City of Cheyenne
Board of Public Utilities

Volume 1 – Executive Summary

2013 Cheyenne Water and Wastewater Master Plans

Final

November 27, 2013

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Board of Public Utilities

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Abbreviations and Acronyms

ac-ft/yr	Acre-feet per year
BOPU	Board of Public Utilities
gal	Gallon
gpm	Gallons per Minute
MGD	Million Gallons per Day
O&M	Operations and Maintenance

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1.1 Introduction

The City of Cheyenne's (City) Board of Public Utilities (BOPU) retained HDR Engineering, Inc. (HDR) to develop the 2013 Cheyenne Water and Wastewater Master Plans. The plans are divided into multiple volumes, each of which addresses a specific topic, and the volumes are assembled into three books.

Book 1 contains	Volume 1 – Executive Summary
	Volume 2 – Future Capacity Requirements
	Volume 3 – Water Supply and Delivery
Book 2 contains	Volume 4 – Potable Water Treatment
	Volume 5 – Potable Water Storage and Distribution
	Volume 6 – Non-Potable Water Treatment and Distribution
Book 3 contains	Volume 7 – Wastewater Collection
	Volume 8 – Wastewater Treatment
	Volume 9 – Comprehensive Water and Wastewater Rate Study
	Volume 10 – Enterprise Technology Master Plan

Overall, the volumes present a wide range of findings and recommendations for the water and wastewater utilities. The recommended projects include evaluations to meet future regulatory and supply requirements, infrastructure improvements to increase capacity and meet demands arising from growth, and infrastructure improvements to meet operational and efficiency needs. Details of the evaluations and analyses are found in the individual volumes. Summaries of the major findings and recommendations from each volume are presented in this Executive Summary.

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1.2 Study Area Characteristics

The Study Area boundary was developed to establish the limits of the area considered in the Master Plans for the 50-year planning period. The Study Area includes the water (potable water, raw water irrigation, and recycled water) and wastewater service areas. It also includes the 201 Study Area Boundary, plus the Laramie County Archer Complex area to the east and an area extended to the south to the Wyoming and Colorado border to be consistent with the PlanCheyenne planning area. The PlanCheyenne planning area was used as the basis for population projections. Figure 2.1 in Volume 2 shows the Study Area boundary which encompasses approximately 136,000 acres of land.

Existing and future utilities within the Study Area boundaries are considered in establishing the future capacity requirements, completing the facility evaluations, and developing recommendations for improving the water and wastewater systems. Elements of the raw water supply system and the water treatment facilities are located outside of the Study Area boundary. The raw water irrigation distribution, potable water distribution, wastewater collection, and recycled water distribution systems as well as the water reclamation facilities are all within the Study Area boundary.

To evaluate future capacity requirements for 10-, 20-, and 50-year planning horizons, population and land use projections over a 50-year planning period were used to establish the magnitude and areas of future water demands and wastewater flows within the BOPU study area.

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1.3 Future Capacity Requirements

Future system capacity requirements for the Board of Public Utilities were established by reviewing the physical characteristics of the Study Area, population densities and potential growth, and existing land use and future zoning that will dictate utility service requirements in the future. The number of BOPU customers is expected to rise from the current estimated population of 75,000 to 122,000 within 50 years. This trend is reflected in the rise of projected potable water demands. As the demand for potable water increases, BOPU must prepare for the parallel demand for raw source water. A summary of these projections is shown in Table 1-1.

BOPU utilizes raw water supplied through a combination of surface water and groundwater sources for both potable water treatment and raw water irrigation. While the raw water irrigation demand is a relatively small component of the source water demand, one of the recommendations in the Master Plan is for BOPU to move toward replacement of all raw water irrigation with Class A recycled water, thus making the irrigation supply available for treatment as potable water (see Volume 6).

Even with the replacement of raw water irrigation supplies with reclaimed water, additional source water supplies will be needed over the planning period. The supply options are discussed at length in Volume 3. Recommendations include investigating options for storing additional surface water and for the development of additional groundwater resources.

