repair, replace and dispose assets. The value of the asset portfolio may seem a bit academic. What is germane is understanding most cost efficient means of keeping those assets functioning at the level of service your customers demand and comparing replacement costs (currently and in the future) with ongoing maintenance, repair and service deterioration costs. The calculus is a function of the remaining useful life of your assets, the cost of replacement, and your ability to preserve the assets through optimal repair and rehabilitation planning.

By establishing replacement values for assets, the utility can more effectively inform future budgeting. By understanding and establishing the replacement value, it is possible to assess and evaluate the cost effectiveness of repair and replacement strategies. There are a variety of approaches to obtaining these estimates, and they can be done relatively cost-effectively.

Expand Capital and Operating Budgets

The valuation step can readily be projected to a total-dollars-per-year requirement to either replace or perform major rehabilitation for all the assets that have been inventoried. This can then be built into future budget and rate requirements.

This projection may show a very uneven expenditure pattern, with some years showing a large requirement and many years showing lesser requirements. These numbers will be very dependent upon when large assets require repair and rehabilitation. (However, the pattern from a rate perspective will be dampened since many capital expenditures will be financed with debt and the costs spread over many years.) Since asset management takes a long-term approach it can smooth out these capital investment peaks and valleys creating a more rational, achievable financial plan. A planning horizon of at least twenty years is necessary to adequately plan for the large asset replacements. A fully developed long term budget may include a repair and replacement reserve in an adequate amount each year which will allow the organization to accumulate excess funds in some years in order to expend additional funds in other years.

Maintain, Repair, Renew and Replace Assets

Implementing an asset management program supports the long-term maintenance, repair, and replacement of the assets needed to achieve sustainability. Two steps to achieving sustainability are dedicating sufficient funding to support system needs and making smart decisions about where to allocate this funding first. An asset management program coupled with a sound decision support approach will allow utilities to meet each of these objectives.

In many cases, funding levels and priorities for the maintenance, repair, and replacement of assets have been based on rules of thumb, operator knowledge, and seat-of-the-pants understanding of system needs. While these are often reasonable approaches to making these decisions in the short term, these approaches typically fail in the long term for a number of potential reasons:

- Proposed budgets based on rules of thumb can not withstand high-level scrutiny during budget-cutting times;
- Staff turnover results in a lost knowledge base to support these decisions; and
- Undocumented assumptions cannot be tested and confirmed to improve the decision-making process in the future.

To reverse this trend, it is important to define the functional objectives that must be achieved by a maintenance, repair, and replacement program. Once these functional objectives are defined, they may be used with assembled asset information to set priorities, allocate funding, and document the success in meeting identified objectives. For example, a typical infrastructure maintenance, repair, and replacement program would include three primary functional objectives:

Capacity restoration – this objective is aimed at keeping assets functioning at their full, original capacity. Examples are removing sediment or debris from a pipeline system; reducing infiltration and inflow in a wastewater collection system; and/or repairing system defects that would limit system flow capacity.

Damage repair – this objective is aimed at repairing structural damage and failures in the system that are a result of wear, corrosion, age, and/or construction-related damage. This function reduces the risk of system failure that could cause interruptions in service, negative impacts to the community, and increase costs as compared to scheduled maintenance and repairs.

Maintenance reduction – this objective is aimed at repairing portions of the system that are subject to known, repeated maintenance problems that increase maintenance costs and keep crews from conducting more productive preventive maintenance. Examples in a wastewater collection system are the repair of conditions such as root intrusion, offset joints, pipe sags, improper service connections, and other system deficiencies that typically lead to recurring problems for system operators.

By defining these functional objectives, utility managers can develop specific criteria to set priorities for where in the system each function is needed. In addition, financial analyses may be conducted for each of these criteria to demonstrate the returns that will be achieved on infrastructure investments. This provides a mechanism to defend proposed funding levels and present the business case for increasing maintenance, repair, and replacement investments.

