale treatability study) will need to be conducted to confirm the treatability of the surface water particles, and to determine the effective rate at which the treatment plant can be operated. The utility will then need to modify the facility into a direct filtration plant, and operate the plant at a rate that does not exceed the effective treatment rate.

Other minor improvements recommended for the wells and treatment plant include:

- Standby power connections for the wells and treatment plant,
- Water treatment control system improvements,
- An alarm dialer at the treatment plant for emergency notification,
- Iron removal capability for the treatment plant,

- Post-chlorination (after treatment chlorination) at the treatment plant, and
- Chlorinator room heating.

During the computer modelling of the Milltown Water Utility's existing water system, the one major weakness that was identified was the lack of fire flow capability within the Town. The Town must decide whether the costs to strengthen the distribution system within the community to provide increased fire flow capabilities is worth the benefits received, and the reduced insurance rates that may be obtained for the residents. More detail on this issue is provided in **Section V.D.**

The distribution system capacity on either side of the north river crossing was also identified as a weakness, as was an older portion of the water system constructed on in the 1930's.

The storage capacity available in the existing water tank is inadequate to meet the peak demands of the utility's customers while maintaining the necessary 35 psi minimum pressure. In order to resolve this situation, the usable capacity in the storage tank should be increased by providing individual or main-line pressure boosting systems to customers at higher elevations.

A tank inspection was performed on water tank. The existing tank requires various rehabilitation and improvement work.

Recommended phasing of projects based on the utility's priorities is included in **Section X** to improve the existing system for current customers and to prepare the system for the proposed growth into the Planning Area. The project information in **Section X** also includes detailed cost estimates and project schedules. Preliminary analyses of the effects of the projects on the utility's rates are provided in **Section XIII**. The projects are briefly described in the following **Table No. 1**.

Table 1
Phased Project Summary-Milltown Water Utility

Phase	Description	Project Cost	Least Projected Rate Effect[1]
Phase I	New Well, Water Tank Rehabilitation, Iron Removal Aerator, Control System Improvements	$580,800	$3.47/mo.
Phase II	Misc. Treatment Plant Improvements (inc. Direct Filtration for Surface Water Influence), Distribution System Improvements, Pressure Improvements, Abandonment/Replacement of Aging Lines	$523,460	($1.11/mo.)
Phase III	New West Water Tank & Transmission Main	$534,300	($1.48/mo.)

(1) Based on a detailed analysis of financing alternatives, see Section XIII for a description of financing scenarios analyzed and estimated rate effects of each scenario

Major decisions need to be made by the utility before the completion of each phased project in order to effectively meet the utility's goals. A number of decisions need to be made during the Phase I Project. These decisions should lead to the final determination as to the water supply source(s) that will be used during the Planning Period, and the structure of the utility that will be used in the expansion of the service area. A detailed discussion of these matters is included in **Section X.B.1.e**.

Prior to the end of the Phase II Project, the utility should reach final conclusion to a number of major decisions, including (1) whether to proceed as a regional system with the Marengo Water Utility, (2) the structure of the entity that will be used to achieve the utility's goals, (3) the process that is going to be used to protect the utility's service area so that the utility's infrastructure investments can be reliably financed by future customers, and (4) determinations as to the sources of wholesale water purchase (if any) from other utilities.

2. Future Needs

The Milltown Water Utility intends to expand its service into a substantial portion of Whiskey Run Township, along with parts of Blue River Township and Spencer Township, all of which is currently unserved by a public water supply. Due to the variation in elevations, it is necessary to set out six service levels (each served by a tank at a different elevation and by a pump

station). Maps showing the area served by each service level are included in **Appendix L**. The details of each service level's water system needs, including the pump station, transmission main, storage tank and distribution system are included in **Section X.B.4**. Detailed cost estimates at current construction costs for these improvements are also provided in **Section X.B.4**. To estimate the costs for any project being considered, the construction costs in these tables should be multiplied by the typical construction inflation factors in **Table No. 84**.

Once the three detailed projects to meet the utility's existing needs are completed, a decision needs to be made as to the specific sequence with which the service levels are to be served. Once the decision has been made to extend service into a new service level, the utility should develop a project which includes the remaining portions of the transmission main in the Main Service Level needed to provide water to the booster station, the booster station for that service level, the transmission main from the booster station to the water tank, and the water tank. During and after the installation of the primary facilities for that service level, the distribution system needs to be constructed to the existing and future customers in that service level. The extent of the work that can be done on the distribution system in a particular service level depends on the financing available, the density of customers readily available to be served, any cost participation by developers or major commercial customers, and the work that is necessary extending service to or within other service levels. Considerations for determining which service level to extend service to, and recommendations on the process of service extension are included in **Section X.D**.

B. Marengo Water Utility

1. Existing System

The Marengo Water Utility is in a precarious position, lacking adequate water supply capacity, having only one well, and without an agreement with Milltown for backup water supply when needed. While the existing well is marginally adequate to serve the peak day demands of the utility's current customers, the utility is in critical need of additional water supplies, both for

its existing customers, as well as for new customers due to the anticipated growth from the quarry/warehouse.

The positive results of the recent bacteriological samples could be caused by a variety of problems. The samples could easily be contaminated during the sampling process or at the laboratory. The specific sampling locations could create difficulties in obtaining a representative sample. Or, there could be problems with the well itself or with the groundwater supply, or with some portion of the distribution system. Before action can be taken, the utility needs to track down the cause of this problem.

The utility should have a radio control system for the existing Springtown Well and any additional wells or water supplies that are acquired.

The concentration of sulfate in Marengo's water supply seems to vary substantially with time, but has been tested at concentrations much higher than the primary (health-related) maximum contaminant level set by the federal government. This is the primary cause of the taste and odor problems being experienced by the utility's customers. Iron concentrations are also adequately high to cause aesthetic concerns for the utility's customers. The utility should provide treatment for these chemicals (see the Phase II Project for details).

There are a number of dead-end mains in the utility's distribution system. Unfortunately, these dead-ends are generally along SR 66. Crossing the state highway, which would require a jacking and boring operation through the rock, would be exceedingly expensive, and the benefits would probably not be worth the cost.

The utility's water tank is reported to have a grease coating on the interior. The tank has not been inspected for at least 5 years, which is the maximum life that is normally expected for this type of coating system. The storage tank needs to be inspected and the recommendations from the inspection need to be implemented. Also, the water tank's available capacity is inadequate to meet the peak demands of the utility's current customers while maintaining the necessary 35 psi minimum pressure. The anticipated fire protection needs of the quarry/warehouse project and the new customers created by this industry add to the water storage problems. In

order to resolve this situation, the utility should both increase the usable capacity in the existing water storage tank by providing main-line pressure boosting systems to customers at higher elevations, and provide an additional storage tank on the hill under which the quarry/warehouse project is located. This tank should not be located above any excavations.

Recommended phasing of projects based on the utility's priorities to resolve major current problems with the system and to prepare the existing water system for the proposed growth created by the employment and fire protection needs of the quarry/warehouse is included in **Section X.C**. The project information in **Section X.C** also includes detailed cost estimates and project schedules. Preliminary analyses of the effects of the projects on the utility's rates in **Section XIII**. The following **Table No. 2** briefly describes each of these projects.

Table 2
Phased Project Summary-Marengo Water Utility

Phase	Description	Project Cost	Least Projected Rate Effect (1)
Phase I	New Well, Iron Removal System, Well Control System	$559,500	$0.00
Phase II	New Water Treatment Plant	$1,055,500	$0.75/mo.
Phase III	New Water Tank & Transmission Main, Ex. Water Tank Rehabilitation	$529,500	$0.24/mo.
Phase IV	New Well, Pressure Improvements, Control System Improvements	$647,860	$1.84/mo.

(1) Based on a detailed analysis of financing alternatives, see Section XIII for a description of financing scenarios analyzed and estimated rate effects of each scenario

The Phase II Project, and portions of the Phase IV project, can be omitted if a regional utility supplies water to the Marengo utility. If a regional utility can be created and developed rapidly to supply water to the Marengo Water Utility, all phases of work can be omitted except Phase III and portions of Phase IV.

Major decisions need to be made by the utility before the completion of each phased project in order to effectively meet the utility's goals. Before the end of the Phase I Project, the utility should finalize an understanding, and ultimately a written agreement if water is going to continue to be provided,

with the Town of Milltown about the quantity and conditions of the water supply that will be provided to the Marengo Water Utility. Prior to the end of Phase I, the Marengo Water Utility should reach final conclusion to a number of major decisions, including (1) whether the utility proceeds as a regional system with the Milltown Water Utility, or remains a municipal utility serving only the Town, (2) if joining with Milltown, the structure of the entity that will be used to achieve the regional utility's goals, whether a regional water district, a conservancy district, a municipal utility, or a not-for-profit utility, (3) the process that is going to be used to protect the regional utility's service area so that the utility's infrastructure investments can be reliably financed by future customers, and (4) determinations (and written agreements) as to the sources of wholesale water purchase (if any) from other utilities. The Milltown Water Utility also needs to resolve these issues, however, since Milltown already has a water treatment plant, their time frame to deal with these issues is not as tight as for the Marengo Water Utility.

Early in the Phase II Project, the Town needs to determine with the quarry/warehouse the final size of the water tank that is to be constructed during the Phase III Project.

2. Future System

Since the goals of the Marengo Water Utility are to serve the Town's existing and future customers without expansion beyond the Town's boundaries, the utility's needs are not as extensive as Milltown's. The Marengo Water Utility will require very little additional quantities of water during the Planning Period beyond the amount needed to meet it's customer's current demands (including the quarry/warehouse and new customers brought to town by the employment) if the riverboat is not sited in Crawford County. If the proposed riverboat is sited at Leavenworth, the water supply needs of the utility will increase to a greater extent. Additional water supplies may be required in the future in either case, depending on the quantity and quality of water obtained from the new wells.

C. Regional Water Utility

The Regional Water Utility Planning Area includes the extensive Milltown Planning Area, along with the Town of Marengo and an area of Liberty Township north of SR 64. The facilities needed for the Regional Water Utility mirror those of the Milltown and Marengo water utilities, with the minor addition of the Liberty Township area.

While the projects described above for Milltown and Marengo water utilities are being constructed, both utilities need to determine the long-term direction of each utility. The development of a Regional Water Utility joining both utilities is an option which should be explored. Both utilities should enter into conversations to determine the opportunities available with a Regional Water Utility, and, if considered viable, should jointly:

a. Determine the form of the regional entity, whether a regional water district, a conservancy district, a municipal utility or a not-for-profit corporation. The advantages and disadvantages of each of these entities are involved, and both utilities should obtain legal and financial advice, along with engineering expertise, to make the final choice in this matter.

b. Decide whether to sell or give the municipal utility to the regional entity, or maintain the existing system as a separate entity with a formal relationship with the regional entity,

c. Decide whether the regional entity will be a wholesale purchaser or seller of water to either or both utilities,

d. Determine how the regional entity's governing board will be comprised,

e. Decide as to the management and operation of the regional entity (through contract with one or both of the utilities), and conversely, should the regional entity operate and manage the existing utilities if they are to remain separate,

f. Identify the general method of financing for future improvements to the regional system (through connection fees, rates, etc.),

g. Determine whether the existing utilities can/should have different rates from the future customers if they join entirely with into the regional utility.

Without these decisions being settled, detailed water supply and treatment costs, and rate analyses cannot be developed. However, a sample cost analysis is provided in **Table No. 84** based on specific circumstances.

SECTION II - PURPOSE AND SCOPE

The purpose of the engineering analyses that have been conducted on the Milltown Water Utility and the Marengo Water Utility, and this Report outlining the findings of these analyses, is to identify the existing capacities, as well as the short-term and long-term needs of the utility. This work is also intended to be a guide for each utility in its long-term goals, and includes for each utility:

A. a description of the project planning area and the characteristics that both limit and promote the development of water utilities in the planning area;
B. a review of the historical populations within the service areas and the planning areas, and projections of the populations within the planning areas with and without the riverboat in Leavenworth;
C. projections of customers for both utilities with and without the riverboat sited in the county;
D. an analysis of the present system-wide and average customer water demands, and a projection of the probable future water needs in the planning area, including an evaluation of fire protection requirements (where fire protection is provided);
E. a review of the existing facilities, including current capacities of each facility and the results of a computerized hydraulic analysis of each utility's supply, storage and distribution systems;
F. a discussion of the needs of the utilities (both current and during the planning period), including current operational problems and a detailed review of the facilities needs during the planning period;
G. a detailed review of the reasonable alternatives that are available in satisfying the utility's needs;
H. a section on other planning considerations is provided;
I. a comprehensive program of improvements needed for the utilities to meet their customer's demands during the planning period, including project cost estimates and schedules for the improvements needed;
J. a review of each utility's current user rates;
K. a review of the various funding options available to each utility for these proposed improvements; and,
L. a detailed analysis of the effects of various funding alternatives on each utility's user rates at each project phase.

The Town of Milltown and the Town of Marengo each separately owns and operates an independent municipal water utility. However, these two water systems are physically

interconnected through a 6-inch transmission main, and the Marengo Water Utility occasionally purchases water from the Milltown Water Utility. This Report includes separate analyses of each water utility, independent of the other (excepting of course, the existing water supply interconnection). The analyses also include review of the effects of both water utilities joining together in a regional system serving both Towns as well as a region of northeast Crawford County not current served with a public water supply. When discussing these two utilities jointly, they will be referred to as the Regional Water System. When reviewing information related solely to one water utility, that utility is specifically identified by name.

This Report has been prepared according to FmHA's Preliminary Engineering Report Guidelines for Water Facilities 1942-A, Guide 7, dated July 8, 1992. Supplemental information for future master planning considerations has also been provided.

SECTION III - PROJECT PLANNING AREA CHARACTERISTICS

In this Section, the planning area and planning period are defined, and background information and current characteristics of the planning area are reviewed. This information is of importance in the both the engineering analyses and the decision-making process, since many of the factors related to the utility's existing condition and the plans for the future are based on the historical circumstances surrounding the utility and the characteristics of the project area. Definition of the planning area and planning period are important in identifying the future areas to be served by the utility, and determination of the time period that is used for planning is one factor in defining the facilities sizing necessary to prepare the utility for future customer demands.

A. Planning Period

One of the first considerations in master planning for the Milltown Water Utility and the Marengo Water Utility is to identify a reasonable planning period. The master planning period should be of adequate time that the utility can complete work with the knowledge that additional work will not be required in the near future, yet not so lengthy that the facilities are oversized. An additional consideration in identifying an appropriate planning period is for financing. Many municipal financing sources are hesitant to finance a project that will not be adequate in capacity to serve the municipality's needs for the term of the financing. For example, certain financing sources would probably not consider favorably a project that would require 20-year financing, but that would only be adequate for 10-years (after which more financing would be needed even while the original financing was still being paid).

Based on the location and projected growth rates of Milltown and Marengo, and the Liberty, Whiskey Run and Blue River Townships, along with the financing mechanisms available to the towns, a 20-year planning period ("Planning Period") was determined to be the most appropriate timespan for the utilities' planning efforts.

B. Planning Area Location and Background Information

1. General Location

Crawford County is located in the extreme south-central boundary of Indiana. It contains 199,680 acres, or 312 square miles of land. The Ohio

River borders the county on the south; Perry County borders the county to the southwest; Harrison County provides the eastern border; Washington and Orange Counties border Crawford to the north, and Jasper County provides the western border. The General State-Wide Location Map provided in **Figure No. 1** on page 21 shows the general location of these utilities in relation to the state and county.

2. Current Service Areas and Planning Areas

a. Current Service Areas

Both the Milltown Water Utility and the Marengo Water Utility serve all water customers within their respective corporate limits. Both utilities also serve a small number of customers near their communities, but outside of their corporate limits. Additionally, the Marengo Water Utility provides service to a number of residential and small commercial customers located along SR 64 between the two towns. The Milltown Water Utility's service area covers an area of approximately 1.2 square miles, while the Marengo Water Utility's service area includes about 1.0 square miles. **Figure No. 2** shows the current service areas that each of the water utilities serve, including the corporate limits of each of the towns and the development along SR 64/66 between the towns.

b. Planning Area

Three different Planning Areas have been defined for the analyses conducted for the utilities. The first Planning Area is for the Milltown Water Utility, as a separate entity. The second Planning Area is for the Marengo Water Utility, also as a separate entity. While the third Planning Area is for the joint development of a water system in the region by both utilities.

(1) Milltown Planning Area

Since the Milltown Water Utility plans to actively pursue new customers and additional service area, the Milltown Planning Area includes not only the current Milltown Water Utility

service area, but also about 90% of Whiskey Run Township, 25% of Blue River Township (Harrison County), and 20% of Spencer Township (Harrison County) by land area.

(2) Marengo Planning Area

The Marengo Water Utility anticipates substantial growth in its customer base over the next few years due to a new quarry/warehouse operation. The growth in the utility's customer base, however, is anticipated to occur within the existing corporate limits, as well as directly adjacent to the town in areas that have yet to be developed and annexed. The Town and the Marengo Water Utility do not anticipate actively pursuing new customers outside of the current and future corporate limits.

(3) Regional Planning Area

A Planning Area has also been identified in the event the Milltown and the Marengo water utilities join in a regional water system. The Regional Planning Area includes the Milltown Planning Area, the Marengo Planning Area, and 30% of Liberty Township by area.

When discussing the various planning areas, the term Milltown Planning Area will refer to the planning area solely for the Milltown Water Utility, the term Marengo Planning Area will be used when discussing the planning area solely for the Marengo Water Utility, and the term Regional Planning Area will be used when discussing the results of analyses related to a joint Regional Water Utility. **Figure No. 2** shows not only each utility's current service area, but also the Planning Areas that each of the water utilities are projected to serve in both future scenarios (separate utilities, and joint regional utility).

3. Utility Governance and Management

Milltown and Marengo are two separate incorporated towns located along State Road 64 in northeastern Crawford County. The Milltown Water Utility is wholly owned and operated by the Town of Milltown, and is overseen by the Milltown Town Council. Similarly, the Marengo Water Utility is wholly owned and operated by the Town of Marengo, and is overseen by the Marengo Town Council. The Town Councils of each town are three-person boards consisting of a president and two members. The term for each board member is four years. Each utility has a superintendent who is responsible for the normal day-to-day operation and maintenance of the utility. The following **Table No. 3** shows the names of the current Town Council Members and Utility Superintendents of each utility.

Table 3
Town Councils and Superintendents of Both Utilities

Town of Milltown		Town of Marengo	
William Dubois	Council President	**John Pierson**	Council President
David Skinner	Council Member	**Michael Cox**	Council Member
Dennis Satterfield	Council Member	**Mark Holland**	Council Member
Monty Garrett	Superintendent	**Michael Cox**	Superintendent

4. Other Area Utilities

Other utilities serving the Planning Areas include electric service, natural gas service, telephone service, and cable TV. These utilities also serve each of the planning areas. The towns provide sewer service to those within their corporate boundaries. These other utilities are described in the following **Table No. 4**.

Table 4
Other Utilities In Planning Areas

Utility	Name and Address
Electric	PSI Electric 329 E. Chestnut St. Corydon, Indiana 47112
Natural Gas	Indiana Natural Gas W. Hospital Road Paoli, Indiana 47454
Telephone	GTE Capitol Avenue Corydon, Indiana 47112
Cable TV	Tele-Media Paoli, Indiana 47454

C. General Characteristics of the Planning Areas

1. General Planning Area Description

The Planning Areas have two primary regions in which development has occurred; the towns of Milltown and Marengo. Each of these towns has a core of public and commercial establishments in their downtown business district, including shops, restaurants, churches and businesses, with residences surrounding the business core. Marengo's business district is supplemented by business development along SR 64/66. Except for some incidental development adjacent to SR 64, the remainder of the Planning Areas are of an undeveloped rural nature, with scattered residences along the winding county and state roads.

2. Land Use

Land use within the Planning Area can be generally categorized as cultivated (farm land), developed or undeveloped. Land occupied by homes, businesses, roads and streets, utilities and cultivated areas is considered developed land. The majority of the land in the Marengo Planning Area is

developed. The majority of the land in the Milltown Planning Area and the Regional Planning Area is either cultivated or undeveloped.

3. Topography and Soils

The topography of Crawford County is influenced by the two major waterways of the county - the Ohio River and the Blue River. The Blue River runs through Milltown. All parts of the Planning Areas drain to the Blue River. The Planning Areas are characterized by strongly sloping ridges and steep hillsides. Low lying areas are occasionally flooded. The majority of the Planning Areas are comprised of soils of the Hagerstown-Crider association, which are located on gently sloping to steep ground, and characterized by deep, well-drained, and medium-textured soils, with more finely textured soils on uplands. Certain parts of the Marengo Planning Area and the Regional Planning Area, particularly west of Hogtown and west of Cider Fork, have soils of the Wellston-Gilpin-Zanesville-Berks association, with moderately deep and deep, well-drained medium-textured soils. The map included on **Figure No. 3** shows the general soils associations within Crawford County.

4. Elevations

The elevations within the Milltown Planning Area vary substantially, with peaks of over 880' msl (feet above sea level) at a number of locations, to the lowest point in the Planning Area at approximately 420' msl along the Blue River south of Milltown.

The highest point in the Marengo Planning Area is located to the northeast of Marengo at an elevation of 763' msl. The lowest point in the Marengo Planning Area is located near the Whiskey Run at an elevation of less than 560' msl (the lowest area served is 573' msl). There are a number of peaks near the Marengo Planning Area in excess of 800' msl, the highest at an elevation of over 850' msl.

Within the Regional Planning Area, the elevations also include the high peaks to the northwest of Marengo at elevations to 950' msl, as well as elevations as high as 880' msl closer to Milltown, and the low elevations near the Blue River south of Milltown at approximately 420' msl.

5. Main Thoroughfares

The main thoroughfares through the Planning Areas are State Road 64 (SR 64) and State Road 66 (SR 66). SR 64 runs in an east-west direction through the Planning Areas, and SR 66 runs south from Marengo, and north from Milltown (these two highways run concurrently between the two towns). The Southern Railroad also runs in an east-west direction through the Planning Areas to the south of SR 64.

6. Area Economy

Crawford County is one of the smallest counties in Indiana, with an estimated population, population density and labor force size among the lowest in the state. The county is also the poorest in the state, with the lowest per capita income of just under $13,000 per year. The county economy is primarily driven by logging, milling and woodworking (farm) efforts, along with retail and government services. Some mining work is also done in the area. **Table No. 5** below details some of the economic information on Crawford County.

Table 5
Crawford County Economy[1]

Employment and Earnings by Industry	Number of Jobs in 1993	Percent of All Jobs	State Ranking in # of Jobs	Average Earnings Per Job
Farm	480	16%	82	$400
Non-Farm				
Manufacturing	176	6%	90	$18,972
Retail	572	19%	87	$11,212
Services	N/A	N/A	N/A	N/A
Construction	259	8%	81	$9,093
Trans, Public Utilities	111	4%	88	$20,369
Finance, Ins., Real Est.	186	6%	84	$12,774
Government	495	16%	88	$20,741
Other Non-Farm	789	26%		
Non-Farm Total	2,588	84%	89	$14,179
Total	**3,068**	**100%**	**89**	**$12,023**

[1] From Indiana Business Research Center - Status of Indiana Families Profile 1996 - Crawford County

More detailed information about Crawford County and the county economy is included in **Appendix A**.

The median incomes of those persons living within the various places (census areas) included in the Planning Areas are outlined in **Table No. 6**.

Table 6
Planning Area Places Median Incomes

Place	Per Capita Income [1]	Median Household Income [1]	Percent with Low-Moderate Income
Town of Milltown	7,528	14,022	64.20%[2]
Town of Marengo	9,208	17,813	65.25%[3]
Liberty Township	9,473	21,510	46.89%[2]
Whiskey Run Township	8,668	22,407	44.99%[2]
Blue River Township (Harrison Co.)	9,681	21,959	45.51%[2]

[1] From 1990 Income Measures for RDA: 1990-Indiana
[2] From 1990 Census Low-Mod Data by County, Minor Civil Division and Place
[3] From CFF Income Survey, November, 1995 by Vincennes University

Refer to **Appendix A** for more detailed information the results of the CFF Income Survey of the Town of Marengo.

7. Other Area Utilities

There are a number of other water utilities located in the region around each of the Planning Areas, but no water utilities are currently providing water service within any of the Planning Areas.

a. Crawford County Water Company, Inc.

Crawford County Water Company purchases water on a wholesale basis from the Town of Leavenworth. Leavenworth has two wells located adjacent to the Ohio River, each with a capacity of 300 gpm. The Crawford County Water Company has a 4-inch main extending along SR 66 to south of Marengo. This water main lies along the western boundary of the Milltown Planning Area and the Regional Planning Area, as well as adjacent to the Marengo Planning Area. The utility has a 150,000 gallon water tank on Pilot Knob, and two 2 1/2-inch water lines extending for a distance along Old Mill Road, Pilot Knob Pike and Speed Road.

b. Ramsey Water Company

The service area of the Ramsey Water Company borders the Milltown Planning Area on the east. Ramsey Water Company has 5 wells near Leavenworth to provide water supply. A 150,000 gallon water tank is located in Frenchtown, and a 2 1/2" water line extends along Frenchtown Road to where the Milltown Water Utility's Frenchtown Road water line ends. Ramsey Water also has small (2-inch to 3-inch) water lines extending to west and south of Little St. Louis, water lines serving DePauw, and a water line north of SR 66 along Fredricksburg Road to near Mt. Zion Hill and along Orchard Ridge.

Ramsey Water Company provides wholesale service, or has interconnections with a number of municipalities in the area, including Georgetown and Corydon.

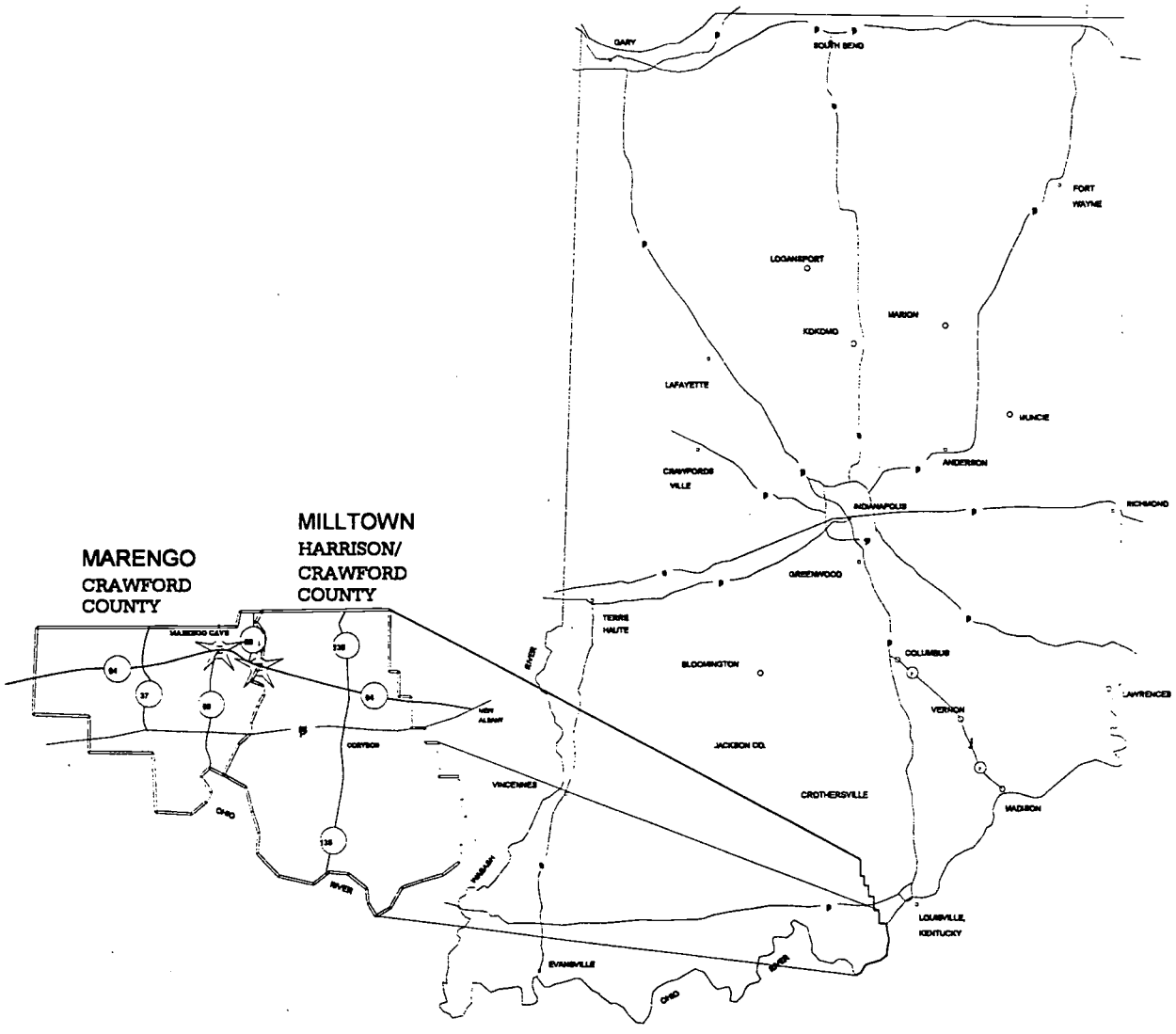
c. Patoka Lake Regional Water District

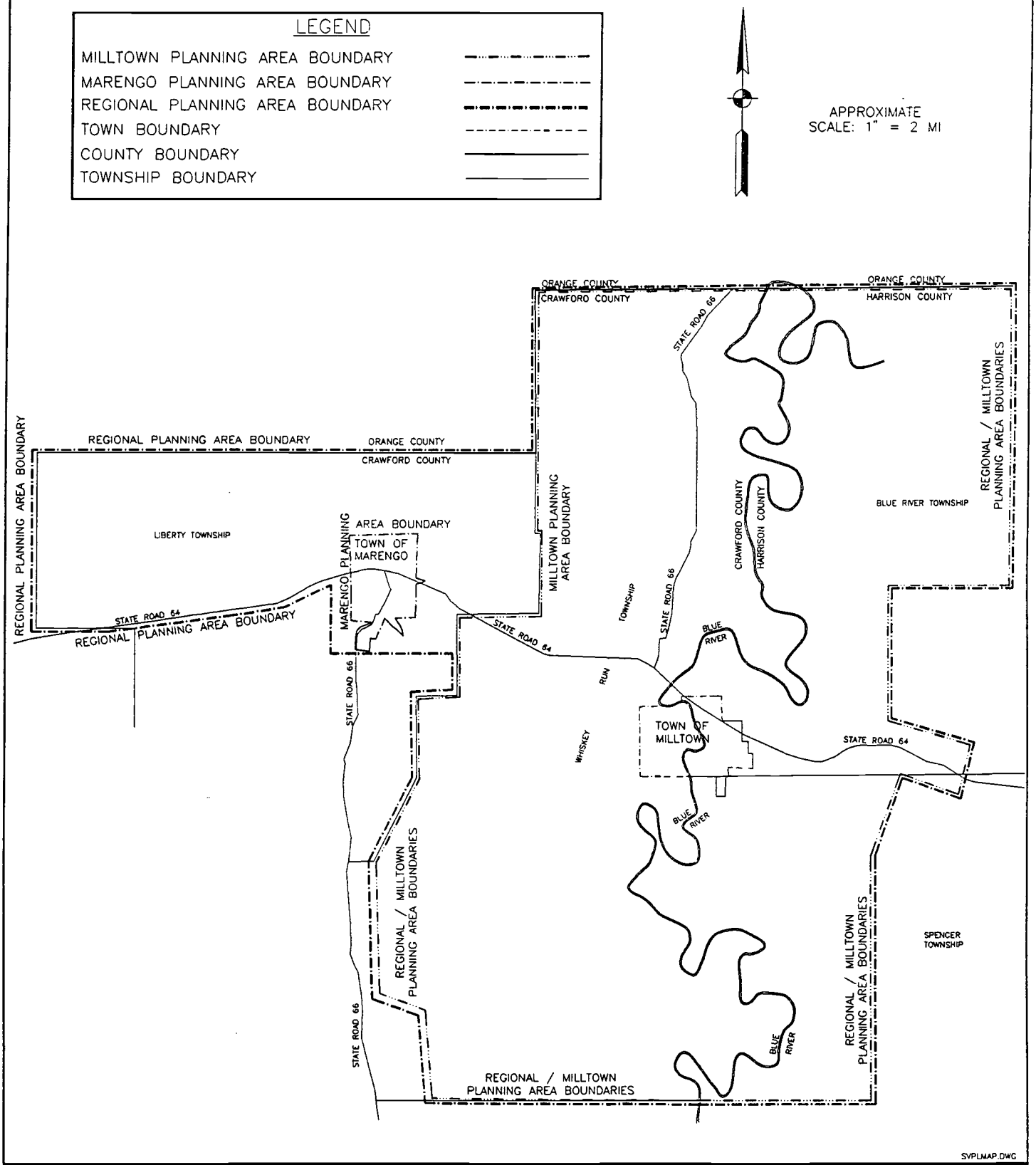
Patoka Lake Regional Water District obtain's its water supply from the Patoka Lake in the far northwest side of the county. The utility's water system has a 12-inch main on the west side of SR 37 which is located within about 4 miles of Marengo, and about 7 miles from Milltown. Patoka Lake RWD provides wholesale water supply service to a number of communities, the nearest of which is English, and has two water tanks located in the Town of English.

d. Posey Township Water Company

The Posey Township Water Company serves the area of Orange County north of the Milltown Planning Area. The water company obtains its water supplies from a number of small wells near Poseyville and from Patoka Lake RWD. The water lines near the Milltown Planning Area are very small, and have been recently installed by the utility.

Figure 1
General State-Wide Location Map





SVPLMAP.DWG

COMMONWEALTH ENGINEERS, INC.

TOWN OF MILLTOWN AND
TOWN OF MARENGO

WATER UTILITY STUDY

CURRENT SERVICE AREA AND
PLANNING AREA MAP

D. Environmental Concerns

1. Endangered Species

The issue of habitat preservation for rare and endangered species has become a critical concern over the past several years. The Blue River is the only designated wild and scenic river in Indiana, and a number of species of concern are known to reside in the area.

The Indiana Department of Natural Resources, Division of Nature Preserves was contacted to obtain a list of rare and endangered species in Crawford County. A large number of endangered or rare species have been spotted and are known to exist in the region of the Planning Area, including the Indiana Bat and the Bald Eagle. A detailed report of the various rare and endangered species in the area is included in **Appendix B** of this Report. The rare and endangered plants and animals would most likely be undisturbed by construction due to the location of their isolated living environment, except at river crossings or in the event a cave is encountered.

2. Archaeological/Historic Sites

According to Indiana Department of Natural Resources' (DNR) Division of Archaeology and Historic Preservation, Crawford County currently has a substantial number of documented archaeological/historical sites. However, reconnaissances have not been conducted by a qualified archaeologist on the great majority of the county, so additional sites are likely to exist.

Construction work would occur primarily on sites that have been previously disturbed, such as the existing plant site and permanent easements directly next to existing roadways. Therefore, habitat disruption would be minimal and archaeological investigations are only anticipated in previously undisturbed sites.

3. Wetlands

The National Wetlands Inventory Maps of the Planning Area were reviewed to identify wetlands that might affect any project that the utility might require. There are numerous riverine wetlands located along many of the creeks in

the Planning Area. There are also many palustrine wetlands scattered throughout the Planning Area. These wetlands are too numerous to describe in detail. However, they will need to be considered in the design of any project the utilities might consider. A copy of the wetlands inventory maps for the Planning Areas is included in **Appendix C**.

E. Hydrology and Groundwater Resources

In general, much of the northern and west-central portions of Indiana have an abundant supply of groundwater. However, the southern portion of Indiana does not have such readily available sources of groundwater. The majority of the southern portion of the state must obtain water through rural water distribution systems. The water supplied to these distribution systems is usually obtained from ground water wells drilled next to the Ohio River, or from one of the unusual aquifers that is capable of producing enough water for municipal purposes. The general state-wide availability of groundwater can be seen in **Figure No. 4**.

