Eastern Panhandle Conservation District
Morgan County Rural Water Committee
West Virginia Conservation Agency
USDA Natural Resources Conservation Service

Water Resources Plan

Volume 2 of 2

Morgan County

Water Resources Study

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GANNETT FLEMING
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MORGAN COUNTY WATER RESOURCES STUDY

VOLUME 1 OF 2 - ASSESSMENT AND PLAN DEVELOPMENT

VOLUME 2 OF 2 - WATER RESOURCES PLAN

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LIST OF ABBREVIATIONS

Agencies & Organizations

AWWA	-	American Water Works Association
EPCD	-	Eastern Panhandle Conservation District
GF	-	Gannett Fleming, Inc.
MCC	-	Morgan County Commission
MCRWC	-	Morgan County Rural Water Committee
NRCS	-	United States Department of Agriculture, Natural Resource Conservation Service
OEHS	-	West Virginia Bureau for Public Health – Office of Environmental Health Services
PSD	-	Public Service District
USEPA	-	United States Environmental Protection Agency
USGS	-	United States Geological Survey
VA	-	Commonwealth of Virginia
WV	-	State of West Virginia
WVCA	-	West Virginia Conservation Agency
WVDEP	-	West Virginia Department of Environmental Protection
WVDHHR	-	West Virginia Department of Health and Human Resources
WVDNR	-	West Virginia Department of Natural Resources
WVGES	-	West Virginia Geological and Economic Survey
WVU	-	West Virginia University

Common Engineering Terms

ADD	-	Average Daily Demand
cfs	-	Cubic Feet per Second
cfsm	-	Cubic Feet per Second per Square Mile
CM	-	Construction Management
DI	-	Ductile Iron (pipe)
DIP	-	Ductile Iron Pipe
EDC	-	Endocrine Disruptor Compounds
gpcd	-	Gallons per Capita per Day
gpd	-	Gallons per Day
gpm	-	Gallons per Minute
l.f.	-	Linear Feet
MGD	-	Million Gallons per Day
O&M	-	Operation and Maintenance
PDD	-	Peak Daily Demand
PRV	-	Pressure Reducing Valve
psi	-	Pounds per Square Inch
WTP	-	Water Treatment Plant

1.0 INTRODUCTION

1.1 Volume 1 (Phase I) Summary

Results of the background investigation and County-wide assessment described in Volume 1 (previously referred to as Phase I of the Water Resources Study) indicate the basis for the creation of a public water supply system in Morgan County. A recommended plan is developed that will result in both short- and long-term benefits. The details of the recommended County-wide water resources plan for Morgan County are presented in this Volume 2 (previously referred to as Phase II of the Water Resources Study).

The Eastern Panhandle Conservation District (EPCD) commissioned Gannett Fleming, Inc. (GF) to provide consulting services in order to develop the Morgan County Water Resources Study. The ultimate goal of the Morgan County Water Resources Study was to identify and develop a drinking water project plan for the identified "Priority Area" of Morgan County that will satisfy drinking water demands within the designated area over a 25-year planning period (2005 – 2030). The research completed in Phase I of the study resulted in the selection of groundwater as the raw water source for all three regions (South, North, and Great Cacapon) of the Priority Area.

After selecting groundwater alternatives as sources of water supply in the Priority Area, the Morgan County Rural Water Committee (MCRWC) requested an additional review of the permitting requirements for surface water withdrawals from the Cacapon River and the Potomac River. Discussions with the West Virginia Department of Health and Human Resources (WVDHHR) indicated that construction permits for groundwater wells and surface water intake structures, as well as water treatment plants (WTP), are required by WVDHHR. West Virginia (WV) does not issue withdrawal permits for WV rivers; however, if a Potomac River intake is desired, then the State of Maryland would need to provide approval based on longstanding water rights agreements. WVDHHR confirmed that public water systems typically do not apply for a surface water intake and treatment facility if they have selected groundwater as the preferred raw water source. However, should MCRWC require a surface water intake and treatment facility in the future, WVDHHR indicated that all permit applications are reviewed and decided upon within a 4 to 6 week timeframe.

Historical streamflow data are used by regulatory agencies to approve surface water withdrawals. The current design standard used by WVDHHR is loosely defined as "10% of low water level". WV has historically used the 7-day, 10-year low flow value (7Q10). To assist WVDHHR with intake and treatment facility design review, the West Virginia Department of Natural Resources (WVDNR) provides input based on the available flow data of the proposed river or stream. WVDHHR indicated that "competition" for surface water is not a significant concern in WV. The West Virginia Department of Environmental Protection (WVDEP) has completed a statewide water use study that documents groundwater wells and surface water intakes. The report, available on the WVDEP website, indicates that there are few river intakes located on the Cacapon River, which confirms the WVDHHR opinion that Morgan County would not face significant competition for water from the Cacapon River.

Based on this information, MCRWC and MCC should not feel obligated to apply for a surface water intake and treatment facility permit at this time.

1.2 Plan Organization

This comprehensive water resources plan divides the County's identified Priority Area into three (3) regions, as shown in Figure 1 of Section 2 of this Volume 2. These regions were delineated based on such factors as topographic constraints, the location of the existing Town of Bath water supply system, source reliance, and development locations.

1.3 Improvement Categories

The recommended water supply plan components for each area are generally presented in two (2) categories:

- New Source and Treatment Development (S/T)
- New Distribution System Development (D)

Included in this section are summary descriptions of the primary components that comprise the recommended Plan. Detailed descriptions of the service areas, facilities, implementation requirements, and project cost estimates for each component are presented within this Volume 2. Each component has its own designation that identifies its category and provides a unique numerical identity. Detailed maps showing the location of the components are included in this Volume 2.

1.4 Plan Use

Volume 2 is presented in a manner to allow the Morgan County Rural Water Committee (MCRWC), Morgan County Commission (MCC), WV Infrastructure and Jobs Development Council (WVIJDC), and funding and regulatory agencies to review preliminary descriptions of the various public water supply system components for planning and funding purposes and to assess the relationship of the components to one another. It is intended as a guidance document and provides preliminary engineering data and recommended water system facilities for the entire Morgan County Priority Area. Support for plan development of selected phases can be excerpted from Volume 2, as required.

Plan Components are described in Section 2. Component mapping is included as Figures 1 through 4 in Section 2. Estimated component costs are included in Section 3. Plan implementation strategies, as well as organizational and administrative recommendations, are included in Section 4.

It should be noted that no hydraulic modeling was performed for the Water Resources Study; therefore, it will be necessary to perform hydraulic modeling as a part of the engineering design services to ensure adequate sizing of the recommended water system facilities. Phasing is considered and presented in each regional plan. Land development and desired service to existing homes may actually dictate phasing in a different configuration. Water system facility sizes and system performance should be analyzed and modified accordingly during final design.

2.0 PLAN COMPONENTS

Included in this section are preliminary design considerations and narrative descriptions of the public water supply system components identified for each region of the Priority Area within Morgan County. A narrative description, cost estimate, and a copy of the appropriate Priority Area region map can be packaged to provide a stand-alone description of each component. Detailed cost estimates and descriptions of implementation requirements for each Priority Area region are contained in Sections 3 and 4, respectively. Each component has its own designation that describes its category and provides a number identity. For example, the first new source and treatment development project in the South Region is designated S/T and numbered 1 (S/T-1). Plan organization and use is described in Section 1.

2.1 Preliminary Design Considerations

Preliminary design guidance was provided by the West Virginia Department of Health and Human Resources (WVDHHR) Legislative Rule Title 64, Series 77 ("Public Water Systems Design Standards"), the Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers "Recommended Standards For Water Works" (2003 Edition), and the United States Environmental Protection Agency (USEPA) Safe Drinking Water Act.

Systems were configured to provide transmission main pressures between 150 pounds per square inch (psi) in low-lying areas and 35 psi at higher elevations. Pressure reducing valves (PRV) were identified in areas where transmission main pressures would otherwise exceed design limits. Conversely, booster pump stations were located to provide water service to higher elevations.

Pipeline diameters were selected based on the calculated water demands for the three (3) regions and an assumed fire flow. Typical fire flow rates for residential communities range from 500 gallons per minute (gpm) to 1,500 gpm. Due to a combination of residential and commercial properties in the Priority Area, a fire flow rate of 1,000 gpm was selected. All system piping was assumed to be ductile iron.

Finished water storage tanks were sited based on the determined pressure/service level associated with a region. If possible, storage tanks were indicated at locations with an elevation equal to the service level of the region, which would result in a ground level storage tank. If ground elevations within a region were not high enough or if it was deemed unreasonable to install additional pipelines to reach higher ground elevations, storage tanks were sited at the highest reasonable elevation and it is assumed that an elevated storage tank would be required to maintain distribution system pressures.

The volumes of the water storage tanks were calculated based on West Virginia regulations, which dictate that the distribution system storage should equal 2 days of water usage based on the average daily demand (ADD), as well as fire flow storage. It was assumed that the 2 days of ADD storage, which acts as the operational storage and system equalization storage, could be proportionally divided between the storage tanks of the regions based on an even demand distribution along the proposed pipelines. In order to determine the required fire storage, the fire flow rate of 1,000 gpm was assumed to have a 2-hour duration. This resulted in

fire storage equal to 120,000 gallons for each of the regions. It was also assumed that each storage tank should contain the required fire storage. This assumption was based on the theory that a fire located near a storage tank would receive almost 100% of the fire flow from the closest storage tank.

It is important to note that no hydraulic modeling was conducted for the Water Resources Study. All pipeline diameters and storage tank volumes, as well as the locations for PRVs or booster pump stations, were estimated based on regulatory guidance and engineering practice. Also, the selected fire flow rate was preliminarily agreed upon by the MCRWC for use during this Study. However, it has not been officially approved by West Virginia or Morgan County officials; therefore, it would need to be confirmed when project components are to be designed and constructed. In order to ensure proper sizing and locations, a hydraulic model should be developed and analyzed during the design of all facilities.

Upon pursuit of a particular component project, further investigation into physical constraints of the service area, coordination with other utilities, and easement issues are recommended to identify specific distribution system needs.

The following sections discuss the water supply plan components associated with the three (3) regions of the Priority Area in greater detail.

2.2 Plan Descriptions

2.2.1 South Region

The recommended plan for the South Region calls for five (5) phases of construction, containing a total of three (3) new groundwater well field locations and treatment facilities and five (5) new distribution system components. The following sections describe the five (5) phases in greater detail.