Table 1-1
Summary of Population, Potable Water and Source Water Projections

Year	Planning Period	Estimated BOPU Customers Low / High	Potable Water Maximum Day Demand (MGD)	Potable Water Peak Hour Demand (MGD)	Source Water Projected Total Demand (ac-ft/yr)
2013	Existing	74,400 / 75,000	35.8	65.7	18,378
2023	Near-Term	81,700 / 84,400	40.9	74.5	21,056
2033	Mid-Term	90,100 / 95,100	47.7	86.1	24,753
2043	Long-Term	97,500 / 104,900	54.0	96.9	
2053		104,600 / 114,000	60.1	107.2	
2063		110,300 / 122,000	65.3	115.8	34,459

Projections for BOPU wastewater flows are presented for two wastewater collection regions which deliver flows to either the Crow Creek Water Reclamation Facility (CCWRF) or to the Dry Creek Water Reclamation Facility (DCWRF). The maximum month treatment capacities of CCWRF and DCWRF are currently rated at 6.5 mgd and 10.5 mgd, respectively. Over the 50-yr planning horizon, the flows to both plants are projected to double. Table 1-2 summarizes the wastewater and recycled water projections for the planning periods. Wastewater plant improvements are required by the regulations to be in design when the plant capacity reaches 80 percent of the design capacity. Wastewater treatment plant projects are detailed in Volume 8. The wastewater collection system must be sized to handle the peak hour flow. Recommended improvements to the collection system are based on both the projections for growth and for flow relief in areas of the system that are at high risk for sanitary sewer overflows. Volume 7 provides details of the collection system evaluation and recommended projects.

Table 1-2
Summary of Wastewater Influent Flow and Recycled Water Supply and Demand Projections

Year	Planning Period	CCWRF Maximum Month Influent Flow (mgd)	DCWRF Maximum Month Influent Flow (mgd)	Class A Recycled Water Maximum Day Demand (mgd)	Class B Reuse Water Maximum Day Demand (mgd)	CCWRF Recycled Water Maximum Day Supply (mgd)	DCWRF Recycled Water Maximum Day Supply (mgd)
2013	Existing	6.5	9.1	2.67	0.27	5.0	8.8
2023	Near-Term	8.0	10.7	3.17	1.07	6.2	9.5
2033	Mid-Term	9.6	12.8	5.22	1.11	7.4	11.5
2043	Long-Term	10.9	14.7	6.39	3.76	7.8	12.7
2053		12.0	16.8	7.69	3.82	7.8	16.1
2063		12.0	19.4	11.24	3.89	7.8	18.4

Wastewater effluent is utilized to produce two types of reclaimed water supply. At the CCWRF, recycled water treatment facilities produce what the State refers to as Class A reuse water and Cheyenne calls recycled water which is used for irrigation. The total produced volume of recycled water is currently limited by the availability of wastewater effluent from CCWRF to be treated. Recommendations for returning treated effluent from DCWRF to CCWRF for treatment as recycled water arise from the identified demand for recycled water that cannot be met without the effluent supplied to the treatment facility.

Wastewater effluent that has not been treated through the recycled water treatment facility at CCWRF is referred to as Class B reuse water. This water is of lower quality than Class A water and has limited uses. All the non-potable sources (raw water, recycled water, and reuse water) are addressed in Volume 6.

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1.4 Water Supply and Delivery

Adequate raw water supplies are critical to the future operation of BOPU. The raw water collection system for BOPU is extensive, involving several surface storage reservoirs, pipelines from multiple watersheds providing surface water, well fields supplying groundwater, and arrangements for water exchanges between watersheds.

The reliability of the raw water collection system depends on the variability of runoff from the surface water system, the sustainability of the groundwater well fields, and required non-potable and potable demands. Runoff in the collection area during recent droughts ranged from 13% to 25% below the long-term average. Static water levels in some well fields have also been declining. The variation in surface water supply and trends in groundwater yields affect the raw water supply in meeting demands. As the demands are expected to increase over time (Volume 2), shortages in raw water supply are likely to occur in the future. The magnitude of these shortages and potential infrastructure improvements that will provide increased raw water system resiliency are presented in Volume 3.