1. Hydrogeological Characteristics

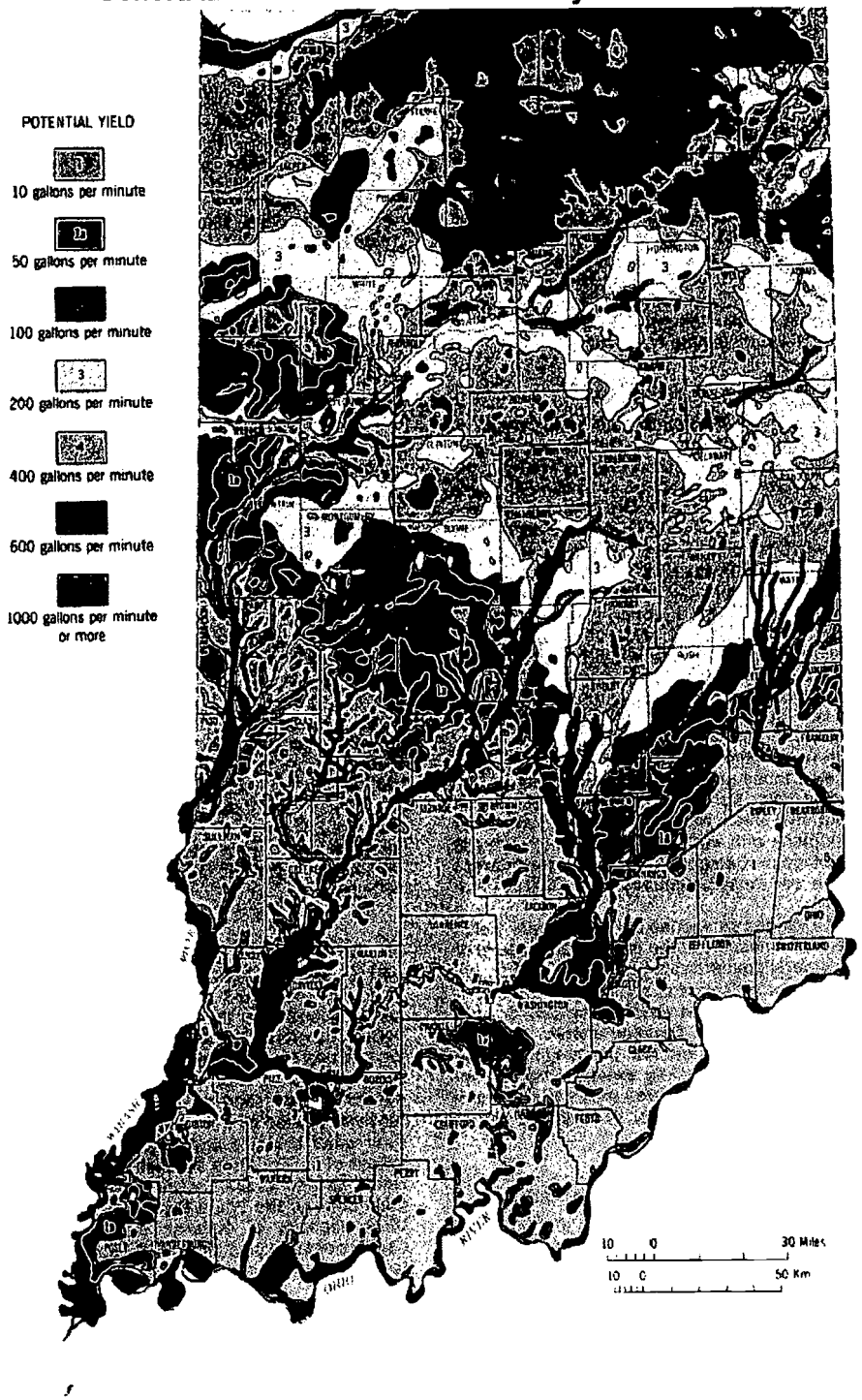
Most of Crawford County was not glaciated during the Wisconsinan Period, and so the topography, hydrogeology and groundwater availability are all dominated by the bedrock located just under a thin layer of unconsolidated material. The portion of the Milltown Planning Area to the west of the Blue River, all of the Marengo Planning Area, and the portion of the Regional Planning Area to the west of the Blue River lies within the Crawford Upland geological area, which is characterized by a considerable increase in altitude and a great diversity of relief and landforms. The relief is due to differential erosion of alternating beds of sandstone, shale and limestone. The bedrock throughout this part of the Planning Areas is comprised of limestone and dolostone, with the bedrock immediately below hills possibly containing an interbedded complex of sandstone, shale and limestone. To the east of the Blue River, the geology is dominated by the Mitchell Plain, which is formed on the slope of a thick sequence of limestones. This area has low relief and is marked by sinkholes and other solution features. Much of the drainage is underground, and streams generally traverse the surface for only a short distance before disappearing into sinkholes. The bedrock in the Mitchell Plain is similar in nature to the limestone and dolostone found at lower elevations below the Crawford Upland. Except in confined locations, the

limestone and dolostone in both the Crawford Upland and the Mitchell Plain do not historically produce adequate water for municipal purposes.

2. Registered Significant Water Withdrawal Facilities

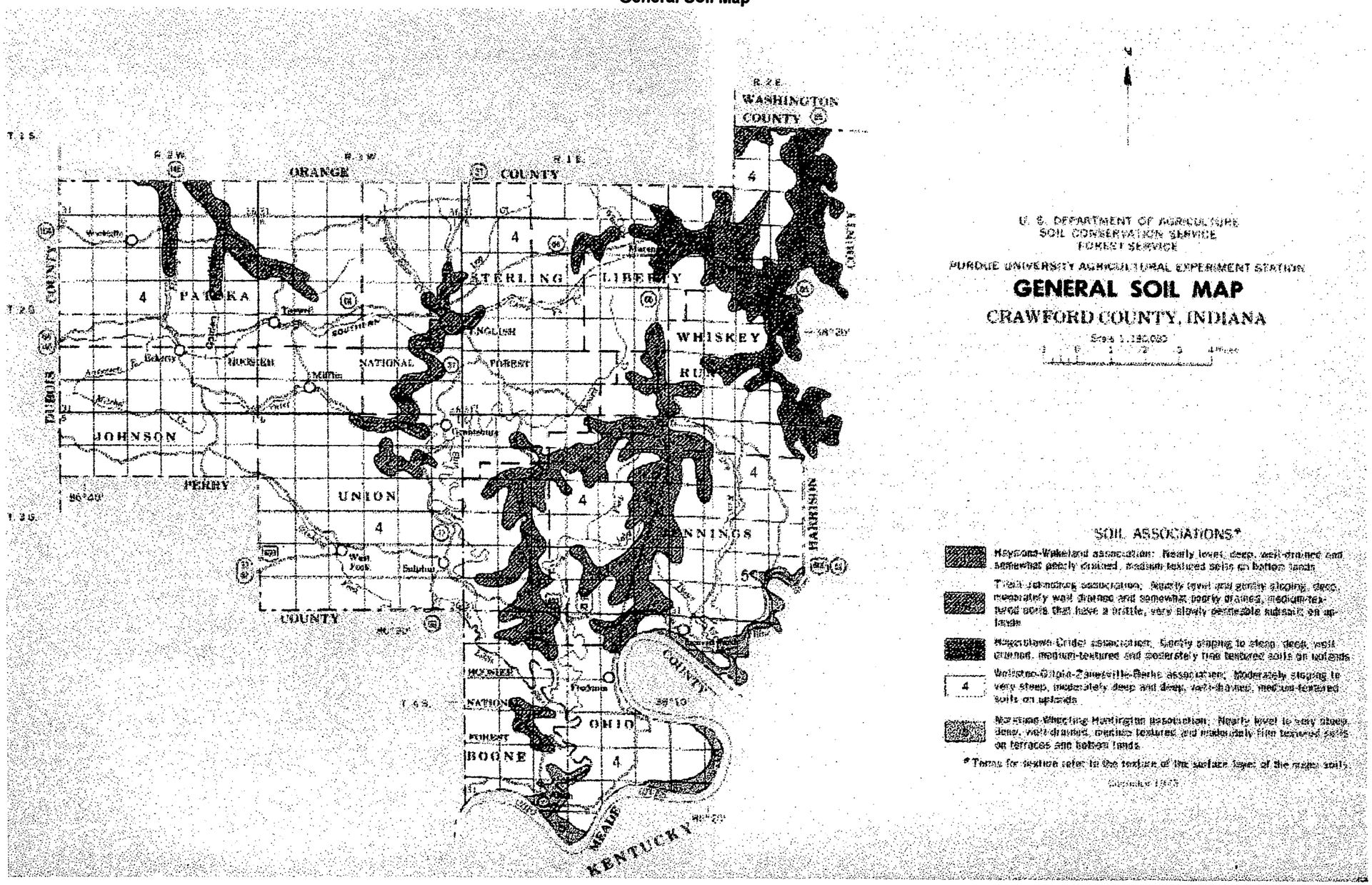
Indiana requires that any well with a capacity of greater than 70 gallons per minute (100,000 gallons per day) be registered as a significant water withdrawal facility. A review of the Indiana Department of Natural Resources' registered wells files showed only the presence of Milltown's wells in or near the planning areas. There were no records identified in the registered wells files for Marengo's Spring Town Well. It is recommended that the Town have this well registered.

Figure 4
Generalized Groundwater Availability In Indiana [1]



(1) Map courtesy of the Governor's Water Resource Study Commission as prepared by the Indiana Department of Natural Resources, Division of Water

Figure 3
General Soil Map



SECTION IV - HISTORICAL AND PROJECTED POPULATION

A review of the historical population served by each utility provides a basis for the detailed analysis of customer demands that is provided in the next section. This historical perspective also tends to act as a test of the reasonableness of population projections. If the population projections indicate, without reason, a substantially different growth rate than has been seen historically, then a reason must be set forth for this change in conditions.

The projection of population into the future is an important factor in the planning process, since the water demands that the utility will need to provide in the future are hinged on the population served, and governs the capacities that the utility will require.

A. Historical Population

1. Historical Population in Each Service Area

The historical population of the Milltown Water Utility's current service area and the Marengo Water Utility's current service area were determined based on U.S. Census decennial population counts for each of the towns from 1970 through 1990. The U.S. Census' population estimates were used to estimate the population of each of the utility service areas for the years 1991 through 1994. The population served by out-of-town connections was estimated for each utility by multiplying the number of out-of-town customers by the average number of persons per connection of the in-town utility customers.

The large majority of the Milltown Water Utility's customers are within the town's corporate limits. However, there are about 26 customers that lie outside of the corporate limits. Milltown's average persons/connection ratio is 2.7 persons per connection (assuming 8% business connections). This average number of persons per connection has been extended to the utility's customers outside of the corporate limits, having the effect of adding to the current Milltown Water Utility service area a total of 70 persons more than the town's U.S. Census values. The historical number of out-of-town persons in the utility's service area has been adjusted in direct proportion to changes in the Town's past population (based on the U.S. Census values).

Similarly, most of the Marengo Water Utility's customers lie within the corporate limits. There are 2 customers that are outside of the town's limits. The population represented by these customers has been added to the town's census values (with an average of 2.4 persons per connection), and pro-rated for the past Marengo service area population.

Table 7
Historical Populations In The Service Areas

Year	Milltown Service Area		Marengo Service Area	
	Population (Persons)	Change (Annual %)	Population (Persons)	Change (Annual %)
1970	890	-----	772	-----
1980	1,080	2.14%	897	1.62%
1990	985	-0.87%	860	-0.41%
1991	992	0.65%	852	-0.93%
1992	967	-2.49%	856	0.47%
1993	1,007	4.11%	850	-0.70%
1994	1,024	1.71%	854	0.47%

2. Historical Populations in Each Planning Area

Since the Marengo Planning Area coincides with the water utility's service area, the Marengo Planning Area historical population is the same as the historical population of the Marengo Water Utility's service area. However, the Milltown Planning Area extends to areas beyond the utility's current and historical service area. In order to determine the historical populations within the Milltown Planning Area and the Regional Planning Area, the historical population of the rural areas need to be determined. To determine the rural population for each census year, the population in the incorporated areas within each of the townships was subtracted from the township population. The proportion of the township (by area) within the planning area was then multiplied by the historical rural township population to estimate the rural township population within the planning area. The historical rural populations within the planning areas determined in this manner were then added to the historical populations in the towns to identify the total historical planning area population.

Table 8
Historical Population In The Planning Areas

Year	Milltown Planning Area		Marengo Planning Area		Regional Planning Area	
	Population (Persons)	Change (Annual %)	Population (Persons)	Change (Annual %)	Population (Persons)	Change (Annual %)
1990	2,799	-----	860	-----	4,295	-----
1991	2,800	0.04%	852	-0.93%	4,296	0.00%
1992	2,817	0.61%	856	0.47%	4,311	0.36%
1993	2,903	3.05%	850	-0.70%	4,379	1.58%
1994	3,000	3.32%	854	0.47%	4,517	3.15%

B. Projected Population In The Planning Areas

The projection of each of the Planning Areas' future populations is important to the planning and design of any improvements to the water utilities. (The water demands by the utility's customers are usually directly proportional to the projected population, unless a major industry or other water user unplanned at this time connects to the system).

There is a possibility that Crawford County may acquire the last State permit for a riverboat gambling operation. This project represents a major economic impact in Crawford County that is not addressed in the population projections used by the population projection sources used in this Report for the non-riverboat analyses. This riverboat operation, if obtained, would be located in Leavenworth on the Ohio River.

The proximity of the Planning Areas to this potential project necessitates considering two growth scenarios for each Planning Area. The first growth scenario is without the riverboat gambling operation. The second growth scenario includes a higher growth rate with the acquisition of the riverboat gambling operation by the county.

1. Projected Population in Each Planning Area Without Riverboat Gambling

The Indiana University's Business Research Center (IBRC) county population projections were used to project the population changes if there

were no riverboat gambling. The IBRC uses formulas based on birthrates, deathrates, and the influx and efflux of people to project future population changes, and projects average annual population changes of 0.4% from 1995 to 2000, 0.39% for the years between 2000 and 2005, 0.38% in the years from 2005 to 2010, 0.19% for the years after 2010 through the end of the Planning Period.

The IBRC's population projections are not based on the location of a major new industry within a community. However, a new quarry/warehouse operation has been located in the Town of Marengo that is anticipated to have a substantial effect on the population of the Town and of the Marengo Planning Area. The Town anticipates substantial additional employment over the next few years from this warehouse, which would add between 500 and 800 persons to the area's population. It is estimated by the Town that 70% of the quarry/warehouse employees would reside within the Town and be served by the Marengo Water Utility. For this reason, the Town has indicated an additional 455 persons should be added to the population projections for the Marengo Planning Area and the Regional Planning Area (70% of 650 total persons).

The following **Table No. 9** shows the projected population in each of the Planning Areas during the Planning Period in the event the riverboat gambling site is not located in Crawford County.

Table 9
Projected Population in Each Planning Area Without Riverboat Gambling

Year	Change (Annual %)	Planning Area Population (Persons) Milltown	Marengo[1]	Regional[1]
1998	0.40%	3,048	1,095	4,450
2000	0.40%	3,072	1,330	4,711
2002	0.39%	3,096	1,336	4,744
2004	0.39%	3,121	1,343	4,778
2006	0.39%	3,145	1,350	4,811
2008	0.38%	3,169	1,357	4,845
2010	0.38%	3,193	1,364	4,878
2012	0.19%	3,205	1,367	4,895
2014	0.19%	3,217	1,371	4,912
2016	0.19%	3,229	1,374	4,929

(1) Includes 228 additional persons in 1998 and 455 persons for the years 2000 and after to include the Marengo quarry/warehouse project.

2. Projected Population in Each Planning Area with Riverboat Gambling

The possibility of riverboat gambling in Leavenworth represents a major potential economic factor in the county which will effect the population growth in the Planning Areas. The final riverboat permit will be provided to either Crawford County or Switzerland County, and the decision will not be made by the Indiana Gaming Commission until after the date of this report. For this reason, two projected population scenarios needed to be developed.

The projected population growth rates in the Planning Areas with riverboat gambling in Leavenworth are based on the population projections completed by the county for the Indiana Gaming Commission. These annual growth rates are projected to be 3.0% in 1997, 5.0% in 1998, 3.0% in 1999, and 2.0% for each of the following years through the year 2006. This county annual growth rate of 2.0% has been projected through the Planning Period.

The following **Table No. 10** shows the population projections for each of the Planning Areas in the event the riverboat gambling operation is permitted for Leavenworth.

Table 10
Projected Population in Each Planning Area With Riverboat Gambling

Year	Change (Annual %)	Planning Area Population (Persons) Milltown	Marengo[1]	Regional[1]
1998	4.00%	3,480	1,218	5,048
2000	2.50%	3,654	1,495	5,517
2002	2.00%	3,800	1,537	5,719
2004	2.00%	3,952	1,580	5,930
2006	2.00%	4,110	1,625	6,149
2008	2.00%	4,275	1,672	6,377
2010	2.00%	4,446	1,721	6,613
2012	2.00%	4,623	1,771	6,860
2014	2.00%	4,808	1,824	7,116
2016	2.00%	5,001	1,879	7,382

(1) Includes 228 additional persons in 1998 and 455 persons for the years 2000 and after to include the Marengo quarry/warehouse project.

SECTION V - CURRENT AND PROJECTED WATER DEMANDS

This section presents the results of a detailed analysis of the demands being placed on each utility by its customers, then projects these demands (using the population projections developed in the last section) through the Planning Period. The various characteristics of the customer's demands that are relevant to the determination of available capacities and design of water facilities are discussed, and used as a basis for the demand analyses.

A. Current System Demands

Each utility's pumpages were analyzed to determine the system demands (the combined water demands of all customers). The system demands need to be determined to support the engineering analyses of the existing system, and to identify the customer demands. One of the best methods to characterize the current system demands is to determine the utility's current:

- typical **average daily demand**,
- **highest monthly average daily demand,**
- highest **peak daily demand** (for use in analyzing the necessary well supply, treatment, transmission and storage capacities),
- highest **peak demand as a percent of average demand**, and
- estimated **peak hour demand** during the peak day (which is used in determining storage and distribution requirements).

1. Peak Hourly Demands

Pumping charts (or metering charts) indicating the times of pump operations, and water tank level charts were not available for these analyses. Without a means of determining the actual peak hour demand being placed on each utility by its customers, a conservative average of 1.5 times peak daily demand was used to estimate the peak hourly demand for both utilities.

2. Current Milltown Water Utility System Demands

For the Milltown Water Utility, the pumpages for the 1-1/2 year period from January, 1993 to May, 1994 were analyzed to determine the current system

demands. This analysis used data maintained by the utility in its monthly and annual operating reports.

The following **Table No. 11** summarizes the current system demands placed on the Milltown Water Utility. A more detailed analysis of the current pumpages from which this data has been developed is provided in **Appendix D**.

Table 11
Summary of Current System Demands-Milltown Water Utility

Demand Category	Current Demand
Typical Average Daily Demand	118,639 gallons per day
Highest Monthly Average Daily Demand	159,355 gallons per day
Peak Daily Demand	251,000 gallons per day
Estimated Peak Hour Demand	261 gallons per minute

The pumpage data from 1/93 to 5/94 has indicated a relatively consistent 15% difference between the total of Well Nos. 1 and 3, and the master meter near Well No. 2. The master meter reading was higher than the total of the Well No. 1 and Well No. 3 meters. For this reason, the master meter readings were used for this system demand analysis. A master meter calibration has been performed of the well meters within the last year.

In most communities, normal residential water usage fluctuates greatly from season to season. Average daily water consumption in most municipal systems during the winter months is typically 75 to 80% of the annual daily average. Summer consumption in most residential systems, on the other hand, normally averages about 25% greater than the annual daily average. These fluctuations tend to be less in rural utilities, where lawn watering and other seasonal water uses are minimal. The seasonal variations in system demand in the Milltown Water Utility are typical of the fluctuations found in similar utilities.

3. Current Marengo Water Utility System Demands

The pumpages by the Marengo Water Utility for the 1-1/2 year period from January, 1995 to August, 1996 were analyzed to determine the current

Marengo Water Utility's system demands. This analysis used data maintained by the utility in its monthly and annual operating reports.

The following **Table No. 12** summarizes the current system demands placed on the Marengo Water Utility. A more detailed analysis of the current pumpages from which this data has been developed is provided in **Appendix D**.

Table 12
Summary of Current System Demands-Marengo Water Utility

Demand Category	Current System Demand
Typical Average Daily Demand	93,940 gallons per day
Highest Monthly Average Daily Demand	98,117 gallons per day
Peak Daily Demand	202,800 gallons per day
Estimated Peak Hour Demand	211 gallons per minute

In most communities, normal residential water usage fluctuates greatly from season to season. Average daily water consumption in most municipal systems during the winter months is typically 75 to 80% of the annual daily average. Summer consumption in most residential systems, on the other hand, normally averages about 25% greater than the annual daily average. These fluctuations tend to be less in rural utilities, where lawn watering and other seasonal water uses are minimal. The seasonal variations in system demand in the Marengo Water Utility are typical of the fluctuations found in similar utilities.

B. Current Utility Customer Bases

The great majority of each utility's customers are residential, and have a standard 5/8" x 3/4" water meter. The Milltown Water Utility does have a small number of major water users.

Table 13
Number of Customers in Each Utility by Meter Size

	No. of Meters (Customers)	
Meter Size	Milltown Water Utility	Marengo Water Utility
5/8" x 3/4"	411	380
1"	0	
1 1/2"	0	
2"	4	
3"	0	
Unmetered	0	
Total	415	380

The Milltown Water Utility has indicated that none of the customers with 2-inch meters use substantial quantities of water. Since neither utility has any major customers that demand a substantial quantity of water, all customers of each utility have been placed in a single class.

C. Current Customer Demands

In order for system demands to be projected into the future, it is necessary to determine the average per-customer water demands of each of the utility's existing customers (called customer demands). The customer demands are multiplied by the projected future customers in order to project the future system demands. To do this, the system demands are divided by the number of customers being served by the utility to calculate a per-customer demand.

1. Milltown Water Utility's Current Customer Demands

The following **Table No. 14** summarizes the current customer demands being placed on the Milltown Water Utility. These values include lost water as well as water metered and consumed by the customer. A more detailed analysis of the current customer demands is provided in **Appendix D**.

Table 14
Summary of Current Customer Demands-Milltown Water Utility

Demand Category	Current Demand
Typical Average Daily Demand	314 gallons per day
Highest Monthly Average Daily Demand	384 gallons per day
Peak Daily Demand	605 gallons per day
Estimated Peak Hour Demand	0.63 gallons per minute

2. Marengo Water Utility's Current Customer Demands

The following **Table No. 15** summarizes the current customer demands being placed on the Marengo Water Utility. These values include lost water as well as water metered and consumed by the customer. A more detailed analysis of the current customer demands is provided in **Appendix D**.

Table 15
Summary of Current Customer Demands-Marengo Water Utility

Customer Demand Category	Current Customer Demand
Typical Average Daily Demand	247 gallons per day
Highest Monthly Average Daily Demand	258 gallons per day
Peak Daily Demand	534 gallons per day
Estimated Peak Hour Demand	0.56 gallons per minute

D. Fire Protection Considerations

The ISO Commercial Risk Services, Inc. office (ISO) is a quasi-governmental organization that is one of the primary sources of property risk ratings used by insurance companies to set insurance rates. The ISO provides two major services, it rates major structures, and it also provides evaluations of communities with regard to fire suppression capability.

Three general factors are used by the ISO in calculating an insurance rating for a structure. One of these factors is type of construction, with particular emphasis on fireproof design and construction materials. Another factor utilized by ISO is the availability of the recommended fire flow in terms of proximity of fire hydrants, and flows available from hydrants.

The third insurance rating factor is the Town's Key Rating, which is used for the ratings of major structures, and is also used by insurance companies to set the property risk rates for unrated (non-major) structures. ISO adds the values of three classifications (factors) to derive the Key Rating for a community. These classifications are Water Supply (worth a maximum of 40% of the total Key Rating credit), Fire Department (worth 50% of the total Key Rating credit), and receiving and handling fire alarms (worth 10% of the total Key Rating credit). A divergence factor for differences in the relative credits for the Fire Department and the Water Supply classifications is also calculated and deducted from the sum of the classifications. The sum of the credits determines the Town's Key Rating. **Table No. 16** below outlines the classes that are calculated by ISO based on the total credit assigned.

Table 16
Public Protection Classes as Percentage of Credits

Class	Credit
1	90.00 or more
2	80.00 to 89.99
3	70.00 to 79.99
4	60.00 to 69.99
5	50.00 to 59.99
6	40.00 to 49.99
7	30.00 to 39.99
8	20.00 to 29.99
9	10.00 to 19.99
10	0 to 9.99

The Fire Department classification includes credits for fire protection equipment, fire service communications, response time and other factors. The Water Supply classification credits are outlined in the following **Table No. 17**.

Table 17
Water Supply Classification Credit Items

Credit Item	Description	Maximum Credit
Water System	Supply, main capacities and hydrant distribution	35.00
Hydrants	Hydrant type and method of installation	2.00
Inspection and condition of Hydrants	Frequency of hydrant inspection and their condition	3.00
Total Available Credit	Sum of Credit Items	40.00

1. Recommended Volumes for Fire Fighting

a. Rated Structures

To determine an area's recommended fire flow requirements for a single building, the following formula, developed by ISO is used.

From the Fire Suppression Rating Schedule, an estimate of recommended fire flow requirements are determined by the formula:

$$F = 18 * (C) * A^{0.5}$$

Where:

F = the required flow in gpm
C = coefficient related to the type of construction
A = the total floor area in the building being considered

In order to meet normal ISO guidelines, commercial users will require the largest fire flow capability. The "C" factor for typical construction is 1.2.

As an example, for a 25,000 square foot building of ordinary construction ("C" = 1.2), the recommended fire flow rate will be:

$$F = 18 * (1.2) * (25{,}000)^{0.5}$$

$$F = 3{,}415 \text{ gpm (3,500 gpm rounded to the nearest 250 gpm)}$$

b. Unrated Structures

For residential areas utilizing more typical wood frame construction for smaller structures ("C" factor = 1.5), the typical recommended fire flows would be as follows:

1500 Sq. Ft. Home: 1,045 gpm
1800 Sq. Ft. Home: 1,145 gpm
2100 Sq. Ft. Home: 1,237 gpm
2400 Sq. Ft. Home: 1,322 gpm

These flow values should be used in sizing future water mains where fire protection is being provided to obtain the highest Key Rating for the Town.

2. Milltown Water Utility's Fire Flow Requirements

The latest inspection of the Milltown Water Utility was made in the summer of 1995. The Town's classification prior to the inspection was Class 9 on a scale of 1 (best) to 10 (unprotected). The inspection resulted in an upgrade of the Town's grading classification to a rating of 7. The water supply received a rating of 15.13 out of a possible 40.00. Hydrant fire flow data indicated needed fire flows (for the highest rating) ranging from 750 gpm to 1,750 gpm. Actual fire flows available were substantially less than the needed fire flows at all locations, except at the residential fire flow area at Day Lane south of Hill Street (which was slightly less than the needed fire flow).

Specific water supply data was requested of the ISO to determine the feasibility of upgrading the water system to improve the Key Rating. While ISO did not provide this information, the credit assigned to each category

was available. The following **Table No. 18** outlines the credits that were assigned to Town to arrive at its Key Rating.

Table 18
Assigned Credit-Town of Milltown

Category	Credit Assigned	Maximum Credit
Receiving and Handling Fire Alarms	4.77%	10.00%
Fire Department	18.67%	50.00%
Water Supply	15.13%	40.00%
Divergence	-0.09%	
Total Credit	**38.48%**	**100.00%**

Because of the inability of the utility's distribution system to provide a higher fire flow, and based on the current acceptability of the Key Rating by the Town, the design fire flow used for the engineering analyses in this report is 500 gpm for a period of 2-hours.

3. Marengo Water Utility's Fire Flow Requirements

The latest inspection of the Marengo Water Utility was made in 1987. The Town's classification based on this inspection is Class 7 on a scale of 1 (best) to 10 (unprotected). The following **Table No. 19** describes the credits that the Town received from this inspection.

Table 19
Assigned Credit-Town of Marengo

Category	Credit Assigned	Maximum Credit
Receiving and Handling Fire Alarms	5.72%	10.00%
Fire Department	9.74%	50.00%
Water Supply	29.19%	40.00%
Divergence	-10.70%	
Total Credit	**33.95%**	**100.00%**

As can be seen from reviewing these figures, the water supply provided the majority of the credit assigned to the Town. **Table No. 20** below details the

credits assigned to the specific items for which the Marengo Water Utility was inspected.

Table 20
Water Supply Classification Credits-Marengo Water Utility

Credit Item	Assigned Credit	Maximum Credit
Water System	26.79%	35.00%
Hydrants	1.45%	2.00%
Inspection and condition of Hydrants	0.95%	3.00%
Total Available Credit	**29.19%**	**40.00%**

The highest fire flow that was listed in the ISO hydrant flow data summary from the 1987 survey was 1,750 gpm. A quarry that has existed on the south side of Marengo has recently been converted to a used tire storage and warehouse facility. This facility presents a substantial fire hazard, and has requested from the Town additional water storage for fire protection. Conversations with the manager of the quarry/warehouse project have indicated that they have not determined a needed fire flow, and intend to install an overhead sprinkler system in the near future. For the purposes of this Report, the design fire flow that will be used for these analyses is 1,250 gallons per minute for a period of two hours.

E. Water Accountability

Water usage can be generally divided into three classifications: (1) residential or domestic consumption, (2) commercial and industrial uses, and (3) leakage and waste. Pipe leakage is generally proportional to the size and length of the pipe line, and can vary based on type of joint, pipe material, and age. Water service lines can also be a major factor in the leakage and waste in a water utility, depending on the material and bedding of the service lines. Other sources of leakage and waste in a water system can include filter backwash water, fire department exercises, hydrant flushing, and fire protection. Inaccurate metering (particularly with master meters) can also create circumstances where leakage and waste may appear to be greater or less than the actual lost water.

The accountability of water is the percent of water pumped that is actually billed or which is otherwise accounted. Unaccounted for water is important to a utility for a number of reasons. Since the utility's facilities must have the capacity to pump the

unaccounted for water into the system (whether it is used by a customer, and billed for, or not), excess water loss can use up system capacity that would otherwise be available for customers. Additionally, since lost or unaccounted for water costs the utility money, the reduction of unaccounted for water can increase the revenues and reduce the operating costs of the utility. The utility should strive to maintain its unaccounted for water to no more than 10% of the total water pumped into the system.

The engineering purpose for reviewing the unaccounted water of the utility is to determine whether there might be additional capacities available to the utility without the need for a water supply, treatment or storage project. It may be found that the replacement of leaking lines could provide the utility with substantially more usable water supply, or that an inaccurate master meter is providing data that inaccurately reflects the needs of the utility.

1. Milltown Water Utility's Unaccounted Water

The following **Table No. 21** summarizes the review of the utility's unaccounted water for the period from January, 1996 through July, 1996. A more detailed analysis of the utility's unaccounted water is included in **Appendix E**.

Table 21
Current Unaccounted Water-Milltown Water Utility

Average Unaccounted Water	39.3%
Maximum Unaccounted Water	50.2%

Water loss in the Milltown Water Utility is substantially higher than is preferred, and is caused by aged water mains constructed in the "Old Town" during the 1930's. The utility has been conducting an active leak repair program that has reduced the unaccounted water during the last few years. However, in spite of these successes, the unaccounted water remains high and should be reduced. Recommendations for correction of the water loss situation are provided in **Sections VII, VIII and X**.

2. Marengo Water Utility's Unaccounted Water

Billing information was not available from the Marengo Water Utility to determine the degree of unaccounted water being experienced within the system.

F. Projected Customer Bases

1. Water Supplies Outside of Utility Service Areas

Residences and businesses in the Planning Areas that lie outside of either the Milltown Water Utility service area or the Marengo Water Utility service area are not served by a public water supply system. Instead, alternative water supplies such as shallow wells, deep wells, cisterns, and hauled water are used. Shallow wells are the most common type of well in the area. These wells are subject to very poor water quality and susceptible to running dry during the dry summer months. Deep rock wells, which can range from 250' to more than 350' depending on the elevation of the wellhead, tend to provide a better quality and more reliable water supply, but are very expensive, ranging upwards of $5,000 to construct. Cisterns are generally used as a supplement to hauled water, and require charcoal filters to make the water safe for consumption. Hauled water costs range from $20/month to more than $40/month, depending on the water consumption and the availability of a cistern. For these reasons, it is believed that the great majority of existing residents would connect to the water system in the Planning Area.

2. Changes in Customer Characteristics

With changes in the characteristics of the customers of the Milltown Water Utility and the Marengo Water Utility, there is the potential for the average water demands per customer to change. For example, if the nature of the customer base were changing from rural to urban, the average number of persons in each household may increase, and the water usage (and peak demand ratio) would probably also increase. Additionally, if there were any major industrial or commercial customers foreseen in the future, the water demands of these new customers should be taken into account in the planning of the water needs during the Planning Period.

In the case of the Milltown Water Utility and the Marengo Water Utility, no substantial changes in the characteristics of the utility's residential/small commercial customers is foreseen during the Planning Period, even in the event the riverboat gambling operation is located in Crawford County. In addition, there are no major commercial/industrial customers that are foreseen to be requiring water service from either utility during the Planning Period. If either of these circumstances do occur in the future, the projections of system demands should be adjusted.

3. Milltown Water Utility's Projected Customer Base

The Milltown Water Utility has received numerous requests for service throughout the Milltown Planning Area. The availability and quality of the well water in the area is poor, at best. Throughout the areas of growth currently occurring to the east of the Milltown Planning Area, one of the primary factors supporting development has been the availability of water, and to a lesser extent, the availability of sewer service.

In the past decade, residential growth from Louisville has been progressively approaching the Milltown Planning Area along SR 64 and I-64 over the last ten years, and can be seen as close as Ramsey and DePauw. If the discussed highway interchange at I-64 and the Leavenworth-Milltown Rd. for Wyandotte Caves and the riverboat is constructed, residential growth from Louisville is anticipated to increase substantially in the southern portions of the Milltown Planning Area.

For this reason, the Milltown Water Utility foresees the possibility that the actual growth rate in this area may exceed the county's growth rate as projected by the IBRC, and is anticipating actively expanding its water utility service area through the Milltown Planning Area over the Planning Period. As the utility's lines are extended, it will be able to connect the existing residents outside of its current service area, and to offer service to new residents where development pressures have been blocked by the lack of water service.

The Milltown Water Utility's customer base is projected to grow to include substantially all of the population of the Milltown Planning Area by the end of the Planning Period. Due to the reasonable possibility that the growth rate

may exceed projections, the customer base of the Milltown Water Utility has been forecast to be 100% of the projected Planning Area population. The projected customer base served by the Milltown Water Utility, therefore, will be increasing at a consistent rate (as water lines are extended to existing residences and new residents connect) from the current customer base to include ultimately all of the Milltown Planning Area.

The following **Table No. 22** provides projections of the customer bases of the Milltown Water Utility through the Planning Period based on that utility's intentions to expand into the Milltown Planning Area.

Table 22
Projected Customer Base-Milltown Water Utility

Year	w/o Riverboat Gambling	w/ Riverboat Gambling
1998	433	495
2000	437	520
2002	547	671
2004	658	833
2006	771	1,008
2008	885	1,195
2010	1,002	1,395
2012	1,116	1,609
2014	1,230	1,839
2016	1,346	2,084

4. Marengo Water Utility's Projected Customer Base

The Marengo Water Utility currently has no plans to increase its Planning Area during the Planning Period. However, with the quarry/warehouse project newly located within the Town, the Town's population and customer base are anticipated to grow rapidly during the next few years. On the basis of these assumptions, the Marengo Water Utility's customer base is projected to increase in direct proportion to the growth of the population in the Marengo Planning Area, as described in **Section IVB.** on page 30.

The following **Table No. 23** provides projections of the customer base of the Marengo Water Utility through the Planning Period considering the utility's

intentions to serve the Marengo Planning Area, which includes essentially only areas within the corporate limits.

Table 23
Projected Customer Base-Marengo Water Utility

Year	w/o Riverboat Gambling	w/ Riverboat Gambling
1998	487	542
2000	592	665
2002	595	684
2004	598	703
2006	601	723
2008	604	744
2010	607	766
2012	608	788
2014	610	812
2016	612	836

5. Regional Water Utility's Projected Customer Base

The customer base of a regional utility system is projected to grow during the Planning Period to include all customers projected to reside in the Milltown Planning Area, the Marengo Planning Area, and (due to the reduced possibility of exceeding projections) 80% of the additional area included in the Regional Planning Area (the northern portion of Liberty township outside of Marengo) at the end of the Planning Period.

The following **Table No. 24** provides projections of the customer bases of the Regional Water Utility through the Planning Period.

Table 24
Projected Customer Base-Regional Water Utility

Year	w/o Riverboat Gambling	w/ Riverboat Gambling
1998	933	1,052
2000	1,055	1,215
2002	1,181	1,403
2004	1,308	1,603
2006	1,438	1,817
2008	1,569	2,046
2010	1,702	2,291
2012	1,831	2,552
2014	1,961	2,832
2016	2,093	3,129

G. Projected System Demands

One of the most important issues to be addressed by the Milltown Water Utility, the Marengo Water Utility and a Regional Water Utility is how to provide the increased demands imposed on the system by the growing base of projected customers during the Planning Period. The system demands in each Planning Area have been projected based upon current customer demands and the customer projections presented in the previous section. With this information, the demands placed on each system by its customers can be projected through the Planning Period.

Each utility's existing customer's demands were summarized in **Table Nos. 14 and 15**. Using these values, the tables in the following subsections present the projected average and peak daily water demands of each system for the Planning Period.

1. Milltown Water Utility's Projected System Demands

Table 25
Projected System Demands w/o Riverboat-Milltown Water Utility[1]

Year	Typical Average Day Demand (Gallons/Day)	Highest Monthly Avg. Daily Demand (Gallons/Day)	Peak Day Demand (Gallons/Day)	Peak Hour Demand (gpm)
1997	135,000	165,000	260,000	270
1998	136,000	166,000	262,000	270
1999	137,000	168,000	264,000	270
2000	137,000	168,000	264,000	270
2001	155,000	190,000	299,000	310
2002	172,000	210,000	331,000	350
2003	190,000	232,000	366,000	380
2004	207,000	253,000	399,000	420
2005	225,000	275,000	434,000	450
2006	242,000	296,000	466,000	490
2007	260,000	318,000	501,000	520
2008	278,000	340,000	536,000	560
2009	297,000	363,000	572,000	600
2010	315,000	385,000	607,000	630
2011	333,000	407,000	642,000	670
2012	350,000	428,000	674,000	700
2013	368,000	450,000	709,000	740
2014	386,000	472,000	744,000	770
2015	405,000	495,000	780,000	810
2016	423,000	517,000	815,000	850

[1] These demands DO NOT include water demands by the Marengo Water Utility

The projected customer demands with the riverboat being site at Leavenworth are provided in the following **Table No. 26**.