The distribution system components of the South Region were developed in a pipeline loop format. Looped distribution systems are hydraulically more desirable than dead-end pipelines and will often result in smaller pipeline diameters due to multiple flow paths. The decision to develop all distribution system components in the South Region as looped systems was based on the uncertainty of where future residential and commercial development will occur in the South Region. It is unclear at this time if development will occur predominantly along the existing Route 522 corridor, along the proposed Route 522 bypass, or some combination of both. It was assumed that development would occur along both roadways by the end of the 30-year planning horizon, thus resulting in the looped distribution system components.

However, if development occurs only along the existing Route 522, the distribution system in the South Region will no longer be a looped system, but instead will be a single pipeline along Route 522. Although this would result in less pipelines being installed overall in the South Region, the pipeline along Route 522 would need to be increased in size to a 12-inch diameter pipeline in order to handle the anticipated water demands and fire flows of the South Region.

Phase 1 (South):

Phase 1 in the South Region contains a new groundwater well field and treatment facility (S/T-1) located in Rock Gap of Warm Springs Ridge (west of Route 522 at Rock Gap Road) and a distribution system component (D-1). These components were selected as Phase 1 due to the fact that the South Region has been identified as the region with the largest percentage of projected water demands, as well as the fact that this area is immediately south of the Town of Berkeley Springs, which could lead to quicker development.

The proposed renovation and development of the Coolfont Resort located on Cold Run Valley Road is another reason for designating these components for Phase 1 (South). If the new public water supply system is to serve Coolfont Resort, S/T-1 and a portion of D-1 (labeled D-1A) need to be constructed in order to deliver water to the resort. The distribution system component that would serve Coolfont Resort is considered to be Phase 2 (South).

S/T-1: The water production capacity for S/T-1 was estimated based on the assumption that S/T-1 would be responsible for providing the projected water demand associated with the area served by D-1 (A and B), D-2, and ultimately D-5. Assuming that the water demands are evenly distributed in these areas and that S/T-1 would need to satisfy the peak daily demands (PDD) of these areas, S/T-1 has an assumed water production capacity of 1,060,776 gallons per day (gpd), or approximately 737 gpm.

D-1A: This pipeline section extends north along Route 522 from S/T-1 to the connection point with D-2 (Phase 2 of the South Region serving Coolfont Resort). This distribution component consists of the least amount of pipeline required to deliver water to D-2/Coolfont Resort. D-1A consists of approximately 1,450 linear feet (l.f.) of 12-inch diameter ductile iron pipe (DIP) and approximately 8,900 l.f. of 8-inch diameter DIP water main.

D-1B: This pipeline section contains the remaining pipeline segments within Phase 1. Associated with this segment is the possibility of an emergency connection with the Town of Bath (Berkeley Springs) water distribution system near the southern end of that system. D-1B consists of a looped system that includes pipelines along the existing Route 522 and the proposed Route 522 Bypass. The pipeline length associated with D-1B is approximately 37,080 l.f., of which approximately 16,550 l.f. is assumed to be 12-inch diameter DIP and approximately 20,530 l.f. is assumed to be 8-inch diameter DIP. These sizes were calculated based on an emergency fire flow condition within the component.

Based on a review of the Priority Area topography, the South Region is assumed to be at a single service level of approximately 1,040 feet. One storage tank has been proposed for D-1B and was located near the northern edge of D-1B, with a site elevation of approximately 920 feet. This would result in the need for an elevated water storage tank. The tank is located on the opposite end of D-1B from S/T-1 in order to eliminate the creation of a dead-end in the proposed pipeline, which could result in poor water quality. The storage tank was sized in accordance with the assumptions listed in Section 2.1,

which stated that each storage tank would need to contain the recommended fire storage of 120,000 gallons, as well as the required portion of the 2 days of ADD storage. Based on the fact that the proposed storage tank will provide operational storage for D-1 (A and B) and D-5, as well as the 120,000 gallons of fire storage, the tank would need to contain 1,244,000 gallons of water. West Virginia regulations recommend that storage tanks have approximately 20% turnover in a 24-hour period. Assuming that the tank starts full each day and that the tank supplies the ADD for components D-1 (A and B) and D-5 over a 16-hour period (assuming that S/T-1 refills the tank during the remaining 8 hours, which are periods of low demand), there would be an estimated 30% turnover in the tank at full build out of the D-1 (A and B) and D-5 areas.

Phase 2 (South):

Phase 2 in the South Region contains the distribution system component (D-2) that would serve the Coolfont Resort on Cold Run Valley Road. The renovations to the Coolfont Resort are scheduled to be completed in 2009-2010; therefore, water service would need to be provided to that area by that time. This would provide the managing PSD with a good initial customer base, even though the Coolfont Resort homes will mostly serve as seasonal residences as opposed to permanent residences. If the MCRWC and the MCC recommend providing additional water service in Sir Johns Run Valley north of the Coolfont Resort, the water distribution system can be extended north. This scenario is designated in ***Phase 2B*** and is presented in greater detail in a subsequent section. For this study, however, only Phase 2 will be advanced through the financial evaluations presented in Section 3.

D-2: This pipeline section extends west and north from D-1A at the intersection of Route 522 and Cold Run Valley Road. The pipeline follows Cold Run Valley Road approximately 17,000 l.f. to the Coolfont Resort. The pipeline then extends beyond the Coolfont Resort area to a storage tank located on Warm Springs Ridge and then extends down the east side of the ridge to connect to D-1B along Route 522. The total pipeline length associated with D-2 is approximately 19,400 l.f., of which approximately 2,000 l.f. is assumed to be 12-inch diameter DIP and approximately 17,400 l.f. is assumed to be 8-inch diameter DIP. The 12-inch diameter pipeline segment is located between the Coolfont Resort and the proposed water storage tank and the 8-inch diameter pipeline segment is from the connection point to D-1A and the Coolfont Resort, as well as from the water storage tank to D-1B along Route 522. These sizes were calculated based on an emergency fire flow condition within the component.

During a review of the topography along Cold Run Valley Road, it was found that there is a high point close to Route 522 with an elevation of approximately 965 feet. Based on the assumed South Region service level of approximately 1,040 feet, there would be approximately 32-35 psi available at the high point, which is considered acceptable.

One storage tank has been proposed for D-2 and was located on Warm Springs Ridge near the Coolfont Resort. The tank is located on the opposite end of D-2 from the water supply point of D-1A in order to eliminate the creation of a dead-end in the proposed pipeline, which could result in poor water quality. The tank site has a ground elevation of approximately 1,040 feet, which would allow for a ground level water storage tank. The storage tank was sized in accordance with the assumptions listed in Section 2.1, which stated that each storage tank would need to contain the recommended fire storage of 120,000 gallons, as well as the required portion of the 2 days of ADD storage. Based on the fact that the proposed storage tank will provide operational storage for D-2, as well as the 120,000 gallons of fire storage, the tank would need to contain 560,000 gallons of water. West Virginia regulations recommend that storage tanks have approximately 20% turnover in a 24-hour period. Assuming that the tank starts full each day and that the tank supplies the ADD for component D-2 over a 16-hour period (assuming that S/T-1 refills the tank during the remaining 8 hours, which are periods of low demand), there would be an estimated 23% turnover in the tank at full build out of the D-2 (Coolfont Resort) area.

Phase 2B (South):

In order to provide additional water service to Sir Johns Run Valley north of the Coolfont Resort, the water production capacity of S/T-1 would need to be increased and an additional distribution component would need to be installed. These revised components are referred to as S/T-1B and D-2B, respectively. ***As stated in the text for Phase 2 (South), the information contained below for Phase 2B has not been used in the financial evaluations presented in Section 3***.

In order to determine the proper sizes for these facilities, some assumptions were made regarding the number of customers that would potentially be served in this region of the County. For this study, it was assumed that an additional 200 homes would be served by this distribution component. It was also assumed that there are 2.5 people per home and that each person consumes 100 gpcd. These assumptions result in a water consumption of 50,000 gpd. Based on the assumption that unaccounted-for water is 10% of ADD in new systems, the ADD for D-2B is considerd to be approximately 55,556 gpd (39 gpm). Based on a 1.5 peaking factor, the PDD for D-2B is 83,333 gpd (58 gpm).

S/T-1B: The water production capacity for S/T-1 would need to increase by approximately 83,333 gpd, or 58 gpm, at full build out in order to meet the increased customer demands. Therefore, S/T-1B would need to have a total maximum capacity of approximately 1,144,109 gpd, or 795 gpm.

D-2B: Based on mapping of the area, it is assumed that water distribution lines for this component would extend from the Coolfont Resort area north along Cold Run Valley Road to the intersection of Route 9. From there, the pipeline will continue north along Sir Johns Run Road to an ending point near the Potomac River. This results in an approximate pipeline length of 31,000 l.f. The pipeline is assumed to be 8-inch diameter DIP based on the approximate water demand of the area and emergency fire flow conditions within the component.

During a review of the topography along Cold Run Valley Road and Sir Johns Run Road, it was found that the highest elevation along the roadways that would be served is approximately 900 feet and the lowest elevation to be served would be approximately 500 feet near the Potomac River. Based on the topography of D-2B, the assumed South Region service level of approximately 1,040 feet will be adequate to serve the D-2B component. It was also assumed that there would need to be an additional pump station to ensure proper hydraulic pressure and performance of the system, as well as a PRV station in order to reduce water pressure in the lower elevations of the service area near the Potomac River.

One storage tank has been proposed for D-2B and would be located toward the northern end of the D-2B component along Sir Johns Run Road in order to maintain adequate system pressures towards the end of the distribution system, as well as to help maintain water quality. The storage tank was sized in accordance with the assumptions listed in Section 2.1, which stated that each storage tank would need to contain the

recommended fire storage of 120,000 gallons, as well as the required portion of the 2 days of ADD storage. Based on the fact that the proposed storage tank will provide operational storage for D-2B, as well as the 120,000 gallons of fire storage, the tank would need to contain 231,000 gallons of water. West Virginia regulations recommend that storage tanks have approximately 20% turnover in a 24-hour period. Assuming that the tank starts full each day and that the tank supplies the ADD for component D-2B over a 16-hour period (assuming that S/T-1 refills the tank during the remaining 8 hours, which are periods of low demand), there would be an estimated 32% turnover in the tank at full build out of the D-2B area.