The principal water source for Cheyenne has historically been surface water, which has provided about 70% of total demand on average. Groundwater has been used as a supplemental source, for water quality blending, and as an important way to meet peak summer demands. As the water supply demands increase, groundwater will become an even more important source of supply.

Future well field options are identified in the Master Plan and evaluated with respect to water availability and site-specific characteristics. Further exploration of the Belvoir Ranch and Polo Ranch areas is recommended for developing additional groundwater sources for BOPU. Implementation of aquifer storage and recovery (ASR) may be a viable way to enhance performance of the Ogallala Aquifer and the corresponding City-owned wells, but only in some areas where the conditions are right. Use of ASR requires additional study and performance of a pilot test to determine whether the process is beneficial for full-scale use. Provision of an interconnecting pipeline between the existing Federal Well Field and the King II tank is recommended to eliminate the need for transmission through the old Round Top Tank.

Options for increasing the collection of surface water were evaluated. Dredging of the existing Crystal Lake Reservoir is not recommended due to the high cost and minimal increase in storage volume that could result. Raising the dam heights at Crystal Lake and Granite Springs Reservoirs could produce as much as 8,700 acre-feet of additional storage capacity and may be possible but will require additional evaluation of the dams to determine whether they are safe and could meet regulatory requirements for modification. An alternative that should be investigated by BOPU is the potential for a new reservoir site.

Collection of water from the North Crow Creek watershed is recommended to make use of this existing City resource. Options were identified and evaluated for bringing this water into the Sherard Water Treatment Plant for treatment. A preferred piping alignment is recommended.

Similarly, pipeline alignments for transmitting Stage I and Stage II water to the Sherard WTP were evaluated and the preferred option identified. Should either Granite Springs Reservoir or Crystal Lake Reservoir be unusable by infrastructure failure or contamination, or be taken out of service for maintenance, the impact on BOPU's ability to deliver adequate water to its customers during high demand times would be significant. The bypass pipeline eliminates this risk.

A summary of the capital improvement plan for the near term is presented in Table 1-3. The studies related to reservoir expansion include raising the dams and a preliminary search for a new reservoir site. Recommended pipelines include

- Federal and Bell Well Field pipeline and booster pump station.
- Crystal Lake and Granite Springs Reservoirs bypass pipeline, and
- North Crow Creek raw water pipeline.

In addition to these near-term recommendations, a $45,000,000 fund should be planned for the mid-term period to develop the Belvoir well field.

Table 1-3
Summary of Capital Improvement Plan for Raw Water Sources

Infrastructure Improvements	Near Term (2014-2023)
Well Field Expansion Planning	$80,300
Aquifer Storage and Recovery Pilot Test	$110,900
Studies Related to Reservoir Storage Expansion	$359,000
Negotiation for Additional Water Rights	$21,400
Raw Water Pipelines and Booster Pump Station	$8,772,200
Total Estimated Cost	$9,343,800

1.5 Water Treatment

The Sherard Water Treatment Plant (WTP) produces high quality drinking water with capacity that is adequate to meet the projected mid-term (2033) demand of 47.7 MGD, assuming the filters can be re-rated for a higher flow rate. Included in the recommended plant treatment testing projects is the filter evaluation at higher flow rates and the associated communications with the State Department of Environmental Quality.

From a regulatory perspective, the treatment plant is well positioned to meet potential new regulatory requirements, along with the existing requirements, for the next ten years. The regulatory horizon beyond that timeframe is difficult to predict, so continued review of future regulations is recommended.

Based on the frequency and magnitude of recent fires in the Rocky Mountain region, BOPU is advised to develop a Wildfire Emergency Response Plan so that if a major fire impacts the BOPU watershed, the utility will be prepared for follow-up actions, particularly managing water supplies and minimizing impacts to potable water that can result from fire.