Table 26
Projected System Demands w/Riverboat-Milltown Water Utility[1]

Year	Typical Average Day Demand (Gallons/Day)	Highest Monthly Avg. Daily Demand (Gallons/Day)	Peak Day Demand (Gallons/Day)	Peak Hour Demand (gpm)
1997	151,000	185,000	291,000	300
1998	155,000	190,000	299,000	310
1999	160,000	196,000	308,000	310
2000	163,000	200,000	314,000	320
2001	187,000	230,000	361,000	370
2002	211,000	258,000	406,000	430
2003	237,000	289,000	456,000	470
2004	262,000	320,000	505,000	530
2005	290,000	354,000	558,000	580
2006	316,000	387,000	609,000	640
2007	345,000	422,000	665,000	690
2008	375,000	459,000	723,000	760
2009	407,000	498,000	784,000	820
2010	439,000	536,000	845,000	880
2011	472,000	577,000	910,000	950
2012	505,000	617,000	972,000	1,010
2013	540,000	661,000	1,041,000	1,090
2014	577,000	705,000	1,112,000	1,150
2015	616,000	753,000	1,187,000	1,230
2016	655,000	801,000	1,262,000	1,320

[1] These demands DO NOT include water demands by the Marengo Water Utility

2. Marengo Water Utility's Projected System Demands

Table 27
Projected System Demands w/o Riverboat-Marengo Water Utility

Year	Typical Average Day Demand (Gallons/Day)	Highest Monthly Avg. Daily Demand (Gallons/Day)	Peak Day Demand (Gallons/Day)	Peak Hour Demand (gpm)
1997	107,000	112,000	231,000	240
1998	120,000	125,000	259,000	270
1999	133,000	139,000	287,000	300
2000	146,000	152,000	315,000	330
2001	147,000	154,000	317,000	330
2002	147,000	154,000	317,000	330
2003	148,000	155,000	320,000	330
2004	148,000	155,000	320,000	330
2005	149,000	156,000	322,000	340
2006	149,000	156,000	322,000	340
2007	149,000	156,000	322,000	340
2008	149,000	156,000	322,000	340
2009	150,000	157,000	324,000	340
2010	150,000	157,000	324,000	340
2011	150,000	157,000	324,000	340
2012	150,000	157,000	324,000	340
2013	151,000	158,000	326,000	340
2014	151,000	158,000	326,000	340
2015	151,000	158,000	326,000	340
2016	151,000	158,000	326,000	340

Table 28
Projected System Demands w/Riverboat-Marengo Water Utility

Year	Typical Average Day Demand (Gallons/Day)	Highest Monthly Avg. Daily Demand (Gallons/Day)	Peak Day Demand (Gallons/Day)	Peak Hour Demand (gpm)
1997	120,000	125,000	259,000	270
1998	133,000	139,000	288,000	300
1999	149,000	155,000	321,000	340
2000	164,000	171,000	354,000	370
2001	167,000	175,000	360,000	380
2002	169,000	177,000	365,000	380
2003	172,000	180,000	372,000	380
2004	174,000	182,000	376,000	390
2005	177,000	186,000	383,000	400
2006	179,000	188,000	388,000	410
2007	181,000	190,000	392,000	410
2008	184,000	192,000	397,000	420
2009	187,000	196,000	404,000	420
2010	189,000	198,000	409,000	430
2011	192,000	201,000	414,000	430
2012	194,000	203,000	420,000	440
2013	198,000	207,000	428,000	450
2014	201,000	210,000	434,000	450
2015	204,000	213,000	440,000	460
2016	206,000	216,000	446,000	460

3. Regional Water Utility's Projected System Demands

Table 29
Projected System Demands w/o Riverboat-Regional Water Utility

Year	Typical Average Day Demand (Gallons/Day)	Highest Monthly Avg. Daily Demand (Gallons/Day)	Peak Day Demand (Gallons/Day)	Peak Hour Demand (gpm)
1997	272,000	332,000	524,000	545
1998	289,000	353,000	557,000	580
1999	306,000	374,000	590,000	615
2000	323,000	395,000	623,000	650
2001	343,500	420,000	661,500	690
2002	364,000	445,000	700,000	730
2003	384,500	470,000	740,000	770
2004	405,000	495,000	780,000	810
2005	425,500	520,500	820,000	855
2006	446,000	546,000	860,000	900
2007	467,500	571,500	900,500	940
2008	489,000	597,000	941,000	980
2009	510,000	623,500	982,500	1,025
2010	531,000	650,000	1,024,000	1,070
2011	552,000	675,500	1,064,000	1,110
2012	573,000	701,000	1,104,000	1,150
2013	594,000	726,500	1,144,500	1,190
2014	615,000	752,000	1,185,000	1,230
2015	636,000	778,000	1,225,500	1,275
2016	657,000	804,000	1,266,000	1,320

Table 30
Projected System Demands w/Riverboat-Regional Water Utility

Year	Typical Average Day Demand (Gallons/Day)	Highest Monthly Avg. Daily Demand (Gallons/Day)	Peak Day Demand (Gallons/Day)	Peak Hour Demand (gpm)
1997	303,000	369,500	582,000	600
1998	326,000	398,000	627,000	650
1999	349,000	426,500	672,000	700
2000	372,000	455,000	717,000	750
2001	402,000	491,500	774,500	810
2002	432,000	528,000	832,000	870
2003	463,500	567,000	893,000	930
2004	495,000	606,000	954,000	990
2005	529,500	647,500	1,020,000	1,060
2006	564,000	689,000	1,086,000	1,130
2007	600,500	734,000	1,156,500	1,205
2008	637,000	779,000	1,227,000	1,280
2009	676,000	826,500	1,302,500	1,355
2010	715,000	874,000	1,378,000	1,430
2011	756,500	925,000	1,458,000	1,515
2012	798,000	976,000	1,538,000	1,600
2013	843,000	1,031,000	1,624,000	1,690
2014	888,000	1,086,000	1,710,000	1,780
2015	935,500	1,144,000	1,801,500	1,875
2016	983,000	1,202,000	1,893,000	1,970

SECTION VI - EXISTING WATERWORKS FACILITIES

This section provides a review of the history of each of the water utilities, and then provides the results of a comprehensive engineering analysis of the capacities of each of the major facilities. The general results of the computerized hydraulic analyses of each utility's pumping stations, water tanks and water distribution systems, as well as a review of available water quality data is also provided in this section.

A. Milltown Municipal Water Utility

1. Utility History

The majority of the original Milltown Water System was built in the early 1930's. Certain parts of the water system were in existence before this time. In 1981, a new well was constructed, along with a 304,000 gallon standpipe, about 10,000 lineal feet of water line, and metering of the utility's customers. Two water tanks were demolished during this project. One of the tanks was removed, the other stands today next to the acting Town Hall on Tower Lane.

Subsequently, in 1993, a water treatment plant and new well (Well No. 3), and some minor distribution system upgrades were completed. A map of the Milltown Water Utility's existing facilities, showing the locations of the raw water wells, treatment facilities, elevated storage tank, and distribution system is included in **Appendix F** of this Report.

2. Well Supplies

a. Aquifer Characteristics

(1) Geology

The geology of the area around Milltown is dominated by bedrock structures overlain by a thin layer of soil. Water travels within the bedrock through solution cavities.

(2) Surface Water Influence

A concern exists that the Milltown Water Utility's wells are under the influence of surface water. Preliminary analyses have been conducted on the raw water from each of the wells. However, a final determination from IDEM as to whether the utility's wells are under the influence of surface water has yet to be made.

(3) Well Performance

The performance of the Milltown Water Utility's wells have historically suffered substantially during extended periods of dry weather. The pumping capacities are reduced, and the wells tend to pump muddy water during these times. In the past, the operator has manually throttled the well discharge valves to regulate the pumping rates during these dry times to keep the quality of the water as acceptable as possible, and to keep the pumps from pumping air (which would cause damage to the pumps).

b. Well Construction

Water supply for the Milltown Water Utility is obtained from three rock wells with vertical turbine pumps or submersible pumps, and electric motors. These wells are located close together on the northeast side of Milltown between the railroad and SR 64. The wells all operate at the same time without alternation or sequential operation. They are controlled through dedicated land lines from floats in the clearwell of the water treatment plant. None of the wells has standby power available. The zones of influence of Well No. 1 and Well No. 2 overlap, since the operation of both wells at the same time causes pumping problems.

(1) Well No. 1

Well No. 1 was drilled to a diameter of 10-inches, and a depth believed to be about 160'. This well has an 8-inch x 13

bowl vertical turbine pump set at a depth of about 135', with a discharge pipe that is 4-inches in diameter. The pump has a 30 horsepower motor, and is oil lubricated. Static water level in Well No. 1 is highly variable, and was 60' during the well's development, but has been recorded as low as 105'. The pump was last repaired, and the well cleaned, in early 1994.

(2) Well No. 2

Well No. 2 is located in the pumphouse in the middle of the wellfield. This well discharges to the header in the wellhouse that receives water from all of the wells, and is kept only as a standby water supply.

Milltown's Well No. 2 was used only during the three months of October, November and December of 1993, but had not been previously used in 1993, nor has it been used in 1994, 1995, or 1996.

(3) Well No. 3

Well No. 3 is a 12-inch diameter well drilled through rock. The well pump is a submersible 6-inch x 4 bowl pump set about 182 feet deep (the wellhead is at a higher elevation than the other two wells). The well is designed to pump around 100 gpm (80 gpm according to the aquifer analysis). The motor is a 20 horsepower unit. The well was installed during the 1981 improvements project, and was cleaned in 1993. A new pump and motor was installed in early 1996. Static water level was 85' in 1993, and 70' in 1996.

c. Well and Wellfield Capacities

(1) Historical Well Specific Capacity

The aquifer immediately around a well ultimately degrades in its water-bearing capacity over the years as water is

rapidly withdrawn. This is the reason that wells only have a limited functional life. There are certain rehabilitation techniques available to temporarily restore a well's capacity, however, these techniques may be limited in their degree of success, and will only be of value for a restricted time. The continuing capacity of the aquifer immediately around the utility's water supply wells to supply water can be measured by the draw-down (in feet) per gallon of water withdrawn. This measure is called the specific capacity of the well.

The Milltown Water Utility's water supply wells have been maintained on an as-needed basis, most recently by Bastin-Logan Water Services, Inc. The pumping rate and other characteristics of the wells and well pumps are not measured on an annual basis. However, static water depth, pumping water depth and pump rates were recorded on a regular basis between May and December of 1992. From this data, the specific capacity of the wells for this period of time was calculated. In order to determine the long-term life of the wells, information adequate to determine the well's specific capacity over a number of years would be valuable. The following **Table No. 31** and **Figure No. 5** show the historical specific capacities of each of the utility's water supply wells. Copies of the records from which these specific capacities have been derived are included in **Appendix No. G**.

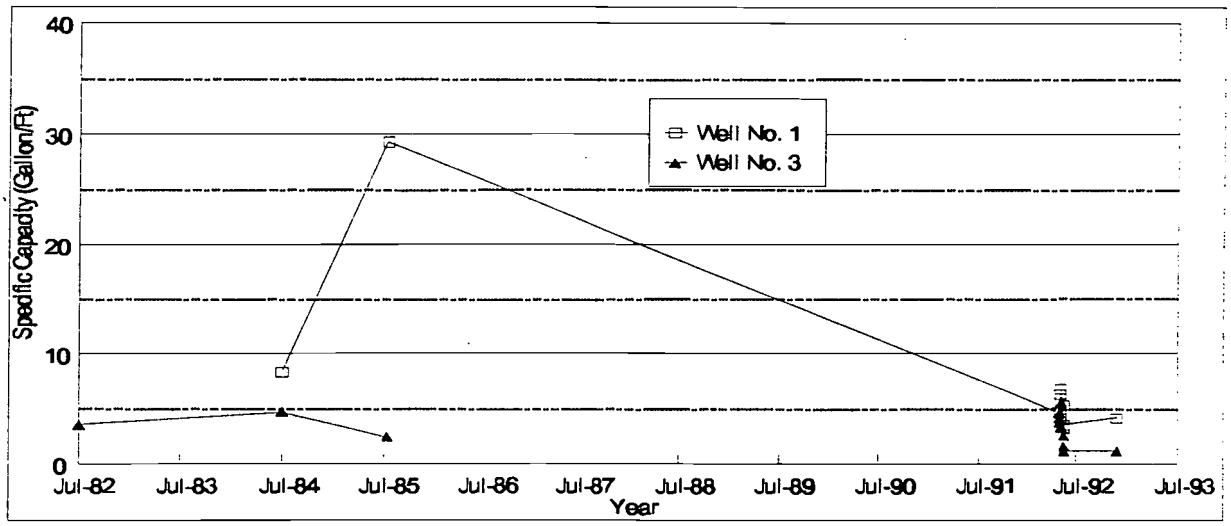
Table 31
Historical Well Specific Capacities [1]

Characteristic	Well No. 1	Well No. 2	Well No. 3
Static Level (Ft)			
Maximum	112		119
Minimum	90		65
Pumping Level (Ft)			
Maximum	130		130
Minimum	112		94
Specific Capacity (Gal/Ft)			
Maximum	6.7		5.6
Minimum	3.1		1.1

[1] From data collected during May-December, 1992

Graphs often show trends in information much more readily than numbers. Since specific capacity often changes subtly over a period of years, graphical review of the data is often valuable. The following **Figure No. 5** shows the specific capacity information for the utility's wells that was included in the previous **Table No. 31**.

Figure 5
Historical Well Specific Capacities-Milltown Water Utility



As can be seen from this data, both the specific capacity and static water levels in Well No. 3, are highly variable. Well No. 1, which is the Milltown Water Utility's largest producer, while variable in nature, is less variable than Well No. 3.

(2) Operating Capacities

According to 10 States Standards, the regulatory guidelines used by the Indiana Department of Environmental Management in approving utility construction permits, the total developed groundwater source capacity shall equal or exceed the design maximum day demand and equal or exceed the design average day demand with the largest producing well out of service. [1]

(1) Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers (10 States Standards), Section 3.2.1.1, pg. 18, 1992 Edition.

While this regulatory standard allows for no standby well supply to meet maximum day demands, given:

(a) the lack of fast-response pump and motor repair equipment in the locale,
(b) the reduced capacities available in the wells during dry-weather periods,
(c) the periodic need to recover after a fire flow,
(d) the need for backwash and other down time at the treatment plant,
(e) the desirability of allowing the aquifer to recover after sustained pumping, and
(f) the inability to operate Well Nos. 1 and 2 at the same time without substantially reduced output and the possibility of pump damage,

it is recommended that the utility be capable of supplying the maximum day demand with Well Nos. 1 and 3 operating at reduced (dry-weather) flows during a 20-hour period of each day. The wells should also be capable of supplying the design average day demand with the largest well out of service. In **Table No. 32** below, both the regulatory requirements (assuming Well No. 2 is not operated at the same time as Well No. 1) and the recommended minimum supply capacities are shown.

Table 32
Supply Well Characteristics and Capacities-Milltown Water Utility

Characteristic	Well No. 1	Well No. 2	Well No. 3
Type of Construction	Rock	Rock	Rock
Total Well Depth (ft)	140.5		197
Static Water Depth (ft)	60		70-90
Column Pipe Dia. (in)	4		3
Design Pumping Rate	200 gpm @ 351' TDH		80 gpm @ 370' TDH
Emergency Power Availability	No	No	No
Date of Construction			1981
Last Well Test and Maintenance	1994		1993-Test/Clean 1996-Pump/Motor
Current Well Capacities (Gallons Per Minute Output) [1]	100 [2]	50 [3]	45
Current Wellfield Capacities [1],[2]			
Regulatory Capacity (Gallons Per Day, Peak Day/Avg. Day)			208,800 peak/136,800 avg.
Rated Wellfield Capacity (Gallons Per Day, Peak Day/Avg. Day) [4]			174,000 peak/114,000 avg.
Rated Wellfield Output (Gallons Per Minute)			145

[1] Based on historical dry-weather pumping rates
[2] Without Well No. 2 operating
[3] Without Well No. 1 operating
[4] Based on 20 hours operating time daily

Refer to the overall system map included in **Appendix F** for the locations of each of these wells.

3. Wholesale Water Supply Agreements

The Milltown Water Utility currently has no agreements or physical interconnections with another utility to obtain potable or unfinished water.

4. Water Treatment Plant

a. Description

The Milltown Water Utility's water treatment plant was constructed during 1991 and 1992. Prior to the construction of this plant, the utility used a wellhouse surrounding Well No. 2, and provided only chlorination. The current water treatment plant includes pre-chlorination, a reaction basin, three gravity filters with surface scour, a circular clearwell, two high service pumps and a backwash lagoon. There were significant changes in the design of the plant as it was being constructed which are not reflected on the plans.

b. Reaction Basin

The Reaction Basin at the Milltown Water Utility's water treatment plant is a rectangular concrete structure set about 5' from the building housing the remainder of the treatment equipment. The Reaction Basin Structure is 12' high by 26' long by 7' deep, and includes some minimal internal baffling (according to the plans).

Assuming that the plant was designed for iron removal, the Reaction Basin should be sized for a minimum of 20-minutes of detention time and include baffling [2].

The following **Table No. 33** describes the pertinent design and capacity information for the Reaction Basin.

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(2) Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers (10 States Standards), Section 4.6.1.2, pg. 72, 1992 Edition.

Table 33
Reaction Basin Design and Capacity-Milltown Water Utility

Characteristic	Size or Capacity
Length (ft)	26
Width (ft)	7
Height (ft)	12
Capacity (gals assuming 1' freeboard)	14,975
Design Capacity	
(Gallons Per Day)[1]	898,498
(Gallons Per Minute Throughput)	749

[1] Based on 20 hours operating time daily

c. Gravity Filters

The Milltown Water Utility's water treatment plant has three gravity multi-media filters located within the water treatment building. These filters are designed to filter out of the water the iron which has been oxidized into an insoluble particulate form by the pre-chlorination and the Reaction Basin. Each of the three filter cells is 5' wide by 10' deep. A flow control valve regulates the rate of water flowing through the filters. The filter was installed with 15-inches of anthracite and 12-inches of sand which is supported by 12-inches of gravel on a steel underdrain plate. The filters can be backwashed with water from the distribution system, the high service pumps or from the adjacent filters. Backwashing is a manual operation.

The 10 States Standards has no explicit standards for the rate of flow through rapid rate gravity filters being used for iron removal. The 10 States Standards does, however, outline a design standard of 3.0 gpm per square foot of filter area for rapid rate pressure filters used for iron removal [3]. IDEM follows this standard for rapid rate gravity filters.

[3] Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers (10 States Standards), Section 4.2.2.2, pg. 48, 1992 Edition.

The probable capacity of the gravity filters was reviewed in light of the possibility that the groundwater supply is determined to be under the influence of surface water. In this event, a pilot study will need to be completed to the satisfaction of IDEM to determine an acceptable capacity for the filters. However, filter loading rates for surface water filters are commonly 2.0 gpm per square foot of filter area, with the largest filter out of service. While a final determination will be required as to the filter capacity based on a pilot study, for the purposes of this report, the loading rate of 2.0 gpm per square foot of filter area will be used to preliminarily determine the filter capacity if the groundwater is found to be under the influence of surface water.

The following **Table No. 34** describes the capacity of the Milltown Water Utility's water treatment filters.

Table 34
Filter Design and Capacities-Milltown Water Utility

Characteristic	Design or Capacity
Number of Filters	3
Length (ft)	10
Width (ft)	5
Surface Area (ft^2)	
Total	150
With One Filter Out of Service	100
Design Capacity-Iron Removal	
(Gallons Per Day) [1]	360,000
(Gallons Per Minute Throughput)	300
Design Capacity-Under The Influence of Surface Water	
(Gallons Per Day) [1]	240,000
(Gallons Per Minute Throughput)	200

[1] Based on 20 hours operating time daily

d. Clearwell

The clearwell at Milltown Water Utility's water treatment plant is designed to allow the filters to operate at a consistent rate (without regular, short-term on-off cycles), to provide a water supply for backwash, to allow additional time for chlorine contact and disinfection, and to provide a finished water supply for the high service pumps. The availability of the clearwell as a readily available finished water supply for the high service pumps is particularly important since the capacity of the utility's well supplies are not enough to keep up with the high service pumps.

There are no regulatory standards for the determination of the capacity needed for clearwells at a water treatment plant (unless chlorine contact time is a regulatory consideration, which is not the case in Indiana for plants such as Milltown's).

Table No. 35, which follows, describes the design and capacities of the clearwell at Milltown Water Utility's water treatment plant.

Table 35
Clearwell Design and Capacity-Milltown Water Utility

Characteristic	Design or Capacity
Shape	Circular
Diameter (ft)	22
Usable Depth (ft with 1' freeboard)	11
Capacity (gals)	31,277

e. High Service Pumps

The high service pumps at Milltown Water Utility's water treatment plant draw finished water from the clearwell and pump this water into the distribution system for use by the utility's customers. Most of the time, the majority of the water goes to the standpipe. However, during peak use times, when the demands exceed the pumping rate, the water may be used by the utility's customers before it reaches the standpipe, and the water levels in the standpipe then fall.

The high service pumps have a higher pumping rate than the utility's well supplies. This creates a situation where the high service pumps are drawing the clearwell water level down, even as the wells are operating. A basic mass-balance calculation of the higher withdrawal of water from the clearwell by the high service pumps in comparison with the water supplied to the clearwell by the wells indicates that the high service pumps can only operate continuously for about 6 1/2 hours before they must shut themselves off to allow the clearwell water level to recover. The clearwell cannot fully recover from being drawn down to the high service pump cut-off level until the high service pumps have remained off for at least 2.6 hours (and longer if the high service pumps are called upon during the recovery period or the clearwell water is used for filter backwash).

The regulatory standards for pumping systems in general, which include high service pumps such as those at the Milltown Water Utility's water treatment plant, require that at least two pumping units be provided, and that with any pump out of service, the remaining pump or pumps shall be capable of providing the maximum daily pumping demand of the system. [4]

Considering the need for the high service pumps in the backwash of the filters at the water treatment plant (or alternately the shutting of these pumps down for use of the distribution system water or to allow the clearwell to refill after the filters have been out of service), it cannot be guaranteed that these pumps will be available more than 20 hours per day under normal operating conditions.

The following **Table No. 36** provides a summary description of the high service pumps and their design capacity.

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(4) Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers (10 States Standards), Section 6.3, pg. 101, 1992 Edition.

Table 36
High Service Pump Characteristics-Milltown Water Utility

Characteristic	Data	
Installation Date	1992	
Number of Pumps	Two	
Pump Data	Pump No. 1	Pump No. 2
Design Capacity	200 gpm @ 240' TDH	200 gpm @ 240' TDH
Type	End Suction, Type L	End Suction, Type L
Manufacturer	PACO Pump Co.	PACO Pump Co.
Motor Horsepower (HP)	25	25
Emergency Power Availability	None	
Pumping Capacity [1]		
(Gallons Per Day) [2]	240,000	
(Gallons Per Minute Throughput)	200	

[1] Capacity with the largest pump out of service
[2] Based on 20 hours of operating time daily

f. Backwash Lagoon

The sanitary and wastewater needs of the Milltown Water Utility's water treatment plant are served by a small grinder station that pumps the wastewater to the sewer utility's gravity sewer system. Due to the capacity of the grinder station, it was necessary to construct a backwash lagoon, which would retain the backwash water from the filters, and allow that water to be slowly pumped by the grinder station into the gravity sewer system.

g. Summary of Water Supply and Treatment Plant Capacities

The total capacity of the Milltown Water Utility's well field and water treatment plant is limited to the capacity of the wellfield or that particular unit in the plant that has the least capacity. The following **Table No. 37** summarizes each of the unit capacities described in the previous sections, and identifies the total system capacity.

Table 37
Total Water Supply and Treatment System Capacity-Milltown Water Utility

Unit	Capacity	
	Throughput/Output (gpm)	Overall Daily (gpd)
Well Supplies (Rated)	145	174,000
Reaction Basin	749	898,498
Filters		
Iron Removal	300	360,000
Under Influence of Surface Water	200	240,000
High Service Pumps	200	240,000
Total Supply and Treatment System Capacity		
Iron Removal	145	174,000
Under Influence of Surface Water	145	174,000

5. Wholesale Water Service Agreements

The Milltown Water Utility currently sells water to the Marengo Water Utility on an as-requested basis. There are no formal agreements for this service.

Table 38
Master Meter Characteristics

Meter Location	
Customer Name	Marengo Water Utility
Size (in)	4-inch
1995 Sales (gallons)	0
Service Level	Main

6. Distribution System

The Milltown Water Utility's distribution system is comprised of water mains, and includes various fittings (such as crosses, tees and elbows), valves, fire hydrants and flush hydrants, along with the service connections, to provide water service to its customers. An optimally designed distribution system

should also include many loops, and the fewest possible dead-end lines. Certain portions of the distribution system along the larger water mains are also designed to provide fire protection service, and have marginally adequate capacity to carry enough water to a fire hydrant for the fire department's needs (called a fire flow). The majority of the water mains in the distribution system are made of cast iron, with some of the mains constructed of galvanized, asbestos-cement or PVC pipe.

a. Service Levels

Distribution systems are often (particularly in hilly areas) divided into different service levels that are (hydraulically) separated from the other service levels, and there are no open piped connections between service levels except through a pump (going to a higher service level), or through a pressure reducing valve (going to a lower service level). Each service level also needs either a water tank or a hydropneumatic pressure boosting system to provide pressure in that service level (if higher pressure is needed), or a pressure reducing valve (if a lower pressure is needed). Service levels can be designed so that water is pumped through to another service level, as well as serving the customers on that service level.

Each of these service levels has a different pressure at any particular elevation, and the service levels are designed so that the customer at a particular elevation can connect to a pipe that has the correct pressure range for safe and usable service. If water pressure is inadequate, the possibility of contamination is increased. If water pressure is too great, the maintenance on the water system is increased, and the customer may have plumbing problems.

The Milltown Water Utility's distribution system has only one service level, and all customer demands are from the standpipe. There are individual pressure reducing valves located along Main Street, Mill Street and Back Street. Individual pressure boosting stations have been provided on Frenchtown Road and to some residences at higher elevations to the north of SR 64.

b. Distribution System Inventory

(1) Water Mains

Table No. 39 has been provided to summarize the utility's current inventory of water mains and hydrants.

Table 39
Existing Distribution System Inventory-Milltown Water Utility

Description	Length (ft)	Percent of Total (%)
Water Distribution Mains		
12" Water Main	N/A	0.0%
10" Water Main	142	0.2%
8" Water Main	7,432	11.3%
6" Water Main	11,772	18.0%
4" Water Main	21,254	32.4%
3" Water Main	N/A	0.0%
2" or Smaller Water Main	24,953	38.1%
Total	**65,553**	**100.0%**
Dead Ends		15

(2) Fire Hydrants and Flush Valves

The Milltown Water Utility has numerous fire hydrants and flush valves located throughout the distribution system. A fire hydrant is defined as an above-ground dry barrel or wet barrel hydrant on at least a 6-inch water main with a minimum 4 1/2" hydrant valve. If a hydrant is on a 4-inch or smaller main, it is considered to be a flush valve.

The following **Table No. 40** shows the utility's current inventory of fire hydrants and flush valves.

Table 40
Existing Hydrant Inventory-Milltown Water Utility

Description	Milltown Water Utility Number	Percent of Total(%)
Hydrants		
Fire Hydrants	19	36%
Above-Ground Flush Hydrants	33	62%
Below-Ground Flush Hydrants	1	2%

7. Water Storage

Elevated water storage serves a number of important functions in the Milltown Water Utility's system. The most common, and arguably the most valuable function that the water tank serves is to provide to the distribution system the peak flows demanded by the utility's customers, particularly during the dry, hot high water usage times of the year, such as during a hot summer afternoon. By serving this function, the water tank allows the utility to size its well field, water treatment facility, high service pumps, and transmission mains for the maximum daily demand of the utility's customers (instead of the peak hourly demand, which is much higher). Through much of the year, the peak demands are no greater than the well and plant capacity, and the water tank stays full. But in the high water use times, the water tank is designed to drain somewhat during the day, and fill again at night. In serving the utility's customers in this way, the water tank also provides water pressure within the system (an important function in protecting the quality of the water) by suspending water at an elevation higher than the customer's home, allowing the water to flow down from the tank to the customer's tap.

There are a number of criteria that the utility should meet in determining the capacity of its storage facilities. First, it must be remembered that **the total capacity of the standpipe is not available to the utility**. Only the water in that part of the tank which is over 81' above the highest customer's service is available for regular customer demands (this provides the minimum 35 psi of water pressure). Additionally, only the water that is more than 47' above the highest customer service is available for fire protection.

In 10 States Standards there are a number of recommended minimum storage tank requirements that need to be met by the utility. First, fire flow requirements should be satisfied where fire protection is provided. Secondly, minimum storage capacity (or equivalent capacity) for a water system not providing fire protection should be equal to the average daily consumption (however, this requirement may be reduced when the source and treatment facilities have sufficient capacity **with standby power** to supplement peak demands of the system) [5]. This is a prudent guideline in determining the amount of water storage capacity required, and one that will be used for the Milltown Water Utility. Finally, the storage tank should provide a minimum working pressure of 35 psi, and the maximum variation in the tank should not exceed 30 feet [6]. The recommended working pressure is 60 psi, and services with pressures exceeding 100 psi should have pressure reducing devices.

The two other major functions of the utility's water tank are to provide a storage of water for fire protection and in case of a major utility emergency. For the Milltown Water Utility, the design fire flow used for this Report is 500 gpm for a period of 2-hours, necessitating that the storage tank maintain at least 60,000 gallons of water (even during the peak customer usage time) without the customer's water pressure going below 20 psi. The Ten States Standards provides that "Fire flow requirements established by the appropriate state Insurance Services Office should be satisfied where fire protection is provided." [7] The water tank also stores water that the customers can use in case a major emergency happens in the utility, such as an area-wide power outage. During the time that the mechanical facilities in the utility are being repaired, the water in the tanks is available to the utility's customers.

Unfortunately for all water utilities, it is at that particular time when the utility is least likely to have excess water available for fire protection that is also the most likely time that a fire will occur. The engineering analyses of storage tank capacity needed by the Milltown Water Utility are based on supplying the needed fire flow at the rated duration during the peak demand

(5) Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers (10 States Standards), Section 7.0.1, pg 106, 1992 Edition.

(6) Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers (10 States Standards), Section 7.3.1, pg 113.

(7) Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers (10 States Standards), Section 7.01.a., pg. 106, 1992 Edition.

hours of the design peak day. These conditions, on which the engineering analyses are made, provide the most conservative results reasonably obtainable.

Storage for the Milltown Water Utility is provided by a single standpipe located on top of a hill near the eastern side of the current service area. This standpipe was constructed during the 1981-82 project, when another water storage tank nearby was demolished and the concrete tank on Tower Lane above old-town Milltown was abandoned.

A summary of the Milltown Water Utility tank information can be found in the following **Table No. 41**.

Table 41
Water Storage Tank Characteristics-Milltown Water Utility

Characteristic	Milltown Tank
Tank Type	Standpipe
Total Capacity (gallons)	304,000
Diameter (ft)	24
Total Tank Height (ft)	90
Overflow Elevation (ft msl)	763
Construction Date	1982
Last Inspection & Service	1996 (see inspection report in **Appendix L**)
Operating Range (ft)	
Current Max. Service Elev. (' msl)	671
Normal Storage (gals @ 35 psi)	37,711
Emergency Storage (gals @ 20 psi)	154,903
Service Level	Main

8. Booster Pumping Stations

There are currently no booster pumping stations in the Milltown Water Utility. A small number of customers in outlying areas have private booster pump systems for their residential service. However, these booster pump systems were installed, and are owned, operated and maintained by the customers.

9. Telemetry and Control System

The Milltown Water Utility's control system consists of two separate systems that work jointly to allow for unattended operation of the high service pumps at the treatment plant and the wells. A radio system signals for the operation and shut-off of the high service pumps at the water treatment plant. The signal is controlled by the elevation of the water in the water tank (to which the pumps transfer water).

The wells are controlled based on the elevation of the water in the clearwell at the water treatment plant. A float system in the clearwell provides signals through a land-line to the control panel in the old wellhouse where Well No. 2 is located. In this way, soon after the high service pumps begin operation, the water level in the clearwell has dropped to the point where the wells are called to operate. When the high service pumps (which typically pump at a higher rate than the wells) are shut off when the water tank is full, the wells continue running until the clearwell is also full, at which time the wells shut-off.

10. Pressure Reducing Valves

There are no main-line pressure reducing valves located in the Milltown Water Utility. The customers in the area along the west side of the Blue River below the hill have individual pressure reducing valves included on their services.

11. Hydraulic Analyses

One of the most valuable engineering tools available to the Milltown Water Utility for the analysis of the existing system, and for the consideration of various alternative improvements, is the computerized hydraulic model. With a computerized model, the strengths and weaknesses of the existing system can be readily determined under a variety of operating conditions. The effects of any proposed modifications to the system can also be readily analyzed in detail to determine the most cost effective solution to any problem that might exist.

To facilitate the analysis of the Milltown Water Utility's high service pumps, elevated storage tank and distribution system, a software package known as Cybernet™ was used. This program is specifically designed to model flow and pressure distributions in water systems. It is currently the most advanced water system modelling product available. A review is provided in **Appendix H** of the capabilities of the computer modelling program and the considerations that were incorporated into the model.

In summary, the computer modelling efforts highlighted the inadequacy of the utility's water supply to meet the peak demands of the system. This problem is intensified by the high elevations of some of the customers served by the utility, which reduces the usable capacity in the water tank. The distribution system was capable of providing less than 500 gpm of fire flow in most locations.

Detailed results of the significant computer model runs are included in **Appendix I**.

12. Water Quality

a. Inorganic Chemicals

The perceived quality of the Milltown Water Utility's raw well water is dependent upon the total content and types of inorganic chemicals. Inorganic chemicals, unless present in substantial quantities, rarely produce undesirable health effects. However, inorganic chemicals can be the cause of water stains and taste and odor problems.

Water naturally contains a number of dissolved inorganic chemicals that together constitute the majority of the total dissolved solids. The major inorganic cations (+) are calcium, magnesium, sodium, and potassium. Major inorganic anions (-) include chloride, sulfate, and carbonates. Water also contains dissolved gases such as carbon dioxide and oxygen that play a major role in the chemistry of the water.

Iron and manganese are inorganic chemicals of importance because of their potential for causing problems commonly known as "red water". Iron will precipitate in wells, mains, and tanks creating a red mass which stains dishware, fixtures, and clothing. Certain types of iron bacteria may also be present. These bacteria may convert the dissolved iron to an insoluble form, producing a semi-solid mass which may collect in water lines, services, meters and valves.

There are no definite limits relative to the amounts of iron which may be present in water without causing problems. The form in which the iron is present, and other characteristics of the water, have considerable bearing on whether the iron content creates an aesthetic problem. As a general rule, waters which contain less that 0.2 mg/l of iron will not cause problems in most cases. Waters which contain from 0.2 to 0.5 mg/l of iron are marginal and waters containing greater than 0.5 mg/l of iron are almost certain to cause some operational problems.

The following **Table No. 42** describes the chemical characteristics of the finished water produced by the Milltown Water Utility. The applicable EPA public water supply standards are also shown. A **primary MCL** represents a concentration which is considered to be potentially harmful to health. A **secondary MCL** is a concentration above which there may create undesirable aesthetic conditions, such as taste and odor or staining, but is not a health risk.

Table 42
Common Inorganic Chemical Concentrations-Milltown Water Utility

Chemical Parameter	Raw Water (mg/l) [1]	Finished Water (mg/l) [1]	Primary MCL (mg/l) [1]	Secondary MCL (mg/l) [1]
Alkalinity (as $CaCO_3$)		240		
Hardness (as $CaCO_3$)		204		
Total Dissolved Solids		416		500
Calcium (as Ca)				
Magnesium (as Mg)				
Sulphate (as SO_4)				
Phosphate (as PO_4)				
pH		7.13		6.5-8.5
Fluoride	1.41		4.0	2
Chloride				250
Copper			based on treatment technique	1.0
Iron				0.3
Lead			based on treatment technique	
Manganese				0.05
Nitrate [2]	1.22	0.700	10	
Nitrite [2]			1	
Potassium				
Sulfate		27.9	500	250

[1] mg/l unless otherwise indicated
[2] Total nitrate/nitrite cannot exceed 10 mg/l

(1) Metals and Other Inorganic Chemicals Concentrations

Concentrations of heavy metals in drinking water can have very dangerous health effects on individuals drinking the water from the system on a regular basis. Besides metals, there are other, less common inorganic chemicals that may be present in the Milltown Water Utility's water supply. Amendments to the Safe Drinking Water Act in the mid-1980's increased the number of metals and inorganic

chemicals that public water supplies needed to sample and analyze.

The following **Table No. 43** shows the allowable limits for heavy metals and other, less common, inorganic chemicals, in public water supplies, and the concentrations found in the Milltown Water Utility's raw water.