Phase 3 (South):

Phase 3 in the South Region contains a new groundwater well field and treatment facility (S/T-2) located in Breakneck Run Gap on the west side of Route 522, across from the Ridge State Fish Hatchery. Phase 3 also includes a distribution system component (D-3) that will deliver water to the southern part of the South Region. These components were selected as Phase 3 due to the fact that this area has been identified as a location with a large number of proposed residential developments, which would provide a good customer base for the PSD.

S/T-2: The water production capacity for S/T-2 was estimated based on the assumption that S/T-2 would be responsible for providing the projected water demand associated with the area served by D-3. Assuming that the water demands are evenly distributed in the South Region and that S/T-2 would need to satisfy the PDD of the area served by D-3, S/T-2 has an assumed water production capacity of 408,759 gpd, or approximately 284 gpm.

D-3: This pipeline section is a looped system that contains two (2) water storage tanks. The southernmost tank is provided to eliminate a dead end in the distribution system, and the northernmost tank is provided to ensure adequate fire protection to the Morgan County Industrial Park. The total pipeline length associated with D-3 is approximately 31,810 l.f., of which approximately 1,890 l.f. will be 12-inch diameter DIP while the remaining 29,920 l.f. will be 8-inch diameter DIP.

Based on a review of the Priority Area topography, D-3 is assumed to be at the same service level as the rest of the South Region, which is approximately 1,040 feet. Both tanks associated with component D-3 were located on sites with ground elevations of approximately 920 feet. Both locations would result in the need for an elevated water storage tank. Although higher elevations are present in the vicinity of D-3 along Warm Springs Ridge, the conceptual tank sites were selected in order to position the storage tanks in closer proximity to the assumed service areas.

The two (2) storage tanks are assumed to be the same size, which was calculated based on the assumptions listed in Section 2.1, which stated that each storage tank would need to contain the recommended fire storage of 120,000 gallons, as well as the required portion of the 2 days of ADD storage. Based on the fact that the proposed storage tanks will provide operational storage for D-3, as well as the 120,000 gallons of fire storage, the tanks would each need to contain 393,000 gallons of water. West Virginia regulations recommend that storage tanks have approximately 20% turnover in a 24-hour period. Assuming that the tanks start full each day and that the tanks supply the ADD for component D-3 over a 16-hour period (assuming that S/T-2 refills the tanks during the remaining 8 hours, which are periods of low demand), there would be an estimated 23% turnover in the tanks at full build out of the D-3 area.

Phase 4 (South):

Phase 4 in the South Region contains a new groundwater well field and treatment facility (S/T-3) located in Indian Run Gap of Warm Springs Ridge and a distribution system component (D-4). These components were selected as Phase 4 in order to connect Phases 1 and 3, thus creating a continuous service area from the Town of Berkeley Springs south along Route 522 to the WV/VA border.

S/T-3: The water production capacity for S/T-3 was estimated based on the assumption that S/T-3 would be responsible for providing the projected water demand associated with the area served by D-4. Assuming that the water demands are evenly distributed in the South Region and that S/T-3 would need to satisfy the PDD of the D-4 area, S/T-3 has an assumed water production capacity of 560,646 gpd, or approximately 389 gpm.

D-4: This pipeline section extends north from two (2) connection points with D-3 to two (2) connection points with D-1 near S/T-1. The pipeline length associated with D-4 is approximately 43,630 l.f. Approximately 42,900 l.f. of the D-4 piping is considered to be 8-inch diameter DIP. The remaining 730 l.f. of pipeline connects the D-4 storage tank to the D-4 distribution system loop. Based on the need to handle the fire flow from the tank to the distribution system loop, this pipeline segment has been sized as 12-inch diameter DIP.

Based on a review of the Priority Area topography, D-4 is assumed to be at the same service level as the rest of the South Region, which is approximately 1,040 feet. One storage tank has been proposed for D-4 and was located on the northern portion of D-4 to provide better overall storage tank spacing in the South Region. The tank site is on Warm Springs Ridge and can be constructed at a site with a ground elevation of approximately 1,040 feet. This would allow for construction of a ground level water storage tank. The storage tank was sized in accordance with the assumptions listed in Section 2.1, which stated that each storage tank would need to contain the recommended fire storage of 120,000 gallons, as well as the required portion of the 2 days of ADD storage. Based on the fact that the proposed storage tank will provide operational storage for D-4, as well as the 120,000 gallons of fire storage, the tank would need to contain 870,000 gallons of water. West Virginia regulations recommend that storage tanks have approximately 20% turnover in a 24-hour period. Assuming that the tank starts full each day and that the tank supplies the ADD for component D-4 over a 16-hour period (assuming that S/T-3 refills the tank during the remaining 8 hours, which are periods of low demand), there would be an estimated 29% turnover in the tank at full build out of the D-4 area.

Phase 5 (South):

Phase 5 in the South Region contains a distribution system component (D-5) that will provide a connection between the South Region and the North Region. It is assumed that by the time D-5 is constructed, the first phase of the North Region will be in place, thus expanding the public service area and providing additional reliability to the South and North Regions.

D-5: This pipeline section extends north from the end of D-1 to the connection point with the North Region of the Priority Area. This segment is recommended in order to connect the South and North Regions of the Priority Area; however, if no connection between the South and North Regions is desired, this segment could be eliminated. The pipeline length associated with D-5 is approximately 18,000 l.f. The pipeline for segment D-5 was sized at 12-inch diameter DIP based on fire flow requirements and the potential need to transfer large amounts of water between the North and South Regions.

2.2.2 North Region

The recommended plan for the North Region calls for five (5) phases of construction, containing a total of two (2) new groundwater well field locations and treatment facilities and five (5) new distribution system components. The following sections describe the five (5) phases in greater detail.

Phase 1 (North):

Phase 1 in the North Region contains a new groundwater well field and treatment facility (S/T-4) located approximately 3 miles east of Berkeley Springs along Route 9, in the vicinity of two (2) public water supply wells: Skyline MHP (13 gpm) and Kat & Rosie Bar (60 gpm). Phase 1 also contains a distribution system component (D-6). These components were selected as Phase 1 due to the fact that the North Region has been identified as the region with the second largest percentage of projected water demands, as well as the fact that this area is immediately east of the Town of Berkeley Springs, which could lead to quicker development.

S/T-4: The water production capacity for S/T-4 was estimated based on the assumption that S/T-4 would be responsible for providing the projected water demand associated with the area served by D-6 and D-8. Assuming that the water demands are evenly distributed in the North Region and that S/T-4 would need to satisfy the peak daily demands (PDD) of these areas, S/T-4 has an assumed water production capacity of 481,668 gpd, or approximately 335 gpm.

D-6: This pipeline section consists of approximately 32,700 l.f. of pipeline, which connects to D-5 of the South Region, as well as provides an emergency interconnection to the Town of Bath (Berkeley Springs) water supply system. The main distribution line for D-6 extends eastward toward the connection point with D-7. Based on fire flow requirements, the pipeline sizes for D-6 have been identified as 12-inch diameter DIP, except for the approximately 4,700 l.f. of 8-inch diameter DIP that will serve as the connection to the Town of Bath water supply system and the pipeline segment from S/T-4 to the transmission main along Route 9.

Based on a review of the Priority Area topography, the North Region is assumed to contain two (2) distinct pressure zones, or service levels. The western pressure zone, which includes distribution system components D-6 and D-8, will have a service level of approximately 930 feet. The eastern pressure zone, which includes distribution system components D-7, D-9, and D-10, will have a service level of approximately 860 feet.

One storage tank has been proposed for D-6 and was centrally located within the D-6 distribution system. The proposed tank site has a ground elevation of approximately 840 feet, which would result in the need for an elevated water storage tank. The storage tank was sized in accordance with the assumptions listed in Section 2.1, which stated that each storage tank would need to contain the recommended fire storage of 120,000 gallons, as well as the required portion of the 2 days of ADD storage. Based on the fact that the proposed storage tank will provide operational storage for D-6, as well as the 120,000 gallons of fire storage, the tank would need to contain 353,000 gallons of water. West Virginia regulations recommend that storage tanks have approximately 20% turnover in a 24-hour period. Assuming that the tank starts full each day and that the tank supplies the ADD for component D-6 over a 16-hour period (assuming that S/T-4 refills the tank during the remaining 8 hours, which are periods of low demand), there would be an estimated 22% turnover in the tank at full build out of the D-6 area.

Phase 2 (North):

Phase 2 in the North Region contains a new groundwater well field and treatment facility (S/T-5) located approximately 1.5 miles west of the Morgan County/Berkeley County border along Route 9. Phase 2 also contains a distribution component (D-7) that will provide the transmission backbone along Route 9 from D-6 to the Morgan County/Berkeley County border.

S/T-5: The water production capacity for S/T-5 was estimated based on the assumption that S/T-5 would be responsible for providing the projected water demand associated with the area served by D-7. Assuming that the water demands are evenly distributed in the North Region and that S/T-5 would need to satisfy the PDD of the areas served by D-7, S/T-5 has an assumed water production capacity of 357,780 gpd, or approximately 249 gpm.

D-7: This pipeline section consists of approximately 35,200 l.f. of pipeline. Based on fire flow requirements, the pipeline sizes for D-7 have been identified as 12-inch diameter DIP, except for the approximately 500 l.f. of 8-inch diameter DIP that will serve as the connection from S/T-5 to the transmission main along Route 9. This component also contains a PRV/Booster Pump Station that is located near the connection point between D-6 and D-7. This station is recommended based on difference in topography between the two (2) components and will allow for the transfer of water between the two (2) systems.

D-7 is located in the eastern pressure zone, which has a service level of approximately 860 feet. One storage tank has been proposed for D-7 and was located toward the eastern end of the distribution system on a site with a ground elevation of approximately 860 feet. This would allow for a ground level storage tank. The storage tank was sized in accordance with the assumptions listed in Section 2.1, which stated that each storage tank would need to contain the recommended fire storage of 120,000 gallons, as well as the required portion of the 2 days of ADD storage. Based on the fact that the proposed storage tank will provide operational storage for D-7, as well as the 120,000 gallons of fire storage, the tank would need to contain 371,000 gallons of water. West Virginia regulations recommend that storage tanks have approximately 20% turnover in a 24-hour period. Assuming that the tank starts full each day and that the tank supplies the ADD for component D-7 over a 16-hour period (assuming that S/T-5 refills the tank during the remaining 8 hours, which are periods of low demand), there would be an estimated 23% turnover in the tank at full build out of the D-7 area.