Taste and odor issues are an occasional concern for BOPU, so the recommendations for the Sherard WTP include installation of a powdered activated carbon system. This treatment process addition will provide a robust method for reducing taste and odor compounds in the finished water. Table 1-4 summarizes the capital improvement plan for water treatment.

Table 1-4
Summary of Capital Improvement Plan for Water Treatment

Infrastructure Improvements	Near Term (2014-2023)
Wildfire Emergency Response Plan	$30,000
Powdered Activated Carbon (PAC) Feed System	$589,800
Plant Treatment Testing and Evaluations	$49,100
Distribution System Water Quality Study	$56,400
Total Estimated Cost	$725,300

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1.6 Potable Water Storage and Distribution

The existing potable water storage and distribution facilities for the BOPU are described in Volume 5 along with recommendations for improvements due to condition and growth over the planning periods. Water distribution system modeling provides insight into how potable water is delivered and where there may be areas that have low delivery pressure and/or flow rate problems or pipelines that have excessive headloss. Distribution system performance requirements include providing adequate storage, flow rates, pressure and storage volume for peak hour demands and fire-flow events. The distribution system must also be configured to provide high quality water at all times.

This Volume presents an evaluation of the existing and future potable water distribution system and recommends improvements to eliminate current deficiencies and meet future growth demands. Recommended improvements include:

- Infrastructure required to support system growth and rehabilitation.
- Pressure management to support system integrity and reduce main breaks.
- Monitoring improvements to support system operations and progress towards system optimization.
- Considerations to reduce water age to support system water quality.
- Distribution system assessment method implementation to support system rehabilitation.
- Preventative maintenance practices to support system sustainability and increase remaining asset life.

Infrastructure improvements including transmission mains, distribution mains, storage reservoirs, and pump stations are recommended for each of the planning periods to support system growth and rehabilitation. In addition, recommendations are made for on-going preventative maintenance and monitoring of system operating parameters. A summary of the capital improvements recommendations is shown in Table 1-5.

Table 1-5
Summary of Capital Improvement Plan for the Potable Water Distribution System

Infrastructure Improvements	Near Term (2014-2023)	Mid-Term (2024-2033)
Transmission Mains	$30,969,200	$50,041,000
Distribution Mains	$25,728,200	$64,877,600
Storage	$16,000,000	$7,500,000
Pump Stations	$1,000,000	$8,000,000
Special Projects	$4,597,400	$6,395,000
Pressure Management	$4,000,000	$5,000,000
Distribution System Assessment and Rehabilitation	$25,200,100	$31,977,400
Preventative Maintenance (Unidirectional Flushing Study)	$75,000	$0
Total Estimated Cost	$107,569,900	$173,791,000

1.7 Non-Potable Water Treatment and Distribution

Non-potable water resources in Cheyenne include raw water, Class A treated wastewater and Class B treated wastewater. Volume 6 describes the existing infrastructure associated with these three water sources and provides recommendations for improvements to the systems that provide these sources. Raw water and Class A water are utilized for irrigation so the recommendations for improvements take into account the increased demand from potential irrigation customers over the planning periods.

In the long term the BOPU will need to look for new raw water sources to meet potable demands. If the existing raw water irrigation system is replaced by an extension of the Class A water system, raw water currently used for irrigation would be made available for potable use instead. With this overall direction in mind, future recommended improvements were limited to the Class A and Class B water systems, which include:

- Improvements to the Class B construction water dispensing system
- Extensions to the existing Class A infrastructure to support system growth.
- Development of a Class A system model to provide insight into controlled system growth.
- Development of a conservation plan to reduce the need for additional infrastructure when adding new irrigation customers to the Class A system.
- Design and construction of a pipeline and pump station to pump treated wastewater from Dry Creek Water Reclamation Facility to Crow Creek Water Reclamation Facility (referred to as the “pump back”) and additional storage to provide additional Class B water to the Crow Creek Recycled Water Facility for treatment to Class A standards.

Infrastructure improvements including transmission mains, customer connections, and pump stations and storage are recommended for each of the planning periods to support Class A system growth. In addition, recommendations are made for system modeling and conservation plans to provide tools that will aid the BOPU in controlling the growth of the Class A system. A summary of the capital improvements recommendations is shown in Table 1-6.