This analysis approach, coupled with condition assessment information needed to support these objectives, improves and documents the basis for setting budgets and priorities so they are more clearly understood by decision makers. Lastly and possibly most importantly, the resulting benefits from the investment in the maintenance, repair, and replacement program must be quantified and documented.

This last element documents the need for funding on an annual, recurring basis so that the long-term success of the program is not undermined.

7.2.2.2 Asset Management Information Systems

Asset management systems deal with complex facilities, with thousands of assets and literally hundreds of attributes for each asset. Therefore information management systems are a critical element in order to turn the avalanche of data into meaningful management information that can be successfully used. Consistent application of good strategic decisions will result in user rates that are the lowest they can be for an expected level of customer service.

An Asset Management System includes all information technology systems needed to track the information the utility managers want for their planning activities. Recent advances in computer hardware and software technology provide cost-effective tools for properly tracking asset information. Not only are these systems used for strategic planning but also for daily tracking of work orders and normal maintenance activities. However, significant thought and intelligence must be applied to appropriately support management decisions.

An Asset Management System needs to track the following basic categories of information.

Asset Inventory – A complete inventory of assets including fields designed to categorize assets in useful groupings (service area, water utility, facility, etc.). An inventory of parts and tools is also important and should be tracked but these are normally tracked in a different way than assets.

Asset Condition – The installed date, estimated useful life, current condition assessment, and numerous other attributes that properly define the condition of an asset must be tracked. Also, information related to condition assessment frequencies should be tracked by asset groupings.

Asset Costs – The valuation component of an asset management system assigns and maintains financial value to inventoried assets consistent with generally accepted accounting principals. These costing techniques may be different for different groupings of assets, but the intent is to maintain estimates of current replacement value.

Work Management – As the heart of the asset management system, this component initiates, tracks and records data about all the maintenance work being performed, posts and tracks preventive and predictive maintenance schedules, and generates crew assignments and links important work-related information to the work order system.

Analysis and Evaluation Tools – In this component, evaluation techniques are used to prioritize work effort, analyze cost-effectiveness, optimize the performance of the asset, and analyze the risk-versus-cost tradeoffs.

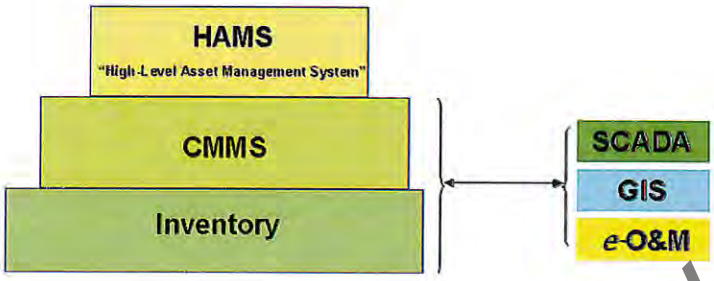

Figure 7-3
Example of Basic Functional Elements of Asset Management Information Systems

Asset Management Information Systems should provide various levels of summary information related to assets and groups of assets to allow managers to perform analysis for planning purposes. **Figure 7-3** shows the structure of one such system. The highest level of this reporting contributes to significantly improved repair and replacement plans and/or Capital Improvement Plans (CIP). Maintaining the actual asset data and managing all of the work order and maintenance data is performed in a computer maintenance management system (CMMS). There are a number of software packages currently available that perform this function. The CMMS would obtain data from several sources and would provide the data for the higher level reporting requirements. Most CMMS packages have "canned" reports, but higher level asset management applications, such as the CAMP tool (**Figure 7-4**), provide the ability to create what if scenarios as well as targeted reports to achieve significantly improved capital planning.