Phase 3 (North):

Phase 3 in the North Region contains a distribution component (D-8) that extends north from D-6 along Pious Ridge Road and creates a loop around Pious Ridge Road and Fairview Drive.

D-8: This pipeline section extends north from D-6 at the intersection of Route 9 and Pious Ridge Road. The total pipeline length of this component is approximately 57,500 l.f. Based on fire flow requirements, it is estimated that 23,600 l.f. of the pipeline length will be 12-inch diameter DIP and the remaining 33,900 l.f. of pipeline will be 8-inch diameter DIP.

D-8 is located in the western pressure zone, which has a service level of approximately 930 feet. One storage tank has been proposed for D-8 and was located on the eastern side of the distribution system loop (on Pious Ridge Road). The approximate ground elevation at the proposed tank site is 860 feet, which would result in the need for an elevated water storage tank. The storage tank was sized in accordance with the assumptions listed in Section 2.1, which stated that each storage tank would need to contain the recommended fire storage of 120,000 gallons, as well as the required portion of the 2 days of ADD storage. Based on the fact that the proposed storage tank will provide operational storage for D-8, as well as the 120,000 gallons of fire storage, the tank would need to contain 529,000 gallons of water. West Virginia regulations recommend that storage tanks have approximately 20% turnover in a 24-hour period. Assuming that the tank starts full each day and that the tank supplies the ADD for component D-8 over a 16-hour period (assuming that S/T-4 refills the tank during the remaining 8 hours, which are periods of low demand), there would be an estimated 26% turnover in the tank at full build out of the D-8 area.

In order to provide adequate hydraulic head to fill the storage tank, it is assumed that a booster pump station will be required for this component. In order to minimize pumping costs, the pump station is to be located as close to the storage facility as possible.

Phase 4 (North):

Phase 4 in the North Region contains a distribution component (D-9) that extends north from D-7 near Stohrs Crossroads.

D-9: This pipeline section extends north from D-7 at the intersection of Route 9 and Potomac Road. The total pipeline length of this component is approximately 17,000 l.f. Based on fire flow requirements, it is estimated that the entire pipeline length will be 12-inch diameter DIP.

D-9 is located in the eastern pressure zone, which has a service level of approximately 860 feet. One storage tank has been proposed for D-9 and was located on the northern end of the proposed D-9 pipeline to eliminate a potential dead end. The approximate ground elevation at the proposed tank site is 720 feet, which would result in the need for an elevated water storage tank. The storage tank was sized in accordance with the assumptions listed in Section 2.1, which stated that each storage tank would need to contain the recommended fire storage of 120,000 gallons, as well as the required portion of the 2 days of ADD storage. Based on the fact that the proposed storage tank will provide operational storage for D-9, as well as the 120,000 gallons of fire storage, the tank would need to contain 241,000 gallons of water. West Virginia regulations recommend that storage tanks have approximately 20% turnover in a 24-hour period. Assuming that the tank starts full each day and that the tank supplies the ADD for component D-9 over a 16-hour period (assuming that S/T-5 refills the tank during the remaining 8 hours, which are periods of low demand), there would be an estimated 16% turnover in the tank at full build out of the D-9 area. Although this value is less than the recommended 20% turnover, it is assumed to be acceptable at this planning level.

In order to provide adequate hydraulic head to fill the storage tank, it is assumed that a booster pump station will be required for this component. In order to minimize pumping costs, the pump station is to be located as close to the storage facility as possible.

Phase 5 (North):

Phase 5 in the North Region contains a distribution component (D-10) that extends north from D-7 at the intersection of Route 9 and River Road.

D-10: This pipeline section extends north from D-7 at the intersection of Route 9 and River Road. The total pipeline length of this component is approximately 14,800 l.f. Based on fire flow requirements, it is estimated that the entire pipeline length will be 12-inch diameter DIP.

D-10 is located in the eastern pressure zone, which has a service level of approximately 860 feet. One storage tank has been proposed for D-10 and was located on the northern end of the proposed D-9 pipeline to eliminate a potential dead end. The approximate ground elevation at the proposed tank site is 650 feet, which would result in the need for an elevated water storage tank. The storage tank was sized in accordance with the assumptions listed in Section 2.1, which stated that each storage tank would need to contain the recommended fire storage of 120,000 gallons, as well as the required portion of the 2 days of ADD storage. Based on the fact that the proposed storage tank will provide operational storage for D-10, as well as the 120,000 gallons of fire storage, the tank would need to contain 225,000 gallons of water. West Virginia regulations recommend that storage tanks have approximately 20% turnover in a 24-hour period. Assuming that the tank starts full each day and that the tank supplies the ADD for component D-10 over a 16-hour period (assuming that S/T-5 refills the tank during the remaining 8 hours, which are periods of low demand), there would be an estimated 16% turnover in the tank at full build out of the D-10 area. Although this value is less than the recommended 20% turnover, it is assumed to be acceptable at this planning level.

In order to provide adequate hydraulic head to fill the storage tank, it is assumed that a booster pump station will be required for this component. In order to minimize pumping costs, the pump station is to be located as close to the storage facility as possible.

2.2.3 Great Cacapon Region

The recommended plan for the Great Cacapon Region calls for one (1) phase of construction, containing one (1) new groundwater well field and treatment facility and one (1) new distribution system component.

Phase 1 (Great Cacapon):

Phase 1 in the Great Cacapon Region contains a new groundwater well field and treatment facility (S/T-6) located on the southern end of the Town of Great Cacapon. Phase 1 also contains a distribution component (D-11) that will provide water to the residents of Great Cacapon.

S/T-6: The water production capacity for S/T-6 was estimated based on the assumption that S/T-6 would be responsible for providing the projected water demand associated with the area served by D-11. Assuming that the water demands are evenly distributed in the Great Cacapon Region and that S/T-6 would need to satisfy the peak daily demands (PDD) of the area served by D-11, S/T-6 has an assumed water production capacity of 140,000 gpd, or approximately 97 gpm.

D-11: This pipeline section consists of approximately 11,100 l.f. of pipeline. Based on fire flow requirements, the pipeline sizes for D-11 are 12-inch diameter DIP (4,100 l.f.) and 8-inch diameter DIP (7,000 l.f.).

One storage tank has been proposed for D-11 and was located toward the eastern edge of the Town of Great Cacapon, which is on the opposite end of the distribution system from S/T-6. The storage tank was sized in accordance with the assumptions listed in Section 2.1, which stated that each storage tank would need to contain the recommended fire storage of 120,000 gallons, as well as the required 2 days of ADD storage. Based on the fact that the proposed storage tank will provide operational storage for D-11, as well as the 120,000 gallons of fire storage, the tank would need to contain 300,000 gallons of water. West Virginia regulations recommend that storage tanks have approximately 20% turnover in a 24-hour period. Assuming that the tank starts full each day and that the tank supplies the ADD for component D-11 over a 16-hour period (assuming that S/T-6 refills the tank during the remaining 8 hours, which are periods of low demand), there would be an estimated 20% turnover in the tank at full build out of the D-11 area.

2.3 Project Mapping

Detailed mapping associated with the Water Resources Study was completed and is included in this Volume 2. Figure 1 is an index map that indicates the coverage areas associated with each region of the Priority Area. Figures 2, 3, and 4 are maps of the water facilities associated with the South, North, and Great Cacapon Regions, respectively.

3.0 ESTIMATED PROJECT COSTS

Estimated costs, financing, and unit cost determinations for the water supply plan are presented in this section. Potential federal and state water project funding sources, which were summarized in Volume 1, were evaluated and applied to applicable projects. Based on prior project experience and input received as part of this evaluation, assumptions were applied to the project costs, and anticipated annual debt service for the recommended plan calculated for two (2) funding scenarios. Total annual costs, which include debt service and operation and maintenance costs, were used to determine the estimated user cost for Morgan County residents.

As discussed in Volume 1, there are many sources of governmental aid in the form of grants and low interest loans. Additional investigation is required to identify specific funding opportunities, and the West Virginia Infrastructure and Jobs Development Council (WVIJDC) should be contacted to assist in the funding process. Upon completion of the Water Resources Study, it is recommended that the Morgan County Rural Water Committee and the Morgan County Commission initiate discussions with the WVIJDC and the identified funding agencies.

Estimated construction and project costs were developed for each component of the water supply plan and are presented in this section. These estimates include total construction costs, as well as an allowance of 20% of the total construction costs to address engineering, permitting, and construction management (CM) fees. A 25% contingency is added to the sum of the total construction costs and fees to provide for unforeseen costs.

Transmission and distribution system piping costs are developed based on an aggregate cost per foot of pipe that incorporates all necessary appurtenances such as valves, fittings, blocking, and pipe, as well as excavation, backfill, and surface restoration. Ductile iron pipe was assumed for all transmission and distribution system piping in this study. Construction costs for storage facilities were based on a unit cost per gallon of storage. Tables 3-1 through 3-11 summarize the total capital costs associated with each phase of construction in the respective regions.

To estimate user fees associated with the proposed water system, two separate funding scenarios were considered. These scenarios were based on conversations with the WVIJDC and are as follows:

- Scenario 1: all components would be eligible for 50% grant monies, with the remaining balance provided through a low-interest loan at 0.5% with a 38-year term (40 years with two-year grace period for construction).

- Scenario 2: assumes bond market (private) financing at 7% with a 30-year term.

To better approximate the user fees, two (2) additional scenarios were applied regarding the amount of water consumption that will occur during the first year after all phases of construction are completed in a given region of the Priority Area. The first scenario was that approximately 27% of the ADD would be realized in the first year after construction. The 27% was a result of assuming that 30% of the ADD would be in place during that first year and

multiplying it by 90% to subtract the unaccounted-for water losses that would not be billed to customers. The second scenario is that the entire consumption amount (ADD less the 10% unaccounted for water losses) would be realized during the first year after all phases had been constructed in each region.