Table 43
Metals and Other Inorganic Chemical Concentrations-Milltown Water Utility

Chemical Parameter	Raw Water (mg/l)[1]	Primary MCL (mg/l)[1]	Secondary MCL (mg/l)[1]
Aluminum			0.05-0.2
Antimony	<0.001	0.006	
Arsenic	0.002	0.05	
Asbestos		7 MFL (mill. fibers/liter)	
Barium	0.070	2	
Beryllium	<0.0002	0.004	
Cadmium	<0.0005	0.005	
Chromium	<0.001	0.1	
Cyanide	<0.005	0.2	
Mercury	<0.0002	0.002	
Nickel	<0.010	0.1	
Selenium	0.002	0.05	
Silver			0.10
Sodium	13.7		
Thallium	<0.0005	0.002	
Zinc			5

[1] mg/l unless otherwise indicated

No sampled metals or other inorganic chemicals exceeded regulatory action limits.

(2) Volatile Organic Compounds

Volatile organic compounds (VOCs) are complex and usually of high molecular weight. Many VOCs may be found in nature, but are most often of man-made origin. The VOCs of concern are generally solvents, pesticides or herbicides.

The Milltown Water Utility conducted VOC testing of its raw water in 1993. Of the eight (8) regulated VOC's and other unregulated but monitored compounds, none were detected in the water sample submitted for analysis (there was one test where the substance appeared in the blank, indicating some contamination originating in the testing procedure). Therefore, no further action was warranted by the utility. Copies of the resulting laboratory report are included in **Appendix J**.

(3) Bacteriological Quality

Public water supplies are regularly sampled and tested for the presence of indicator bacteria that, when present, may indicate the presence of fecal contamination in the water supply or distribution system. Fecal contamination may be present in the raw water, be caused by cross-connections in the distribution system, or possibly be caused by some treatment problem.

The Milltown Water Utility had been cited a number of times prior to the construction of the water treatment plant for exceeding the maximum contaminant level for total coliform bacteria (a bacteria used as an indicator of possible contamination). However, since the completion of the treatment plant construction, there have been no documented incidents where the MCL for total coliform has been exceeded.

b. Lead and Copper

Lead and copper are two metals found commonly in the piping of public water systems, and in the plumbing of houses and other buildings. Lead was used in the past to make joints between the water pipes, and for service lines from the water main to the meter. Lead was also commonly used as a pipe material in plumbing, and in the solder used for copper plumbing. Copper remains a common material for use by utilities in service lines between the water main and the meter, and by plumbers in their plumbing work.

Water can be chemically aggressive (meaning it can leach the piping), or it can be neutral or stable (not chemically active) or depositional (meaning that it can deposit lime on the inside walls of the pipe). If a utility's water supply is aggressive, the lead and copper in pipes and joints can leach into the water, raising their concentration to the extent that long-term exposure may create health concerns. Ideally, a water should be neutral or slightly depositional. Many chemical factors affect a water's aggressiveness, including oxygen, temperature, hardness and alkalinity. A common measure of a water's aggressiveness is it's Langlier Stability Index.

Recent amendments to the Safe Drinking Water Act have placed requirements on public water supply utilities to test the water from private faucets and taps to determine the concentration of lead and copper that the utility's residents with maximum exposure are ingesting. One of the concerns with this issue has been that there are a number of plumbing-related issues (such as water softening) that are not within the control of the utility, but that may affect a water's stability.

The Milltown Water Utility has had lead and copper samples collected and tested according to the new government regulations. Twenty samples were collected around the water system. These were tested and the results were issued in January, 1995. The results showed the 90th percentile lead level was 0.001 mg/l in the first sampling, and 0.003 mg/l in the second sampling, both of which are below the Action Level (AL) of 0.015 mg/l for lead. The results

also showed the 90th percentile copper level was 0.113 mg/l in the first sampling, and 0.108 mg/l in the second sampling, both significantly below the Action Level (AL) of 1.3 mg/l for copper. A previous Langlier Stability Index analysis showed a stable water with a stability index of -0.11.

Based on these results, the Milltown Water Utility has been granted a reduced monitoring compliance schedule for lead and copper.

c. Nitrate Monitoring Requirements

The state has adopted standards (327 IAC 8-2-4.1(f)) for the monitoring of nitrates in all public water supply systems, including the Milltown Water Utility. Nitrates are compounds that displace the oxygen in blood, and are the cause for "blue baby" syndrome.

The Milltown Water Utility has been sampling and testing for nitrates and nitrites in the water at the water treatment plant. The results of the tests indicate concentrations of 1.22 mg/l nitrates in the utility's water supply. This concentration is below the MCL of 10.0 mg/l.

d. Other Utility Regulatory Compliance Issues

(1) Additional MCLs and Other Testing Requirements

Under the Safe Drinking Water Act of 1974, the EPA established drinking water standards, now administered by the Indiana Department of Environmental Management, for all public water supply systems. Maximum contaminant levels have been established for Total Trihalomethanes (TTHMs) and thirty-three Synthetic Organic Chemicals (SOCs) that are applicable to the Milltown Water Utility. Continuing sampling and testing for microbiological quality and radionuclides is also necessary for the utility.

B. Marengo Water Utility

1. Utility History

The existing Marengo Water Utility was constructed in the late 1970's in two phases. The first phase involved the construction of the transmission main from Milltown to the eastern side of Marengo. The second phase included the completion of the pump station and transmission main to the new water tank on the west side of town, and the construction of the distribution system within the Town. Prior to the construction of the existing water system, there existed in the town a system comprised of 1 1/4-inch, 1 1/2-inch, and 2-inch polyethylene pipe, and some 3-inch and 4-inch galvanized pipe. The system also had a 25,000 gallon water tank on So. Cherry Street. There are a number of wells located along the Brandywine Fork and the Whiskey Run that were apparently used prior to the construction of this water system.

A map of the Marengo Water System's existing facilities, showing the locations of the raw water well, elevated storage tank and distribution system is included in **Appendix K**.

2. Well Supplies

a. Aquifer Characteristics

(1) Geology

The geology of the area around Marengo is dominated by bedrock structures overlain by a thin layer of soil. Water travels within the bedrock through solution cavities. No well data was available for the existing Springtown Well or other area wells to detail the geology of the utility's wells.

(2) Well Performance

The performance of the Marengo Water Utility's well has historically suffered substantially during extended periods of dry weather. The pumping capacities are reduced, and the well tends to pump muddy water during these times. In the

past, the operator has manually throttled the well discharge valves to regulate the pumping rates during these dry times to keep the quality of the water as acceptable as possible, and to keep the pumps from pumping air (which would cause damage to the pumps). The water is high in sulfate, and the problems with aesthetic water quality increase during dry weather periods.

b. Well Construction

Water supply for the Marengo Water Utility is obtained from one rock well with a submersible pump and electric motor. This well is located adjacent to the Whiskey Run on the north-central side of Marengo. The well is operated manually, and has no standby power available.

(1) Springtown Well

The Springtown well has a reported depth of about 205'. The pump has had maintenance problems when the well is pumped hard during dry weather, and was last repaired in September, 1996.

(2) Poe Well

A small well located along the Brandywine Fork behind the Poe residence is capable of providing a small quantity of water if necessary. Due to its small capacity and lack of regular use, this well will not be considered in the analyses that follow.

(3) Well No. 3

The utility also has an inactive Well No. 3 that won't be included in these engineering analyses.

c. Well and Wellfield Capacities

(1) Historical Well Specific Capacity

The aquifer immediately around a well ultimately degrades in its water-bearing capacity over the years as water is rapidly withdrawn. This is the reason that wells only have a limited functional life. There are certain rehabilitation techniques available to temporarily restore a well's capacity, however, these techniques may be limited in their degree of success, and will only be of value for a limited time. The continuing capacity of the aquifer immediately around the utility's water supply wells to supply water can be measured by the draw-down (in feet) per gallon of water withdrawn. This measure is called the specific capacity of the well.

The Marengo Water Utility's water supply well has been maintained on an as-needed basis, most recently by Mike Dooley, a local well driller. The pumping rate and other characteristics of the wells and well pumps are not measured on an annual basis. However, the well is reported to have a capacity of up to 200 gpm, with a dry-weather capacity that at times does not exceed 140 gpm. In order to determine the long-term life of the wells, information adequate to determine the well's specific capacity over a number of years would be valuable.

(2) Operating Capacities

According to 10 States Standards, the regulatory guidelines used by the Indiana Department of Environmental Management in approving utility construction permits, the total developed groundwater source capacity shall equal or exceed the design maximum day demand and equal or exceed the design average day demand with the largest producing well out of service [8].

(8) Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers (10 States Standards), Section 3.2.1.1, pg. 18, 1992 Edition.

While this regulatory standard allows for no standby well supply to meet maximum day demands, given:

(a) the lack of fast-response pump and motor repair equipment in the locale,
(b) the reduced capacities available in the well during dry-weather periods,
(c) the periodic need to recover after a fire flow, and
(d) the desirability of allowing the aquifer to recover after sustained pumping,

it is recommended that the utility be capable of supplying the maximum day demand with its wells operating at reduced (dry-weather) flows during a 20-hour period of each day. The utility should also have the supply capacity to meet the design average day demand with the largest well out of service. In **Table No. 44** below, both the regulatory requirements and the recommended minimum supply capacities will be shown.

Table 44
Supply Well Characteristics and Capacities-Marengo Water Utility

Characteristic	Springtown Well
Type of Construction	Rock
Total Well Depth (ft)	205'
Static Water Depth (ft)	
Depth-Top of Screen (ft)	
Column Pipe Dia. (in)	6-inch
Design Pumping Rate	200
Emergency Power Availability	No
Date of Construction	
Last Well Test and Maintenance	1996-Pump/Motor
Current Well Capacities	
(Gallons Per Minute Output) [1]	145
Current Wellfield Capacities [1]	
Regulatory Capacity (Gallons Per Day, Peak Day/Avg. Day)	208,800 / 0
Rated Wellfield Capacity (Gallons Per Day, Peak Day/Avg. Day) [2]	174,000 / 0
Rated Wellfield Output (Gallons Per Minute)	0

[1] Based on historical dry-weather pumping rates
[2] Based on 20 hours operating time daily

Refer to the overall system map included in **Appendix F** for the locations of this well.

3. Wholesale Water Supply Agreements

The Marengo Water Utility currently has no agreements to obtain potable or unfinished water. The utility, however, does have a physical interconnection with the Milltown Water Utility to obtain potable water through a 6-inch transmission main along SR 64 and a 150 gpm pump station along SR 64 on the east side of Town. Milltown Water Utility has been providing water to the Marengo Water Utility on an as-needed basis through this main and pump station.

4. Water Treatment

The Marengo Water Utility provides chlorination of the water supply obtained from its well with a hypochlorinator located in the wellhouse. No other treatment is provided.

5. Distribution System

The Marengo Water Utility's distribution system is comprised of water mains, and includes various fittings (such as crosses, tees and elbows), valves, fire hydrants and flush hydrants, along with the service connections, to provide water service to its customers. An optimally designed distribution system should also include many loops, and the fewest possible dead-end lines. Many portions of the distribution system (the larger water mains) are also designed to provide fire protection service, and have adequate capacity to carry enough water to a fire hydrant for the fire department's needs (called a fire flow). The majority of the water mains in the distribution system are made of PVC pipe.

a. Service Levels

Distribution systems are often (particularly in hilly areas) divided into different service levels that are (hydraulically) separated from the other service levels, and there are no open piped connections between service levels except through a pump (going to a higher service level), or through a pressure reducing valve (going to a lower service level). Each service level also needs either a water tank or a hydropneumatic pressure boosting system to provide pressure in that service level, and service levels can be designed so that water is pumped through to another service level, as well as serving the customers on that service level.

Each service levels has a different pressure at any particular elevation, and the service levels are designed so that the customer at a particular elevation can connect to a pipe that has the correct pressure range for safe and usable service. If water pressure is inadequate, the possibility of contamination is increased. If water

pressure is too great, the maintenance on the water system is increased, and the customer may have plumbing problems.

The Marengo Water Utility's distribution system has only one service level, so all demands are served by the existing standpipe. There are problems with low pressure for customers at higher elevations.

b. Distribution System Inventory

(1) Water Mains

Table No. 45 has been provided to summarize the utility's current inventory of water mains and hydrants.

Table 45
Existing Distribution System Inventory-Marengo Water Utility

Description	Length (ft)	Percent of Total (%)
Water Distribution Mains		
12" Water Main	N/A	0.0%
10" Water Main	490	0.6%
8" Water Main	3,662	4.8%
6" Water Main	20,387	26.6%
4" Water Main	15,945	20.8%
3" Water Main	N/A	0.0%
2" or Smaller Water Main	8,574	11.2%
6-Inch Transmission Main	27,500	35.9%
Total	**76,558**	**100.0%**
Dead Ends	6	

(2) Fire Hydrants and Flush Valves

The Marengo Water Utility has numerous fire hydrants and flush valves located throughout the distribution system. A fire hydrant is defined as an above-ground dry barrel or wet barrel hydrant on at least a 6-inch water main with a

minimum 4 1/2" valve. If a hydrant is on a 4-inch or smaller main, it is considered to be a flush valve.

The following **Table No. 46** shows the utility's current inventory of fire hydrants and flush valves.

Table 46
Existing Hydrant Inventory-Marengo Water Utility

	Marengo Water Utility	
Description	**Number**	**Percent of Total (%)**
Hydrants		
Fire Hydrants	≈75	96%
Above-Ground Flush Hydrants	3	4%
Below-Ground Flush Hydrants	0	0%

6. Water Storage

Elevated water storage serves a number of important functions in the Marengo Water Utility's system. The most common, and arguably the most valuable function that the water tank serves is to provide to the distribution system the peak flows demanded by the utility's customers, particularly during the dry, hot high water usage times of the year, such as during a hot summer afternoon. By serving this function, the water tank allows the utility to size its well field for that highest daily demand of the utility's customers (not the peak hour demand, which is substantially higher). Through much of the year, the peak hourly demands are no greater than well capacity, and the water tank stays full. But in the high water use times, the water tank is designed to drain somewhat during the day, and fill again at night. In serving the utility's customers in this way, the water tank also provides water pressure within the system (an important function in protecting the quality of the water) by suspending water at an elevation above the customer's home, allowing the water to flow down from the tank to the customer's tap.

There are a number of criteria that the utility should meet in determining the capacity of its storage facilities. First, it must be remembered that **the total capacity of the standpipe is not available to the utility**. Only the water in that part of the tank which is over 81' above the highest customer's

service is available for regular customer demands (this provides the minimum 35 psi of normal operating water pressure). Additionally, only the water that is more than 47' above the highest customer service is available for fire protection (providing the minimum 20 psi emergency water pressure requirement).

In 10 States Standards there are a number of recommended minimum storage tank requirements that need to be met by the utility. First, fire flow requirements should be satisfied where fire protection is provided. Secondly, minimum storage capacity (or equivalent capacity) for systems not providing fire protection should be equal to the average daily consumption (however, this requirement may be reduced when the source and treatment facilities have sufficient capacity **with standby power** to supplement peak demands of the system) [9]. Finally, the storage tank should provide a minimum working pressure of 35 psi, and the maximum variation in the tank should not exceed 30 feet [10]. The recommended working pressure is 60 psi, and services with pressures exceeding 100 psi should have pressure reducing devices.

The two other major functions of the utility's water tank are to provide a storage of water for fire protection and in case of a major utility emergency. In the case of the Milltown-Marengo Water Utility, the design fire flow used for this report is 500 gpm for a period of 2-hours, necessitating that the storage tank maintains at least 60,000 gallons of water even during the peak customer usage time that is available and where the system water pressure does not go below 20 psi. The Ten States Standards provides that "Fire flow requirements established by the appropriate state Insurance Services Office should be satisfied where fire protection is provided." [11] The water tank also stores water that the customers can use in case a major emergency happens in the utility, such as an area-wide power outage. During the time that the mechanical facilities in the utility are being repaired, the water in the tanks is available to the utility's customers.

(9) Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers (10 States Standards), Section 7.0.1, pg 106, 1992 Edition.

(10) Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers (10 States Standards), Section 7.3.1, pg 113.

(11) Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers (10 States Standards), Section 7.01.a., pg. 106, 1992 Edition.

The engineering analyses of storage capacity required by the Marengo Water Utility are based on supplying the needed fire flow at the rated duration during the peak hours of the design peak day. Unfortunately for all water utilities, it is that time when the utility is least likely to have excess water available for fire protection that is also the most likely time that a fire will occur. These conditions, on which the engineering analyses are made, provide the most conservative results reasonably obtainable.

Storage for the Marengo Water Utility is provided by a single standpipe located on top of a hill near the western side of the current service area. This standpipe was constructed during the late 1970's during the construction of the majority of the distribution system.

A summary of the Marengo Water Utility tank information can be found in the following **Table No. 47**.

Table 47
Water Storage Tank Characteristics-Marengo Water Utility

Characteristic	Milltown Tank
Tank Type	Standpipe
Total Capacity (gallons)	336,000
Diameter (ft)	25
Total Tank Height (ft)	91.5
Overflow Elevation (ft msl)	834
Construction Date	1978
Last Inspection & Service	Unknown
Operating Range (ft)	
Current Max. Service Elev. (' msl)	763
Normal Storage (gals @ 35 psi)	(37,000)
Emergency Storage (gals @ 20 psi)	88,000
Service Level	Main

7. Booster Pumping Stations

A booster pumping station rated for 150 gpm at 100' TDH is located at the end of the transmission main from Milltown, adjacent to SR 64. This booster

station is designed to pump water purchased from the Milltown Water Utility to the standpipe. This water source is now only used in emergencies. There are no booster pumping stations in the Marengo Water Utility distribution system to increase the pressure in specific areas, nor are there any customers in outlying areas that have private booster pump systems for their residential service.

8. Pressure Reducing Valves

There are no main-line pressure reducing valves located in the Marengo Water Utility.

9. Telemetry and Control System

A telemetry system that allowed for the automatic operation of the booster pumping station from the Milltown Water Utility has been abandoned. The wells are operated manually, and no telemetry system is currently in use in the utility.

10. Hydraulic Analyses

One of the most valuable engineering tools available to the Marengo Water Utility for the analysis of the existing system, and for the consideration of various alternative improvements, is the computerized hydraulic model. With a computerized model, the strengths and weaknesses of the existing system can be readily determined under a variety of operating conditions. The effects of any proposed modifications to the system can also be readily analyzed in detail to determine the most cost effective solution to any problem that might exist.

To facilitate the analysis of the Marengo Water Utility's well, elevated storage tank and distribution system, a software package known as Cybernet™ was used. This program is specifically designed to model flow and pressure distributions in water systems. It is currently the most advanced water system modelling product available. A review is provided in **Appendix H** of the capabilities of the computer modelling program and the considerations that were incorporated into the model.

In summary, the computer modelling efforts highlighted that the water supply situation in the Marengo Water Utility is in critical condition. The modelling also indicated that the connection of customers on North Main Street, the mobile home park along Depot Street, and the customers along South Cherry Street need to be provided a pressure boosted service in order to provide adequate capacity in the existing standpipe. The existing water line sizing is adequate for the utility's needs during the Planning Period. The water tank sizing is adequate during the Planning Period if the utility develops an adequate water supply, and provides pressure boosting systems to the indicated customers.

Detailed results of the significant computer model runs are included in **Appendix I**.

11. Water Quality

The Marengo Water Utility, the Town Board and IDEM have been receiving complaints about discolored water, taste and odor from the utility's customers. These complaints occur on a periodic basis, but the problem appears to be widespread when it does occur. Often, the Town has tracked the source of odors to the anode in the customer's hot water heater.

a. Inorganic Chemicals

The perceived quality of the Marengo Water Utility's raw well water is dependent upon the total content and types of inorganic chemicals. Inorganic chemicals, unless present in substantial quantities, rarely produce undesirable health effects. However, inorganic chemicals can be the cause of water stains and taste and odor problems.

Water naturally contains a number of dissolved inorganic chemicals that together constitute the majority of the total dissolved solids. The major inorganic cations (+) are calcium, magnesium, sodium, and potassium. Major inorganic anions (-) include chloride, sulfate, and carbonates. Water also contains dissolved gases such as carbon dioxide and oxygen that play a major role in the chemistry of the water.

Iron and manganese are inorganic chemicals of importance because of their potential for causing problems commonly known as "red water". Iron will precipitate in wells, mains, and tanks creating a red mass which stains dishware, fixtures, and clothing. Certain types of iron bacteria may also be present. These bacteria may convert the dissolved iron to an insoluble form, producing a semi-solid mass which may collect in water lines, services, meters and valves.

There are no definite limits relative to the amounts of iron which may be present in water without causing the above described problems. The form in which the iron is present and other characteristics of the water have considerable bearing on whether the iron content is creating aesthetic problems. As a general rule, waters which contain less that 0.2 mg/l of iron will not cause problems in most cases. Waters which contain from 0.2 to 0.5 mg/l of iron are marginal and waters containing greater than 0.5 mg/l of iron are almost certain to cause some operational problems.

The following **Table No. 48** describes the chemical characteristics of the finished water produced by the Marengo Water Utility. The applicable EPA public water supply standards are also shown. A **primary MCL** represents a concentration which is considered to be potentially harmful to health. A **secondary MCL** is a concentration above which there may be undesirable aesthetic conditions, such as taste and odor, or staining. However, exceeding secondary MCLs does not indicate a potential health threat.

Table 48
Common Raw Water Chemical Characteristics-Marengo Water Utility

Chemical Parameter	Raw Water (mg/l) [1]	Finished Water (mg/l) [1]	Primary MCL (mg/l) [1]	Secondary MCL (mg/l) [1]
Alkalinity (as $CaCO_3$)	314			
Hardness (as $CaCO_3$)	638			
Total Dissolved Solids				500
Calcium (as Ca)	194			
Magnesium (as Mg)	50			
Sulphate (as SO_4)				
Phosphate (as PO_4)	<0.09			
pH				6.5-8.5
Fluoride	2.94		4.0	2
Chloride	11			250
Copper			based on treatment technique	1.0
Iron	<0.10			0.3
Lead			based on treatment technique	
Manganese	<0.02			0.05
Nitrate [2]	0.68		10	
Nitrite [2]	<0.01		1	
Potassium	3.0			
Sulfate	975		500	250

[1] mg/l unless otherwise indicated
[2] Total nitrate/nitrite cannot exceed 10 mg/l

The concentration of sulfate reported on a sample taken on October 6, 1993 exceeded both the secondary and primary maximum contaminant levels.

(1) Metals and Other Inorganic Chemical Concentrations

Concentrations of heavy metals in drinking water can have very dangerous health effects on individuals drinking the water from the system on a regular basis. Besides metals, there are other, less common inorganic chemicals that may

be present in the Marengo Water Utility's water supply. Amendments to the Safe Drinking Water Act in the mid-1980's increased the number of metals and inorganic chemicals that public water supplies needed to sample and analyze.

The following **Table No. 49** shows the allowable limits for heavy metals and other, less common, inorganic chemicals, in public water supplies, and the concentrations found in the Milltown Water Utility's raw water.

Table 49
Metals and Other Inorganic Chemical Concentrations-Marengo Water Utility

Chemical Parameter	Raw Water (mg/l)[1]	Primary MCL (mg/l)[1]	Secondary MCL (mg/l)[1]
Aluminum			0.05-0.2
Antimony	0.003	0.006	
Arsenic	<0.002	0.05	
Asbestos		7 MFL (mill. fibers/liter)	
Barium	0.020	2	
Beryllium	<0.0002	0.004	
Cadmium	<0.0001	0.005	
Chromium	<0.001	0.1	
Cyanide		0.2	
Mercury	<0.0002	0.002	
Nickel	<0.01	0.1	
Selenium	<0.002	0.05	
Silver			0.10
Sodium	17.2		
Thallium	<0.002	0.002	
Zinc			5

[1] mg/l unless otherwise indicated

No sampled metals or other inorganic chemicals exceeded regulatory action limits. The utility has received a waiver from

the sampling and testing of asbestos based on the lack of asbestos-cement pipe in the distribution system.

(2) Volatile Organic Compounds

Volatile organic compounds are complex, usually high molecular weight, many of which may be found in nature, but are most often of man-made origin. The VOCs of concern are generally solvents, pesticides or herbicides.

The Marengo Water Utility conducted VOC testing of its raw water in 1993. Of the eight (8) regulated VOC's and other unregulated but monitored compounds, none were detected in the water sample submitted for analysis (tests for a number of compounds could not be completed due to the heavy chlorination of the sample). Copies of the resulting laboratory report are included in **Appendix J**.

(3) Bacteriological Quality

Public water supplies are regularly sampled and tested for the presence of indicator bacteria that, when present, may indicate the presence of fecal contamination in the water supply or distribution system. Fecal contamination may be present in the raw water, be caused by cross-connections in the distribution system, or possibly be caused by some treatment problem.

The Marengo Water Utility had not historically experienced problems with positive bacteriological test results. However, the utility has, within the last few months, been receiving positive test results from its bacteriological samples.

b. Lead and Copper

Lead and copper are two metals used commonly in the piping of public water systems, and in the plumbing of houses and other buildings. Lead was used in the past to make joints between the

water pipes, and for service lines from the water main to the meter. Lead was also commonly used as a pipe material in plumbing, and in the solder used for copper plumbing. Copper is a common material used in service lines from the water main to the meter, and in plumbing. If a utility's water supply is aggressive, the lead and copper in these pipes and joints can leach into the water, raising the concentration of these metals in the water to the extent that long-term exposure may create health concerns.

A water can be aggressive (meaning it can leach the metal of the piping), or it can be neutral or stable (not chemically active) or depositional (meaning that it can deposit lime on the inside walls of the pipe). Ideally, a water should be neutral or slightly depositional. Many chemical factors affect a water's aggressiveness, including oxygen, temperature, hardness and alkalinity. A common measure of a water's aggressiveness is it's Langlier Stability Index.

Recent amendments to the Safe Drinking Water Act have placed requirements on public water supply utilities to test the water from private faucets and taps to determine the concentration of lead and copper that the utility's residents are ingesting. One of the concerns with this issue has been that there are a number of plumbing-related issues (such as water softening) that are not within the control of the utility, but that may affect a water's stability.

The Marengo Municipal Water Utility has had lead and copper samples collected and tested according to the new government regulations. Based on these results, the Marengo Water Utility has been granted a reduced monitoring compliance schedule for lead and copper.

c. Nitrate Monitoring Requirements

The state has adopted standards (327 IAC 8-2-4.1(f)) for the monitoring of nitrates in all public water supply systems, including the Marengo Water Utility. Nitrates are compounds that displace the oxygen in blood, and are the cause for "blue baby" syndrome.

The Marengo Water Utility has been sampling and testing for nitrates and nitrites in the water at the water treatment plant. The results of the tests indicate concentrations of less than 1.0 mg/l nitrates in the utility's water supply. This concentration is below the primary MCL of 10.0 mg/l.

d. Other Utility Regulatory Compliance Issues

(1) Additional MCLs and Other Testing Requirements

Under the Safe Drinking Water Act of 1974, the EPA established drinking water standards, now administered by the Indiana Department of Environmental Management, for all public water supply systems. Maximum contaminant levels have been established for Total Trihalomethanes (TTHMs) and thirty-three Synthetic Organic Chemicals (SOCs) that are applicable to the Marengo Water Utility. Continuing sampling and testing for microbiological quality and radionuclides is also necessary for the utility.

SECTION VII - NEEDS ASSESSMENT

In previous sections, the existing populations and current demands were analyzed. With this information and the population projections, the demands on the utilities during the Planning Period were projected. In the last section, the existing conditions and capacities of each utility's water system were detailed.

In this section, the needs of each water utility are reviewed. The first part of this section (existing system needs) discusses each utilities' current needs in order to meet regulatory and prudent engineering standards. A review is also provided of existing operational problems that the utilities are experiencing. The second part of this section (additional needs through planning period) identifies the additional improvements that each utility is projected to need to meet their future customer's demands during the Planning Period.

A. Existing System Needs

1. Milltown Water Utility

a. Water Supply

(1) Quantity

The Milltown Water Utility has three wells supplying its water treatment plant. Well Nos. 1 and 3 are typically used, while Well No. 2 is held on standby. Use of Well Nos. 1 and 2 at the same time results in a loss of capacity in both wells since they influence each other.

The following **Table No. 50** compares the current well capacities with the minimum regulatory and recommended capacities.

Table 50
Comparison of Existing and Required Well Capacities-Milltown Water Utility

Well Operating Condition	Capacity (gpm)	Average Day Demands[1]	Actual Peak Day Demands[1]	Excess/ (Deficit) (gpm)	Recomm. Peak Day Capacity[1]	Excess/ (Deficit) (gpm)
Wells 1 & 3 Operating (Soft Capacity)	145		174	(29)	209	(64)
Wells 2 & 3 Operating (Firm Capacity)	95	56		39		

[1] These demands DO NOT include water demands by the Marengo Water Utility

Clearly, the Milltown Water Utility must increase its water supplies to serve its current customers, and additional supplies (above the quantities described above) are necessary for the utility to serve the Marengo Water Utility during peak demand periods.

(2) Possible Surface Water Influence

The possibility of surface water influence on the Milltown Water Utility's wells remains a major area of concern. A final determination as to the presence of a surface water influence has yet to be made by IDEM.

If it is determined that the groundwater pumped by the utility's wells is under the influence of surface water, an engineering report and pilot plant study (small-scale treatability study) will need to be conducted to confirm the treatability of the surface water particles, and to determine the effective rate at which the treatment plant can be operated. The utility will then need to modify the treatment system into a direct filtration plant, and operate the plant at a rate that does not exceed the effective treatment rate. A direct filtration plant provides coagulation (with a chemical such as alum or ferric chloride) and flocculation (but no sedimentation), in addition to the treatment currently being provided [12].

[12] Refer to 327 IAC 8-2-1(17) for a definition of "direct filtration", and 327 IAC 8-2-8.5 for information about the study and treatment regulations.

Other considerations that the utility may need to address if the wells are found to be under the influence of surface water include chlorine contact time for disinfection [13], baffling within the clearwell to limit short-circuiting to allow its use as a post-chlorination basin [14], and the presence of a certified operator during all operating hours [15].

(3) Standby Power Connection

The Milltown Water Utility's wellfield is currently served by a single electrical supply. While the electrical supply to the motors on the well pumps has proven to date to be reasonably reliable, it is recommended that a quick-connect with a manual throw-switch be installed so that the utility can provide emergency power to the wells with the use of a portable generator. The utility would need to make arrangements with other local utilities, communities or contractors for the availability and use of these generators on an as-needed basis.

b. Water Treatment

(1) Control System

The current control system for the high service pumps at the treatment plant and for the wells does not allow for adequate versatility or operator information for decision-making. For example, the operator has had to install a bubbler pressure gauge to determine the water level in the clearwell, and there is no method to directly determine the height of the water in the standpipe. This information is particularly important during unusual operating conditions such as during a fire, manual filling of the water tank, or during pump or well problems or repairs.

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(13) see 327 IAC 8-2-8.6

(14) Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers (10 States Standards), Section 4.3.2, pg. 58, 1992 Edition.

(15) see 327 IAC 8-2-8.5(d), which is being interpreted currently by IDEM to mean certified operator attendance during all times that the plant is in operation.

As with the high service pumps, the well controls are also difficult for the operator to use. The well control panel is located in the old pumphouse in the wellfield, and has no manual operating mode on the switches, nor any alternating capabilities. When manually operating the wells, there is no information available as to the water level in the clearwell, nor any lights confirming well pump operation.

The Milltown Water Utility's water treatment plant should have a master control panel located in the filter building which has digital level indicators for the water levels in the standpipe and the clearwell, and has H-O-A switches with operating condition lights (green for "on", and red for "off") for the high service pumps and for each of the wells. A 7-day circular chart level recorder should be provided for the water level in the standpipe, and hourmeters should be provided for the high service pumps and the wells.

(a) Clearwell High Service Pump Shut-Off Controls

In the clearwell at the water treatment plant, a low-water cut-off float was installed during the plant construction in 1993. The manner that this low-water cut-off was wired causes the high service pumps to "bump" or turn on for just a moment as the clearwell level rises slightly above the cut-off level, only to be turned off right away as the level in the clearwell again falls below the cut-off level due to the water being pumped out.

An additional float and necessary control relays needs to be installed in the clearwell control system. The low-water cut-off for the high service pumps should function, when these additions are made to the control system, so that the high service pumps remain off after reaching the low-water cut-off level until the water rises to the new float level, which

should be set about 1 foot above the low-water cut-off level.

(b) Alarm Dialer

With the current control system at the water treatment plant, there is no method for notification of utility personnel about problems with the plant. An alarm dialer should be installed, along with telephone service and the necessary controls to allow dialer notification for the following events:

i) low clearwell level, and
ii) low standpipe level.

This alarm dialer should have adequate contacts to allow for the connection of additional alarms in preparation of future plant expansions or alarm conditions, and for additional water tank level alarms.

(2) Iron Removal

The iron content of the water supply for the Milltown Water Utility is adequately high to create aesthetic taste and odor concerns among the utility's customers, and to cause staining on plumbing fixtures and in clothing. The water treatment plant was designed to accommodate an aerator on top of the reaction basin, but the unit was deleted in the previous project as one of the actions taken to bring the project within budget.

It is recommended that an induced-draft aerator be installed on top of the existing reaction basin to improve the iron removal capabilities of the treatment system.

(3) Post-Chlorination

The Milltown Water Utility's water treatment plant currently provides pre-chlorination of the water entering the plant through an injector located in the piping outside of the plant. The plant should also be capable of providing post-chlorination of the water as it leaves the plant.

(4) Chlorinator Room Heating

The chlorinator room at the treatment plant currently is not heated. The room has a number of small diameter PVC pipes which carry chlorine solution and are subject to freezing and breaking. Additionally, the chlorinators tend to become problematic if any moisture enters the chlorinator, or the temperature drops. The capacity of the chlorine tanks to discharge chlorine gas into the system is also substantially reduced if the temperature in the room is low. Heating is necessary to address these problems.

(5) Standby Power Connection

As with the well field, the water treatment plant does not have a standby power system, and is served from a single electrical supply. A quick-connect with manual throw switch should be installed at the plant of the same type that should be located in the well field. Arrangements should be made to have a portable generator available to the utility in the event of a major power failure for the operation of the water treatment plant.

c. Water Loss

The Milltown Water Utility is faced with an exceptionally high water loss due to aging pipes (and particularly joints) from the 1930's era original water system. The utility's supply, treatment and storage facility capacity requirements are all increased by the excessive water loss. The utility has been conducting an aggressive repair

program on these mains, and has had success in reducing the water loss. However, the ultimate solution to the problem must be the replacement of these mains, since they have reached the end of their useful life. A program of replacement of the aging water mains in "old town" Milltown needs to be undertaken as part of the larger work required for the utility.

d. Distribution System Upgrades

During the computer modelling of the Milltown Water Utility's existing water system, the one major weakness that was identified was the lack of fire flow capability within the Town. The Town must decide whether the costs to strengthen the distribution system within the community to provide increased fire flow capabilities is worth the benefits received, and the reduced insurance rates that may be obtained for the residents.

Based on the information provided by the ISO, it appears that there is no one feature of the Key Rating (receiving and handling fire alarms, fire department and water supply) that has a credit which is substantially higher or lower, proportionately, than the others. For this reason, the Town may wish to consider some "across the board" upgrades to increase the Town's Key Rating, but a focus on the water distribution system for this purpose is not warranted.

e. Water Storage

The water storage capacity available in the Milltown Water Utility's existing water tank is inadequate to meet the peak demands of the utility's customers while maintaining the necessary 35 psi minimum pressures. Only 12.4% of the total storage capacity (37,700 gallons) is available for this purpose. The reason for this situation is that the utility serves a number of areas by gravity that are quite high in elevation. In order to resolve this situation, the utility should increase the usable capacity in the existing water storage tank by providing individual or main-line pressure boosting systems to customers at elevations higher than 637' msl. This work would increase the usable capacity in the existing water storage tank to 150,000 gallons.

(1) Pressure Boosting Systems

(a) Main-Line Pressure Boosting Stations

i) Construct a small main-line pressure boosting stations to serve Elk Street,
ii) Construct a small main-line pressure boosting stations to serve German Street,
iii) Construct a small main-line pressure boosting stations to serve Quarry Lane, and
iv) Construct a small main-line pressure boosting stations to serve Broadway St. (west end).

(b) Individual Pressure Boosting Areas

Construct and convey to the homeowners (subject to financial requirements) breakwater suction tanks and individual pressure boosting stations for the services in the following areas:

i) Tower Hill,
ii) Schools on Speed Rd.,
iii) hill near existing water tank,
iv) Hill Street, and
v) north of SR 64.

(2) Existing Water Tank Rehabilitation and Improvements

A tank inspection was performed on Milltown Water Utility's standpipe by CT Tank Services, Inc. on August 23, 1996. The tank inspection, as well as other observations of the standpipe, highlighted the rehabilitation needs of the tank. The existing standpipe requires rehabilitation and improvements work, including:

(a) the installation of a cathodic protection system,
(b) replacement of the flexible sealant at the joint between the tank bottom and the foundation,
(c) the replacement of the insect screen on the roof vent,

(d) the installation of an air gap on the end of the overflow pipe with a flapper valve or insect screening,
(e) the anchor bolts should be cleaned and painted,
(f) the climbing device should be repositioned in the center of the exterior ladder,
(g) the spot repair of the exterior paint system and installation of an exterior overcoat,
(h) the removal and replacement of the interior paint system, and
(i) the installation of an pressure sustaining/altitude valve and vault.