Table 1-6
Summary of Capital Improvement Plan for Non-Potable Water Sources

Infrastructure Improvements	Near Term (2014-2023)	Mid-Term (2024-2033)
Planning Projects	$98,800	$41,900
Class A Pipelines	$6,610,300	$5,574,000
Customer Connections	$0	$92,100
Pump Station and Storage Improvements	$942,300	$13,470,364
Total Estimated Cost	$7,651,400	$19,178,364

1.8 Wastewater Collection

Wastewater collection system modeling provides insight into how wastewater is collected throughout the system and where there may be areas that have capacity issues including surcharged pipes or sanitary sewer overflows (SSOs). Volume 8 presents an evaluation of the existing collection system and recommends improvements to eliminate current capacity deficiencies and meet future flow needs. Although the actual rate, location and timing of growth are unknown, a long-range capital improvement framework allows BOPU to evaluate and prioritize improvements as the growth occurs. Collection system performance requires adequate capacity to convey and pump, where necessary, maximum day and peak hour flows.

Areas of the existing system where peak flows exceeded 80 percent of pipe capacity or where they were predicted, SSO risks were evaluated to determine the extent and severity of overloading. Localized problems due to a single segment of flat slope or undersized line do not usually require rehabilitation. In general, relief lines are not recommended until a line is modeled to be 120 percent of capacity, unless surcharging problems have been reported in the area.

Relief sewer lines and new extension lines should be sized more conservatively to provide some reserve capacity to accommodate changes in land-use patterns and tributary areas that cannot be forecasted until the improvements are made.

Infrastructure improvements including mains, interceptors, lift stations and force mains are recommended for each of the planning periods to support system growth and rehabilitation. The improvement recommendations from the collection system and lift station analyses are summarized in Table 1-7 and include:

- Infrastructure improvements to support system growth and rehabilitation.
- Flow monitoring improvements to support system operations and future planning and design efforts.
- Collection system assessment method implementation to support system rehabilitation.
- Preventative maintenance practices to support system sustainability and increase remaining asset life.

Table 1-7
Summary of Capital Improvement Plan for Wastewater Collection Facilities

Infrastructure Improvements	Near-Term (2014-2023)	Mid-Term (2024-2033)
Collection Interceptors[(1)]	$30,122,000	$31,951,000
Collection Mains	$12,886,700	$27,606,600
Lift Stations and Force Mains	$0	$7,000,000
Special Projects	$3,410,200	$4,795,600
Collection System Assessment and Rehabilitation	$21,589,100	$26,377,200
Preventative Maintenance	$450,000	$650,000
Total Estimated Cost	$68,458,000	$98,380,400

[(1)] One of the near-term interceptor projects has both gravity and pumped alternatives and is grouped here with the collection interceptors. See Volume 7 for additional details.

1.9 Wastewater Treatment

The two existing wastewater reclamation facilities are evaluated with respect to how they will meet future demands and the results are presented in Volume 8. The analysis provides insight into both the hydraulic and biological processes at both the Crow Creek Wastewater Reclamation Facility (CCWRF) and the Dry Creek Wastewater Reclamation Facility (DCWRF). Hydraulic and biological performance is compared to the increase in peak day and hour demands, WDEQ performance criteria, and process efficiency.

Overall the Volume recommends improvements in three major categories: planning, capacity improvements, and operational and efficiency improvements. The near-term capital improvement projects are summarized in Table 1-8, separated by facility. There are no recommendations for mid-term projects from the analysis, so they are not included in the summary table.

Table 1-8
Summary of Capital Improvement Plans for the Wastewater Reclamation Facilities

Infrastructure Improvements	Near Term (2014-2023)	Near Term (2014-2023)
	DCWRF	CCWRF
Planning Projects	$221,800	$110,900
Capacity Improvements	$6,018,000	$0
Operational and Efficiency Improvements	$1,629,000	$3,199,500
Total Estimated Cost	$7,868,800	$3,310,400

The volume identifies the need to review several key issues in depth before determining if improvements are required in the near or mid-term. These plans include a selenium study to determine what type of treatment improvements may be required to meet the new WDEQ limits on selenium.