User costs for water service in Morgan County are estimated for each of the funding scenarios, as shown in Tables 3-12 through 3-23. Operation and maintenance costs were estimated based on the most recent Annual Reports from the Paw Paw and Bath systems. User costs are estimated by summing the annual costs of the new debt service and the estimated operation and maintenance costs and dividing the cost by the assumed percentage of the projected average daily consumption of the region in the first year after all phases have been constructed. The average monthly bill represents the conceptual bill for the customers, based on the consumption assumptions, if all the components were constructed under the described funding scenario. It should be noted that if more customers were available to the PSD at the time of construction completion, the estimated user fees would decrease. However, if fewer customers were available to the PSD at the time of project completion, the estimated user fees would increase. The feasibility of each project phase will largely be based on the number of people that can be initially served upon completion of the facilities. The PSD will need to investigate local interest and analyze each phase during project implementation. It may be necessary to seek outside financial support to justify some initial project phases. As more users are connected to the system, the debt service and operating cost will be spread over a larger number of users.

Unit costs are expressed as $/1,000 gallons on each table. Typical monthly costs are also presented assuming an average monthly consumption of 4,000 gallons per connection. Unit cost estimates in this evaluation consider total costs for rendering high quality water service by a system that is operated and maintained in a professional manner and is continually renewed. However, these costs are not intended to represent proposed or projected water rates. No attempt to determine individual community rates was made. The intent of the unit cost evaluation is to determine an order-of-magnitude value based on estimated project costs and certain funding assumptions. Actual costs will vary based on funding terms, bidding climate, and other factors. The funding assumptions presented herein have a significant impact on the estimated unit cost. Actual user cost will depend on negotiated funding scenarios as the projects are implemented.

Tables 3-12 through 3-15 present the four (4) conceptual user fee estimates associated with the South Region. Tables 3-16 through 3-19 present the four (4) conceptual user fee estimates associated with the North Region. Tables 3-20 through 3-23 represent the four (4) conceptual user fee estimates associated with the Great Cacapon Region.

TABLE 3-1A
ESTIMATED CAPITAL COST FOR SOUTH REGION - PHASE 1A
Morgan County Water Resources Study

DESCRIPTION	QTY.	UNIT	UNIT COST	COST
Install Well at S/T-1	1	LS	$450,000	$450,000
WTP at S/T-1	1,060,776	GPD	$2	$2,122,000
Distribution Mains (1)				
12-inch DI Main	1,450	LF	$66	$96,000
8-inch DI Main	8,900	LF	$40	$356,000
Pressure Reducing Valve (2)		EA		
Booster Pump Station (3)		EA		
Storage Tank (4)		GAL		
			Subtotal =	**$3,024,000**
			Engineering, Permitting and CM (20%) =	$605,000
			Subtotal =	**$3,629,000**
			Project Contingencies (25%) =	$907,000
			TOTAL PROJECT COST =	**$4,536,000**

Notes:

(1) Includes: fittings, valves, and other items incidental to construction.

(2) Includes: valve, piping, bypass, and vault.

(3) Includes: two pumps, controls, valves, piping, telemetry, and building.

(4) Includes: tank construction, control valve and vault, piping, telemetry, and site work.

TABLE 3-1B
ESTIMATED CAPITAL COST FOR SOUTH REGION - PHASE 1B
Morgan County Water Resources Study

DESCRIPTION	QTY.	UNIT	UNIT COST	COST
Install Well at S/T-1		LS		
WTP at S/T-1		GPD		
Distribution Mains (1)				
12-inch DI Main	16,550	LF	$66	$1,092,000
8-inch DI Main	20,530	LF	$40	$821,000
Pressure Reducing Valve (2)		EA		
Booster Pump Station (3)		EA		
Storage Tank (4)	1,244,000	GAL	$2	$2,488,000
			Subtotal =	**$4,401,000**
			Engineering, Permitting and CM (20%) =	$880,000
			Subtotal =	**$5,281,000**
			Project Contingencies (25%) =	$1,320,000
			TOTAL PROJECT COST =	**$6,601,000**

Notes:

(1) Includes: fittings, valves, and other items incidental to construction.

(2) Includes: valve, piping, bypass, and vault.

(3) Includes: two pumps, controls, valves, piping, telemetry, and building.

(4) Includes: tank construction, control valve and vault, piping, telemetry, and site work.

TABLE 3-2
ESTIMATED CAPITAL COST FOR SOUTH REGION – PHASE 2
Morgan County Water Resources Study

DESCRIPTION	QTY.	UNIT	UNIT COST	COST
Install Well		LS		
WTP		GPD		
Distribution Mains (1)				
12-inch DI Main	2,000	LF	$66	$132,000
8-inch DI Main	17,400	LF	$40	$696,000
Pressure Reducing Valve (2)		EA		
Booster Pump Station (3)		EA		
Storage Tank (4)	560,000	GAL	$2	$1,120,000
			Subtotal =	**$1,948,000**
			Engineering, Permitting and CM (20%) =	$390,000
			Subtotal =	**$2,338,000**
			Project Contingencies (25%) =	$585,000
			TOTAL PROJECT COST =	**$2,923,000**

Notes:

(1) Includes: fittings, valves, and other items incidental to construction.

(2) Includes: valve, piping, bypass, and vault.

(3) Includes: two pumps, controls, valves, piping, telemetry, and building.

(4) Includes: tank construction, control valve and vault, piping, telemetry, and site work.

TABLE 3-2B
ESTIMATED CAPITAL COST FOR SOUTH REGION – PHASE 2B
Morgan County Water Resources Study

DESCRIPTION	QTY.	UNIT	UNIT COST	COST
Install Well		LS		
WTP at S/T-1 (Increased Production)	83,333	GPD	$2	$167,000
Distribution Mains (1)				
12-inch DI Main		LF		
8-inch DI Main	31,000	LF	$40	$1,240,000
Pressure Reducing Valve (2)	1	EA	$50,000	$50,000
Booster Pump Station (3)	1	EA	$100,000	$100,000
Storage Tank (4)	231,000	GAL	$2	$462,000
			Subtotal =	**$2,019,000**
			Engineering, Permitting and CM (20%) =	$404,000
			Subtotal =	**$2,423,000**
			Project Contingencies (25%) =	$606,000
			TOTAL PROJECT COST =	**$3,029,000**

Notes:

(1) Includes: fittings, valves, and other items incidental to construction.

(2) Includes: valve, piping, bypass, and vault.

(3) Includes: two pumps, controls, valves, piping, telemetry, and building.

(4) Includes: tank construction, control valve and vault, piping, telemetry, and site work.

TABLE 3-3
ESTIMATED CAPITAL COST FOR SOUTH REGION – PHASE 3
Morgan County Water Resources Study

DESCRIPTION	QTY.	UNIT	UNIT COST	COST
Install Well at S/T-2	1	LS	$450,000	$450,000
WTP at S/T-2	408,759	GPD	$2	$818,000
Distribution Mains (1)				
12-inch DI Main	1,890	LF	$66	$125,000
8-inch DI Main	29,920	LF	$40	$1,197,000
Pressure Reducing Valve (2)		EA		
Booster Pump Station (3)		EA		
Storage Tank (4)				
Tank #1	393,000	GAL	$2	$786,000
Tank #2	393,000	GAL	$2	$786,000
			Subtotal =	**$4,162,000**
			Engineering, Permitting and CM (20%) =	$832,000
			Subtotal =	**$4,994,000**
			Project Contingencies (25%) =	$1,249,000
			TOTAL PROJECT COST =	**$6,243,000**

Notes:

(1) Includes: fittings, valves, and other items incidental to construction.

(2) Includes: valve, piping, bypass, and vault.

(3) Includes: two pumps, controls, valves, piping, telemetry, and building.

(4) Includes: tank construction, control valve and vault, piping, telemetry, and site work.

TABLE 3-4
ESTIMATED CAPITAL COST FOR SOUTH REGION - PHASE 4
Morgan County Water Resources Study

DESCRIPTION	QTY.	UNIT	UNIT COST	COST
Install Well at S/T-3	1	LS	$450,000	$450,000
WTP at S/T-3	560,646	GPD	$2	$1,121,000
Distribution Mains (1)				
12-inch DI Main	730	LF	$66	$48,000
8-inch DI Main	42,900	LF	$40	$1,716,000
Pressure Reducing Valve (2)		EA		
Booster Pump Station (3)		EA		
Storage Tank (4)	870,000	GAL	$2	$1,740,000
			Subtotal =	**$5,075,000**
			Engineering, Permitting and CM (20%) =	$1,015,000
			Subtotal =	**$6,090,000**
			Project Contingencies (25%) =	$1,523,000
			TOTAL PROJECT COST =	**$7,613,000**

Notes:

(1) Includes: fittings, valves, and other items incidental to construction.

(2) Includes: valve, piping, bypass, and vault.

(3) Includes: two pumps, controls, valves, piping, telemetry, and building.

(4) Includes: tank construction, control valve and vault, piping, telemetry, and site work.

TABLE 3-5
ESTIMATED CAPITAL COST FOR SOUTH REGION - PHASE 5
Morgan County Water Resources Study

DESCRIPTION	QTY.	UNIT	UNIT COST	COST
Install Well		LS		
WTP		GPD		
Distribution Mains (1)				
12-inch DI Main	18,000	LF	$66	$1,188,000
8-inch DI Main		LF		
Pressure Reducing Valve (2)		EA		
Booster Pump Station (3)		EA		
Storage Tank (4)		GAL		
			Subtotal =	**$1,188,000**
			Engineering, Permitting and CM (20%) =	$238,000
			Subtotal =	**$1,426,000**
			Project Contingencies (25%) =	$357,000
			TOTAL PROJECT COST =	**$1,783,000**

Notes:

(1) Includes: fittings, valves, and other items incidental to construction.

(2) Includes: valve, piping, bypass, and vault.

(3) Includes: two pumps, controls, valves, piping, telemetry, and building.

(4) Includes: tank construction, control valve and vault, piping, telemetry, and site work.

TABLE 3-6
ESTIMATED CAPITAL COST FOR NORTH REGION - PHASE 1
Morgan County Water Resources Study

DESCRIPTION	QTY.	UNIT	UNIT COST	COST
Install Well at S/T-4	1	LS	$450,000	$450,000
WTP at S/T-4	481,668	GPD	$2	$963,000
Distribution Mains (1)				
12-inch DI Main	28,000	LF	$66	$1,848,000
8-inch DI Main	4,700	LF	$40	$188,000
Pressure Reducing Valve (2)		EA		
Booster Pump Station (3)		EA		
Storage Tank (4)	353,000	GAL	$2	$706,000
			Subtotal =	**$4,155,000**
			Engineering, Permitting and CM (20%) =	$831,000
			Subtotal =	**$4,986,000**
			Project Contingencies (25%) =	$1,247,000
			TOTAL PROJECT COST =	**$6,233,000**

Notes:

(1) Includes: fittings, valves, and other items incidental to construction.