The pressure sustaining/altitude valve and vault is necessary for a variety of reasons. First, an altitude valve is necessary as a part of the control system of when the second tank is built on the Main Service Level. The valve in the vault should also include the provisions to function as a pressure sustaining valve to allow the existing tank to be drained and rehabilitated. The vault should include a valving arrangement such that the water flowing through the pressure sustaining valve can be directed to either the tank or to waste when the valve is functioning as a pressure sustaining valve. This valve and vault should be constructed before any maintenance or rehabilitation work necessitating draining is conducted on the existing standpipe.

A copy of the Tank Inspection Report of Milltown Water Utility's standpipe is included in **Appendix K**.

2. Marengo Water Utility

a. Water Supply

(1) Quantity

The Marengo Water Utility is in a precarious position, lacking adequate water supply capacity, having only one well, and

without an agreement with Milltown for backup water supply when needed.

The following **Table No. 51** compares the current well capacities with the minimum regulatory and recommended capacities.

Table 51
Comparison of Existing and Required Well Capacities-Marengo Water Utility

Well Operating Condition	Capacity (gpm)	Average Day Demands	Actual Peak Day Demands	Excess/ Deficit (gpm)	Recomm. Peak Day Capacity	Excess/ Deficit (gpm)
Springtown Well Operating (Soft Capacity)	140		141	(1)	169	(29)
Springtown Well (Largest) Out of Service (Firm Capacity)	0	65		(65)		

While the existing well is marginally adequate to serve the peak day demands of the utility's current customers, the Marengo Water System is in critical need of additional water supplies, both for its existing customers, as well as for new customers due to the anticipated growth. Clearly, the Marengo Water Utility must increase its water supply quantity and reliability to serve its customers.

(2) Bacteriological Quality

The positive results of the recent bacteriological samples could be caused by a variety of problems. The samples could easily be contaminated during the sampling process or at the laboratory. The specific sampling locations could create difficulties in obtaining a representative sample. Or, there could be problems with the well itself or with the groundwater supply, or with some portion of the distribution system. Before action can be taken, the Marengo Water Utility needs to track down the cause of this problem.

(3) Control System

The lack of a control system for the utility's well creates difficulties in the operations of the system by allowing the storage tank water level to drop below optimal levels, necessitating operator attendance every day throughout the year, and occasionally causing overflows (since there is no telemetry indicating the tank water level from the well control house).

The utility should have a radio control system for the existing Springtown Well and any additional wells or water supplies that are acquired.

b. Water Treatment

(1) Iron Concentrations

The iron content of the water supply for the Marengo Water Utility is adequately high to create aesthetic taste and odor concerns among the utility's customers, and to cause staining on plumbing fixtures and in clothing. Currently the utility does not provide any treatment for the iron concentrations in the water, which should be considered by the utility.

(2) Sulfate Concentrations

Sulfate is an (-) anion that is often present in small concentrations in groundwater. The action of anaerobic bacteria in the groundwater and the distribution and plumbing systems can change this sulfate into hydrogen sulfide, causing this highly unpleasant rotten egg odor, or swampy and fishy tastes and odors. High sulfate concentrations can cause diarrhea in persons not used to this chemical in the water supply, and is regulated by the state and federal government.

The concentration of sulfate in Marengo's water supply seems to vary with time, but has been tested at concentrations substantially higher than the primary maximum contaminant level set by the federal government. The utility should consider providing treatment for this chemical.

c. Distribution System Upgrades

(1) Fire Flow Upgrades

There are three components of the Key Rating that ISO Commercial Risk Services issues for municipalities. The three components of the Key Rating are receiving and handling fire alarms, fire department and water supply. The water supply can receive a possible 40% of the total credit that makes up the Key Rating. The Fire Department can receive a possible 50% of the total credit, and receiving and handling fire alarms represents a possible 10% of the total credit. The higher the credit, the better the Key Rating and the lower the property insurance premiums will be for the Town's population. A divergence factor is also assigned to the Key Rating. This divergence factor represents a reduction in the credit for the proportional difference in each of the components from the others.

Based on the classification details and improvement statements provided by the ISO about the Marengo Water Utility, it appears that the credit for the water utility represents the majority of the Key Rating credit for the Town. This means that the water system's credit that is substantially higher, proportionately, than the others. For this reason, the Town would gain greater benefit by focusing on improvements to the fire department to help the Town's Key Rating, instead of the water system (the improvements to the fire department would not only increase the credit, but reduce the diversity factor).

(2) Dead End Mains

There are a number of dead-end mains in the Marengo Water Utility. Unfortunately, these dead-ends are generally along SR 66. Crossing the state highway, which would require a jacking and boring operation through the rock, would be exceedingly expensive, and the benefits would probably not be worth the cost.

d. Water Storage

(1) Water Tank Inspection and Rehabilitation

The Marengo Water Utility's water storage tank is reported to have a grease coating on the interior. The tank has not been inspected for at least 5 years, which is the maximum life that is normally encountered for this type of coating system. The storage tank needs to be inspected and the recommendations from the inspection need to be implemented.

(2) Water Tank Available Storage Capacity Improvements

The water storage capacity available in the Marengo Water Utility's existing water tank is inadequate to meet the peak demands of the utility's current customers while maintaining the necessary 35 psi minimum pressures. With customers served on the higher elevations, including the hill near the tank, the mobile home park to the southeast, and North Main Street, none of the storage capacity is currently available while still meeting this minimum pressure requirement. Additionally, the anticipated fire protection needs of the quarry/warehouse project and the new customers to the water system created by this industry add to the water storage problems. In order to resolve this situation, the utility should both increase the usable capacity in the existing water storage tank by providing main-line pressure boosting systems to customers at elevations higher than 725' msl and

provide an additional storage tank on the hill under which the quarry/warehouse project is located. This tank should not be located above any excavations. This work would increase the usable capacity in the existing water storage tank during normal operations to 102,000 gallons, which is projected to be adequate (with the indicated water supplies) to serve the Marengo Water Utility throughout the Planning Period.

The capacity available in the existing storage tank for fire flows would be increased to 157,000 gallons with this work. This 157,000 gallon capacity is adequate for the design fire flow of 1,250 gpm for 2 hours (not considering the as-yet to be determined fire flow requirements of the quarry/ warehouse).

(a) Pressure Boosting Stations

i) Construct a small main-line pressure boosting station to serve North Main Street,

ii) Construct a small main-line pressure boosting station to serve the mobile home park along Depot Street, and

iii) Construct a small main-line pressure boosting station to serve the Fancher Heights Addition and South Cherry Street, along with a small parallel water main. The parallel water main is necessary to maintain the use of the existing transmission main along South Cherry Street to the existing water tank.

(3) Pressure Sustaining Valve

A pressure sustaining valve and vault is necessary at the water tank for the Marengo Water Utility to drain, inspect and rehabilitate the existing water tank. The valve in the vault should function as a pressure sustaining valve, and should include a bypass piping arrangement, and a valving arrangement so that the water flowing through the valve can

be directed either to the tank or to waste. This valve should be installed before any tank work.

B. Additional Needs Through Planning Period

1. Milltown Water Utility

a. Water Supply Requirements

The Milltown Water Utility will require substantial additional quantities of potable water during the Planning Period if it wants to expand its service area to the extent desired. If the proposed riverboat is sited at Leavenworth, the water supply needs of the utility will increase to an even greater extent. The following **Table No. 52** indicates the dry weather (lowest pumping rate) water supply capacities that are recommended during the Planning Period if the riverboat is not sited at Leavenworth.

Table 52
Projected Water Supply Requirements w/o Riverboat-Milltown Water Utility[1]

Year	Peak Day Demands (gpd)	Required Supply (gpm)[2]	Current Supply (gpm)	Excess/Deficit (gpm)
1997	273,879	228	145	(83)
1998	281,506	235	145	(90)
1999	305,286	254	145	(109)
2000	329,066	274	145	(129)
2001	353,397	294	145	(149)
2002	377,728	315	145	(170)
2003	402,656	336	145	(191)
2004	427,584	356	145	(211)
2005	453,028	378	145	(233)
2006	478,472	399	145	(254)
2007	504,468	420	145	(275)
2008	530,463	442	145	(297)
2009	557,009	464	145	(319)
2010	583,555	486	145	(341)
2011	609,550	508	145	(363)
2012	635,545	530	145	(385)
2013	661,816	552	145	(407)
2014	688,087	573	145	(428)
2015	714,633	596	145	(451)
2016	741,179	618	145	(473)

[1] These demands DO NOT include water demands by the Marengo Water Utility
[2] Based on 20-hour operating time with the smaller of the wells influenced by others on standby

If the riverboat is sited at Leavenworth, an even greater water supply will be required by the Milltown Water Utility. The following **Table No. 53** indicates the projected dry-weather (lowest pumping rate) water supply needs of the utility if Crawford County is successful in obtaining the last riverboat permit.

Table 53
Projected Water Supply Requirements w/Riverboat-Milltown Water Utility[1]

Year	Peak Day Demands (gpd)	Required Supply (gpm)[2]	Current Supply (gpm)	Excess/Deficit (gpm)
1997	339,000	283	145	(138)
1998	364,000	303	145	(158)
1999	404,000	337	145	(192)
2000	445,000	371	145	(226)
2001	488,000	407	145	(262)
2002	530,000	442	145	(297)
2003	572,000	477	145	(332)
2004	617,000	514	145	(369)
2005	664,000	553	145	(408)
2006	711,000	593	145	(448)
2007	761,000	634	145	(489)
2008	813,000	678	145	(533)
2009	868,000	723	145	(578)
2010	922,000	768	145	(623)
2011	981,000	818	145	(673)
2012	1,037,000	864	145	(719)
2013	1,100,000	917	145	(772)
2014	1,160,000	967	145	(822)
2015	1,226,000	1,022	145	(877)
2016	1,291,000	1,076	145	(931)

[1] These demands DO NOT include water demands by the Marengo Water Utility
[2] Based on 20-hour operating time with the smaller of the wells influenced by others on standby

b. Service Level Needs

The Milltown Planning Area covers a substantial amount of land with major changes in elevation, often over short distances. In order to serve this widely varying area, a number of "service levels" need to be created over the Planning Period. Each service level will have a particular service area, and include a water tank, and a booster station pumping water to the tank to keep it full. Each service level will be hydraulically isolated from other service levels except through the booster station, and perhaps through a pressure reducing valve.

The elevation of the water tank in each service level will govern the pressure of the water service provided to customers in that service level. Customers at an elevation sufficiently below the elevation of the water tank in that service level will need to have either a main line pressure reducing valve or individual pressure reducing valves. Customers at an elevation close to the top of the water tank will need to have their pressure boosted with either a main line pressure boosting station or an individual pressure booster station.

(1) Areas included in Service Levels

The Milltown Planning Area has been divided into 6 service levels, named generally after the direction that the service level is located from Milltown. The Main Service Level includes the utility's current service area, as well as a region to the west along SR 66 and Speed Road, and east along SR 66. The West Service Level includes areas to the far western extent of Speed Road. The Southwest Service Level covers the area generally south of Devil's Hollow. The Northwest Service Level includes almost the entire area north of SR 66 and west of the Blue River, while the Northeast Service Level covers the area north of SR 66 and east of Blue River.

The area southeast of Milltown includes areas of exceptional elevational changes, and the roads through the area are not conducive to the development of a single service level. For this reason, this area is called the Southeast Service "Area", and is served directly from the Main Service Level, from the Southwest Service Level, and possibly from the Ramsey Water Company.

The Future Water System Maps included in **Appendix L** show the areas served by each service level, as well as approximate areas within each service level that will require either pressure reducing or pressure boosting to provide adequate water pressure.

(2) Final Sizing of Facilities

With the dispersed nature of the facilities required to serve the Milltown Planning Area, the utility has the opportunity to refine the sizing necessary for the pump stations and storage tanks in each of the surrounding service levels. Prior to entering design of each of these facilities, a current house count should be conducted in the area to be served. This house count, and a factor related to the growth being experienced at that time and anticipated in the future, along with the historical percentage of existing homes obtaining service in other service levels, should be used to determine the sizing of the pump stations and storage tanks for that service level.

(3) Fire Flows

It is also assumed that fire flows will not be provided to additional portions of the Milltown Planning Area, so water lines, booster stations and tanks have not been sized for this additional capacity.

(4) Main Service Level Needs

During the Planning Period, the Main Service Level will provide the core of water supply, treatment and transmission of water to not only the customers within the area served by this service level, but also to the other service levels.

The following **Table No. 54** provides the details of the service required by this service level.

Table 54
Main Service Level Needs

Facility	Size or Capacity w/o Riverboat	w/Riverboat
Service Elevations		
Service (Tank Overflow) Elevation		763' msl
Customer Elevation Ranges		
Highest Service w/o Pressure Boosting		637' msl
Lowest Service w/o Pressure Reducing		487' msl
Pumping System		
Booster Pump St. Firm Capacity (gpm)		N/A
Transmission System (LF/Size)		
Main Service Level (to proposed tank)		3,200 LF of 8-inch
to West Service Level		8,800 LF of 6-inch
to Southwest Service Level		16,500 LF of 6-Inch
to Northwest Service Level		8,500 LF of 8-Inch
to Northeast Service Level		16,500 LF of 8-Inch
to Southeast Service Level		3,800 LF of 6-Inch
Water Storage Requirements		
Usable Storage Required (gals)	265,000	415,000
Existing Storage (gals)		150,000
Additional Storage Required (gals)	115,000	265,000
Tank Size		
Existing		24' dia.
Proposed	22' dia.	32' dia.
Distribution System (LF)		
8-Inch Water Mains		2,900
6-Inch Water Mains		22,500
4-Inch Water Mains		31,800
3-Inch Water Mains		32,900
Total Distribution System		90,100

c. West Service Level Needs

A main-line pressure boosting station is proposed along Speed Road to provide water from the Main Service Level into the West Service Level. A water storage tank (West Water Tank) is proposed on the hill near the center of Section 20 to supply the water storage requirements for this service level. A 6-inch transmission main should be built in the Main Service Level along Speed Road prior to or during consideration of service to this service level. A 6-inch main is recommended for the transmission main from the booster station to the tank. The pressure boosting station should be controlled by the water level in this West Water Tank. The distribution system for the West Service level should be 4-inch and 3-inch water mains.

The following **Table No. 55** provides the details of the service required by the West Service Level.

Table 55
West Service Level Needs

Facility	Size or Capacity w/o Riverboat	w/Riverboat
Service Elevations		
Service (Tank Overflow) Elevation		1,011' msl
Customer Elevation Ranges		
Highest Service w/o Pressure Boosting		885' msl
Lowest Service w/o Pressure Reducing		735' msl
Pumping System		
Booster Pump St. Firm Capacity (gpm)	45	70
Transmission System (LF/Size)		6,500 LF of 6-inch
Water Storage Requirements		
Usable Gallons	24,000	37,000
Tank Size	10' dia.	12' dia.
Distribution System (LF)		
4-Inch Water Mains		44,900
3-Inch Water Mains		12,800
Total Distribution System		57,700

d. Southwest Service Level Needs

The proposed 6-inch main south along Leavenworth Road will be adequate to supply water from the Main Service Level to the Southeast Service Level. This Leavenworth Road transmission main should be built before or during consideration of service to the Southwest Service Level. A pressure boosting station should be built in or near Devil's Hollow to serve this area, and a 6-inch transmission main should extend from the booster station to the proposed water tank. The proposed water tank should be located on a hill to the southern end of Whiskey Run Township, and to the west of the Blue River (see the maps in **Appendix** L). A 6-inch water line should extend across the Blue River bridge at the southern end of Whiskey Run Township to provide service to the lower portions of

the Southeast Service Area. The distribution system should be comprised of 4-inch and 3-inch water mains.

The following **Table No. 56** provides the details of the service required by the Southwest Service Level.

Table 56
Southwest Service Level Needs

Facility	Size or Capacity w/o Riverboat	w/ Riverboat
Service Elevations		
Service (Tank Overflow) Elevation		1,011' msl
Customer Elevation Ranges		
Highest Service w/o Pressure Boosting		885' msl
Lowest Service w/o Pressure Reducing		735' msl
Pumping System		
Booster Pump St. Firm Capacity (gpm)	50	75
Transmission System (LF/Size)		15,000 LF of 6-inch
Water Storage Requirements		
Usable Gallons	30,000	45,000
Tank Size	12' dia.	14' dia.
Distribution System (LF)		
4-Inch Water Mains		28,900
3-Inch Water Mains		4,400
Total Distribution System		33,300

e. Northwest Service Level

The Northwest Service Level is served from the Main Service Level through a main-line booster pumping station on SR 66 north of SR 64, which will pump water to a water storage tank located on a hill near the center of the area served by this service level. An 8-inch transmission main in the Main Service Level will provide water to the pressure boosting station, and an interconnection is proposed from

the Northwest Service Level to the Northeast Service Level across Totten Ford Bridge.

The following **Table No. 57** provides the details of the service required by this service level.

Table 57
Northwest Service Level Needs

Facility	Size or Capacity w/o Riverboat	Size or Capacity w/ Riverboat
Service Elevations		
Service (Tank Overflow) Elevation		965' msl
Customer Elevation Ranges		
Highest Service w/o Pressure Boosting		839' msl
Lowest Service w/o Pressure Reducing		689' msl
Pumping System		
Booster Pump St. Firm Capacity (gpm)	110	165
Transmission System (LF/Size)		18,500 LF of 6-inch
Water Storage Requirements		
Usable Gallons	70,000	110,000
Tank Size	16' dia.	20' dia.
Distribution System (LF)		
4-Inch Water Mains		43,500
3-Inch Water Mains		44,300
Total Distribution System		87,800

f. Northeast Service Level

The Northeast Service Level obtains its water supply from the Main Service Level through a transmission main along SR 64 east of the Blue River. Water is pumped from the Main Service Level to the Northeast Service Level through a main line booster station to be located on Opossum Trail or Fredricksburg Road just north of SR 64. A 6-inch transmission main needs to be constructed on Opossum

Trail, along Orchard Ridge to Fredricksburg Road, then north on Fredricksburg Road to the hill across from Mt. Zion cemetery. A 6-inch main should be constructed from the tank to Totten Ford Bridge and cross the Blue River to connect near SR 66 to the Northwest Service Level. The remainder of the distribution system is of 4-inch and 3-inch mains.

The following **Table No. 58** provides the details of the service required by the Northeast service level.

Table 58
Northeast Service Level Needs

Facility	Size or Capacity w/o Riverboat	Size or Capacity w/ Riverboat
Service Elevations		
Service (Tank Overflow) Elevation		965' msl
Customer Elevation Ranges		
Highest Service w/o Pressure Boosting		839' msl
Lowest Service w/o Pressure Reducing		689' msl
Pumping System		
Booster Pump St. Firm Capacity (gpm)	35	50
Transmission System (LF/Size)		13,900 LF of 6-inch
Water Storage Requirements		
Usable Gallons	25,000	35,000
Tank Size	10' dia.	12' dia.
Distribution System (LF)		
6-Inch Water Mains		21,500
4-Inch Water Mains		46,400
3-Inch Water Mains		13,100
Total Distribution System		81,000

g. Southeast Service Area

The northern portion of the Southeast Service Area is served directly from the Main Service Level, and the storage capacities for this portion of the service area have been included in the Main Service Level storage requirements. A region in the center of the Southeast Service Area could be served by wholesale service from Ramsey Water Company, or by pumping from the northern portion of the Southeast Service Level. The southern part of the Southeast Service Area can be served through a pressure reducing valve from the middle region of the service area, or could be served through a pressure reducing valve and Blue River crossing at the southeast edge of the Southwest Service Level.

The following **Table No. 59** provides the details of the service required by this service level.

Table 59
Southeast Service Area Needs

Facility	Size or Capacity w/o Riverboat	w/ Riverboat
Service Elevations (Northern Portion)		
Service Elevation	763' msl	
Customer Elevation Ranges		
Highest Service w/o Pressure Boosting	637' msl	
Lowest Service w/o Pressure Reducing	487' msl	
Service Elevations (Middle Portion)		
Service Elevation	881' msl	
Customer Elevation Ranges (Based on Booster Pump Controls/Ramsey PRV Set)		
Highest Service w/o Pressure Boosting	800' msl	
Lowest Service w/o Pressure Reducing	650' msl	
Service Elevations (Southern Portion)		
Service Elevation (based on PRV settings)	763' msl	
Customer Elevation Ranges		
Highest Service w/o Pressure Boosting	637' msl	
Lowest Service w/o Pressure Reducing	487' msl	
Pumping System		
Booster Pump St. Firm Capacity (gpm)	15 gpm for middle region, add if southern region served	25 gpm for middle region, add if southern region served
Transmission System (LF/Size)	N/A	
Water Storage Requirements		
Usable Gallons	N/A	
Tank Size	Storage requirements included in Main & Southwest Service Level tanks	
Distribution System (LF)		
6-Inch Water Mains	19,000	
4-Inch Water Mains	48,200	
3-Inch Water Mains	9,500	
Total Distribution System	76,700	

2. Marengo Water Utility

a. Water Supply Needs

The Marengo Water Utility will require very little additional quantities of potable water during the Planning Period beyond the amount needed to meet it's customer's current demands if the riverboat is not sited in Crawford County. If the proposed riverboat is sited at Leavenworth, the water supply needs of the utility will increase to a greater extent. The following **Table No. 60** indicates the dry weather (lowest pumping rate) water supply capacities that are recommended during the Planning Period if the riverboat is not sited at Leavenworth.

Table 60
Projected Water Supply Requirements w/o Riverboat-Marengo Water Utility

Year	Peak Day Demands (gpd)	Required Supply (gpm)(1)	Current Supply (gpm)	Excess/Deficit (gpm)
1997	231,000	190	140	(50)
1998	259,000	220	140	(80)
1999	287,000	240	140	(100)
2000	315,000	260	140	(120)
2001	317,000	260	140	(120)
2002	317,000	260	140	(120)
2003	320,000	270	140	(130)
2004	320,000	270	140	(130)
2005	322,000	270	140	(130)
2006	322,000	270	140	(130)
2007	322,000	270	140	(130)
2008	322,000	270	140	(130)
2009	324,000	270	140	(130)
2010	324,000	270	140	(130)
2011	324,000	270	140	(130)
2012	324,000	270	140	(130)
2013	326,000	270	140	(130)
2014	326,000	270	140	(130)
2015	326,000	270	140	(130)
2016	326,000	270	140	(130)

(1) Based on 20-hour operating time

If the riverboat is sited at Leavenworth, a greater water supply will be required by the Marengo Water Utility. The following **Table No. 61** indicates the projected dry-weather (lowest pumping rate) water supply needs of the utility if Crawford County is successful in obtaining the last riverboat permit.

Table 61
Projected Water Supply Requirements w/Riverboat-Marengo Water Utility

Year	Peak Day Demands (gpd)	Required Supply (gpm)*	Current Supply (gpm)	Excess/Deficit (gpm)
1997	259,000	220	140	(80)
1998	288,000	240	140	(100)
1999	321,000	270	140	(130)
2000	354,000	300	140	(160)
2001	360,000	300	140	(160)
2002	365,000	300	140	(160)
2003	372,000	310	140	(170)
2004	376,000	310	140	(170)
2005	383,000	320	140	(180)
2006	388,000	320	140	(180)
2007	392,000	330	140	(190)
2008	397,000	330	140	(190)
2009	404,000	340	140	(200)
2010	409,000	340	140	(200)
2011	414,000	350	140	(210)
2012	420,000	350	140	(210)
2013	428,000	360	140	(220)
2014	434,000	360	140	(220)
2015	440,000	370	140	(230)
2016	446,000	370	140	(230)

(1) Based on 20-hour operating time

b. Water Storage Needs

The water storage needs of the Marengo Water Utility for system demands will not change substantially during the Planning Period whether or not the riverboat is located in Leavenworth. With the improvements to the available storage capacity created by the pressure boosting stations, there are no recommended increases to the water storage needs of the Marengo Water Utility to satisfy system demands during the Planning Period.

The Marengo Water Utility will have the storage capacity, with the pressure boosting stations installed, for 157,000 gallons for emergency and fire protection needs. The quarry/warehouse on the southeast side of Brandywine Creek has begun developing warehousing facilities in an abandoned mine, and has preliminarily indicated an interest in obtaining fire protection service from the Town. The quarry has plans to install an overhead sprinkler system, but the capacities and pressures needed for the system have not been analyzed [16]. If the utility chooses to increase the storage capacity available for fire protection, either to improve the town's Key Rating, or for economic reasons, it is recommended that the utility construct a water tank on the hill above the quarry (subject to suitable tank support that hasn't been undermined). This tank should have an overflow elevation of 834' msl (matching the existing tank), subject to adequate pressure being available to the quarry. A waterline will need to be constructed to connect this tank to the existing system. If the tank elevation exceeds the existing tank elevation, a pumping system (possibly FM rated with standby power supply) and a pressure reducing valve for service to the utility would need to be provided. Additionally, turnover of the water would need to be considered, to keep it from becoming stale.

c. Water Distribution System Needs

It will be necessary to construct a water line from the utility's existing water system to the water tank near the quarry/warehouse project. A ?-inch water main is required for this need. The water line will have to cross the creek and railroad track in order to serve the proposed water tank.

The remainder of the improvements to the Marengo Water Utility's distribution system necessitated by the growth in the Marengo Planning Area should be completed on an as-needed basis as determined by the location of the new customers, and are not programmed specifically into this Report.

(16) Conversation with Dick Pennington on October 14, 1996.

3. Regional Water Utility

a. Water Supply Needs

With the creation of a regional water utility in the area serving both the Milltown Planning Area, the Marengo Planning Area and an additional area along the northern portion of Liberty Township, the water supply needs of a relatively large area will need to be addressed. The impact of the riverboat in Leavenworth on the supply needs of the Regional Planning Area is increased dramatically when compared to the supply needs for either Town's planning area alone. **Table No. 62** which follows, projects the water supply requirements of the Regional Planning Area is the riverboat is not located in Leavenworth.

Table 62
Projected Water Supply Requirements w/o Riverboat-Regional Water Utility

Year	Peak Day Demands (gpd)	Required Supply (gpm)(1)	Current Supply (gpm)(2)	Excess/Deficit (gpm)
1997	531,000	440	285	(155)
1998	578,000	480	285	(195)
1999	636,000	530	285	(245)
2000	695,000	580	285	(295)
2001	727,000	610	285	(325)
2002	758,000	630	285	(345)
2003	793,000	660	285	(375)
2004	824,000	690	285	(405)
2005	859,000	720	285	(435)
2006	889,000	740	285	(455)
2007	922,000	770	285	(485)
2008	953,000	790	285	(505)
2009	987,000	820	285	(535)
2010	1,020,000	850	285	(565)
2011	1,053,000	880	285	(595)
2012	1,083,000	900	285	(615)
2013	1,118,000	930	285	(645)
2014	1,149,000	960	285	(675)
2015	1,182,000	990	285	(705)
2016	1,212,000	1,010	285	(725)

(1) Based on 20-hour operating time
(2) Includes existing wells supplies of Milltown Water Utility and Marengo Water Utility

If the riverboat is sited at Leavenworth, a greater water supply will be required by the Regional Water Utility. The following **Table No. 63** indicates the projected dry-weather (lowest pumping rate) water supply needs of the proposed utility if Crawford County is successful in obtaining the last riverboat permit.

Table 63
Projected Water Supply Requirements w/Riverboat-Regional Water Utility

Year	Peak Day Demands (gpd)	Required Supply (gpm)(1)	Current Supply (gpm)(2)	Excess/Deficit (gpm)
1997	596,000	500	285	(215)
1998	652,000	540	285	(255)
1999	728,000	610	285	(325)
2000	805,000	670	285	(385)
2001	856,000	710	285	(425)
2002	906,000	760	285	(475)
2003	962,000	800	285	(515)
2004	1,014,000	850	285	(565)
2005	1,074,000	900	285	(615)
2006	1,129,000	940	285	(655)
2007	1,189,000	990	285	(705)
2008	1,247,000	1,040	285	(755)
2009	1,313,000	1,090	285	(805)
2010	1,378,000	1,150	285	(865)
2011	1,447,000	1,210	285	(925)
2012	1,516,000	1,260	285	(975)
2013	1,592,000	1,330	285	(1,045)
2014	1,664,000	1,390	285	(1,105)
2015	1,741,000	1,450	285	(1,165)
2016	1,819,000	1,520	285	(1,235)

(1) Based on 20-hour operating time
(2) Includes existing wells supplies of Milltown Water Utility and Marengo Water Utility

b. Water Treatment and Pumping Needs

The treatment and pumping capacities of the Regional Water Utility should match the water supply requirements, subject to phasing considerations that may require a larger treatment plant be built during any particular phase. The exact nature of the Regional Water Utility's treatment and pumping needs will be based on the source water, the location of the facilities, and the utility's plans on phasing the expansion of the distribution system into the Regional Planning Area. The capacities of these facilities will also need to be based on

the use of other sources of water (such as one of the other area utilities), and on whether these other water sources are potable, or are providing raw water.

Once these issues become clearer, a more detailed plan for providing treatment and pumping for the Regional Water Utility should be developed.

c. Water Storage Needs

The Regional Water Utility will require water supplies for its customers in excess of the capacities of both the Milltown Water Utility's storage tank and the Marengo Water Utility's storage tank. The locations and sizes of the tanks that will be required will need to be based on the location and capacities of the water supply(s) for the utility, and upon the phasing of the expansions of the utility into the Regional Planning Area. The tank locations and sizes described for the Milltown Planning Area may be used as a general guide, but should be used with caution for the Regional Water Utility. The following **Table No. 64** projects the water storage needs of the Regional Water Utility through the Planning Period without the riverboat being located in Leavenworth.

Table 64
Projected Water Storage Needs w/o Riverboat-Regional Water Utility

Year	Usable Storage Requirements (gals)	Existing Storage (gals)[1] Milltown	Existing Storage (gals)[1] Marengo	Excess/Deficit (gals)
1997	263,000	150,000	102,000	(11,000)
1998	285,000	150,000	102,000	(33,000)
1999	314,000	150,000	102,000	(62,000)
2000	342,000	150,000	102,000	(90,000)
2001	359,000	150,000	102,000	(107,000)
2002	375,000	150,000	102,000	(123,000)
2003	392,000	150,000	102,000	(140,000)
2004	408,000	150,000	102,000	(156,000)
2005	426,000	150,000	102,000	(174,000)
2006	441,000	150,000	102,000	(189,000)
2007	458,000	150,000	102,000	(206,000)
2008	474,000	150,000	102,000	(222,000)
2009	491,000	150,000	102,000	(239,000)
2010	508,000	150,000	102,000	(256,000)
2011	525,000	150,000	102,000	(273,000)
2012	541,000	150,000	102,000	(289,000)
2013	558,000	150,000	102,000	(306,000)
2014	574,000	150,000	102,000	(322,000)
2015	591,000	150,000	102,000	(339,000)
2016	606,000	150,000	102,000	(354,000)

[1] Based on implementation of recommendations in this Report related to increasing storage capacity in existing tanks

The following **Table No. 65** projects the water storage needs of the Regional Water Utility through the Planning Period without the riverboat being located in Leavenworth.

Table 65
Projected Water Storage Needs w/Riverboat-Regional Water Utility

Year	Usable Storage Requirements (gals)	Existing Storage Requirements (gals) (1)		Excess/Deficit (gals)
		Milltown	Marengo	
1997	294,000	150,000	102,000	(42,000)
1998	322,000	150,000	102,000	(70,000)
1999	360,000	150,000	102,000	(108,000)
2000	398,000	150,000	102,000	(146,000)
2001	423,000	150,000	102,000	(171,000)
2002	449,000	150,000	102,000	(197,000)
2003	477,000	150,000	102,000	(225,000)
2004	503,000	150,000	102,000	(251,000)
2005	533,000	150,000	102,000	(281,000)
2006	561,000	150,000	102,000	(309,000)
2007	591,000	150,000	102,000	(339,000)
2008	622,000	150,000	102,000	(370,000)
2009	655,000	150,000	102,000	(403,000)
2010	687,000	150,000	102,000	(435,000)
2011	723,000	150,000	102,000	(471,000)
2012	757,000	150,000	102,000	(505,000)
2013	797,000	150,000	102,000	(545,000)
2014	833,000	150,000	102,000	(581,000)
2015	873,000	150,000	102,000	(621,000)
2016	911,000	150,000	102,000	(659,000)

(1) Based on implementation of recommendations in this Report related to increasing storage capacity in existing tanks

d. Water Distribution System Needs

The size and location of the Regional Water Utility water lines in the Milltown Planning Area can be generalized from the Milltown Water Utility distribution system sections of this Report. The only area not included in one of the previous sections is the North Liberty Township service area to the west of Marengo. Care should be taken in the use of this information until the water supply and other details of a Regional Water Utility are known.

(1) North Liberty Township Service Area

The North Liberty Township Service Area includes all of Liberty Township north of SR 64, and covers a total of 11.2 square miles. This system is located to the north and northwest of Marengo. The system to the northwest of Marengo should include a 6-inch main along SR 64, and north to a water tank located on a hill to the northwest of the Simpson Chapel. This tank would serve much of SR 64 and the northwest quadrant of this service area. The remainder of this service area would be served from the existing Marengo Water Tank, and should connect to the Northwest Service Level through a pressure reducing valve.

The following **Table No. 66** provides the details of the service required by the North Liberty service level.

Table 66
North Liberty Service Area Needs

Facility	Size or Capacity w/o Riverboat	w/ Riverboat
Service Elevations		
Service (Tank Overflow) Elevation		1003' msl
Customer Elevation Ranges		
Highest Service w/o Pressure Boosting		904' msl
Lowest Service w/o Pressure Reducing		772' msl
Pumping System		
Booster Pump St. Firm Capacity (gpm)	35	50
Transmission System (LF/Size)		17,500 LF of 6-inch
Water Storage Requirements		
Usable Gallons	25,000	35,000
Tank Size	14' dia.	18' dia.
Distribution System (LF)		
4-Inch Water Mains		60,000
3-Inch Water Mains		30,000
Total Distribution System		90,000

C. Prioritization of Needs

1. Milltown Water Utility

In order to best accomplish the utility's goals and maximize the utility's effectiveness, the Milltown Water Utility must place a priority on the utility's needs, and work to address those needs in an orderly manner. The following priority of needs (in order of importance) has been developed with the utility:

a. Existing System Needs
   (1) Increase water supply,
   (2) Address surface water influence issue,
   (3) Increase usable capacity in existing water storage tank,

(4) Rehabilitate existing water tank,
(5) Replace aging water lines,
(6) Minor improvements to water treatment plant, and
(7) Determine long-term water supply relationship with Marengo Water Utility.

b. Future System Needs
(1) Protect proposed service area,
(2) Increase water supply,
(3) Prepare Main Service Level capacities for future expansion,
(4) Construct transmission, pumping and storage facilities in orderly manner to service levels,
(5) Construct distribution systems in service levels.

2. Marengo Water Utility

To maximize the effectiveness of the planning effort, and the future of the Marengo water utility, the following prioritization of needs has been developed for the utility.

a. Existing System Needs
(1) Additional water supplies for existing customers,
(2) Improve water quality,
(3) Tank inspection and rehabilitation, and
(4) Pressure boosting stations to improve pressures and increase water tank's usable capacity.

b. Future System Needs
(1) Additional water supplies for future customers,
(2) Increase storage capacity.

3. Regional Water Utility

Once the decision is made that a Regional Water Utility may offer valuable benefits for both the Milltown Water Utility and the Marengo Water Utility, both utilities should jointly:

a. Determine the form of the regional entity, whether a regional water district, a conservancy district, a municipal utility or a not-for-profit corporation. The advantages and disadvantages of each of these entities are involved, and both utilities should obtain legal and financial advice, along with engineering expertise, to make the final choice in this matter.

b. Decide whether to sell or give the municipal utility to the regional entity, or maintain the existing system as a separate entity with a formal relationship with the regional entity,

c. Decide whether the regional entity will be a wholesale purchaser or seller of water to either or both utilities,

d. Determine how the regional entity's governing board will be comprised,

e. Decide as to the management and operation of the regional entity (through contract with one or both of the utilities), and conversely, should the regional entity operate and manage the existing utilities if they are to remain separate,

f. Identify the general method of financing for future improvements to the regional system (through connection fees, rates, etc.),

g. Determine whether the existing utilities can/should have different rates from the future customers if they join entirely with into the regional utility.

SECTION VIII - ALTERNATIVES REVIEW

This section reviews the reasonable alternatives that each utility has to address its current needs, as well as the projected customer demands through the Planning Period.

A. Milltown Water Utility

1. Water Supplies

The additional water supplies needed by the Milltown Water Utility can be obtained from any combination of well supplies and purchased water. The only surface water body that may be a reasonable source of water supply for the Milltown Water Utility is the English Reservoir, about 5 miles west of the Milltown Planning Area, however the possibilities for use of this source is considered slim. Treatment and high service pumping needs will depend on the source of water obtained for the utility's needs.

a. Increased Well Supplies

Increasing the number of water supply wells owned by the utility is one option available to increase the Milltown Water Utility's water supply. With the major investment that the utility has, the usage of the treatment plant should be maximized. For this reason, the development of another well for the near-term needs of the utility is recommended. The best course of action to satisfy the additional, longer-term needs of the utility are less clear. Conversations with area well drillers and with regional well drilling companies have indicated that there is the likelihood of siting new wells in the area with capacities up to 100 gpm [17]. In 1992, the Milltown Water Utility dug a new well just to the west of the existing Well No. 3. This well was reported to have had a very good production, but a well pump was irretrievably lost in the well, and the hole had to be abandoned. It was reported that the well was properly closed, [18] though no paperwork has been located to confirm this circumstance. Also, there is reported to have been a well located in a cave on the north side of SR 64 just north of the existing wells which had produced a

(17) Personal conversations with Randall Stephenson, Mike Dooley, Bastin-Logan, Reynolds Co. and Layne Western.
(18) Personal conversation with Randall Stephenson.

substantial quantity of water. There is a possibility that this well is still in existence.