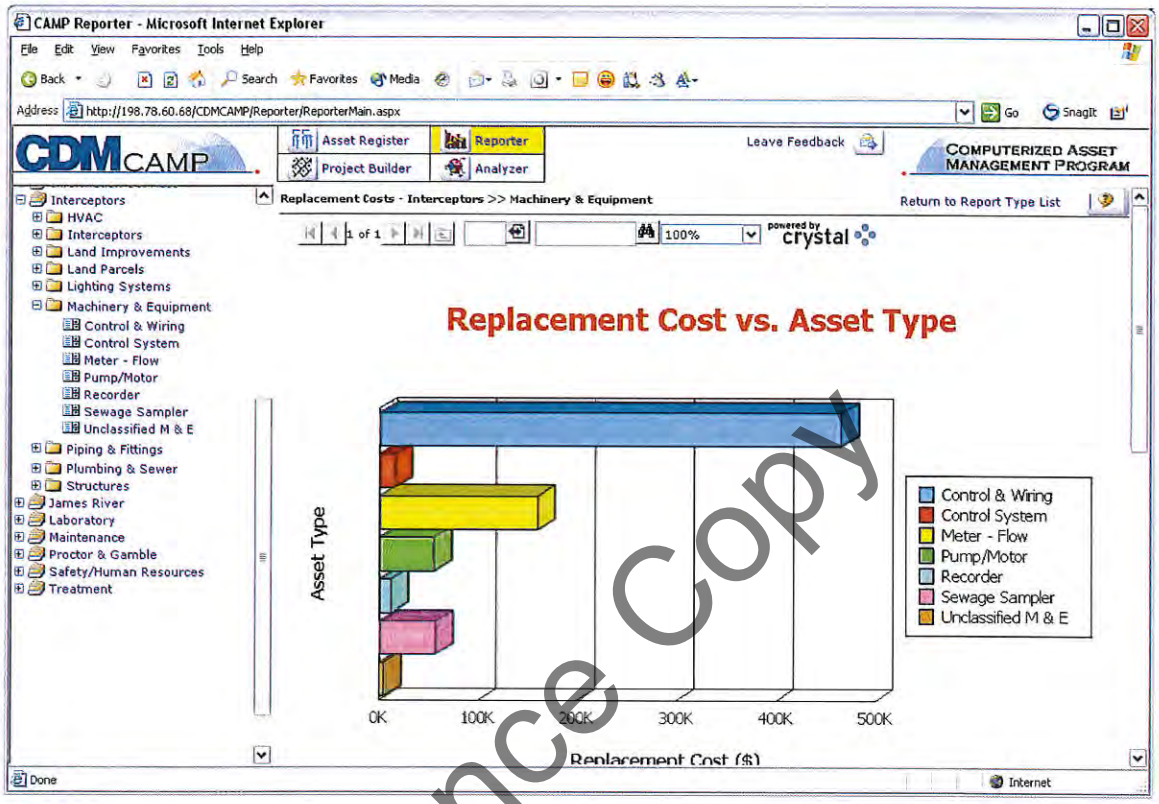

Figure 7-4
Example Asset Management Software Application

Frequently, the inventory control module contained in CMMS systems provides a very flexible and important materials management function. Most CMMS packages incorporate inventory control into their systems. **Figure 7-3** graphically represents the functional elements described. The information contained and used within the Asset Management System covers everything related to the asset and maintaining the asset at the desired level of service. Examples of informational needs include:

- Parts and costs of parts stored in the inventory warehouse system for repair of the assets,
- Labor costs of maintenance staff ,
- Procedures for maintenance and maintenance costing within a computerized maintenance management system,
- Procedures for operations and maintenance of the equipment contained in the O&M manual,

- Operational information on equipment run time and flows contained within the SCADA system,
- Locations and connectivity of assets as contained within the GIS and CMMS,
- Interfaces with financial information system, human resource information system and other systems to enhance the Asset Management System operations and reduce duplicate entry of data.

7.2.2.3 People – A Supportive Work Environment

As noted earlier, neither changed work practices nor technology alone will ensure an effective asset management implementation. Attention must be paid to the work culture and the people who comprise that culture. A utility or public entity moving forward with asset management should develop an explicit strategy to obtain the necessary support and commitment of staff that will be required to modify their work practices and undertake new or additional work. Training and development is essential but not sufficient. Attention must be paid to additional work culture issues.