(2) Includes: valve, piping, bypass, and vault.

(3) Includes: two pumps, controls, valves, piping, telemetry, and building.

(4) Includes: tank construction, control valve and vault, piping, telemetry, and site work.

TABLE 3-7
ESTIMATED CAPITAL COST FOR NORTH REGION - PHASE 2
Morgan County Water Resources Study

DESCRIPTION	QTY.	UNIT	UNIT COST	COST
Install Well at S/T-5	1	LS	$450,000	$450,000
WTP at S/T-5	357,780	GPD	$2	$716,000
Distribution Mains (1)				
12-inch DI Main	34,700	LF	$66	$2,290,000
8-inch DI Main	500	LF	$40	$20,000
Pressure Reducing Valve (2)	1	EA	$50,000	$50,000
Booster Pump Station (3)	1	EA	$100,000	$100,000
Storage Tank (4)	371,000	GAL	$2	$742,000
			Subtotal =	**$4,368,000**
			Engineering, Permitting and CM (20%) =	$874,000
			Subtotal =	**$5,242,000**
			Project Contingencies (25%) =	$1,311,000
			TOTAL PROJECT COST =	**$6,553,000**

Notes:

(1) Includes: fittings, valves, and other items incidental to construction.

(2) Includes: valve, piping, bypass, and vault.

(3) Includes: two pumps, controls, valves, piping, telemetry, and building.

(4) Includes: tank construction, control valve and vault, piping, telemetry, and site work.

TABLE 3-8
ESTIMATED CAPITAL COST FOR NORTH REGION - PHASE 3
Morgan County Water Resources Study

DESCRIPTION	QTY.	UNIT	UNIT COST	COST
Install Well		LS		
WTP		GPD		
Distribution Mains (1)				
12-inch DI Main	23,600	LF	$66	$1,558,000
8-inch DI Main	33,900	LF	$40	$1,356,000
Pressure Reducing Valve (2)		EA		
Booster Pump Station (3)	1	EA	$100,000	$100,000
Storage Tank (4)	529,000	GAL	$2	$1,058,000
			Subtotal =	**$4,072,000**
			Engineering, Permitting and CM (20%) =	$814,000
			Subtotal =	**$4,886,000**
			Project Contingencies (25%) =	$1,222,000
			TOTAL PROJECT COST =	**$6,108,000**

Notes:

(1) Includes: fittings, valves, and other items incidental to construction.

(2) Includes: valve, piping, bypass, and vault.

(3) Includes: two pumps, controls, valves, piping, telemetry, and building.

(4) Includes: tank construction, control valve and vault, piping, telemetry, and site work.

TABLE 3-9
ESTIMATED CAPITAL COST FOR NORTH REGION - PHASE 4
Morgan County Water Resources Study

DESCRIPTION	QTY.	UNIT	UNIT COST	COST
Install Well		LS		
WTP		GPD		
Distribution Mains (1)				
12-inch DI Main	17,000	LF	$66	$1,122,000
8-inch DI Main		LF		
Pressure Reducing Valve (2)		EA		
Booster Pump Station (3)	1	EA	$100,000	$100,000
Storage Tank (4)	241,000	GAL	$2	$482,000
			Subtotal =	**$1,704,000**
			Engineering, Permitting and CM (20%) =	$341,000
			Subtotal =	**$2,045,000**
			Project Contingencies (25%) =	$511,000
			TOTAL PROJECT COST =	**$2,556,000**

Notes:

(1) Includes: fittings, valves, and other items incidental to construction.

(2) Includes: valve, piping, bypass, and vault.

(3) Includes: two pumps, controls, valves, piping, telemetry, and building.

(4) Includes: tank construction, control valve and vault, piping, telemetry, and site work.

TABLE 3-10
ESTIMATED CAPITAL COST FOR NORTH REGION - PHASE 5
Morgan County Water Resources Study

DESCRIPTION	QTY.	UNIT	UNIT COST	COST
Install Well		LS		
WTP		GPD		
Distribution Mains (1)				
12-inch DI Main	14,800	LF	$66	$977,000
8-inch DI Main		LF		
Pressure Reducing Valve (2)		EA		
Booster Pump Station (3)	1	EA	$100,000	$100,000
Storage Tank (4)	225,000	GAL	$2	$450,000
			Subtotal =	**$1,527,000**
			Engineering, Permitting and CM (20%) =	$305,000
			Subtotal =	**$1,832,000**
			Project Contingencies (25%) =	$458,000
			TOTAL PROJECT COST =	**$2,290,000**

Notes:

(1) Includes: fittings, valves, and other items incidental to construction.

(2) Includes: valve, piping, bypass, and vault.

(3) Includes: two pumps, controls, valves, piping, telemetry, and building.

(4) Includes: tank construction, control valve and vault, piping, telemetry, and site work.

TABLE 3-11
ESTIMATED CAPITAL COST FOR GREAT CACAPON REGION – PHASE 1
Morgan County Water Resources Study

DESCRIPTION	QTY.	UNIT	UNIT COST	COST
Install Well at S/T-6	1	LS	$450,000	$450,000
WTP at S/T-6	140,000	GPD	$2	$280,000
Distribution Mains (1)				
12-inch DI Main	4,100	LF	$66	$271,000
8-inch DI Main	7,000	LF	$40	$280,000
Pressure Reducing Valve (2)		EA		
Booster Pump Station (3)		EA		
Storage Tank (4)	300,000	GAL	$2	$600,000
			Subtotal =	**$1,881,000**
			Engineering, Permitting and CM (20%) =	$376,000
			Subtotal =	**$2,257,000**
			Project Contingencies (25%) =	$564,000
			TOTAL PROJECT COST =	**$2,821,000**

Notes:

(1) Includes: fittings, valves, and other items incidental to construction.

(2) Includes: valve, piping, bypass, and vault.

(3) Includes: two pumps, controls, valves, piping, telemetry, and building.

(4) Includes: tank construction, control valve and vault, piping, telemetry, and site work.

TABLE 3-12
SOUTH REGION WATER SUPPLY FINANCIAL STATEMENT
SCENARIO 1 – 50% Grant, 38-Year Loan at 0.5%
27% of Projected ADD
Morgan County Water Resources Study

Phase	Total Capital Improvements (1)	FINANCING					
		Grant %	Grant Amount	Loan Amount	APR	Loan Term	Debt Service Payment
Phase 1 (A&B)	$11,137,000	50%	$5,568,500	$5,568,500	0.5%	38 yr	$161,487
Phase 2	$2,923,000	50%	$1,461,500	$1,461,500	0.5%	38 yr	$42,384
Phase 3	$6,243,000	50%	$3,121,500	$3,121,500	0.5%	38 yr	$90,524
Phase 4	$7,613,000	50%	$3,806,500	$3,806,500	0.5%	38 yr	$110,389
Phase 5	$1,783,000	50%	$891,500	$891,500	0.5%	38 yr	$25,854
REGION SUBTOTAL	$29,699,000		$14,849,500	$14,849,500			$430,638
New Debt Service =			$430,638				
Total Annual O&M in First Year of Operation (2) =			$490,050				
Total Annual Cost =			**$920,688**				
Average Daily Consumption in First Year of Operation (gpd) (3) =			326,700				
Typical User Cost ($/1,000 gal) =			**$7.72**				
Average Residential Monthly Bill (4,000 gal/month) =			**$30.88**				

Notes:

(1) All costs are in 2006 dollars.

(2) O&M costs ($1.50/gallon) were approximated from current Paw Paw and Bath Annual Reports. Volume of water assumed to be 30% of the regions projected ADD multiplied by 90% to remove unaccounted for water.

(3) Average Daily Consumption assumed to be 30% of the regions projected ADD multiplied by 90% to remove unaccounted for water.

TABLE 3-13
SOUTH REGION WATER SUPPLY FINANCIAL STATEMENT
SCENARIO 2 – 30-Year Loan at 7%
27% of Projected ADD
Morgan County Water Resources Study

Phase	Total Capital Improvements (1)	FINANCING					
		Grant %	Grant Amount	Loan Amount	APR	Loan Term	Debt Service Payment
Phase 1 (A&B)	$11,137,000	0%	$0	$11,137,000	7.0%	30 yr	$897,642
Phase 2	$2,923,000	0%	$0	$2,923,000	7.0%	30 yr	$235,594
Phase 3	$6,243,000	0%	$0	$6,243,000	7.0%	30 yr	$503,186
Phase 4	$7,613,000	0%	$0	$7,613,000	7.0%	30 yr	$613,608
Phase 5	$1,783,000	0%	$0	$1,783,000	7.0%	30 yr	$143,710
REGION SUBTOTAL	$29,699,000		$0	$29,699,000			$2,393,740
New Debt Service =			$2,393,740				
Total Annual O&M in First Year of Operation (2) =			$490,050				
Total Annual Cost =			**$2,883,790**				
Average Daily Consumption in First Year of Operation (gpd) (3) =			326,700				
Typical User Cost ($/1,000 gal) =			**$24.18**				
Average Residential Monthly Bill (4,000 gal/month) =			**$96.72**				

Notes:

(1) All costs are in 2006 dollars.

(2) O&M costs ($1.50/gallon) were approximated from current Paw Paw and Bath Annual Reports. Volume of water assumed to be 30% of the regions projected ADD multiplied by 90% to remove unaccounted for water.

(3) Average Daily Consumption assumed to be 30% of the regions projected ADD multiplied by 90% to remove unaccounted for water.