Capacity analysis in the volume determined that CCWRF should meet the near-term capacity without improvements. However, petitioning WDEQ to have the capacity of CCWRF rerated is recommended, in conjunction with the request for a variance pertaining to the peak flow requirements in the secondary clarifier operation at the DCWRF. The capacity related recommendations for the DCWRF also include a digester capacity expansion project.

The volume also includes recommendations related to process efficiency improvements at both facilities. These projects include:

- High speed blower retrofit projects at DCWRF and CCWRF
- Influent flow metering improvements at DCWRF

- Baffling in the secondary clarifiers at CCWRF
- Flow equalization basin improvements
- Piping and valve changes to improve phosphorous removal at DCWRF
- Installation of secondary clarifier launder covers at DCWRF
- Installation of electronically actuated valves on the primary sludge discharge at DCWRF
- Installation of standby power at DCWRF
- Improvements to the septage receiving facilities at CCWRF
- Sludge drying bed rehabilitation at CCWRF

All the projects identified at the wastewater facilities are scheduled for completion within the near-term horizon and there are no projected mid-term projects.

1.10 Comprehensive Water and Wastewater Rate Study

A comprehensive rate study typically utilizes three interrelated analyses to address the adequacy and equity of a utility's rates. These three analyses are a revenue requirement analysis, a cost of service analysis, and a rate design analysis.

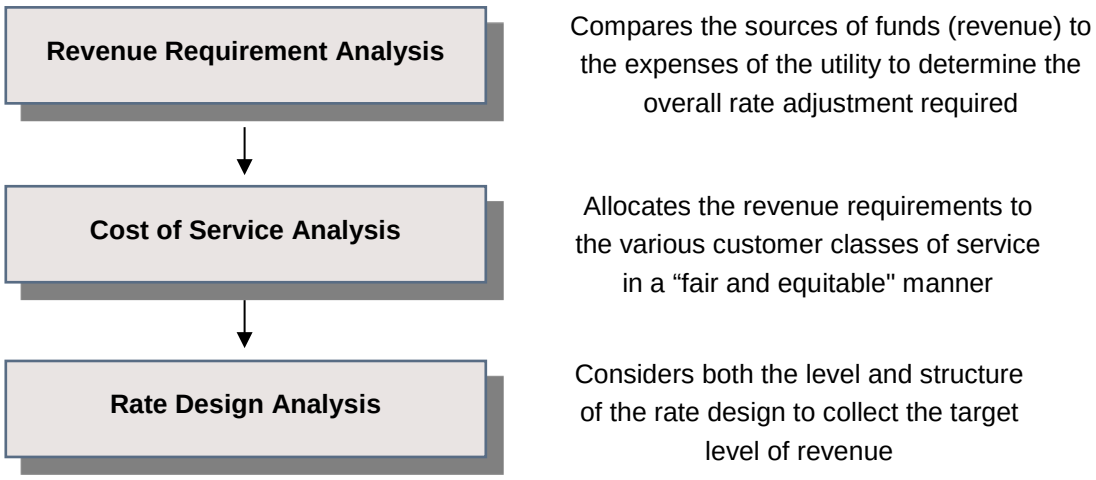

Figure 1-1
Overview of the Comprehensive Rate Study Analyses

The BOPU's water and wastewater utilities were each evaluated on a "stand-alone" basis. That is, no subsidies between the utilities or other City funds should occur. By viewing each utility on a stand-alone basis, the need to adequately fund both O&M and capital infrastructure must be balanced against the rate impacts to the utility's customers.

Based on the technical analysis undertaken as part of this study, the following findings, conclusions, and recommendations were noted for each utility.