There are five broad strategies for leveraging change implementation. These should be incorporated in an explicit plan for building an asset management focus into the work culture. Effective use of these strategies, and the appropriate selection of actions from among several alternatives associated with each of these strategies, will substantially improve the likelihood of successful asset management implementation. The five strategies are described below.

Development

The need for training and development in conjunction with new asset management practices is evident. People require new knowledge and skills to achieve improved performance. Development requires careful planning and integration with improved or altered work practices. Training and development is often timed poorly, either too early or too late. It must be tailored to specific identified asset management needs and delivered 'just-in-time. When training is well planned and delivered, asset management objectives are more likely to be achieved.

Involvement

Perhaps more has been written about the wisdom of involvement, in one form or another, than about any other people-management concept. From McGregor's theory Y, through empowerment, to teams and autonomous work groups, the evidence for the efficacy of involvement is overwhelming. And there's good reason for it. The concept works. It works for a variety of reasons and it serves multiple goals. For our purposes, we can simplify. People who are affected by the introduction of new work practices should be involved in decisions regarding their implementation. Involvement can not be casual or careless, however. Clear ground-rules need to be developed and expectations clarified at all organization levels or involvement can

become counterproductive. More than any other strategy, appropriate involvement will build staff commitment.

Alignment
Organization and political issues often derail projects. When members of management do not share the same understanding of the need for the project or the goals of the project, problems quickly ensue. Time spent early in the project's life cycle building understanding and consensus among key managers is time very well spent. A relatively neutral third party from within or without the organization can test the level of consensus. Various forms of organizational readiness assessments can uncover misalignment as well as other potential roadblocks to the project's success. Plans can then be made and actions taken to deal with organizational or misalignment issues.

Accountability and Incentive
Where performance is paramount, accountability is essential. The key to improved asset management performance is a few critical, agreed-upon unit performance targets. These targets need to be SMART targets; Sensible, Measurable, Attainable, Realistic and Time-bound. The introduction of new asset management practices offers an ideal opportunity to develop those targets. Simply developing targets may not be enough, however. Using the targets wisely and publicly is helpful. Providing incentives (even small ones) and consequences is essential. Again, the basic concept is simple – reward target achievement, deal with target failure.

Communication
Change strategies, whether connected to asset management or not, often suffer from a lack of coordination and misunderstanding. Communication is the glue that binds these strategies into a coordinated whole. Organization staff needs to understand the need for asset management, the goals for the project, the implications for their work lives, and 'what's in it for me.' The understanding should, as much as practical, be achieved through two-way dialogue. As with involvement, thoughtful strategies can be developed for optimal communication that moves implementation along and doesn't bog it down.

Building a work environment supportive of an asset management implementation should not be a chance occurrence. Alignment should be assured by establishing an appropriate asset management organization structure and clarifying roles. Implementation groups should be formed to involve key staff members. A good training plan will need to be created. A knowledge management system may be instituted. Accountability and consequences should be understood by all and ultimately enforced. And a targeted communication plan should be created. Recognizing these important aspects of an asset management implementation is an essential step. Developing an explicit strategy and seeing it through will ensure success.

7.2.3 Conclusion

Asset management represents a way of conducting and operating a business, not a one-time project. The creation of an asset management program requires the involvement of engineers, financial planners, maintenance professionals, operators, accountants and, in some cases, attorneys. Integration of data from key business units is critical to creating an asset management strategy and program. An asset management strategy cannot be developed without first defining objectives and constraints. Infrastructure asset knowledge (criticality and condition information, etc.) is a critical part of building predictive and decision-making models. However, we cannot optimize repair and replacement dollars by simply collecting data; we must know what optimization problem we are trying to solve so we can organize and report that information to help inform strategic and tactical decision making.

The financial management benefits from an asset management system are many. It gives managers a system to accurately project maintenance and capital replacement trends into the future. The system will assist in developing annual funding profiles for maintenance, repair, rehabilitation and replacement of assets. Progressive maintenance planning funded through an asset management system will limit the frequency of expensive and disrupting corrective maintenance reducing costs over time. Historic levels of maintenance can be projected for assets nearing the end of their useful lives. The identification of assets projected for disposal will trigger requests for planning, support, design and funding for replacement. By tying costs to asset condition, and by long-term planning for each asset, it provides reliable information for policy makers so they can understand long range funding needs.