TABLE 3-14
SOUTH REGION WATER SUPPLY FINANCIAL STATEMENT
SCENARIO 1 – 50% Grant, 38-Year Loan at 0.5%
90% of Projected ADD
Morgan County Water Resources Study

Phase	Total Capital Improvements (1)	FINANCING					
		Grant %	Grant Amount	Loan Amount	APR	Loan Term	Debt Service Payment
Phase 1 (A&B)	$11,137,000	50%	$5,568,500	$5,568,500	0.5%	38 yr	$161,487
Phase 2	$2,923,000	50%	$1,461,500	$1,461,500	0.5%	38 yr	$42,384
Phase 3	$6,243,000	50%	$3,121,500	$3,121,500	0.5%	38 yr	$90,524
Phase 4	$7,613,000	50%	$3,806,500	$3,806,500	0.5%	38 yr	$110,389
Phase 5	$1,783,000	50%	$891,500	$891,500	0.5%	38 yr	$25,854
REGION SUBTOTAL	$29,699,000		$14,849,500	$14,849,500			$430,638
New Debt Service =			$430,638				
Total Annual O&M in First Year of Operation (2) =			$1,633,500				
Total Annual Cost =			**$2,064,138**				
Average Daily Consumption in First Year of Operation (gpd) (3) =			1,089,000				
Typical User Cost ($/1,000 gal) =			**$5.19**				
Average Residential Monthly Bill (4,000 gal/month) =			**$20.76**				

Notes:

(1) All costs are in 2006 dollars.

(2) O&M costs ($1.50/gallon) were approximated from current Paw Paw and Bath Annual Reports. Volume of water assumed to be 90% of the regions projected ADD.

(3) Average daily consumption assumed to be 90% of the projected ADD.

TABLE 3-15
SOUTH REGION WATER SUPPLY FINANCIAL STATEMENT
SCENARIO 2 – 30-Year Loan at 7%
90% of Projected ADD
Morgan County Water Resources Study

Phase	Total Capital Improvements (1)	FINANCING					
		Grant %	Grant Amount	Loan Amount	APR	Loan Term	Debt Service Payment
Phase 1 (A&B)	$11,137,000	0%	$0	$11,137,000	7.0%	30 yr	$897,642
Phase 2	$2,923,000	0%	$0	$2,923,000	7.0%	30 yr	$235,594
Phase 3	$6,243,000	0%	$0	$6,243,000	7.0%	30 yr	$503,186
Phase 4	$7,613,000	0%	$0	$7,613,000	7.0%	30 yr	$613,608
Phase 5	$1,783,000	0%	$0	$1,783,000	7.0%	30 yr	$143,710
REGION SUBTOTAL	$29,699,000		$0	$29,699,000			$2,393,740
New Debt Service =			$2,393,740				
Total Annual O&M in First Year of Operation (2) =			$1,633,500				
Total Annual Cost =			**$4,027,240**				
Average Daily Consumption in First Year of Operation (gpd) (3) =			1,089,000				
Typical User Cost ($/1,000 gal) =			**$10.13**				
Average Residential Monthly Bill (4,000 gal/month) =			**$40.52**				

Notes:

(1) All costs are in 2006 dollars.

(2) O&M costs ($1.50/gallon) were approximated from current Paw Paw and Bath Annual Reports. Volume of water assumed to be 90% of the regions projected ADD.

(3) Average Daily Consumption assumed to be 90% of the regions projected ADD.

TABLE 3-16
NORTH REGION WATER SUPPLY FINANCIAL STATEMENT
SCENARIO 1 – 50% Grant, 38-Year Loan at 0.5%
27% of Projected ADD
Morgan County Water Resources Study

Phase	Total Capital Improvements (1)	FINANCING					
		Grant %	Grant Amount	Loan Amount	APR	Loan Term	Debt Service Payment
Phase 1	$6,233,000	50%	$3,116,500	$3,116,500	0.5%	38 yr	$90,379
Phase 2	$6,553,000	50%	$3,276,500	$3,276,500	0.5%	38 yr	$95,019
Phase 3	$6,108,000	50%	$3,054,000	$3,054,000	0.5%	38 yr	$88,566
Phase 4	$2,556,000	50%	$1,278,000	$1,278,000	0.5%	38 yr	$37,062
Phase 5	$2,290,000	50%	$1,145,000	$1,145,000	0.5%	38 yr	$33,205
REGION SUBTOTAL	$23,740,000		$11,870,000	$11,870,000			$344,231
New Debt Service =			$344,231				
Total Annual O&M in First Year of Operation (2) =			$226,800				
Total Annual Cost =			**$571,031**				
Average Daily Consumption in First Year of Operation (gpd) (3) =			151,200				
Typical User Cost ($/1,000 gal) =			**$10.35**				
Average Residential Monthly Bill (4,000 gal/month) =			**$41.40**				

Notes:

(1) All costs are in 2006 dollars.

(2) O&M costs ($1.50/gallon) were approximated from current Paw Paw and Bath Annual Reports. Volume of water assumed to be 30% of the regions projected ADD multiplied by 90% to remove unaccounted for water.

(3) Average Daily Consumption assumed to be 30% of the regions projected ADD multiplied by 90% to remove unaccounted for water.

TABLE 3-17
NORTH REGION WATER SUPPLY FINANCIAL STATEMENT
SCENARIO 2 – 30-Year Loan at 7%
27% of Projected ADD
Morgan County Water Resources Study

Phase	Total Capital Improvements (1)	FINANCING					
		Grant %	Grant Amount	Loan Amount	APR	Loan Term	Debt Service Payment
Phase 1	$6,233,000	0%	$0	$6,233,000	7.0%	30 yr	$502,380
Phase 2	$6,553,000	0%	$0	$6,553,000	7.0%	30 yr	$528,172
Phase 3	$6,108,000	0%	$0	$6,108,000	7.0%	30 yr	$492,305
Phase 4	$2,556,000	0%	$0	$2,556,000	7.0%	30 yr	$206,014
Phase 5	$2,290,000	0%	$0	$2,290,000	7.0%	30 yr	$184,574
REGION SUBTOTAL	$23,740,000		$0	$23,740,000			$1,913,445
New Debt Service =			$1,913,445				
Total Annual O&M in First Year of Operation (2) =			$226,800				
Total Annual Cost =			**$2,140,245**				
Average Daily Consumption in First Year of Operation (gpd) (3) =			151,200				
Typical User Cost ($/1,000 gal) =			**$38.78**				
Average Residential Monthly Bill (4,000 gal/month) =			**$155.12**				

Notes:

(1) All costs are in 2006 dollars.

(2) O&M costs ($1.50/gallon) were approximated from current Paw Paw and Bath Annual Reports. Volume of water assumed to be 30% of the regions projected ADD multiplied by 90% to remove unaccounted for water.

(3) Average Daily Consumption assumed to be 30% of the regions projected ADD multiplied by 90% to remove unaccounted for water.

TABLE 3-18
NORTH REGION WATER SUPPLY FINANCIAL STATEMENT
SCENARIO 1 – 50% Grant, 38-Year Loan at 0.5%
90% of Projected ADD
Morgan County Water Resources Study

Phase	Total Capital Improvements (1)	FINANCING					
		Grant %	Grant Amount	Loan Amount	APR	Loan Term	Debt Service Payment
Phase 1	$6,233,000	50%	$3,116,500	$3,116,500	0.5%	38 yr	$90,379
Phase 2	$6,553,000	50%	$3,276,500	$3,276,500	0.5%	38 yr	$95,019
Phase 3	$6,108,000	50%	$3,054,000	$3,054,000	0.5%	38 yr	$88,566
Phase 4	$2,556,000	50%	$1,278,000	$1,278,000	0.5%	38 yr	$37,062
Phase 5	$2,290,000	50%	$1,145,000	$1,145,000	0.5%	38 yr	$33,205
REGION SUBTOTAL	$23,740,000		$11,870,000	$11,870,000			$344,231
New Debt Service =			$344,231				
Total Annual O&M in First Year of Operation (2) =			$756,000				
Total Annual Cost =			**$1,100,231**				
Average Daily Consumption in First Year of Operation (gpd) (3) =			504,000				
Typical User Cost ($/1,000 gal) =			**$5.98**				
Average Residential Monthly Bill (4,000 gal/month) =			**$23.92**				

Notes:

(1) All costs are in 2006 dollars.

(2) O&M costs ($1.50/gallon) were approximated from current Paw Paw and Bath Annual Reports. Volume of water assumed to be 90% of the regions projected ADD.

(3) Average Daily Consumption assumed to be 90% of the regions projected ADD.

TABLE 3-19
NORTH REGION WATER SUPPLY FINANCIAL STATEMENT
SCENARIO 2 – 30-Year Loan at 7%
90% of Projected ADD
Morgan County Water Resources Study

Phase	Total Capital Improvements (1)	FINANCING					
		Grant %	Grant Amount	Loan Amount	APR	Loan Term	Debt Service Payment
Phase 1	$6,233,000	0%	$0	$6,233,000	7.0%	30 yr	$502,380
Phase 2	$6,553,000	0%	$0	$6,553,000	7.0%	30 yr	$528,172
Phase 3	$6,108,000	0%	$0	$6,108,000	7.0%	30 yr	$492,305
Phase 4	$2,556,000	0%	$0	$2,556,000	7.0%	30 yr	$206,014
Phase 5	$2,290,000	0%	$0	$2,290,000	7.0%	30 yr	$184,574
REGION SUBTOTAL	$23,740,000		$0	$23,740,000			$1,913,445
		New Debt Service =	$1,913,445				
		Total Annual O&M in First Year of Operation (2) =	$756,000				
		Total Annual Cost =	**$2,669,445**				
		Average Daily Consumption in First Year of Operation (gpd) (3) =	504,000				
		Typical User Cost ($/1,000 gal) =	**$14.51**				
		Average Residential Monthly Bill (4,000 gal/month) =	**$58.04**				

Notes:

(1) All costs are in 2006 dollars.

(2) O&M costs ($1.50/gallon) were approximated from current Paw Paw and Bath Annual Reports. Volume of water assumed to be 90% of the regions projected ADD.

(3) Average Daily Consumption assumed to be 90% of the regions projected ADD.

TABLE 3-20
GREAT CACAPON REGION WATER SUPPLY FINANCIAL STATEMENT
SCENARIO 1 – 50% Grant, 38-Year Loan at 0.5%
27% of Projected ADD
Morgan County Water Resources Study

Phase	Total Capital Improvements (1)	FINANCING					
		Grant %	Grant Amount	Loan Amount	APR	Loan Term	Debt Service Payment
Phase 1	$2,821,000	50%	$1,410,500	$1,410,500	0.5%	38 yr	$40,905
REGION SUBTOTAL	$2,821,000		$1,410,500	$1,410,500			$40,905
New Debt Service =			$40,905				
Total Annual O&M in First Year of Operation (2) =			$36,450				
Total Annual Cost =			**$77,355**				
Average Daily Consumption in First Year of Operation (gpd) (3) =			24,300				
Typical User Cost ($/1,000 gal) =			**$8.72**				
Average Residential Monthly Bill (4,000 gal/month) =			**$34.88**				

Notes:

(1) All costs are in 2006 dollars.