- A revenue requirement analysis was developed for each utility for the calendar years of 2014 – 2023.
- The estimated overall average growth rate over the ten year period of 2014 – 2023 was approximately 1.0% per year.
- Capital projects for the 2014 – 2023 time periods were based on current capital improvement needs shown in the Master Plans and BOPU staff input. Detailed discussions were held with BOPU's management on the timing and possible funding sources for these capital projects.
- Rates for each utility were developed for the three-year time period of 2014, 2015, and 2016.

- A 2014 rate adjustment of 3.4%, effective January 1, 2014, was already approved prior to this study for both the water and wastewater utility. The wastewater utility has an additional $0.05 per 1,000 gallons increase approved to begin in January 2014 as well.
- To transition into the rate revenue needed to fully support operations, capital improvements from the Master Plans, and to maintain target reserve levels, the rate adjustments needed include 4.0% proposed rate adjustments for the water utility in 2015 and a 4.5% rate adjustment in 2016. The wastewater utility requires 5.5% projected rate adjustments in 2015 and 6.3% in 2016.
- Additional rate adjustments are needed each year throughout the 10-year time period to fully fund the capital improvements identified within the Master Plans for the near-term.
- The BOPU should continue to review, each year, the need for rate adjustments due to the variability in consumption from weather variation, actual growth versus projected growth, and changes in customer usage patterns.

The “projected rate adjustments” are only one of many possible solutions for the utility to fully fund the operational and maintenance expenses, capital improvements identified within the Master Plans, and targeted reserve levels. A gradual transition approach to funding the utility’s needs was developed. There are numerous options for adjusting these projected rate adjustments, including deferring capital projects to reduce financing and funding pressures. If grant funding becomes available, long-term debt costs could be reduced, or zero interest loans for any of the projects will also help lower rate adjustments that currently appear to be needed.

A cost of service analysis was completed for both the water and wastewater utilities which resulted in a recommendation not to alter the rate basis for customer classes for either utility at this time.

System development fees for both water and wastewater are under development and will be summarized here when the work is complete.

1.11 Enterprise Technology Master Plan

The existing use of information management systems by the BOPU is described in Volume 10, along with recommendations for improvements to these systems over the next ten years. Technology expectations and needs will continue to grow as the utility moves forward. Investments in technology improve both the efficiency and effectiveness of service delivery for BOPU customers. Volume 10 presents a long-range strategy to transform BOPU into a knowledge sharing organization whose information technologies are seamlessly integrated and to maintain the most appropriate level of information technology utilization within the organization.

The rapid changes in technology and costs of both purchasing and maintaining information technology are significant issues for BOPU due to the number of stand-alone systems that need to be brought into enterprise-wide applications. The organization will need to spend higher levels of capital on information technology than has historically been budgeted. A business case evaluation process should be adopted for all projects to ensure BOPU is making the most effective use of capital.

Figure 1-2 illustrates the relationships between the parts of the proposed integrated system. Combined, these recommended technology improvements provide BOPU with the ability to:

- Improve utility data collection, management, and analysis
- Maximize efficiency in business processes
- Maintain asset information and performance tracking
- Enhance interdepartmental and external communication
- Develop centralized document management and knowledge sharing
- Upgrade software, hardware, and data storage to support enterprise systems