An Aquifer Test Analysis conducted by Layne Western Co. in 1981 for Well No. 3 (called Well No. 4 at times in the report, but subsequently re-numbered) indicates the presence of a potential joint system entering approximately 70 feet northeast of the proposed site, which may be more productive. The report also discussed the possibility of additional water supplies to the northwest of the existing Well No. 1. This may be an additional indication of more water supply availability in the area.

The issue of surface water influence would have to be addressed with any new wells the utility develops (as it must also be addressed for the existing wells). The capacity of the utility's water treatment plant may be reduced if it is determined that the existing or new wells are under the influence of surface water. Additionally, a delineation of the wellhead protection area and a contaminant source identification process would need to be undertaken prior to final well siting.

b. Ramsey Water Company

Preliminary conversations with Ramsey Water Company have indicated the availability of adequate water for Milltown's needs at Ramsey Water Company's Frenchtown Water Tank. This tank is located about 2.9 miles along Frenchtown Road from Milltown's southeastern corporate boundary, has a capacity of 250,000 gallons, and an overflow elevation of 964' msl. The elevation of this tank would allow service without pumping to the Milltown Water Utility's Main Service Level, and to the higher elevations of the Southeast Service Area. Currently, Ramsey Water Company serves much of Frenchtown Road, but only has 2-inch water mains along this road, and a 4-inch main serving the tank.

The extent of upgrades necessary within Ramsey Water Company's system, and the exact nature of improvements to the Milltown Water System will depend on the amount of water which the Milltown Water

Utility may choose to purchase from the Ramsey Water Company. Ramsey Water Company has indicated a willingness to share in the costs of water main upgrades for Milltown and Marengo.

c. Crawford County Water Company

The Crawford County Water Company's system originates at their wells on the Ohio River in Leavenworth, and extends across I-64 along SR 66 almost to the southern corporate limits of Marengo. The water line crossing I-64 is 6-inches in size. The utility's SR 66 water line is a 4-inch line throughout almost all of its distance near the Planning Area. A water tank is located at Pilot Knob Rd. and SR 66. The tank has a capacity of 150,000 gallons, and an overflow elevation of 1030' msl. Small 2 1/2-inch water lines extend a distance east from SR 66 along Pilot Knob Rd. and Speed Rd.

Due to the cost of crossing I-64 with a water main, extensive capacity is probably not available from Crawford County Water Company for the Milltown Water Utility. However, the possibility exists that service may be available from Crawford County Water Company into the West Service Area. The Pilot Knob tank elevation is adequate to serve this area by gravity (possibly with pressure reducing valves). The extent of upgrades necessary within Crawford County Water Company's system, and the exact nature of improvements to the Milltown Water System will depend on the amount of water which the Milltown Water Utility may choose to purchase from the Crawford County Water Company.

d. Patoka Lake Regional Water District

Patoka Lake Regional Water District obtains its water supplies from Patoka Lake, and serves a substantial area of south-central Indiana. The district provides both retail water service and wholesale water service. Area wholesale customers include the English Municipal Water Utility and the Posey Township Water Company. As a matter of policy, the Patoka Lake Regional Water District sets its rates for a wholesale customer based on the costs to upgrade the district's system for the requested service, added to the general, pro-rata

costs of operations and maintenance of the system. As a rule, the costs of service from Patoka Lake Regional Water District are considered to be high in comparison with other water systems for the region. The district's most recent project, identified as Phase V, had 10 wholesale customers participating, and a cost of $2.20/1,000 gallons.

Discussions with the district have indicated that the closest water main of substantial size is a 12-inch water main that has been constructed just to the west of SR 37 near English.

e. Posey Township Water Company

Posey Township Water Company is a small water system located to the north of the Milltown Planning Area. The water system previously obtained its water supply from wells, but has recently connected with the Patoka Lake RWD for a part of its water supply. The Posey Township Water Company has only small water lines in the area north of the Milltown Planning Area and to the west in Orange County. The possibility of obtaining meaningful water supplies from this utility are considered to be slim.

2. Water Treatment

The Milltown Water Utility currently has a water treatment plant designed as an iron removal plant and adequate in capacity for the next few years. With a well supply inadequate for the treatment capacity, it is recommended that the issue of surface water influence be resolved. This determination will allow the actual available well (the wells may not be under the influence at a certain pumping rate, but be under the influence at a higher pumping rate) and plant capacity (as a direct filtration plant) to be identified. After this determination, a well supply should be provided to the plant to maximize its use. Minor improvements, including an aerator, standby power supply connection and various control improvements should be completed at the plant while these final determinations are made.

The Milltown Water Utility's water treatment facility's capacity needs mirror the projected water supply demands of the utility's customers (as reduced

by potable water purchased from other utilities, and increased by sales to the Marengo Water Utility). The water treatment capacity, however, cannot be increased in the smaller increments available for well supply increases. Therefore, the utility needs to determine which sources of water are going to be utilized prior to a final determination as to the phasing of any treatment plant expansions. The quality of the well water to be treated, and the influence of surface water on the particular groundwater supply would need to be determined before treatment requirements can be identified.

3. Water Storage

The Milltown Water Utility has three options in providing additional water storage for the utility. The most common storage method in rural areas is the standpipe. The standpipe is a tall, cylindrical steel water tank placed on a concrete foundation, with a diameter that is smaller that the height. Ground storage tanks, which are similar to standpipes, except that they are larger in diameter than they are high, are a viable option where a substantial hill is located in the area where the tank could be located. There are also various elevated water tanks that can be constructed for a water system. While elevated tanks are more expensive than standpipes (on a per-gallon basis), their capacity is smaller, since all of the water can be used by the utility's customers.

Generally, the necessary tank height above the tank foundation will determine the most cost effective type of tank to use in any particular instance. The decision as to the specific tank type should be left until the design phase, when the land for the tank site can be identified.

B. Marengo Water Utility

1. Water Supplies

The additional water supplies needed by the Marengo Water Utility can be obtained from any combination of well supplies and purchased water. Treatment, transmission main and high service pumping needs will depend on the source of water obtained for the utility's needs.

a. Increased Well Supplies

Increasing the number of water supply wells owned by the utility is one option available to increase the Marengo Water Utility's water supply. Conversations with area well drillers and with regional well drilling companies have indicated that there is the likelihood of siting new wells in the area with capacities up to 100 gpm [19]. There appears to be a consensus among these well drillers that the most probable locations for additional water supplies are in the park south of Marengo on SR 66, and near the confluence of Brandywine Fork and Whiskey Run. The quality of this water will not be as good as water obtained from farther to the east near the Blue River.

The issue of surface water influence would have to be addressed with any new wells the utility develops in these areas. Additionally, a delineation of the wellhead protection area and a contaminant source identification process would need to be undertaken prior to final well siting.

b. Crawford County Water Company

The Crawford County Water Company's system originates at their wells on the Ohio River in Leavenworth, and extends across I-64 along SR 66 almost to the southern corporate limits of Marengo. The water line crossing I-64 is 6-inches in size. The utility's SR 66 water line is a 4-inch line throughout almost all of its distance near the Marengo Planning Area. A water tank is located at Pilot Knob Rd. and SR 66. The tank has a capacity of 150,000 gallons, and an overflow elevation of 1030' msl.

Due to the cost of crossing I-64 with a water main, extensive capacity is probably not available from Crawford County Water Company for the Marengo Water Utility. If a water supply can be arranged, the Pilot Knob tank elevation is adequate to serve into the Marengo Water Utility by gravity (possibly with pressure reducing valves). The extent of upgrades necessary within Crawford County Water Company's system, and the exact nature of improvements to

(19) Personal conversations with Randall Stephenson, Mike Dooley, Bastin-Logan, Reynolds Co. and Layne Western.

the Marengo Water System will depend on the amount of water which the Marengo Water Utility may choose to purchase from the Crawford County Water Company.

c. Patoka Lake Regional Water District

Patoka Lake Regional Water District obtains its water supplies from Patoka Lake, and serves a substantial area of south-central Indiana. The district provides both retail water service, as well as wholesale water service. Area wholesale customers include the English Municipal Water Utility and the Posey Township Water Company. As a matter of policy, the Patoka Lake Regional Water District sets its rates for a wholesale customer based on the costs to upgrade the district's system for the requested service, added to the general, pro-rata costs of operations and maintenance of the system. As a rule, the costs of service from Patoka Lake Regional Water District are considered to be high in comparison with other water systems for the region. The district's most recent project, identified as Phase V, which had 10 wholesale customers participating, had a cost of $2.20/1,000 gallons.

Discussions with the district have indicated that the closest water main of substantial size is a 12-inch water main that has been constructed just to the west of SR 37 near English.

2. Water Treatment

a. Iron Removal

The removal of iron is commonly done in the water supply industry through the use of an iron removal plant. This plant is composed of an aerator (usually an induced-draft aerator), a reaction basin, and filters. The water is oxidized in the aerator when it comes in contact with the air, and the iron changes to a form that is insoluble in water. The minute iron particles are then filtered out by the filters. The water is then chlorinated and pumped into the distribution system.

An alternative method of managing high iron concentrations in a water supply is to chemically sequester (bind up) the iron with the use of a polyphosphate. This treatment technique is simple and relatively inexpensive, and is common in smaller water utilities. Based on the size of the Marengo Water Utility, this technique is recommended for managing the iron problems with the water supply if the water treatment plant is not built, or the wells are continued to be used as a standby or alternative water source to the Regional Water Utility.

b. Sulfate Removal

The concentration of sulfate in the Marengo Water Utility's water supply can be substantially reduced by a number of treatment processes, including reverse osmosis, electrodialysis and adsorption with activated alumina. However, the most reasonable, cost-effective and operable type of treatment is with anion exchangers. These units are essentially commercial-sized water softeners, only with a different resin that removes sulfate (instead of hardness). This type of treatment process would not work well at the removal of iron or hardness (which require a different type of resin).

In order to maximize the effectiveness of the process, prior to the sulfate removal process the iron concentration should be reduced with a forced-air/filtration type iron removal system, and the water should be softened with a standard ion exhange softening system.

It must be noted that, at the higher sulfate concentrations, the finished water may exceed the federal limits (MCLs) for chlorides, since the sulfate and hardness in the water are being replaced by chlorides in the treatment process.

3. Water Storage

The Marengo Water Utility has three options in providing additional water storage for the quarry/warehouse project. The most common storage method in rural areas is the standpipe. The standpipe is a tall, cylindrical steel water tank placed on a concrete foundation, with a diameter that is

smaller that the height. Ground storage tanks, which are similar to standpipes, except that they are larger in diameter than they are high, are a viable option where a substantial hill is located in the area where the tank could be located. There are also various elevated water tanks that can be constructed for a water system. While elevated tanks are more expensive than standpipes (on a per-gallon basis), their capacity is smaller, since all of the water can be used by the utility's customers.

Generally, the necessary tank height above the tank foundation and the needed tank capacity will determine the most cost effective type of tank to use in any particular instance. The tank capacity necessary for the quarry/warehouse and the utility cannot be determined until certain decisions are made by the management of the quarry/warehouse project, and until the sprinkler system for the facility is under design. The decision as to the specific tank type should be left until the design phase, when the land for the tank site can be identified, and the needed capacity is known.

C. Regional Water Utility

1. Water Supplies

The water supply alternatives available to a Regional Water Utility do not differ from those available to the Milltown Water Utility and the Marengo Water Utility. The purchase of the wells, or wholesale water, from each of the utilities is a possibility, as is the purchase of water from another area utility. The final determination as to the source of water to pursue should be developed during the development of the Regional Water Utility.

2. Water Treatment

As with the Milltown Water Utility's treatment alternatives, the Regional Water Utility will need to determine its treatment needs based on the source water that is obtained. The sale of the Milltown Water Treatment Plant to the Regional Water Utility along with the wells, or the sale of potable water to the utility are both viable alternatives.

3. Water Storage

The final disposition of the water storage tanks in existence in the Milltown Water Utility and the Marengo Water Utility will need to be determined in the creation of a Regional Water Utility. The plan for the Milltown Planning Area and the Marengo Planning Area should provide a general guide for the water storage needs of this area. An additional water storage tank will be required to the west of Marengo to serve the northern part of Liberty Township (unless the proposed water tank in Marengo is of adequate elevation). However, these needs may change depending on the source of water.

SECTION IX - OTHER PLANNING CONSIDERATIONS

A. Wellhead Protection

1. General Wellhead Protection Requirements

The state's new Wellhead Protection Program (WHPP) developed by IDEM through the Indiana Ground Water Protection Act of 1989 (as directed by federal regulations) is a mandatory program for community public water supply systems which use groundwater as a source of water supply, such as the Milltown Water Utility and the Marengo Water Utility. The final WHPP regulation was approved by Indiana's Water Pollution Control Board in July, 1996 and is being reviewed by the Attorney General's office prior to being signed into law by the governor. The regulation will become effective 30 days after it's signing. One of the bases for this program is to recognize that the original 200 foot setback for protection of public water supplies from possible contamination by bacteriological contaminants did not account for the long-term impacts from chemical contaminants (such as agricultural pesticides and industrial solvents), which are capable of traveling much farther than 200 feet in the groundwater.

Once the WHPP is signed into law, each community in Indiana will be responsible for developing its own WHPP in order to meet specific local needs. This will take place in two (2) phases as follows:

- the preparation and submittal of a local WHPP (Phase I)
- the implementation and periodic review and modification of the WHPP (Phase II)

In general, each utility's WHPP will require:

a. The creation of a number of local committees,
b. Delineation of the wellhead protection area (WHPA), including the use of one of the various accepted hydrogeological models,
c. Identification of potential sources of contamination within the WHPA,
d. Development of a management strategy for the protection of the groundwater within the WHPA,
e. Preparation of a draft contingency plan for an emergency situation,

f. Creation of a program to support the participation of the public in the WHPP implementation, and
g. Preparation of a draft plan for educating the public.

These elements will be incorporated into a WHPP document for submittal to and approval by IDEM. The Milltown Water Utility and the Marengo Water Utility will each be required to submit their WHPP plan to IDEM for approval within five (5) years after the regulation becomes effective to complete the Phase I requirements.

Once the WHPPs are approved by IDEM, each utility will have to submit the Phase II requirements within 10 years. The Phase II WHPP submittal needs to include:

a. a comprehensive WHPP,
b. an updated schedule of implementation,
c. an updated delineation of the WHPA, considering new data,
d. an updated potential contaminant source inventory,
e. a report of any problems or concerns regarding the WHPP,
f. any revisions to the contingency plan, and
g. various documentation that the WHPP is being implemented.

2. New Wells

If the Milltown Water Utility or the Marengo Water Utility proceed with the design and construction of any additional wells to increase their source water supply, portions of the new WHPP will need to be completed and submitted to IDEM (probably prior to the issuance of a construction permit for the wells). Prior draft versions of the state's implementation guidelines have indicated that the WHPA delineation must be preliminarily completed, and the potential contaminant source inventory must be completed. The final draft regulation does indicate that each utility will have to submit:

a. a USGS map illustrating the area,
b. a detailed map showing the proposed well site with various information,
c. the WHPA delineated based on one of a number of methodologies,
d. the potential contaminant source inventory,

e. a summary of geological and groundwater quality information on the aquifer to be used, and

f. a schedule for the development of the Phase I WHPP.

IDEM is currently in the process of updating the implementation guidelines, based on the final version of the regulation. Once finalized, the guidelines may provide more detail on the new well submittal requirements, and may add additional requirements deemed necessary by the IDEM staff.

B. Structure of Regional and Area-Wide Utilities

There are a number of structural alternatives available for the expansion of the Milltown Water Utility or the creation of a Regional Water Utility. The structure of the utility refers to the form of the body that owns and operates the utility. For example, both of the Towns, Milltown and Marengo, each own and operate the water utilities within their communities, so the structure of the current utilities are municipal water utilities. Other common examples of utility structures include Regional Water Districts, Conservancy Districts, Private Water Utilities and Not-For-Profit Corporations. The structure of the utility will govern the method of creation, the governance, the powers, the ability to obtain and alternatives for financing, control of the planning area for water service and other issues of primary importance in the ultimate success of the utility. The alternatives available for the structure of the Regional Water Utility are essentially the same as those available to the Milltown Water Utility for the expansion of its service area into the Milltown Planning Area. The final decision as to the structure of the Regional Utility should be based on consultations with legal, financial advisors, in addition to the utility's engineering consultants.

1. Defined Planning Area

The Town of Milltown and the Town of Marengo each has the authority to define a 3-mile and a 5-mile Planning Area, into which the town plans to annex in the future.

2. Regional Water District

A regional water district is a special purpose district created in accordance with the Regional Water and/or Sewer Districts Act, Public Law 150 in 1972,

amended by Public Law 195 in 1973 and Public Law 86 in 1976. A regional water district is formed by petition filed with the Indiana Water Pollution Control Board.

3. Conservancy District

A conservancy district is a special purpose district created in accordance with the Indiana Conservancy Act, Chapter 308, Act of 1957. Conservancy Districts are created through a petition circulated in the area to be included in the proposed district and filed in the Circuit Court of the county holding the most land. These districts can be created for:

a. Flood Prevention and Control,
b. Drainage,
c. Irrigation,
d. Water Supply,
e. Sewage Collection and Disposal,
f. Recreational Areas, Parks, etc., and
g. Soil Erosion Control.

4. Annexation

Under this option, an unincorporated area could be annexed into the Town. Annexation would be a potentially viable option for the unserved unincorporated places which have developed around the outskirts of the town.

SECTION X - RECOMMENDED SOLUTIONS

With the existing and projected needs of the Milltown Water Utility and the Marengo Water Utility defined in the previous sections, a plan of recommended solutions has been developed to address the short-term and long-term needs of each of the utilities. Each utility should proceed with a phased program that includes projects based on both the utility's priority of needs, and the engineering requirements necessary to maximize the utilization of each facility. The scopes of each of these projects have been developed of a size that will allow each utility to finance the project through current financial mechanisms that maximize the benefit to the utility and its customers.

A. General Construction Issues

1. Environmental Impact Considerations

The layout of the proposed distribution system improvements is intended to follow the route of the existing road system. Therefore, most new piping is expected to be installed within previously disturbed areas and existing road rights-of-way, and significant environmental impacts, or archaeological work are not anticipated, nor are they included in the project costs unless specifically included in the cost estimates.

The locations of wells, booster stations and water tanks will be outside of the right-of-way, and will probably necessitate the acquisition of land or easements, and may require archaeological and other environmental reviews. These costs are included in the estimated project costs.

Certain financing sources (FmHA/RD) may require environmental assessments. Since this source of funding is considered to be a reasonable possibility, the costs for these environmental assessments are included in the cost estimates.

2. Land Requirements

Most water main work is expected to take place within existing road right-of-way or existing easements. Temporary construction easements may be needed for certain work. Estimated costs for temporary construction easements are included in the project cost estimates, however, the costs of

permanent construction easements are not included unless specifically identified in the project costs.

Land will need to be acquired for the construction of wells, main-line booster pump stations and water tanks. The estimated costs for the land for these facilities has been included in the project cost estimates. Any treatment plant expansions are presumed to occur at the existing treatment plant site.

3. Construction Problems

Based upon discussions with utility personnel and the information available on the local wells, there should be no major construction concerns with respect to the water table. The most significant potential problem which may arise during construction is the shallow rock level in the Planning Areas. Another problem which may occur during construction concern the locations of existing utilities, especially the water mains and service lines which are to be replaced.

To allow continued water service to customers during the construction of replacement lines, the existing distribution system will need to remain in full service until the replacement system is completely installed, flushed, disinfected, tested and placed into operation. Segments of the existing system can then be abandoned as customer service connections are transferred to the new system.

4. Customer Connections

For replacement mains, new service lines will be run from the new mains to reconnect to the existing homeowner's lines at the edge of the right-of-way. The existing mains will be disconnected from the system and abandoned in place once the new main is placed into service.

The connection of existing customers to a replacement water system may involve the disturbance of the area in front of the customer's yard in order to locate the existing service line, and to make the connection. Disturbances may include lawns, landscaping, fencing, sidewalks, trees and landscaping. Most customers do not realize that this area is public land, but instead believe that it is part of their yard. Care and consideration must be taken in

working with each customer, both in letting them know beforehand of the work that will be done, finding out any information that the customer may have of the service line location, and repairing the damaged area to the best possible condition.

The connection of an existing customer to a new service line sometimes causes the water pressure (usually the available water flow) to be increased, which can cause plumbing problems. The installation of an individual pressure boosting station for a customer may create both plumbing problems, and electrical power supply problems (if the power supply to the home isn't of adequate amperage to supply the home and the pump). As with individual pressure boosting stations, the installation of a main-line pressure booster to increase the pressure of the service along a water main may create plumbing problems, as defective plumbing that worked adequately at the low pressure becomes a problem. The customers affected by these situations should be forewarned of these possibilities by the utility.

5. Granular Backfill and Road Replacement

The water main improvements described in this Report are preliminarily planned to be located more than 5' from the edge of pavement of the roads along which they'll be built, so that granular backfill will generally not be required. Land constraints may necessitate the design of water lines closer to the road than anticipated, increasing the costs for granular backfill and road replacement, however, only a small cost consideration has been included for backfill or road replacement for lines running parallel to the road.

Road crossings for services and where mains connect will require both granular backfill and road surface repair. Additionally, crossing existing driveways will necessitate the use of granular backfill and the repair of the driveway. Estimated costs for 32' of granular backfill and 22' of asphalt repair has been added for half of the water services proposed, and for 5% by length of the water lines to be constructed.

6. Water Storage Tanks

The most economical water storage tank to be built will be based on the specific circumstances surrounding the tank design, most notably on the elevation of the ground on which the tank is placed. A standpipe is generally more economical for short and medium height tanks, while an elevated tank may be more economical for a tall tank. Since the top elevation of the tank is governed by the elevations of the service area, there is very little room for adjustment without increasing the area requiring either pressure boosting or pressure reducing. However, the specific location of the tank, and the elevation of the ground on which the tank will sit (which will govern the height of the tank) is unknown at this time. For this reason, the type and height (as opposed to the overflow elevation) of the tank cannot be known at this time.

The cost estimates for water tanks developed in this report assume that the water tanks will be standpipes with a total height of 90'. Higher tanks may increase the costs for the tank.

7. Surface Water Influence

The basic recommendations developed in this Report are based on the presumption that the Milltown Water Utility's wells are found to be not under the influence of surface water.

If it is determined that any of the Milltown Water Utility's wells are under the influence of surface water, it will be necessary for the utility to modify the existing water treatment plant to a direct filtration plant if it is to continue the use of its wells. Alternatively, the utility could pursue other sources of water. Preliminary cost estimates for modifications to the existing treatment plant are included in this section, and are based on the use of the excess capacity in the reaction basin for coagulation and flocculation.

B. Milltown Water Utility

1. Milltown Phase I Project

a. Project Description

In the Milltown Phase I Project, the hydrogeological investigations and well development activities are intended to provide the utility with a well supply sufficient to reliably meet the existing water treatment plant's capacity. (The ability of a single well to accomplish this work will be based on the well's capacity and the final determination of plant capacity based on whether the groundwater is under the influence of surface water.) The water tank will also be rehabilitated in accordance with the tank inspection report. Water tank work will include replacement of the interior paint system, replacement of the exterior paint system, and various minor repairs. The problems with the well and treatment plant controls will be resolved with the installation of a control panel in the water treatment plant that will allow control of the wells and high service pumps, and telemetry to report and record the water elevations in the clearwell and the existing water tank.

b. Utility Needs Satisfied

The Phase I Project has been developed to satisfy the utility's most pressing current needs, including:

(1) increasing the water supply capacity,
(2) increasing the usable capacity in the existing water tank,
(3) rehabilitating the existing tank, and
(4) providing treatment plant and well control upgrades.

c. Estimated Phase I Project Costs

The following **Table No. 67** provides a detailed breakdown of the estimated project costs for the Milltown Phase I Project.

Table 67
Estimated Project Costs-Milltown Phase I Improvements

Work Item	Quantity/Units	Unit Cost	Extension Cost	
WELLFIELD INVESTIGATIONS				
Test Well Development	3 LS	$12,000	$36,000	
Subtotal				$36,000
WELLFIELD DEVELOPMENT				
Well Install, Testing and Development	1 LS	$65,000	$65,000	
Well Pump	1 EA	$12,000	$12,000	✓
Well House, Power	1 LS	$50,000	$50,000	
Piping and Connections	1 LS	$50,000	$50,000	
Sitework	1 LS	$20,000	$20,000	
Subtotal				$197,000
WATER TANK REHABILITATION				
Pressure Sustaining Valve & Vault	1 LS	$12,000	$12,000	
Int./Ext. Paint, Misc. Repairs	1 LS	$52,800	$52,800	
Cathodic Protection System	1 LS	$10,000	$10,000	
Subtotal				$74,800 ✓
TREATMENT PLANT IMPROVEMENTS				
Control System	1 LS	$40,000	$40,000	
Iron Removal Aerator	1 LS	$35,000	$35,000	
Subtotal				$75,000 ✓
TOTAL ESTIMATED CONSTRUCTION COSTS				**$382,800**

Table 67
Estimated Project Costs-Milltown Phase I Improvements (con't)

Service Item	Cost	
NON-CONSTRUCTION COSTS[1]		
Administrative		
Administrative	$3,500	
Labor Standards (DOC)	$5,000	
Environmental Review (DOC)	$2,000	
Grant Administration (DOC)	$20,000	
Legal Services	$3,000	
Financial Advisor (Rate Consultant)	$6,000	
Bond Counsel	$4,000	
Subtotal		$43,500
Basic Engineering Services		
Basic Design & Const. Administration		$42,000
Land/Easement Acquisition		
Appraisal	$2,000	
Description Preparation	$1,000	
Purchase	$30,000	
Subtotal		$33,000
Inspection Services		
Construction Inspection		$21,500
Other Technical Services		
Hydrogeological Investigations	$6,000	
WHPA Delineation, Potential Sources ID	$30,000	
Surf. Water Influence Pilot Study	$15,000	
Soils Borings (Water Line from Well)	$2,000	
Environmental Information Preparation (RD)	$5,000	
Subtotal		$58,000
Total Estimated Construction Costs		**$382,800**
Total Estimated Non-Construction Costs		**$198,000**
TOTAL ESTIMATED PROJECT COST		**$580,800**

(1) Line items where funding sources are indicated in parentheses are only required with the indicated funding source

d. Phase I Project Schedule

The following T**able No. 68** presents the estimated project time schedule for the Phase I Project. This schedule is representative if all parties respond promptly when called upon to proceed with their tasks. However, following phases would follow a similar time schedule.

Table 68
Milestones and Time Schedule-Milltown Phase I Project

Task	Estimated Date
Town Approves & Accepts Report	January, 1997
RD Pre-Application Prepared & Submitted	January, 1997
RD Environmental Assessment Authorized	January, 1997
Rate Consultant Analysis Completed (Fin. Analysis based on Prelim. Project Costs)	February, 1997
Conduct Public Hearing	February, 1997
Submit IDOC Grant Proposal	February, 1997
Submit RD Full Application	March, 1997
Conduct Second Public Hearing	April, 1997
Submit Full IDOC Grant Application	April, 1997
Receive RD Letter of Conditions	May, 1997
Receive IDOC Grant Award	May, 1997
Town Procures Professional Services	May, 1997
Town Hires Engineer, Administrator for DOC Portion	June, 1997
Town Approves Plans & Specifications	September, 1997
Town Submits Plans & Specifications to IDEM	September, 1997
Town Receives IDEM Construction Permit	November, 1997
Town Advertises for Bid	November, 1997
Town Conducts Pre-Bid Meeting	November, 1997
Town Opens Bids	December, 1997
Town Obtains Release of Funds from IDOC	December, 1997
RD Loan Closing	February, 1998
Town Conducts Pre-Construction Meeting	February, 1998
Town Issues Notice to Proceed	February, 1998
Construction Begins	February, 1998
Construction Complete	August, 1998
Grant Administratively Closed	September, 1998
RD Final Inspection	September, 1998

e. Additional Work Required During Milltown Phase I Project

In order to effectively proceed with the work needed to meet the utility's goals, a number of decisions need to be made during the Phase I Project. These decisions should lead to the final determination as to the water supply source(s) that will be used during the Planning Period, and the structure of the utility that will be used in the expansion of the service area.

With the information from the surface water influence treatability study, the utility will be well informed on the ability of the treatment plant to meet treatment requirements if the groundwater supply is found to be under the influence of surface water. It will also become clear what improvements are required at the treatment plant if the wells are found to be under the influence of surface water.

The utility should also actively pursue detailed discussions with Ramsey Water Co. and Crawford County Water Company about:

(1) the costs of improvements that might be necessary to get a wholesale water supply for part or all of the utility's future needs,
(2) the possibility of the Milltown Water Utility purchasing the Crawford Co. Water Co's. Pilot Knob Tank, or capacity from this tank for the West Service Level and the Southwest Service Level,
(3) the possibility of joining with Ramsey Water Co. in the construction of the transmission main and water tank serving the Northeastern Service Level.

The utility should also finalize an understanding, and ultimately a written agreement if water is going to continue to be provided, with the Town of Marengo about the quantity and conditions of the water supply that will be provided to the Marengo Water Utility. Any water provided to Marengo will have to be added to the water demands already listed.

While the Milltown Water Utility is in a position where it should first maximize the use of capacities in its existing water treatment plant, the Marengo Water Utility is operating on a shorter time schedule for some of its major decisions. Without a water treatment plant, and having water quality as the second highest priority, the Marengo Water Utility will need to make a decision about whether to proceed with the construction of a sulfate removal plant before proceeding with its **second** phase of work. For this reason, it is recommended that both utilities begin immediately to resolve the issues that need to be dealt with before completion of Milltown's Phase II project (see Additional Work During Phase II).

2. Milltown Phase II Project

a. Phase II Project Description

The Phase II Project completes the improvements to the existing water treatment plant by adding standby power connections for the wells and for the treatment plant, post-chlorination and modifications to the treatment plant in the event the water supply is found to be under the influence of surface water. Two water main projects are required to strengthen the ability of the utility to transfer water to the west side of the Blue River. The capacity problems with the existing water tank related to gravity service to customers at higher elevations will be resolved by providing these customers with main-line pressure boosting systems or with individual pressure boosting stations. Additionally, a number of the most aged and problematic water mains must be abandoned, a new water main constructed on Church Street, and the services on these abandoned main connected to either existing mains or the new Church Street Main.

b. Utility Needs Addressed by the Phase II Project

The Milltown Phase II Project has been developed to satisfy many of the utility's remaining current needs, including:

(1) providing chlorination improvements to improve treatment, reduce operations and maintenance costs, and to prepare

the treatment plant in the event the water supply is found to be under the influence of surface water,

(2) better preparing the utility for emergencies by providing quick-connect connections and manual transfer switches for an emergency power supply at the wellhouse and the treatment plant,

(3) strengthening the distribution system on either side of the north river crossing to allow a better transfer of water to the west side of the water system, and

(4) replacing the aged water mains that have been a maintenance and leakage problem for the utility in the past, and connecting services from these mains to existing mains or a new main on Church Street.

c. Estimated Phase II Project Costs

The following **Table No. 69** provides a detailed breakdown of the Phase II Estimated Project Costs.

Table 69
Estimated Project Costs-Milltown Water Utility Phase II Improvements

Work Item	Quantity/Units	Unit Cost	Extension Cost	
TREATMENT PLANT IMPROVEMENTS				
Standby Power Connections (Plant and Wells)	3 EA	$16,000	$48,000	
Post-Chlorination System	1 LS	$25,000	$25,000	
Chlorinator Room Heating	1 LS	$1,000	$1,000	
Direct Filtration Modifications (Preliminary Estimate)	1 LS	$80,000	$80,000	
Subtotal				$154,000
DISTRIBUTION SYSTEM IMPROVEMENTS				
Water Main from Plant to East Side of North River Crossing (8-inch)	600 LF	$25	$15,000	
Water Main on Main St. on the West Side of North River Crossing (8-inch)	500 LF	$27	$13,500	
Subtotal				$28,500
PRESSURE IMPROVEMENTS				
Mainline Pressure Boosting Stations	3 EA	$40,000	$120,000	
Water Main Connection (for Boosters)	3 LS	$7,000	$21,000	
Individual Pressure Boosting Stations	12 EA	$5,000	$60,000	
Subtotal				$201,000
REPLACEMENT OF AGING WATER LINES				
Church Road Water Line Extension (6-Inch)	520 LF	$18	$9,360	
Meter Box/Service Line Replacements	14 EA	$650	$9,100	
Subtotal				$18,460
TOTAL ESTIMATED CONSTRUCTION COSTS				**$401,960**

Table 69
Estimated Project Costs-Milltown Water Utility Phase II Improvements (con't)

Service Item	Cost	
NON-CONSTRUCTION COSTS[1]		
Administrative		
Administrative	$3,500	
Labor Standards (DOC)	$5,000	
Environmental Review (DOC)	$2,000	
Grant Administration (DOC)	$20,000	
Legal Services	$3,000	
Financial Advisor (Rate Consultant)	$6,000	
Bond Counsel	$4,000	
Subtotal		$43,500
Basic Engineering Services		
Basic Design & Const. Administration		$43,000
Inspection Services		
Construction Inspection		$26,000
Other Technical Services		
Soils Borings (Water Line)	$4,000	
Environmental Information Preparation (RD)	$5,000	
Subtotal		$9,000
Total Estimated Construction Costs		**$401,960**
Total Estimated Non-Construction Costs		**$121,500**
TOTAL ESTIMATED PROJECT COST		**$523,460**

(1) Line items where funding sources are indicated in parentheses are only required with the indicated funding source

d. Phase II Project Schedule

The Phase II Project probably will not be able to be financed until the Phase I Project grants have been closed. The exact timing of this event is not currently known. The Phase II Project schedule will be similar to the schedule of the Phase I Project, with the start date being shortly after the close of the Phase I Project grant and other financing.

e. Additional Work Required During Phase II

The work in Phase I and Phase II will have placed the Milltown Water Utility in a position where the capacities and effectiveness of its existing facilities are maximized. Prior to the end of Phase II, the Milltown Water Utility should reach final conclusion to a number of major decisions. These decisions include:

(1) whether the utility proceeds as a regional system with the Marengo Water Utility, or proceeds by itself,
(2) the structure of the entity that will be used to achieve the utility's goals, whether a regional water district, a conservancy district, a municipal utility, or a not-for-profit utility,
(3) the process that is going to be used to protect the utility's service area so that the utility's infrastructure investments can be reliably financed by future customers, and
(4) determinations (and written agreements) as to the sources of wholesale water purchase (if any) from other utilities.

3. Milltown Phase III Project

a. Phase III Project Description

The Phase III Project completes the improvements the fire protection capabilities of the Town, and prepares the utility for the extension of service into the expanded Milltown Planning Area.

b. Utility Needs Addressed by the Phase III Project

The Milltown Phase III Project has been developed to satisfy the utility's remaining current needs, and to begin the process of preparing the utility to meet the future needs of the Planning Area, including:

(1) improving the fire protection capabilities of the existing system, and

(2) installing the water storage tank capacities needed to begin the extension of service into the Milltown Planning Area.

c. Estimated Phase III Project Costs

The following **Table No. 70** provides a detailed breakdown of the Phase III Estimated Project Costs.

Table 70
Estimated Project Costs-Milltown Water Utility Phase III Improvements

Work Item	Quantity/Units	Unit Cost	Extension Cost	
NEW WEST WATER TANK				
Water Tank[1]	1 LS	$245,000	$245,000	
Control System	1 LS	$30,000	$30,000	
Cathodic Protection System	1 LS	$10,000	$10,000	
Transmission Main (8-Inch PVC)	3,200 LF	$24	$76,800	
Site Improvements	1 LS	$15,000	$15,000	
Subtotal				$376,800
TOTAL ESTIMATED CONSTRUCTION COSTS				**$376,800**

(1) Based on siting of riverboat in Crawford County, reduce Water Tank to $175,000 if riverboat is not sited in Crawford County

Table 70
Estimated Project Costs-Milltown Water Utility Phase III Improvements (con't)

Service Item	Cost	
NON-CONSTRUCTION COSTS[1]		
Administrative		
Administrative	$3,500	
Labor Standards (DOC)	$5,000	
Environmental Review (DOC)	$2,000	
Grant Administration (DOC)	$20,000	
Legal Services	$3,000	
Financial Advisor (Rate Consultant)	$6,000	
Bond Counsel	$4,000	
Subtotal		$43,500
Basic Engineering Services		
Basic Design & Const. Administration		$41,000
Land/Easement Acquisition		
Appraisal	$2,000	
Description Preparation	$1,000	
Purchase	$30,000	
Subtotal		$33,000
Inspection Services		
Construction Inspection		$27,000
Other Technical Services		
Soils Investigations (Water Tank Foundation)	$4,000	
Soils Borings (Water Line)	$4,000	
Environmental Information Preparation (RD)	$5,000	
Subtotal		$13,000
Total Estimated Construction Costs		**$376,800**
Total Estimated Non-Construction Costs		**$157,500**
TOTAL ESTIMATED PROJECT COST		**$534,300**

(1) Line items where funding sources are indicated in parentheses are only required with the indicated funding source

d. Phase III Project Schedule

The Phase III Project probably will not be able to be financed until the Phase II Project grants have been closed. The exact timing of this event is not currently known. The Phase III Project schedule will be similar to the schedule of the Phase I Project and the Phase II Project, with the start date being shortly after the close of the Phase II Project grant and other financing.

e. Additional Work Required During Phase III

The work in Phase III will have placed the Milltown Water Utility in a position where the utility can actively pursue its long-term goals. Prior to the end of Phase III, the Milltown Water Utility should reach final conclusion as to:

(1) which areas (service levels) to which water service is going to be extended to first.