(2) O&M costs ($1.50/gallon) were approximated from current Paw Paw and Bath Annual Reports. Volume of water assumed to be 30% of the regions projected ADD multiplied by 90% to remove unaccounted for water.

(3) Average Daily Consumption assumed to be 30% of the regions projected ADD multiplied by 90% to remove unaccounted for water.

TABLE 3-21
GREAT CACAPON REGION WATER SUPPLY FINANCIAL STATEMENT
SCENARIO 2 – 30-Year Loan at 7%
27% of Projected ADD
Morgan County Water Resources Study

Phase	Total Capital Improvements (1)	FINANCING					
		Grant %	Grant Amount	Loan Amount	APR	Loan Term	Debt Service Payment
Phase 1	$2,821,000	0%	$0	$2,821,000	7.0%	30 yr	$227,373
REGION SUBTOTAL	$2,821,000		$0	$2,821,000			$227,373
New Debt Service =			$227,373				
Total Annual O&M in First Year of Operation (2) =			$36,450				
Total Annual Cost =			**$263,823**				
Average Daily Consumption in First Year of Operation (gpd) (3) =			24,300				
Typical User Cost ($/1,000 gal) =			**$29.75**				
Average Residential Monthly Bill (4,000 gal/month) =			**$119.00**				

Notes:

(1) All costs are in 2006 dollars.

(2) O&M costs ($1.50/gallon) were approximated from current Paw Paw and Bath Annual Reports. Volume of water assumed to be 30% of the regions projected ADD multiplied by 90% to remove unaccounted for water.

(3) Average Daily Consumption assumed to be 30% of the regions projected ADD multiplied by 90% to remove unaccounted for water.

TABLE 3-22
GREAT CACAPON REGION WATER SUPPLY FINANCIAL STATEMENT
SCENARIO 1 – 50% Grant, 38-Year Loan at 0.5%
90% of Projected ADD
Morgan County Water Resources Study

Phase	Total Capital Improvements (1)	FINANCING					
		Grant %	Grant Amount	Loan Amount	APR	Loan Term	Debt Service Payment
Phase 1	$2,821,000	50%	$1,410,500	$1,410,500	0.5%	38 yr	$40,905
REGION SUBTOTAL	$2,821,000		$1,410,500	$1,410,500			$40,905
New Debt Service =			$40,905				
Total Annual O&M in First Year of Operation (2) =			$121,500				
Total Annual Cost =			**$162,405**				
Average Daily Consumption in First Year of Operation (gpd) (3) =			81,000				
Typical User Cost ($/1,000 gal) =			**$5.49**				
Average Residential Monthly Bill (4,000 gal/month) =			**$21.96**				

Notes:

(1) All costs are in 2006 dollars.

(2) O&M costs ($1.50/gallon) were approximated from current Paw Paw and Bath Annual Reports. Volume of water assumed to be 90% of the regions projected ADD.

(3) Average Daily Consumption assumed to be 90% of the regions projected ADD.

TABLE 3-23
GREAT CACAPON REGION WATER SUPPLY FINANCIAL STATEMENT
SCENARIO 2 – 30-Year Loan at 7%
90% of Projected ADD
Morgan County Water Resources Study

Phase	Total Capital Improvements (1)	FINANCING					
		Grant %	Grant Amount	Loan Amount	APR	Loan Term	Debt Service Payment
Phase 1	$2,821,000	0%	$0	$2,821,000	7.0%	30 yr	$227,373
REGION SUBTOTAL	$2,821,000		$0	$2,821,000			$227,373
New Debt Service =			$227,373				
Total Annual O&M in First Year of Operation (2) =			$121,500				
Total Annual Cost =			**$348,873**				
Average Daily Consumption in First Year of Operation (gpd) (3) =			81,000				
Typical User Cost ($/1,000 gal) =			**$11.80**				
Average Residential Monthly Bill (4,000 gal/month) =			**$47.20**				

Notes:

(1) All costs are in 2006 dollars.

(2) O&M costs ($1.50/gallon) were approximated from current Paw Paw and Bath Annual Reports. Volume of water assumed to be 90% of the regions projected ADD.

(3) Average Daily Consumption assumed to be 90% of the regions projected ADD.

4.0 IMPLEMENTATION PLAN

4.1 Potential Impediments and Conceptual Solutions

Due to the broad nature of this undertaking, identifying highly specific obstacles to developing water supply facilities outlined in the Morgan County Water Resources Study is difficult. However, there are some general impediments that should be addressed during the early stages of the County's water system development.

The overall project costs could be seen as an impediment to the creation and development of a large water provider. Funding opportunities via federal and state government programs are available in order to offset this potential impediment. The availability of grants and loans for the proposed water system may affect project implementation.

Another potential impediment could be associated with the development of sufficient groundwater wells to satisfy the projected water demands of the Priority Area. The suggested well field locations indicated in this report are based on a collection of existing data, but did not include test drilling or field verifications. One solution that applies to the South and North Regions is to maximize production at a well field site. If a well field is found to be more productive than originally expected, it should be used to its full capacity in the event that one of the other well fields in the region is less productive than anticipated. Water supply capacity should be confirmed early in the project implementation.

This Study was based on the assumption that the significant recent growth rate of Morgan County will continue over the course of the 25-year planning horizon. Therefore, the water supply facilities that were developed for the Water Resources Study are sized according to the predicted growth rate. If development and growth in Morgan County occurs at a slower rate than anticipated, the designing engineer will need to adjust the projected capacities and facility sizes.

The number of customers available to each phase of the new water supply system at the time it is constructed could be an impediment. Current residents of Morgan County that live in the Priority Area would not be required to become a customer of the new water system. Therefore, the water provider should provide the best service possible in order to attract customers. To guarantee additional customers to help offset the capital and O&M expenses associated with the new water system, Morgan County could impose zoning and land development regulations stipulating that new residential and commercial development located within a certain number of feet from a water distribution main must be served by the public water supply.

4.2 Leadership for Continued Development

This Study is intended to serve as a planning and management tool for the Morgan County Rural Water Committee (MCRWC), the Morgan County Commission (MCC), and regulatory and funding agencies. Periodic review and updating is necessary to account for changes in conditions and assumptions made at the time of Study preparation. An annual review is recommended. It is anticipated that periodic modifications will be required to accommodate change in local conditions, water system provider goals, and funding program qualification

criteria. The MCRWC and the MCC should work together to accomplish Plan updates. The MCRWC is envisioned as an advisory body to the County Commission on matters related to community water supply. The MCRWC should work closely with the developing water system(s) to ensure an understanding of individual issues. Overall recommendations, for the good of the water supply area, should be made to the County Commission. The County Commission should act on matters presented by the MCRWC and modify the plan appropriately, if the County Commission agrees to take on the responsibility of implementing the Plan. Such an approach will provide guidance to the West Virginia Infrastructure and Jobs Development Council (WVIJDC) and other funding agencies regarding water service issues in Morgan County and dramatically increase the possibility for successful project funding.

The MCC and the MCRWC must be the driving force behind this project until an owning agency is found.

4.3 Owning Agency Issues

It is assumed that the existing Warm Springs Public Service District (PSD) will own and operate the proposed water supply systems outlined in this report. After this decision is made, legal council should be consulted to determine any actions necessary for the existing PSD to initiate water system service. Primary operating impacts to the existing PSD include staffing, project funding, construction, operation and maintenance, and administration.

Staffing levels would need to be addressed by the PSD prior to constructing new system components. Although each of the proposed WTP facilities is relatively small, there would still be a need for licensed operators to be available to maintain proper functioning of the facilities. Also, a maintenance crew will be required to address any problems that may occur in the distribution systems, or the PSD could obtain these services through a contract with a private company.

The timeline for implementing the components in this Plan is highly variable. The projected Morgan County growth rates in Volume 1 assumed that moderately high growth trends would continue over the next 25 years. If the actual growth rates are lower than predicted, the PSD will have more time between constructing major components of the Plan. However, if Morgan County grows at a rate faster than expected, the PSD could be forced to construct the components over a shorter timeframe, thus incurring debt more rapidly.

Funding for the study components is a major issue that needs to be reviewed on a regular basis. A good working relationship between the MCRWC, the County Commission, the PSD, and the WVIJDC will be instrumental in facilitating the project funding. Availability of funding, along with public interest, will likely dictate the direction of water service development in the Priority Area.

Construction of the overall water supply systems recommended in this Plan will take a considerable amount of time. One initial issue associated with the Plan is land acquisition. The proposed well field locations will need to be acquired by the PSD prior to any component being constructed. The next issue to be addressed associated with construction is the interruption of

normal traffic flow conditions if the pipelines are to be installed within the various roadway right-of-ways. Although there is no simple solution to minimize pipeline construction, negative impacts on traffic can be minimized by nighttime construction in non-residential areas.

Similar to staffing, as the PSD continues to grow via the recommended components, the operation and maintenance requirements increase dramatically. Well-maintained equipment, as well as an adequate workforce, will result in efficient operations. Proper operations and maintenance will reduce annual cost over an extended period.

4.4 Recommended Implementation Plan

Based on the preliminary results of the Morgan County Water Resource Study, the following is a list of recommended action items that will be critical for the MCRWC, MCC, and the owning agency to accomplish in order for the project to be implemented. The action items listed are general in nature and were listed in an approximately chronological order; however, it is suggested that some of these items will occur coincidentally to other items in order to minimize the required timeframe.

1. Retain council to assist with legal issues associated with the owning agency (Warm Springs PSD) initiating water service.
2. Hire a consulting engineer to design the required project, and develop a more detailed project cost estimate and user fees.
3. Select the desired phase of the project to be initially constructed.
4. Determine the number of customers that will be initially served by the selected phase.
5. Begin discussions with the WVIJDC to secure project funding input, and make formal application when appropriate.
6. Finalize project funding and customer rates.
7. Obtain approval from the West Virginia Public Service Commission for the proposed rates.
8. Submit relevant permit applications to the applicable West Virginia regulatory agencies.
9. Start project construction.
10. Evaluate existing staffing capacity of the owning agency and determine appropriate additions based on licensing, and operation and maintenance requirements.
11. After staffing decisions are made, select and acquire operation and maintenance equipment.
12. Monitor and update the Water Resources Study and Plan for future expansions.