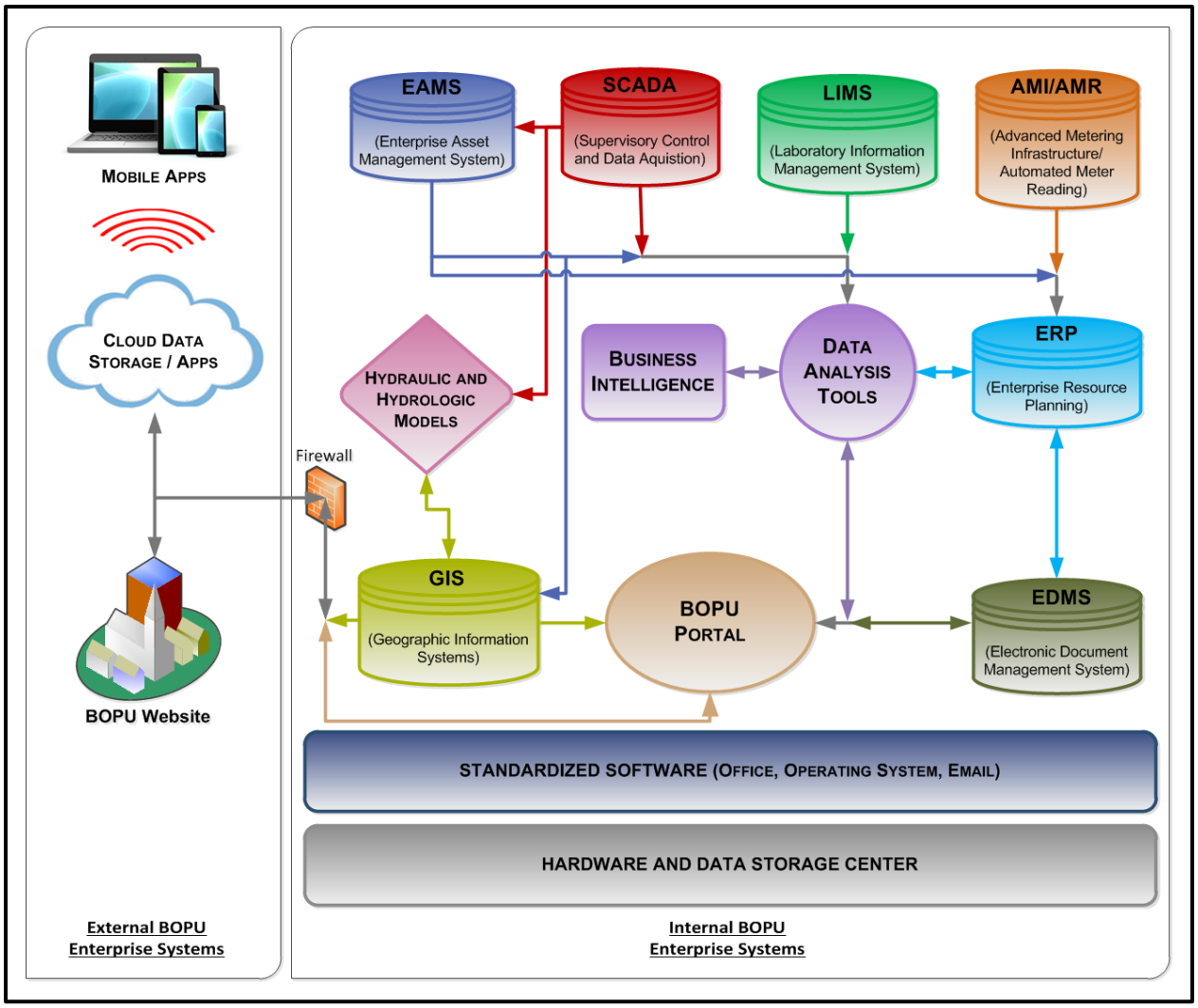

Figure 1-2
Concept Diagram of Integrated System

The recommendations in this Enterprise Technology Master Plan are designed as a progressive enhancement strategy and listed as stages of development with one tool building upon another. The data center storage and hardware infrastructure will grow in support and anticipation of each progressive layer of technology. Each of the projects is explained in some detail in Volume 10 and a summary of estimated costs is presented in Table 1-9.

Table 1-9
Summary of Capital Improvement Plan for Enterprise Technology

Infrastructure Improvements	Near Term (2014-2023)
Enterprise Asset Management System	$534,900
Enterprise Resource Planning System	$1,328,700
SCADA and System Monitoring Expansion	$3,252,300
Data Center Storage and Server Upgrades	$582,900
Electronic Document Management System	$678,700
Cloud-Based Data and Knowledge Sharing Platforms	$79,100
BOPU Portal	$470,700
Advanced Metering Infrastructure/Automated Meter Reading Assessment	$79,900
BOPU Website	$30,000
Laboratory Information Management System	$200,500
Microsoft Package Upgrades	$155,500
Total Estimated Cost	$7,393,200

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