Issues related to this decision are discussed in the following section.

4. Subsequent Phased Improvements

a. Water Supply Requirements for Subsequent Improvements

The water supply available to the Milltown Water Utility after completion of Phases I, II and III should be adequate for the connection of a nominal number of additional customers to the system. However, it will be necessary for the utility to actively pursue additional water supply sources as the utility extends its customer base. The possible sources of this water supply are discussed in **Sections VIIIA.1., VIIIB.1.** on pages 142, 146. General project costs for wells supplies and iron removal water treatment plants are included in the subsequent section on the Regional Water Utility.

Depending on the source, the utility may be able to obtain water supply capacity adequate for substantial future growth at one time. If this is the case, the utility can focus on the development of the

transmission, pumping, storage and distribution systems, as well as the customer base. However, the utility may have to obtain water supplies in small increments, perhaps from a number of sources. Under this circumstance, the utility may have to pursue additional water supplies on a per-project or regular basis.

b. Sequence of Service Level Improvements

(1) Determination of Which Service Levels to Serve First

Once the Main Service Level facilities are improved to the extent that they are capable of supporting extension of water service into the various service levels, a decision needs to be made by the Milltown Water Utility as to the specific sequence with which the service levels are to be served. For example, if the utility foresees substantial growth potential and a reasonable existing customer base in the Northeast Service Level, this area may be the first choice for service.

The density of customers in an area that can be readily served, along with the foreseen growth rate in that area should both be considered in this decision. A drive-through house count should be completed before the decision is made, and agreements for service with as many future customers as possible should be completed before the extension of service should be finalized.

Once the water system has been developed in the first service level to be serviced, the utility should then review the circumstances in existence at that time, and choose the second service level for which service should be extended.

(2) Process for Service Extension

(a) Primary Facilities

Once the decision has been made to extend service into a new service level, the Milltown Water Utility should develop a project which includes:

i) the remaining portions of the transmission main in the Main Service Level needed to provide water to the booster station,
ii) the booster station for that service level,
iii) the transmission main from the booster station to the water tank, and
iv) the water tank.

These facilities will comprise the primary water supply and storage for that service level, and will be necessary before water service can be provided to customers in that service level.

(b) Distribution System

During and after the installation of the primary facilities for that service level, the distribution system needs to be constructed to the existing and future customers in that service level. The extent of the work that can be done on the distribution system in a particular service level depends on the financing available, the density of customers readily available to be served, any cost participation by developers or major commercial customers, and the work that is necessary extending service to or within other service levels.

(c) Phasing of Facilities

While for certain facilities (such as water tanks and water mains) phasing of the capacities is generally not practical, there are certain facilities where phasing may be practical. The utility may wish to consider for its larger service level booster stations (where connections and growth is anticipated over a number of years) that the pumps be phased. Phasing could occur by either installing larger impellers into the booster pumps to increase their capacity as needed (the motors should be sized for this increase when originally installed), or by providing the room and piping in the booster station housing for the installation of a third pump in the future.

(d) Final Routing and Location of Facilities

At this planning level, specific routes for water lines cannot be deduced. The final route for a water line, or the location of a water tank or booster station should be done during the design phase, and should be based on a more detailed analysis of the elevations involved, land and easement availability, and other considerations. However, it is reasonable at this stage to assume that water lines and main line booster stations will be located along existing roads, and that water tanks can be placed on hills near roads.

c. Construction Cost Estimates

The following tables outline preliminary, planning level project cost estimates for the construction of the improvements in each of the service levels. These cost estimates are based on current construction costs for SDR 26 and SDR 21 PVC water main pipe without substantial granular backfill and limited flush hydrants and

valves. Customer meter taps, service lines, boxes and meters are assumed to be paid from the connection fee paid by the customer.

These cost estimates include a 35% factor for non-construction costs. The actual non-construction cost factor may vary substantially from this amount, depending on the financing source and size of the project. Many of the non-construction costs, particularly related to legal and financial services, do not vary a great deal, whether the project is large or small. Because of this, with smaller projects the non-construction costs may be a higher percentage than is indicated. Also, the types and extent of certain non-construction costs, particularly legal, financial and environmental services will differ depending on the financing source.

Since the specific timing of each of these projects is not known at this time, and the construction costs will most likely increase in the future, the cost estimates provided in these tables should be multiplied by the inflation factors provided in **Table No. 84** to obtain a better idea of the cost of a project at any specific time. As with all cost estimates, these costs are based on experience with similar projects as engineering professionals, and the actual costs will vary from these estimates. In addition, due to the general, planning level nature of these projects, the potential variability of these cost estimates from the actual costs will be higher than cost estimates developed from, for example, final plans and specifications.

Table 71
Main Service Level Project Cost Estimates (Outside Current Service Area)-
Milltown Water Utility

Work Item	Quantity/ Units	Unit Cost	Extension Cost	
TRANSMISSION SYSTEM				
to West Service Level (6-Inch)	8,800 LF	$13	$114,400	
to Southwest Service Level (6-Inch)	16,500 LF	$13	$214,500	
to Northwest Service Level (8-Inch)	8,500 LF	$17	$144,500	
RR/Highway Crossing	4 EA	$20,000	$80,000	
to Northeast Service Level (8-Inch)	16,500 LF	$17	$280,500	
RR/Highway Crossings	2 EA	$20,000	$40,000	
to Southeast Service Level (6-Inch)	3,800 LF	$13	$49,400	
Subtotal				$923,300
DISTRIBUTION SYSTEM				
8-Inch Distribution System	2,900 LF	$17	$49,300	
6-Inch Distribution System	22,500 LF	$13	$292,500	
4-Inch Distribution System	31,800 LF	$11	$349,800	
3-Inch Distribution System	32,900 LF	$8	$263,200	
Highway Crossings	2 EA	$20,000	$40,000	
Subtotal				$994,800
Total Estimated Construction Costs				**$1,918,100**
Total Estimated Non-Construction Costs				**$671,000**
TOTAL ESTIMATED PROJECT COSTS				**$2,589,100**

Table 72
West Service Level Project Cost Estimates-Milltown Water Utility

Work Item	Quantity/ Units	Unit Cost	Extension Cost	
BOOSTER STATION				
Booster Station[1]	1 LS	$40,000	$40,000	
Electrical Power	1 LS	$10,000	$10,000	
Subtotal				$50,000
WATER STORAGE TANK				
Water Tank[1]	1 LS	$125,000	$125,000	
Control System	1 LS	$20,000	$20,000	
Cathodic Protection System	1 LS	$8,000	$8,000	
Site & Improvements	1 LS	$35,000	$35,000	
Subtotal				$188,000
TRANSMISSION SYSTEM				
Transmission Main (6-Inch)	6,500 LF	$13	$84,500	
Subtotal				$84,500
DISTRIBUTION SYSTEM				
4-Inch Distribution System	44,900 LF	$11	$493,900	
3-Inch Distribution System	12,800 LF	$8	$102,400	
Subtotal				$596,300
Total Estimated Construction Costs				**$918,800**
Total Estimated Non-Construction Costs				**$322,000**
TOTAL ESTIMATED PROJECT COSTS				**$1,240,800**

(1) Based on siting of riverboat in Crawford County, reduce Booster Station to $37,000 and Water Tank to $105,000 if riverboat is not sited in Crawford County

Table 73
Southwest Service Level Project Cost Estimates-Milltown Water Utility

Work Item	Quantity/ Units	Unit Cost	Extension Cost	
BOOSTER STATION				
Booster Station	1 LS	$40,000	$40,000	
Electrical Power	1 LS	$10,000	$10,000	
Subtotal				$50,000
WATER STORAGE TANK				
Water Tank	1 LS	$125,000	$125,000	
Control System	1 LS	$20,000	$20,000	
Cathodic Protection System	1 LS	$8,000	$8,000	
Site & Improvements	1 LS	$35,000	$35,000	
Subtotal				$188,000
TRANSMISSION SYSTEM				
Transmission Main (6-Inch)	15,000 LF	$13	$195,000	
Subtotal				$195,000
DISTRIBUTION SYSTEM				
4-Inch Distribution System	28,900 LF	$11	$317,900	
3-Inch Distribution System	4,400 LF	$8	$35,200	
Subtotal				$353,100
Total Estimated Construction Costs				**$786,100**
Total Estimated Non-Construction Costs				**$275,000**
TOTAL ESTIMATED PROJECT COSTS				**$1,061,100**

(1) Based on siting of riverboat in Crawford County; reduce to Booster Station to $37,000 and Water Tank to $110,000 if riverboat is not sited in Crawford County

Table 74
Northwest Service Level Project Cost Estimates-Milltown Water Utility

Work Item	Quantity/ Units	Unit Cost	Extension Cost	
BOOSTER STATION				
Booster Station[1]	1 LS	$55,000	$55,000	
Electrical Power	1 LS	$12,000	$12,000	
Subtotal				$67,000
WATER STORAGE TANK				
Water Tank[1]	1 LS	$160,000	$160,000	
Control System	1 LS	$20,000	$20,000	
Cathodic Protection System	1 LS	$8,000	$8,000	
Site & Improvements	1 LS	$35,000	$35,000	
Subtotal				$223,000
TRANSMISSION SYSTEM				
Transmission Main (6-Inch)	18,500 LF	$13	$240,500	
Subtotal				$240,500
DISTRIBUTION SYSTEM				
4-Inch Distribution System	43,500 LF	$11	$478,500	
3-Inch Distribution System	44,300 LF	$8	$354,400	
Highway Crossings	3 LF	$20,000	$60,000	
Subtotal				$892,900
Total Estimated Construction Costs				**$1,423,400**
Total Estimated Non-Construction Costs				**$498,000**
TOTAL ESTIMATED PROJECT COSTS				**$1,921,400**

(1) Based on siting of riverboat in Crawford County; reduce to Booster Station to $50,000 and Water Tank to $130,000 if riverboat is not sited in Crawford County

Table 75
Northeast Service Level Project Cost Estimates-Milltown Water Utility

Work Item	Quantity/ Units	Unit Cost	Extension Cost	
BOOSTER STATION				
Booster Station[1]	1 LS	$38,000	$38,000	
Electrical Power	1 LS	$10,000	$10,000	
Subtotal				$48,000
WATER STORAGE TANK				
Water Tank[1]	1 LS	$120,000	$120,000	
Control System	1 LS	$20,000	$20,000	
Cathodic Protection System	1 LS	$8,000	$8,000	
Site & Improvements	1 LS	$35,000	$35,000	
Subtotal				$183,000
TRANSMISSION SYSTEM				
Transmission Main (6-Inch)	13,900 LF	$13	$180,700	
Subtotal				$180,700
DISTRIBUTION SYSTEM				
6-Inch Distribution System	21,500 LF	$13	$279,500	
4-Inch Distribution System	46,400 LF	$11	$510,400	
3-Inch Distribution System	13,100 LF	$8	$104,800	
RR/River/Highway Crossings	3 LF	$20,000	$60,000	
Subtotal				$954,700
Total Estimated Construction Costs				**$1,366,400**
Total Estimated Non-Construction Costs				**$478,000**
TOTAL ESTIMATED PROJECT COSTS				**$1,844,400**

(1) Based on siting of riverboat in Crawford County; reduce Booster Station to $35,000 and Water Tank to $110,000 if riverboat is not sited in Crawford County

Table 76
Southeast Service Area Project Cost Estimates-Milltown Water Utility

Work Item	Quantity/ Units	Unit Cost	Extension Cost	
BOOSTER STATION				
Booster Station	1 LS	$32,000	$32,000	
Electrical Power	1 LS	$10,000	$10,000	
Subtotal				$42,000
DISTRIBUTION SYSTEM				
6-Inch Distribution System	19,000 LF	$13	$247,000	
4-Inch Distribution System	48,200 LF	$11	$530,200	
3-Inch Distribution System	9,500 LF	$8	$76,000	
River Crossing	1 LF	$20,000	$20,000	
Subtotal				$853,200
Total Estimated Construction Costs				**$895,200**
Total Estimated Non-Construction Costs				**$313,000**
TOTAL ESTIMATED PROJECT COSTS				**$1,208,200**

C. Marengo Water Utility

1. Marengo Phase I Project

a. Project Description

In the Phase I Project, hydrogeological investigations and well development activities will be conducted. Polyphosphate feeders will be installed at the existing and the new well buildings to control the iron content in the water. Also, a well control system will be installed at the water tank, existing well and new well to allow for the automatic control of both well pumps. Much of the piping and connections costs for the new well are related to the connection of the existing well to the new well site for ultimate connection to the water treatment plant in the Phase II Project. This connection may not be possible if the new well site is a substantial distance from the existing well site.

b. Utility Needs Satisfied

The Phase I Project has been developed to satisfy the utility's most pressing current needs, including:

(1) increasing the water supply to meet the utility's current customer demands,
(2) providing limited treatment for a partial improvement of the water quality, and
(3) providing an automatic well control to reduce tank overflows, reduce operating costs and improve system pressures.

c. Estimated Phase I Project Costs

The following **Table No. 77** provides a detailed breakdown of the estimated costs for the Marengo Water Utility Phase I Project.

Table 77
Estimated Project Costs-Marengo Water Utility Phase I Improvements

Work Item	Quantity/Units	Unit Cost	Extension Cost	
WELLFIELD INVESTIGATIONS				
Test Well Development	3 LS	$12,000	$36,000	
Subtotal				$36,000
WELLFIELD DEVELOPMENT				
Well Install, Testing and Development	1 LS	$65,000	$65,000	
Well Pump	1 EA	$12,000	$12,000	
Well House, Power	1 LS	$65,000	$65,000	
Chlorination System	1 LS	$25,000	$25,000	
Piping and Connections	1 LS	$50,000	$50,000	
Sitework	1 LS	$15,000	$15,000	
Subtotal				$232,000
IRON REMOVAL SYSTEMS				
Polyphosphate Pumps & Piping	2 LS	$8,000	$16,000	
Subtotal				$16,000
WELL CONTROL SYSTEM				
Basic Control System	1 LS	$40,000	$40,000	
Well Control Modifications	1 LS	$40,000	$40,000	
Subtotal				$80,000
TOTAL ESTIMATED CONSTRUCTION COSTS				**$364,000**

Table 77
Estimated Project Costs-Marengo Water Utility Phase I Improvements (con't)

Service Item	Cost	
NON-CONSTRUCTION COSTS[1]		
Administrative		
Administrative	$3,500	
Labor Standards (DOC)	$5,000	
Environmental Review (DOC)	$2,000	
Grant Administration (DOC)	$20,000	
Legal Services	$3,000	
Financial Advisor (Rate Consultant)	$6,000	
Bond Counsel	$4,000	
Subtotal		$43,500
Basic Engineering Services		
Basic Design & Const. Administration		$40,000
Land/Easement Acquisition		
Appraisal	$2,000	
Description Preparation	$1,000	
Purchase	$40,000	
Subtotal		$43,000
Inspection Services		
Construction Inspection		$26,000
Other Technical Services		
Hydrogeological Investigations	$6,000	
WHPA Delineation, Potential Sources ID	$30,000	
Soils Borings (Water Line)	$2,000	
Environmental Information Preparation (RD)	$5,000	
Subtotal		$43,000
Total Estimated Construction Costs		**$364,000**
Total Estimated Non-Construction Costs		**$195,500**
TOTAL ESTIMATED PROJECT COST		**$559,500**

(1) Line items where funding sources are indicated in parentheses are only required with the indicated funding source

d. Phase I Project Schedule

The following **Table No. 78** presents the estimated project time schedule for the Phase I Project. This schedule is representative if all parties respond promptly when called upon to proceed with their tasks. Subsequent phases would follow a similar time schedule following a notice to proceed.

Table 78
Project Time Schedule-Marengo Water Utility Phase I Project

Task	Estimated Date
Town Approves & Accepts Report	January, 1997
RD Pre-Application Prepared & Submitted	January, 1997
RD Environmental Assessment Authorized	January, 1997
Rate Consultant Analysis Completed (Fin. Analysis based on Prelim. Project Costs)	February, 1997
Conduct Public Meeting	February, 1997
Submit Preliminary IDOC Grant Proposal	February, 1997
Submit RD Full Application	March 18, 1997
Conduct Second Public Meeting	April, 1997
Submit Full IDOC Grant Application	April, 1997
Receive RD Letter of Conditions	May, 1997
Receive IDOC Grant Award	May, 1997
Town Procures Professional Services	May, 1997
Town Hires Engineer, Administrator, Etc.	June, 1997
Town Approves Plans & Specifications	September, 1997
Town Submits Plans & Specifications to IDEM	September, 1997
Town Receives IDEM Construction Permit	November, 1997
Town Advertises for Bid	November, 1997
Town Conducts Pre-Bid Meeting	November, 1997
Town Opens Bids	December, 1997
Town Obtains Release of Funds from IDOC	December, 1997
RD Loan Closing	February, 1998
Town Conducts Pre-Construction Meeting	February, 1998
Town Issues Notice to Proceed	February, 1998
Construction Begins	February, 1998
Construction Complete	August, 1998
Grant Administratively Closed	September, 1998
RD Final Inspection	September, 1998

e. Additional Work Required During Phase I

In order to effectively proceed with the work needed to meet the utility's goals, the utility should finalize an understanding, and ultimately a written agreement if water is going to continue to be provided, with the Town of Milltown about the quantity and conditions of the water supply that will be provided to the Marengo Water Utility.

The work in Phase I will have placed the Marengo Water Utility in a position where the capacities and effectiveness of its existing facilities are maximized. Prior to the end of Phase I, the Marengo Water Utility should reach final conclusion to a number of major decisions. These decisions include:

(1) whether the utility proceeds as a regional system with the Milltown Water Utility, or remains a municipal utility serving only the Town,
(2) if joining with Milltown, the structure of the entity that will be used to achieve the regional utility's goals, whether a regional water district, a conservancy district, a municipal utility, or a not-for-profit utility,
(3) the process that is going to be used to protect the regional utility's service area so that the utility's infrastructure investments can be reliably financed by future customers, and
(4) determinations (and written agreements) as to the sources of wholesale water purchase (if any) from other utilities.

The Milltown Water Utility also needs to resolve these issues, however, since Milltown already has a water treatment plant, their time frame to deal with these issues is not as tight as for the Marengo Water Utility.

2. Marengo Phase II Project

a. Project Description

The Marengo Water Utility should proceed with the Phase II Project only if necessary based on the future of a water supply relationship with a regional water utility or with the Milltown Water Utility, and based on the water quality and location of the well construction in the Phase I Project.

In the Phase II Project, a water treatment plant is constructed capable of reducing the concentration of iron and sulfate in the supply water. The plant also needs to provide softening in order to allow the sulfate removal process to function adequately. The treatment plant is planned to be built on the site of the well built in the Phase I Project. The connection of the existing well is planned, with the majority of the piping for this connection being constructed in the Phase I Project. Without knowing the final site of the treatment plant and new well, it is not known whether this connection will be possible. A clearwell is provided from which the high service pumps can pump treated water to the system. A brine tank is also provided in which to store brine solution for regeneration of both the softeners and the sulfate removal system. A short gravity connection of the sewer line from the treatment plant to an existing sewer is presumed. If this is not possible, a holding tank and pump station will be required at additional cost. A well pump control system will be installed to allow the automatic operation of the well pumps. It is assumed that the project will include the transfer of the chlorination equipment and polyphosphate feed equipment from the existing wellhouses to the new treatment plant.

b. Utility Needs Satisfied

The Phase II Project has been developed to satisfy the utility's second most pressing current need by providing treatment to improve the utility's water quality.

c. Estimated Phase II Project Costs

The following **Table No. 79** provides a detailed breakdown of the estimated costs for the Marengo Water Utility Phase II Project.

Table 79
Estimated Project Costs-Marengo Water Utility Phase II Improvements

Work Item	Quantity/Units	Unit Cost	Extension Cost	
TREATMENT PLANT				
Treatment Building	1 LS	$60,000	$60,000	
Iron Removal Equipment	1 LS	$195,000	$195,000	
Zeolite Softening Equipment	1 LS	$140,000	$140,000	
Sulfate Treatment Equipment	1 LS	$220,000	$220,000	
Internal Piping, Meters and Valves	1 LS	$45,000	$45,000	
High Service Pumping	1 LS	$16,000	$16,000	
External Piping and Connections	1 LS	$18,000	$18,000	
Control System	1 LS	$60,000	$60,000	
Laboratory Equipment	1 LS	$4,000	$4,000	
Power	1 LS	$16,000	$16,000	
Heating, Ventilating	1 LS	$8,500	$8,500	
Clearwell	1 LS	$20,000	$20,000	
Brine Tank	1 LS	$12,000	$12,000	
Sanitary and Backwash Sewer	1 LS	$8,000	$8,000	
Sitework	1 LS	$18,000	$18,000	
Subtotal				$840,500
TOTAL ESTIMATED CONSTRUCTION COSTS				**$840,500**

Table 79
Estimated Project Costs-Marengo Water Utility Phase II Improvements (con't)

Service Item	Cost	
NON-CONSTRUCTION COSTS[1]		
Administrative		
Administrative	$3,500	
Labor Standards (DOC)	$5,000	
Environmental Review (DOC)	$2,000	
Grant Administration (DOC)	$25,000	
Legal Services	$4,500	
Financial Advisor (Rate Consultant)	$6,000	
Bond Counsel	$6,000	
Subtotal		$52,000
Basic Engineering Services		
Basic Design & Const. Administration		$79,000
Land/Easement Acquisition		
Appraisal	$2,000	
Description Preparation	$1,000	
Purchase	$30,000	
Subtotal		$33,000
Inspection Services		
Construction Inspection		$42,000
Other Technical Services		
Soils Borings (Water Line and Sewer)	$4,000	
Environmental Information Preparation (RD)	$5,000	
Subtotal		$9,000
Total Estimated Construction Costs		**$840,500**
Total Estimated Non-Construction Costs		**$215,000**
TOTAL ESTIMATED PROJECT COST		**$1,055,500**

(1) Line items where funding sources are indicated in parentheses are only required with the indicated funding source

d. Phase II Project Schedule

The timing of the Phase II Project should be based on the success of discussions with the Milltown Water Utility regarding the

development of a regional water utility, and with other utilities for alternate water supplies. If a regional water utility is created with the Milltown Water Utility, this Phase II Project should be eliminated, and the Phase III Project (without the additional well) should be completed in its place.

Should the Marengo Water Utility choose to proceed with the Phase II Project, the timing and major tasks will be similar to the Phase I Project, with the timeframe adjusted to the date of notice to proceed for the Phase II Project.

e. Additional Work During Phase II Project

The Town needs to determine the final size of the water tank that is to be constructed during the Phase III Project with the quarry/warehouse early in the Phase II Project. The final tank size should be based on the fire flow requirements of the quarry/warehouse, and the most up-to-date estimates of employment (along with the percentage of the employees that will settle in areas served by the Marengo Water Utility).

3. Marengo Phase III Project

a. Phase III Project Description

The Phase III Project constructs an additional water tank on the hill near the quarry/warehouse, along with the control system and transmission main needed to connect the tank to the existing water system. The project also provides for the rehabilitation of the existing water tank, and the installation of altitude valves on both tanks.

b. Utility Needs Addressed by the Phase III Project

The Marengo Phase III Project adds to the fire protection capabilities of the Town, and prepares the utility for the fire protection requirements of the quarry/warehouse and the additional growth in customers brought on by this industry, and includes:

(1) improving the fire protection capabilities of the existing system

(2) providing needed maintenance to prolong the life of the existing water tank, and

(3) adding water storage tank capacity needed by the additional customers created by employment in the quarry/warehouse.

c. Estimated Phase III Project Costs

The following **Table No. 80** provides a detailed breakdown of the Phase III Estimated Project Costs.

Table 80
Estimated Project Costs-Marengo Water Utility Phase III Improvements

Work Item	Quantity/Units	Unit Cost	Extension Cost	
NEW WATER TANK AND TRANSMISSION MAIN				
Water Tank[1]	1 LS	$175,000	$175,000	
Control System	1 LS	$25,000	$25,000	
Cathodic Protection System	1 LS	$9,000	$9,000	
Transmission Main (8-Inch PVC)	2,400 LF	$20	$48,000	
Site Improvements	1 LS	$25,000	$25,000	
Subtotal				$282,000
WATER TANK REHABILITATION				
Pressure Sustaining/Altitude Valve & Vault	1 LS	$12,000	$12,000	
Int/Ext. Paint, Misc. Repairs	1 LS	$65,000	$65,000	
Cathodic Protection System	1 LS	$9,000	$9,000	
Subtotal				$86,000 ✓
TOTAL ESTIMATED CONSTRUCTION COSTS				**$368,000**

(1) Based on a 250,000 gallon standpipe or elevated ground storage tank. The actual size needed for this tank may differ from the planned size.

Table 80
Estimated Project Costs-Marengo Water Utility Phase III Improvements (con't)

Service Item	Cost	
NON-CONSTRUCTION COSTS[1]		
Administrative		
Administrative	$3,500	
Labor Standards (DOC)	$5,000	
Environmental Review (DOC)	$2,000	
Grant Administration (DOC)	$20,000	
Legal Services	$3,000	
Financial Advisor (Rate Consultant)	$6,000	
Bond Counsel	$4,000	
Subtotal		$43,500
Basic Engineering Services		
Basic Design & Const. Administration		$40,000
Land/Easement Acquisition		
Appraisal	$2,000	
Description Preparation	$1,000	
Purchase	$30,000	
Subtotal		$33,000
Inspection Services		
Construction Inspection		$26,000
Other Technical Services		
Soils Investigations (Water Tank Foundation)	$8,000	
Soils Borings (Water Line)	$6,000	
Environmental Information Preparation (RD)	$5,000	
Subtotal		$19,000
Total Estimated Construction Costs		**$368,000**
Total Estimated Non-Construction Costs		**$161,500**
TOTAL ESTIMATED PROJECT COST		**$529,500**

(1) Line items where funding sources are indicated in parentheses are only required with the indicated funding source

d. Phase III Project Schedule

The Phase III Project probably will not be able to be financed until the Phase II Project grants have been closed. The exact timing of this event is not currently known. The Phase III Project schedule will be similar to the schedule of the Phase I Project and the Phase II Project, with the start date being shortly after the close of the Phase II Project grant and other financing.

4. Marengo Phase IV Project

a. Project Description

In the Phase IV Project, an additional well will be constructed. Also, pressure boosting stations will be constructed in three areas of the system. One pressure boosting system near the existing tank will include a parallel 3-inch water main and reconnection of customers to the new main.

The Marengo Water Utility should only proceed with the well development portions of the Phase IV Project if a water supply relationship with a regional water utility or with the Milltown Water Utility cannot be formed. If an alternate water supply is obtained, the Phase IV Project should replace the Phase III Project in the sequence of improvements.

b. Utility Needs Satisfied

The Phase IV Project has been developed to allow the utility to meet the increasing demands of the utility's growing customer base due to growth brought on by the quarry/warehouse operation. The project also increases the usable capacity in the utility's water tank(s) by providing pressure boosting to customers at higher elevations.

c. Estimated Phase IV Project Costs

The following **Table No. 81** provides a detailed breakdown of the estimated costs for the Marengo Water Utility Phase IV Project.

Table 81
Estimated Project Costs-Marengo Water Utility Phase IV Improvements

Work Item	Quantity/Units	Unit Cost	Extension Cost	
WELLFIELD INVESTIGATIONS				
Test Well Development	3 LS	$12,000	$36,000	
Subtotal				$36,000
WELLFIELD DEVELOPMENT				
Well Install, Testing and Development	1 LS	$65,000	$65,000	
Well Pump	1 EA	$12,000	$12,000	
Well House, Power	1 LS	$50,000	$50,000	
Piping and Connections	1 LS	$50,000	$50,000	
Sitework	1 LS	$20,000	$20,000	
Subtotal				$197,000
PRESSURE IMPROVEMENTS				
Mainline Pressure Boosting Stations	3 EA	$40,000	$120,000	
Fancher Heights/So. Cherry St. 3-Inch Water Main w/Reconnections	2,240 LF	$14	$31,360	
Water Main Connection (for Boosters)	3 LS	$6,000	$18,000	
Electrical Power	3 EA	$9,000	$27,000	
Subtotal				$196,360
WELL CONTROL SYSTEM				
Well Control Modifications	1 LS	$20,000	$20,000	
Subtotal				$20,000
TOTAL ESTIMATED CONSTRUCTION COSTS				**$449,360**

Table 81
Estimated Project Costs-Marengo Water Utility Phase IV Improvements (con't)

Service Item	Cost	
NON-CONSTRUCTION COSTS[1]		
Administrative		
Administrative	$3,500	
Labor Standards (DOC)	$5,000	
Environmental Review (DOC)	$2,000	
Grant Administration (DOC)	$20,000	
Legal Services	$3,000	
Financial Advisor (Rate Consultant)	$6,000	
Bond Counsel	$4,000	
Subtotal		$43,500
Basic Engineering Services		
Basic Design & Const. Administration		$48,000
Land/Easement Acquisition		
Appraisal	$2,000	
Description Preparation	$1,000	
Purchase	$30,000	
Subtotal		$33,000
Inspection Services		
Construction Inspection		$29,000
Other Technical Services		
Hydrogeological Investigations	$6,000	
WHPA Delineation, Potential Sources ID	$30,000	
Soils Borings (Water Line)	$4,000	
Environmental Information Preparation (RD)	$5,000	
Subtotal		$45,000
Total Estimated Construction Costs		**$449,360**
Total Estimated Non-Construction Costs		**$198,500**
TOTAL ESTIMATED PROJECT COST		**$647,860**

(1) Line items where funding sources are indicated in parentheses are only required with the indicated funding source

d. Phase IV Project Schedule

The Phase IV Project probably will not be able to be financed until the prior project grants have been closed. The exact timing of this is not currently known. The Phase IV Project schedule will be similar to the schedule of the Phase I Project, with the start date being shortly after the close of the prior project's grant and other financing.

5. Subsequent Phases

a. Project Descriptions

(1) Water Supply and Treatment

The subsequent phases of work that will be required by the utility will involve the acquisition of additional water supply sources. The water treatment plant (if built) should be expandable. The Town should continue (either by itself or in conjunction with the regional water utility) to actively pursue water sources besides it's own wells, due to the questionable reliability and quality of the groundwater in the area.

The costs of additional well development and treatment plant upgrades will be comparable to the costs outlined in the previous sections. These costs will have to be updated for inflation. **Table No. 84** provides a guideline for the typical construction cost inflation factors.

(2) Water Storage Requirements

The water tank described in the Phase III Project should be sized to meet the utility's needs through the Planning Period. However, the location of another major industry in the utility's service area or unforeseen population growth may create the need for another tank.

(3) Distribution System Improvements

Extensions of the utility's distribution system should be completed on an as-needed basis determined by demand. The costs for these extensions may be borne by the Town or by the customer, depending on the nature of the request.

D. Regional Water Utility

1. Utility Creation and Water Supply

In the creation of a Regional Water Utility, legal, financial and engineering services will be needed. The range of possible costs for these services may vary considerably, depending on the involvement, charges and type of regional entity created. Costs for negotiation with other area utilities for a water supply may be an additional cost, depending on the course of action taken by the utilities. It is estimated that the professional services costs for the creation of a regional water utility entity might range from $5,000 to $40,000.

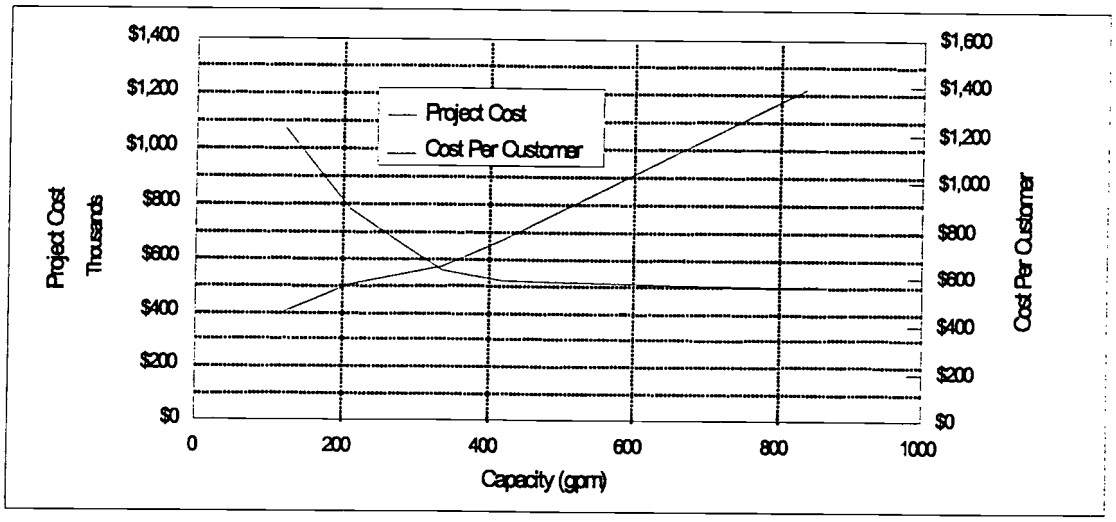
The costs of a water supply cannot be clearly identified at this time. The costs for the negotiation with area utilities for a water supply might range from a few thousand dollars to $20,000 or more. The extent and costs for improvements to those area utility's water systems, as well as the financing requirements, would be the subject of the negotiations with those utilities.

The development of a well supply is estimated to cost between $2,000/gpm to $3,000/gpm. These costs are partially dependent on the proximity of the well to the water system. An extensive transmission main to move the water to the water system is not included in these costs.

The level of treatment of a well supply is dependent on the quality of the groundwater, any surface water influence, and the desired finished water quality. The following **Figure No. 6** provides an estimate of the costs of a conventional iron removal water treatment plant, the type of plant most likely to be needed considering the water quality in the area. These costs are very general, and are based on EPA estimates from 1979. The costs do not include treatment of backwash water, difficult construction situations, or

many of the other specifics of any project that the Regional Water Utility may encounter.

Figure 6
General Water Treatment Project Costs



2. North Liberty Service Area

The North Liberty Service Area is the only area included in the Regional Planning Area where the costs of improvements necessary to provide service has not already been addressed. The following **Table No. 82** describes the estimated project costs to serve this rural area to the west and north of Marengo.

Table 82
North Liberty Service Area Project Cost Estimates-Regional Water Utility

Work Item	Quantity/ Units	Unit Cost	Extension Cost	
BOOSTER STATION				
Booster Station[1]	1 LS	$50,000	$50,000	
Electrical Power	1 LS	$10,000	$10,000	
Subtotal				$60,000
WATER STORAGE TANK				
Water Tank[1]	1 LS	$145,000	$145,000	
Control System	1 LS	$20,000	$20,000	
Cathodic Protection System	1 LS	$8,000	$8,000	
Site & Improvements	1 LS	$35,000	$35,000	
Subtotal				$208,000
TRANSMISSION SYSTEM				
Transmission Main (6-Inch)	17,500 LF	$13	$227,500	
Subtotal				$227,500
DISTRIBUTION SYSTEM				
4-Inch Distribution System	60,000 LF	$11	$660,000	
3-Inch Distribution System	30,000 LF	$8	$240,000	
Subtotal				$900,000
Total Estimated Construction Costs				**$1,395,500**
Total Estimated Non-Construction Costs				**$488,000**
TOTAL ESTIMATED PROJECT COSTS				**$1,883,500**

(1) Based on siting of riverboat in Crawford County, reduce Booster Station to $45,000 and Water Tank to $125,000 if riverboat is not sited in Crawford County

3. Example Regional Utility Scenario

The options that the Milltown Water Utility and the Marengo Water Utility have in the creation and development of a Regional Water Utility are almost endless. For this reason, the costs for such an endeavor cannot currently be quantified. However, an example scenario has been developed in order to provide an idea to each utility of the costs and tasks that may be involved in the regional utility development scenario.

This example scenario is based on the following assumptions:

- The regional entity will be a Regional Water District,
- Each utility will continue to own, operate and maintain its existing water system,
- Both utilities will purchase water on a wholesale basis from the Regional Water District,
- Milltown Water Utility will operate its 200 gpm supply and treatment system at its rated capacity,
- Marengo Water Utility will purchase a substantial portion of its water from the regional Water District, and will blend this water with the well water supplies,
- The Marengo Water Treatment Plant is not built since the Regional Water District is formed, and the water quality from the well constructed in the Phase I Project is better than the existing well, which is maintained on stand-by,
- The Regional Water District builds a 200 gpm well supply and water treatment plant near the Blue River along SR 64, begins extending service to the Northeast Service Level, and serves Marengo through the existing 6-inch main.

The following **Table No. 83** provides estimates of the costs of creation, startup and initial construction projects for this example Regional Water District.

Table 83
Estimated Project Costs-Example Regional Water District Improvements

Work Item	Cost
Wellfield Development	$255,000
Treatment Plant	$500,000
Marengo Connection	$97,500
Service to Northeast Service Area	
Transmission System (from Table 71)	$320,500
Booster Station (From Table 75)	$48,000
Water Storage Tank (From Table 75)	$183,000
Transmission Main (from Table 75)	$180,700
TOTAL ESTIMATED CONSTRUCTION COSTS	**1,584,700**

Table 83
Estimated Project Costs-Example Regional Water District Improvements (con't)

Service Item	Cost	
NON-CONSTRUCTION COSTS[1]		
Regional Water District Creation		
Administrative	$3,500	
Legal	$5,000	
Financial	$2,000	
Engineering	$3,000	
Subtotal		$13,500
Contractual Development		
Legal	$5,000	
Financial	$2,500	
Engineering	$3,000	
Subtotal		$10,500
Project I Non-Construction Costs		
Administrative	$60,000	
Basic Engineering Services	$137,000	
Land/Easement Acquisition	$40,000	
Inspection Services	$70,000	
Other Technical Services	$85,000	
Subtotal		$392,000
Total Estimated Construction Costs		**$1,584,700**
Total Estimated Non-Construction Costs		**$416,000**
TOTAL ESTIMATED PROJECT COST		**$2,000,700**

E. Project Cost Inflation Factors

The construction and other secondary costs of the facilities discussed in this Report will increase with time. All of the cost estimates in the preceding tables are based on current construction costs. The cost estimates provided in the preceding tables are valid for Phases I and II, if each utility proceeds with their construction within the

next few years. However, the cost estimates for any work being started in 1998 or later should be adjusted for the increased costs of construction.

The following **Table No. 84** provides a typical project cost inflation factor that should be applied to the costs in the preceding tables if the project is started in the indicated year. The actual construction cost inflation factors will vary with time according to labor availability, equipment and materials cost and availability, the cost of capital, and other contractor costs.

Table 84
Typical Project Cost Inflation Factors

Year	Inflation Factor
1998	1.04
1999	1.08
2000	1.12
2001	1.17
2002	1.22
2003	1.27
2004	1.32
2005	1.37
2006	1.42
2007	1.48
2008	1.54
2009	1.60
2010	1.67
2011	1.73
2012	1.80
2013	1.87
2014	1.95
2015	2.03
2016	2.11

SECTION XI - CURRENT RATES AND ANNUAL OPERATION, MAINTENANCE AND RESERVE COSTS

The current financial status of the utility are reviewed in this section as a prelude to the determination of the effects of each recommended project on the utility's rates and monthly water bills.

A. IURC Regulation

The IURC has allowed municipal water utilities to "opt out" of IURC regulation under since the late 1980's. Under this regulation, both the Milltown Water Utility and the Marengo Water Utility have chosen to remove themselves from IURC oversight. This choice will allow each utility to proceed with improvements to their utilities without the additional cost and time burden required to obtain IURC approval of the utility's rates and projects.

B. Current Utility Financial Status

1. Milltown Water Utility

The Milltown Water Utility generally has had a stable financial footing in the last years. No bonds are in delinquency.

Table No. 85, following, includes general information regarding the utility's current rate schedules.

Table 85
Current Rate Schedule [1]

Rate Component	Current Rate ($/1,000 gallons)
First 2,500 gallons, minimum	$10.59
Next 2,500 gallons	$3.72
Next 10,000 gallons	$2.65
Next 10,000 gallons	$2.12
Next 25,000 gallons	$1.60
Over 50,000 gallons	$1.05

[1] For the standard 5/8" x 3/4" water meter

There are 405 residential service connections in the Milltown Water Utility. The average metered water consumption for residential users in the community is 5,125 gallons per month (or 168 billable gallons per day). Using the above rate schedule, the average water bill for a typical residential user is approximately $20.22 per month.

2. Marengo Water Utility

The Marengo Water Utility generally has had an even financial footing in the last few years. The utility has no long-term indebtedness.

Table No. 86, following, includes general information regarding the utility's current rate schedules.

Table 86
Current Rate Schedule [1]

Rate Component	Current Rate($/1,000 gallons)
Minimum amount	$8.85
First 2,000 gallons	$4.43
Next 3,000 gallons	$3.54
Next 10,000 gallons	$3.11
Next 10,000 gallons	$2.43
Next 25,000 gallons	$1.18
Over 50,000 gallons	$0.89

[1] For the standard 5/8" x 3/4" water meter

There are about 380 residential service connections in the Marengo Water Utility system. The average metered water consumption for residential users in the community is 6,100 gallons per month (or 200 billable gallons per day). Using the above rate schedule, the average water bill for a typical residential user is approximately $31.75 per month.

C. Annual Operation, Maintenance and Reserve Costs

Each utility must prepare a budget for annual operation and maintenance expenses and reserves for both depreciation and debt.

1. Milltown Water Utility

The Milltown Water Utility has an outstanding debt of $217,500, and an approximate annual debt payment of $20,018. The utility has a depreciation fund for the water utility and as of June 30, 1996, the account balance was $3,627.

The following **Table No. 87** shows the itemized breakdown of operating, maintenance and reserve expenses for the 1995 fiscal year, and for the year following the completion of the Phase I construction project.

Table 87
Existing and Projected Annual Operating Expenses-Milltown Water Utility

Category	Year 1995 Actual	1996 Projected
Water Sales	$90,562	$88,976
Other Operating	$20,515	$17,161
Total Operating Revenue	**$111,077**	**$106,137**
Salaries, Wages and Payroll Tax - Employees	$39,500	$36,577
Salaries, Wages - Directors	$7,209	$8,740
Purchases Power	$10,090	$10,543
Materials and Repairs	$13,698	$16,070
Contractual Services	$2,296	$3,873
Insurance	$7,180	$6,026
Indiana Gross Income Taxes	$1,667	$1,465
Depreciation	$31,709	$31,709
Miscellaneous	$8,263	$7,656
Total Operating Expenses	**$121,612**	**$122,659**
Operating Income	**($10,535)**	**($16,522)**
Interest Income	$435	$573
Non-Operating Income	-	$413
Interest Expense	($14,338)	($14,338)
Total Other Operating Income (Expense)	**($13,903)**	**($13,352)**
Net Income	**($24,438)**	**($29,874)**

2. **Marengo Water Utility**

The Marengo Water Utility has no outstanding long-term debt. The utility does not have a depreciation fund.

The following **Table No. 88** shows the itemized breakdown of operating, maintenance and reserve expenses for the 1995 fiscal year, and for the year following the completion of the Phase I construction project.

Table 88
Existing and Projected Annual Operating Expenses-Marengo Water Utility

	Year	
Category	1995 Actual	1996 Projected
Water Sales	$70,370	$70,954
Other Operating	--	$2,000
Total Operating Revenue	**$70,370**	**$72,954**
Salaries, Wages and Payroll Tax - Employees	$33,480	$32,225
Salaries, Wages - Directors	$1,075	$975
Purchased Water	$351	$656
Purchased Power	$5,128	$7,744
Chemicals	$2,264	$860
Materials and Repairs	$4,924	$7,161
Contractual Services	$8,269	$5,032
Insurance	$3,262	$3,262
Fuel	$1,245	$874
Office Utilities and Miscellaneous	$770	$1,844
Depreciation	$23,256	$23,687
Miscellaneous	$3,508	$2,346
Total Operating Expenses	**$87,532**	**$86,666**
Operating Income	**($17,162)**	**($13,712)**
Interest Income	$1,246	$954
Interest Expense	($474)	($474)
Total Other Operating Income (Expense)	**$772**	**$480**
Net Income	**($16,390)**	**($13,232)**

SECTION XII - DESCRIPTION OF FUNDING OPTIONS

There are several financing options available to the Milltown Water Utility and the Marengo Water Utility to resolve the utility needs that have been identified. These options are reviewed in this section, and include:

A. Rural Development (RD) Grants & Loans (formerly FmHA)

This program is now operated under a new agency, the Rural Development (RD) agency; however, the program is essentially the same. This program consists of both grants and loans to qualifying applicants. Eligibility requirements are based on the non-metropolitan median household income statistics from the 1990 U.S. Census. For loan and grant purposes and based upon current market conditions, the eligibility is as follows:

Table 89
RD Loan and Grant Conditions [1]

Median Household Income	Loan Category	Interest Rates & Loan Terms	Possible Grant Percentages
> $31,243	Market	5.75% for 20-40 Yrs.	None
$24,995-$31,242	Intermediate	5.125% for 20-40 Yrs.	55%
< $24,994	Poverty	4.5% for 20-40 Yrs.	75%

[1] In effect as of October, 1996

It should be noted that the grant percentages are maximums and only apply to eligible project costs as determined by RD.

According to 1990 U.S. Census data, the median household income in all of the places (towns, townships) are within the poverty level loan category according to RD standards. Refer to **Table No. 6** on page 19 for more details on the median incomes in the Planning Areas.

B. Department of Commerce-Community Focus Fund (CFF)

Under this Federally funded program administered by the Indiana Department of Commerce, eligible applicants, including cities and towns, may receive grant funds for water project. The maximum grant available is $500,000 per project. No more than two grants may be open at any one time. The purpose of the CFF program is

to benefit low to moderate income families. Therefore, in order to qualify for consideration, the applicant's low/moderate income ratio must exceed 51.0% as determined by the Department of Commerce (DOC). Within the planning areas, both the Town of Milltown and the Town of Marengo meet the 51% low/moderate ratio. According to the U.S. Census, the rural areas within the Milltown Planning Area and the Regional Planning Area do not meet this criterion. **Table No. 6** on page 19 details this information. An income survey of the residents of any area benefitted by a project can be readily performed to determine the accuracy of the U.S. Census data.

Applicants of DOC grant funds must be able to implement their project in a timely manner. DOC requires that the project be completed within 18 months of award of the grant. This means that applicants must take some risks in proceeding with the project work without having all funding commitments in place.

C. Revenue Bond

Rather than obtaining Federal grants and/or loans, the utility could obtain funds from the issuance of revenue bonds. These bonds, sold on the open financial market or privately placed, are currently being sold at an interest rate of approximately 7.0 to 8.0 for 20 years. Since these bonds are not subsidized or guaranteed by any Federal or State governmental agency (unless bond insurance is purchased), the reserve factor (25%) is usually substantially higher than RD's standard 10% reserve requirement.

D. Indiana Bond Bank

Rather than pursuing an individual bond sale, the State of Indiana through the Indiana Bond Bank, sponsors the sale of bonds for several applicants in an attempt to secure better interest rates. Applicants with no bond rating or a poor bond rating usually obtain better rates under this program. These bonds are currently being sold for approximately 7½% for 20 years, and these bonds require a 25 percent coverage factor.

E. Local Financing

Often for smaller projects, financing institutions are willing to loan funds to local governments for utility projects. These institutions are able to offer a tax-exempt

rate of interest to the community. These loans aide the bank as well as the community through good local public relations, tax write-offs for the bank, and helping the bank to meet its regulations regarding local re-investment. For the utility, while the interest rate for a local loan may be higher than for certain other options, the non-construction costs are reduced, since bond counsel and certain other financing services are not needed.

F. Lease-Purchase

Lease-purchase financing has become a popular alternative in recent years to traditional government financing mechanisms. Lease-purchase financing involves the financing and ownership of a utility facility by a financing organization during the term of the lease. Once the lease payments are complete, the utility's facility is given or sold at a greatly reduced price to the utility. Lease-purchase financing is generally feasible only with the smaller utility projects, since the interest rates are higher, but certain non-construction costs related to traditional financing are not necessary.

SECTION XIII - PRELIMINARY RATE DERIVATIONS

The Milltown Water Utility and the Marengo Water Utility each have several financing sources available for the proposed projects. These sources can be combined in a wide variety of options to create a total financing package that meets the utility's needs at the lowest overall cost.

A. Financing Scenarios

Four financing options have been chosen for closer analysis. These options use one or more of the sources described in the previous section, and are considered the most likely to provide favorable results for the utility. These financing options are described as follows:

Option I-RD Long-Term Loan

Under Option I, it will be assumed that the utility will borrow 100% of the project costs through the RD loan program. The interest rate for the loan will be based on the current interest rate for the poverty loan category, and have a term of 40 years.

Option II-DOC Grant and RD Loan

Option II assumes that the utility will receive a $500,000 grant from the DOC, and the remaining funds will come from an RD loan under the terms described in Option I.

Option III-RD Grant and Loan

Option III considers that the utility may receive a combination of 50% grant and 50% loan from the RD.

Option IV-DOC Grant with RD Grant and Loan

Under Option IV, it will be assumed that the utility will receive a $500,000 DOC grant, with the remaining funds obtained through a combination of 50% grant and 50% loan from RD.

B. Estimated Increases to Annual Revenue Requirements and Monthly Water Bills

In order to calculate the average monthly water rate increase per equivalent customer, it is first necessary to estimate the increased annual revenues needed to satisfy each of the financing options. For the typical project, the utility's revenue must exceed the costs associated with the following expenses:

- Annual Debt Service (Principal & Interest on the financing)
- Annual Reserve for Bond Coverage
- Annual Operation and Maintenance Expense
- Annual Reserve for Depreciation

1. Milltown Water Utility

a. Phase I Project

The following **Table No. 90** presents the estimated average monthly water rates for the Milltown Water Utility's Phase I Project.

Table 90
Estimated Annual Revenue Requirements and Monthly Rate Increases for Various Financing Alternatives- Milltown Water Utility Phase I Project

Est. Increases in Annual Revenue Requirements and Water Billings	Option I	Option II	Option III	Option IV
Projected O & M Expense	$100,373	$100,373	$100,373	$100,373
Annual Principal & Interest Payments (Existing)	$20,050	$20,050	$20,050	$20,050
Annual Principal & Interest Payments (Proposed)	$31,717	$4,412	$20,616	$2,868
Debt Service Reserve - Annual Funding (Proposed)	$3,172	$441	$2,062	$287
Depreciation Reserve Funding (Proposed)	$4,333	$4,333	$4,333	$4,333
Total Projected Annual Revenue Requirements	**$159,645**	**$129,609**	**$147,434**	**$127,911**
Water Revenue at Existing Rates	$91,472	$91,472	$91,472	$91,472
Other Operating Revenue	$17,161	$17,161	$17,161	$17,161
Other Non-Operating Revenue	$986	$986	$986	$986
Excess (Deficit)	($50,026)	($19,990)	($37,815)	($18,292)
Estimated Monthly Water Billing Increase[1] Over 1996 Rates	$9.48	$3.79	$7.17	$3.47

[1] Average Per Equivalent Dwelling Unit

b. Phase II Project

The following **Table No. 91** presents the estimated average monthly water rates for the Milltown Water Utility's Phase II Project.

Table 91
Estimated Annual Revenue Requirements and Monthly Rate Increases for Various Financing Alternatives-
Milltown Water Utility Phase II Project

Est. Increases in Annual Revenue Requirements and Water Billings	Option I	Option II	Option III	Option IV
Projected O & M Expense	$106,597	$106,597	$106,597	$106,597
Annual Principal & Interest Payments (Existing)	$19,500	$19,500	$19,500	$19,500
Annual Principal & Interest Payments (Proposed)				
Phase I	$31,717	$4,412	$20,616	$2,868
Phase II	$28,586	$1,281	$18,581	$833
Debt Service Reserve - Annual Funding (Proposed)				
Phase I	$3,172	$441	$2,062	$287
Phase II	$2,859	$128	$1,858	$83
Depreciation Reserve Funding (Proposed)	$5,380	$5,380	$5,380	$5,380
Total Projected Annual Revenue Requirements	**$197,811**	**$137,739**	**$174,594**	**$135,548**
Water Revenue at Existing Rates	$103,332	$103,332	$103,332	$103,332
Other Operating Revenue	$17,161	$17,161	$17,161	$17,161
Other Non-Operating Revenue	$986	$986	$986	$986
Excess (Deficit)	($76,332)	($16,260)	($53,115)	($14,069)
Estimated Monthly Water Billing Increase[1] Over 1996 Rates	$12.81	$2.73	$8.91	$2.36
Estimated Monthly Water Billing Increase/(Decrease)[1] For Phase II Only	$3.33	($1.06)	$1.74	($1.11)

[1] Average Per Equivalent Dwelling Unit

c. Phase III Project

The following **Table No. 92** presents the estimated average monthly water rates for the Milltown Water Utility's Phase III Project.

Table 92
Estimated Annual Revenue Requirements and Monthly Rate Increases for Various Financing Alternatives-
Milltown Water Utility Phase III Project

Est. Increases in Annual Revenue Requirements and Water Billings	Option I	Option II	Option III	Option IV
Projected O & M Expense	$120,565	$120,565	$120,565	$120,565
Annual Principal & Interest Payments (Existing)	$18,381	$18,381	$18,381	$18,381
Annual Principal & Interest Payments (Proposed)				
Phase I	$31,717	$4,412	$20,616	$2,868
Phase II	$28,586	$1,281	$18,581	$833
Phase III	$29,178	$1,873	$18,966	$1,218
Debt Service Reserve - Annual Funding (Proposed)				
Phase I	$3,172	$441	$2,062	$287
Phase II	$2,859	$128	$1,858	$83
Phase III	$2,918	$187	$1,897	$122
Depreciation Reserve Funding (Proposed)	$6,448	$6,448	$6,448	$6,448
Total Projected Annual Revenue Requirements	**$243,824**	**$153,716**	**$209,374**	**$150,805**
Water Revenue at Existing Rates	$126,220	$126,220	$126,220	$126,220
Other Operating Revenue	$17,161	$17,161	$17,161	$17,161
Other Non-Operating Revenue	$986	$986	$986	$986
Excess (Deficit)	**($99,457)**	**($9,349)**	**($65,007)**	**($6,438)**
Estimated Monthly Water Billing Increase[1] Over 1996 Rates	**$13.66**	**$1.28**	**$8.93**	**$0.88**
Estimated Monthly Water Billing Increase/(Decrease)[1] For Phase III	**$0.85**	**($1.45)**	**$0.02**	**($1.48)**

[1] Average Per Equivalent Dwelling Unit

d. Subsequent Project Phases

Due to the issues as to water supply and structural mechanism (regional water district, conservancy district, etc) remaining about the subsequent phases, as well as changing financial opportunities, analysis of the financing for each of the subsequent project phases should be undertaken as that project is being considered.

2. Marengo Water Utility

a. Phase I Project

The following **Table No. 93** presents the estimated average monthly water rates for the Marengo Water Utility's Phase I Project.

Table 93
Estimated Annual Revenue Requirements and Monthly Rate Increases for Various Financing Alternatives-
Marengo Water Utility Phase I Project

Est. Increases in Annual Revenue Requirements and Water Billings	Option I	Option II	Option III	Option IV
Projected O & M Expense	$88,227	$88,227	$88,227	$88,227
Annual Principal & Interest Payments (Proposed)	$30,554	$3,249	$19,860	$2,112
Debt Service Reserve - Annual Funding (Proposed)	$3,055	$325	$1,986	$211
Depreciation Reserve Funding (Proposed)	$3,488	$3,488	$3,488	$3,488
Total Projected Annual Revenue Requirements	**$125,324**	**$95,289**	**$113,561**	**$94,038**
Water Revenue at Existing Rates	$97,722	$97,722	$97,722	$97,722
Other Operating Revenue	$2,000	$2,000	$2,000	$2,000
Excess (Deficit)	($25,602)	$4,433	($13,839)	$5,684
Estimated Monthly Water Billing Increase[1] Over 1996 Rates	$4.50	$0.00	$2.43	$0.00

[1] Average Per Equivalent Dwelling Unit

b. Phase II Project

The following **Table No. 94** presents the estimated average monthly water rates for the Marengo Water Utility's Phase II Project.

Table 94
Estimated Annual Revenue Requirements and Monthly Rate Increases for Various Financing Alternatives-
Marengo Water Utility Phase II Project

Est. Increases in Annual Revenue Requirements and Water Billings	Option I	Option II	Option III	Option IV
Projected O & M Expense	$98,343	$98,343	$98,343	$98,343
Annual Principal & Interest Payments (Proposed)				
Phase I	$30,554	$3,249	$19,860	$2,112
Phase II	$57,640	$30,335	$37,466	$19,718
Debt Service Reserve - Annual Funding (Proposed)				
Phase I	$3,055	$325	$1,986	$211
Phase II	$5,764	$3,034	$3,747	$1,972
Depreciation Reserve Funding (Proposed)	$4,224	$4,224	$4,224	$4,224
Total Projected Annual Revenue Requirements	**$199,580**	**$139,510**	**$165,626**	**$126,580**
Water Revenue at Existing Rates	$119,368	$119,368	$119,368	$119,368
Other Operating Revenue	$2,000	$2,000	$2,000	$2,000
Excess (Deficit)	**($78,212)**	**($18,142)**	**($44,258)**	**($5,212)**
Estimated Monthly Water Billing Increase[1] Over 1996 Rates	**$11.26**	**$2.61**	**$6.37**	**$0.75**
Estimated Monthly Water Billing Increase[1] For Phase II Only	**$6.76**	**$2.61**	**$3.94**	**$0.75**

[1] Average Per Equivalent Dwelling Unit

c. Phase III Project

The following **Table No. 95** presents the estimated average monthly water rates for the Marengo Water Utility's Phase III Project.

Table 95
Estimated Annual Revenue Requirements and Monthly Rate Increases for Various Financing Alternatives-
Marengo Water Utility Phase III Project

Est. Increases in Annual Revenue Requirements and Water Billings	Option I	Option II	Option III	Option IV
Projected O & M Expense	$98,455	$98,455	$98,455	$98,455
Annual Principal & Interest Payments (Proposed)				
Phase I	$30,554	$3,249	$19,860	$2,112
Phase II	$57,640	$30,335	$37,466	$19,718
Phase III	$28,916	$1,611	$18,795	$1,047
Debt Service Reserve - Annual Funding (Proposed)				
Phase I	$3,055	$325	$1,986	$211
Phase II	$5,764	$3,034	$3,747	$1,972
Phase III	$2,892	$161	$1,880	$105
Depreciation Reserve Funding (Proposed)	$5,283	$5,283	$5,283	$5,283
Total Projected Annual Revenue Requirements	**$232,559**	**$142,453**	**$187,472**	**$128,903**
Water Revenue at Existing Rates	$119,986	$119,986	$119,986	$119,986
Other Operating Revenue	$2,000	$2,000	$2,000	$2,000
Excess (Deficit)	**($110,573)**	**($20,467)**	**($65,486)**	**($6,917)**
Estimated Monthly Water Billing Increase[1] Over 1996 Rates	**$15.83**	**$2.93**	**$9.38**	**$0.99**
Estimated Monthly Water Billing Increase[1] For Phase III Only	**$4.57**	**$0.32**	**$3.01**	**$0.24**

[1] Average Per Equivalent Dwelling Unit

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d. Phase IV Project

The following **Table No. 96** presents the estimated average monthly water rates for the Marengo Water Utility's Phase IV Project.

Table 96
Estimated Annual Revenue Requirements and Monthly Rate Increases for Various Financing Alternatives-
Marengo Water Utility Phase IV Project

Est. Increases in Annual Revenue Requirements and Water Billings	Option I	Option II	Option III	Option IV
Projected O & M Expense	$104,929	$104,929	$104,929	$104,929
Annual Principal & Interest Payments (Proposed)				
Phase I	$30,554	$3,249	$19,860	$2,112
Phase II	$57,640	$30,335	$37,466	$19,718
Phase III	$28,916	$1,611	$18,795	$1,047
Phase IV	$35,379	$8,075	$22,996	$5,248
Debt Service Reserve - Annual Funding (Proposed)				
Phase I	$3,055	$325	$1,986	$211
Phase II	$5,764	$3,034	$3,747	$1,972
Phase III	$2,892	$161	$1,880	$105
Phase IV	$3,538	$806	$2,300	$525
Depreciation Reserve Funding (Proposed)	$6,579	$6,579	$6,579	$6,579
Total Projected Annual Revenue Requirements	**$279,246**	**$159,104**	**$220,538**	**$142,446**
Water Revenue at Existing Rates	$120,604	$120,604	$120,604	$120,604
Other Operating Revenue	$2,000	$2,000	$2,000	$2,000
Excess (Deficit)	**($156,642)**	**($36,500)**	**($97,934)**	**($19,842)**
Estimated Monthly Water Billing Increase[1] Over 1996 Rates	**$22.31**	**$5.20**	**$13.95**	**$2.83**
Estimated Monthly Water Billing Increase[1] For Phase IV Only	**$6.48**	**$2.27**	**$4.57**	**$1.84**

[1] Average Per Equivalent Dwelling Unit

TOWN OF MILLTOWN

P. O. Box 127 • 215 W. Main St.
Milltown, Indiana 47145
(812) 633-4848

OFFICE OF WATER MANAGEMENT IDEM
Oct 26 5 10 PM '99

September 9, 1998

Blue River Water District

Marcus Burgher, Attorney at Law
107 Indiana Avenue
English, Indiana 47118

Dear Marcus Burgher, Attorney at Law:

The towns of Marengo and Milltown authorize you to represent them to the Crawford County Commissioners, Harrison County Commissioners, Crawford County Council, Harrison County Council and to IDEM, in the matter of the Blue River Water District.

A meeting between the two towns concerning the Blue River Water District will be at 7:30 p.m., September 15, 1998 at the Milltown Town Hall, 215 West Main Street.

The towns of Marengo and Milltown appreciate your acceptance of this project.

Sincerely,

TOWN OF MILLTOWN and TOWN OF MARENGO

COUNCIL OF THE TOWN OF MILLTOWN

DAVID SKINNER, PRESIDENT

JEANIE MELTON, COUNCIL MEMBER

DAVID PIERSON, COUNCIL MEMBER

WITNESS:

CLERK TREASURER

COUNCIL OF THE TOWN OF MARENGO

JOHN PIERSON, PRESIDENT

MIKE COX, COUNCIL MEMBER

COUNCIL MEMBER

WITNESS:

CLERK TREASURER

Lmw
cc: File
Milltown Council Members
Marengo Council Members

LUCKETT, BURGHER & BURGHER
ATTORNEYS AND COUNSELORS AT LAW
104 INDIANA AVENUE
P.O. BOX 105
ENGLISH, INDIANA 47118

OFFICE OF WATER MANAGEMENT IDEM
MAR 9 5 02 PM '99

JOHN H. LUCKETT (1867-1952)
KENNETH J. LUCKETT (1910-1982)
MARCUS M. BURGHER III
MARCUS M. BURGHER IV

TELEPHONE
812-338-2700
FACSIMILE
812-338-2700

March 5, 1999

Ms. Lynn Newlin
IDEM
Office of Water Management
100 N. Senate Avenue
P. O. Box 6015
Indianapolis, IN. 46206-6015

RE: Blue River Regional Water District

Dear Ms. Newlin:

Enclosed please find, for your information, a copy of letter received from Commonwealth Engineers, Inc., relative to the above matter.

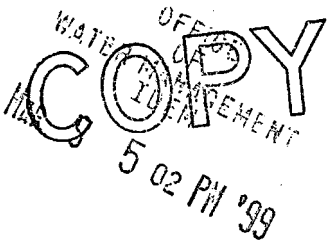
Yours very truly,

Marcus M. Burgher III

MMB:rmp

Enclosure

COMMONWEALTH ENGINEERS, INC.



February 25, 1999

RECEIVED
MAR - 3 1999
LUCKETT & BURGHER

Luckett, Burgher & Burgher
Attorneys' at Law
104 Indiana Ave.
P.O. Box 105
English, IN 47118

Re: Blue River Regional Water District

Dear Mr. Burgher,

This letter is for you to respond to IDEM's Legal Council concerning the proposed Blue River Regional Water District. Lynn Newlin of IDEM called me with two (2) basic questions relative to the petition. The first question dealt with whether the Town of Marengo had actually declared an emergency concerning their Water System (paragraph 4). Attached are the minutes of a special meeting that makes this declaration. Secondly, Ms. Newlin wanted to know how much debt would be transferred by the towns to the District (paragraph 11). This amount according to the Clerk-Treasurer of Milltown and Utility-Clerk of Marengo totals at approximately $382,000 (Milltown $352,000/ Marengo $30,000).

Please transmit this information to IDEM as soon as possible.

Lynn Newlin's address is :
IDEM
Office of Water Management
100 N. Senate Ave.
P.O. Box 6015
Indianapolis, IN 46206-6015.

Should you have any further questions, please do not hesitate to call us.

Sincerely,

Vince S. Sommers
Project Coordinator

Pc. Town of Marengo
Town of Milltown

7256 Company Drive
Indianapolis, Indiana 46237
(317) 888-1177
FAX (317) 887-8641

COPY
WATER MANAGEMENT
5 02 PM '99

Marengo Civil Town Minutes
Special Meeting
November 21, 1997 at 9:00AM

Present: Bob Pierson, Mike Cox, Donnie Linton, Ralph Sherron, Jim Pevlor, and Lisa Roberts.

The purpose of this meeting was to make a decision on whether Marengo should declare the water system an emergency situation.

The board discussed the raw well samples coming back bad. The question is does the chlorine kill the bacteria so that the water is safe to drink. Jim Pevlor called Cynthia Boone at Environmental Consultants, where the water samples are tested. Ms. Boone said that the chlorine does kill the bacteria, but Marengo has to use a higher percentage of chlorine to do this.

The high sulfate in the water was also discussed. Marengo's was has a higher sulfate level in the water than is allowed. IDEM has requested that we post a high sulfate notice to our customers.

Ralph Sherron will call Larry Haag at IDEM to get the possible effects the high sulfate will cause.

Discussed the meeting that IDEM has requested between them and the Town Board. Ralph to call Liz Melvin and set it up for a Friday.

Donnie Linton made the motion to declare an emergency water problem.
Passed 3-0.

Adjourned at 10:30AM.

Bob Pierson

Mike Cox

Donnie Linton

LUCKETT, BURGHER & BURGHER
ATTORNEYS AND COUNSELORS AT LAW
104 INDIANA AVENUE
P.O. BOX 105
ENGLISH, INDIANA 47118

OFFICE OF WATER MANAGEMENT IDEM
MAR 22 3 54 PM '99

JOHN H. LUCKETT (1867-1952)
KENNETH J. LUCKETT (1910-1982)
MARCUS M. BURGHER III
MARCUS M. BURGHER IV

TELEPHONE
812-338-2700
FACSIMILE
812-338-2700

March 16, 1999

Ms. Lynn Newlin
IDEM
Office of Water Management
100 N. Senate Avenue
P. O. Box 6015
Indianapolis, IN. 46206-6015

RE: Debt assumption of the
Blue River Regional Water District

Dear Ms. Newlin:

Blue River Regional Water District will be assuming approximately $382,000 of debt from the Towns of Marengo and Milltown. The present water rates for both Towns are approximately the same. Water revenues from each Town has been sufficient in the past to pay all debts. There will be very little new debt created by the formation of the Blue River Regional Water District.

It is my opinion that the formation of this Water District will have very little, if any, impact on present water rates for Milltown or Marengo.

Once a financial adviser has been retained, I should be able to precisely determine the impact of this merger.

Yours very truly,

Marcus M. Burgher

Marcus M. Burgher III
Attorney for Blue River Regional Water District

Town of Marengo
P.O. Box 206
Marengo, IN 47140-0206
(812) 365-2158

OFFICE
OF
WATER MANAGEMENT
IDEM
MAR 30 12 30 PM '99

Town of Milltown
P.O. Box 127
Milltown, IN 47145-0127
(812) 633-4848

March 25, 1999

Ms. Lynn Newlin
Office of Water Management
100 N. Senate Ave., Rm. 1255
Indianapolis, IN 46206

Re: Blue River Regional Water District

Dear Ms. Newlin:

This letter is to advise you that the Town of Milltown and the Town of Marengo are currently in the process of procuring a financial adviser. We expect to have our financial advisor "on board" sometime in April. We feel that your concerns as to the rate increases, the transferring of debt and other related financial matters must be addressed by a financial advisor. Once this occurs we will provide this information to you.

Should you have any questions, please do not hesitate to call us.

Sincerely,

John Pierson
Council President of Marengo

Jerry Garrett, for David Skinner
David Skinner
Council President of Milltown

p.c. Mr. Marcus Burgher, Atty.

Signed

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

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100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015
(317) 232-8603
(800) 451-6027
www.state.in.us/idem

November 15, 2001

Christopher M. York
McHale, Cook & Welch
Chamber of Commerce Bldg.
320 North Meridian Street
Indianapolis, Indiana
46204-1781

Re: Blue River Regional Water District

Dear Christopher M. York:

This verifies that the Indiana Department of Environmental Management (IDEM) is in receipt of a letter from McHale, Cook & Welch dated March 22, 2001 (Letter) regarding the Blue River Regional Water District (Blue River). The Letter appears to seek recognition by IDEM that Blue River, while failing to meet the statutorily prescribed time period outlined in the Recommended Order forming Blue River dated July 9, 1999 and referenced elsewhere at IC 13-26-2-10(4) and 13-26-6 *et seq,* nevertheless, is in compliance with Indiana law.

Specifically, the Letter contains various appendices, including a list of Current and Recent Projects as well as Expended and Anticipated Costs for the towns of Milltown and Matengo (Appendices). These Appendices supplement the Master Planning Report submitted to IDEM with the Petition to form Blue River.

A review of the Plan and Appendices indicates Blue River will operate the water district in an economically feasible, fair, and reasonable manner. As such, IDEM approves the Plan and Appendices, as submitted; and notes that Blue River has satisfied the statutory requirements outlined at IC 13-26 *et seq.* Thus, although Blue River didn't submit a District Plan to IDEM within 9 months as required by Indiana law; nonetheless, IDEM recognizes the subsequent effort made by Blue River to comply with Indiana law and grants it a waiver of the time deadline.

Please submit to IDEM any further pertinent information as the project proceeds. If you have any questions regarding this correspondence or other matters related to regional districts, please contact me at 317.233.4076.

Sincerely,

Lynne Newlon

Lynne Newlon
Regional Water & Sewer Coordinator

Cc: Beth Admire, IDEM OLC

Bill Harkins, IDEM OLC

BINGHAM McHALE LLP
ATTORNEYS AT LAW

January 16, 2002

Ms. Lynne L. Newlon
Regional District Coordinator
Indiana Department of Environmental Management
100 N. Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015

via Facsimile & U.S. Regular Mail

Dear Ms. Newlon:

This letter is to follow-up on conversations that you have had recently with Chris York of my office and to request confirmation from the Indiana Department of Environmental Management (the "Department") that the proposed financing transaction (as described below) is contemplated and authorized by that certain Order Adopting the Findings of Fact and Recommended Order of the Hearing Officer for the Organization of the Blue River Regional Water District, a copy of which is attached hereto for your convenience reference (the "Order").

The Blue River Regional Water District (the "District") recently adopted an Ordinance, whereby it will issue revenue bonds, the proceeds of which will be paid to the Town of Marengo and the Town of Milltown, so that each of the towns may retire the existing indebtedness on their respective waterworks utilities. The Order provides, in pertinent part, that ". . .any indebtedness from the Milltown Water Utility and/or the Marengo Water Utility will be assumed by the District. All assets and liabilities will be conveyed to the District without compensation." *See* Order, ¶ 13.

Here, the District has determined, after contacting each of the lenders for the Milltown Water Utility and the Marengo Water Utility, that the indebtedness is not assumable by the District. As an alternative, the District proposes to simply refinance the outstanding indebtedness for each of the municipal water utilities to be acquired by it through the issuance of its own waterworks revenue bonds. In this connection, the District has arranged to place a bond with a local bank which will purchase the bonds and, thereby, provide the District with funds to pay to Milltown and Marengo, so that each can pay off the outstanding indebtedness on their respective water utilities.

BINGHAM McHALE LLP
ATTORNEYS AT LAW

We request that the Department confirm that such a financing arrangement is permissible under the terms of the Order. If so, please execute the attached confirmation page and return this letter to us at your earliest convenience. We presently anticipate closing the financing transaction and the transfer of assets from each water utility to the District by the end of next week.

Thank you for your consideration of this request. If you have any questions regarding the enclosed or this letter, please do not hesitate to contact me at 317-686-5225.

Sincerely,

Matthew M. Price

MMP/slm
cc: Rick Pittman (w/o encl.)
Marcus Burgher, IV, Esq. (w/o encl.)
Christopher M. York, Esq. (w/o encl.)
271707

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Matthew M. Price
Bingham McHale
Chamber of Commerce Bldg.
Suite 1100
320 N. Meridian St.
Indianapolis, IN
46204-1781

Via Facsimile &
U.S. Regular Mail

January 23, 2002

Dear Mr. Price:

This letter responds to the January 16, 2002 letter ("Letter") you sent to me where you refer to the Order Adopting the Findings of Fact and Recommended Order of the Hearing Officer for the Organization of the Blue River Regional Water District ("Order"). In the Letter you request IDEM confirm a financing arrangement whereby, in essence, Blue River Regional Water District ("Blue River RWD") proposes to refinance the outstanding indebtedness for the Milltown Water Utility and the Marengo Water Utility to be acquired by it through the issuance of its own waterworks bonds ("Proposed Financing Transaction").

It appears the Proposed Financing Transaction, as above described and more fully outlined in the Letter, comports with the terms of the Order and complies with Indiana law. The Proposed Financing Transaction, as explained in the Letter, is not a material change and does not require amendment to the Order. This letter serves as IDEM's authorization of the Proposed Financing Transaction.

I hope this letter is helpful. Please contact me if I may be of any assistance.

Sincerely,
Lynne Newton
Lynne Newton

Cc: Bill Harkins, IDEM OLC