7.3 Asset Management Pilot Program Overview

The development and implementation of an asset management system is not a one-step change process since asset management requires both conceptual and process changes, in addition to new information technology. In fact, many utilities are reluctant to embark on any asset management initiative just because of the magnitude of the effort includes so many activities that it appears overwhelming. Fortunately, if the effort is staged correctly, asset management doesn't have to be overwhelming. There are many very practical, common-sense approaches and practices that can improve infrastructure management, and can be implemented effectively if one takes a logical 'crawl before you walk, walk before you run' approach.

While asset management encompasses the high-level strategy and program for providing the public with a cost-effective level of service, there are a number of foundational elements that need to be in place in order to be able to perform more the sophisticated analysis and decision-making necessary to put asset management into practice. In addition, many of these 'building block' elements are rooted in sound maintenance management strategies that have existed for many years and which many utilities already practice (if somewhat informally in many cases). The development of an effective asset management strategy can begin with addressing the

following 'building block' elements that basically cover; knowing what assets you own and are responsible for, organizing those assets for cost roll-up and analysis, knowing how important individual assets to your utility's success and what condition those assets are in, developing asset management plans for assets and/or asset groups, and beginning to take a more systematic approach to making asset-related decisions.

7.3.1 Asset Management Pilot Project Tasks

7.3.1.1 Asset Register

During workshop discussions regarding the data and knowledge elements of any asset management program, Stillwater Utilities Authority management staff identified as a critical issue the fact that while many hard copy asset records and related information exists, there is no single asset registry or electronic database that exists within the utility. The utility's lack of a CMMS (the normal information system application for storing asset-related information), severely limits the utilities ability to accurately record and maintain asset-related data.

Recognizing the asset data tracking limitations imposed by not having a functioning CMMS, there are still practical data collection initiatives that can be started and captured in electronic spreadsheet formats. Moreover, because data collection and entry is one of the most time consuming and costly task of any information system implementation, getting an early start on those tasks is an investment for the future. As such, CDM provided utility treatment plant management a set of data collection templates tailored for capturing typical asset attributes for particular equipment types to be used by utility staff to collect 'nameplate' information (**Appendix B-2**).

7.3.1.2 Asset Hierarchy

In preparation for implementing asset management program, CDM demonstrated the concepts of hierarchy development to utility staff and, together, developed the Stillwater Utilities Authority process hierarchy template down to the sub-system level (**Appendix B-3**). It is expected that utility staff will complete the 'drilldown' to the MMI and related component level, and also expand upon this template to include other utility assets such as buildings and grounds, other structures, rolling stock, etc. In addition to the template, CDM and treatment plant management did complete the asset hierarchy 'drilldown' for the wastewater treatment plant process-related assets and components for training purposes (**Appendix B-4**).

7.3.1.3 Prioritize Assets

Acknowledging that attempting to rank the utility's assets according to criticality, a qualitative analysis of assets' failure events and their impact on the business goals of the agency, without the aid of accurate maintenance information gathered and tracked over time by a CMMS would be extremely difficult, CDM led an asset prioritization workshop that relied on the assembled utility staff's knowledge of their assets to perform the ranking exercise.

In addition to needing accurate asset information, there are many sophisticated mathematical techniques that can be used to accomplish asset prioritization exercise. However, they all follow a generally accepted analysis approach that factors the consequences of failure and the probability of failure. Criticality rankings are generally applied at the sub-system/process level of the asset hierarchy and then carried over to the major asset groups within those areas. In determining the consequence of failure for Stillwater Utilities Authority assets, a criteria based on five weighting factors (potential loss of life, community impact - health, damage to property, loss of service, and statutory obligations) were used. To determine the probability of failure factor, the team relied on the involved staff's institutional knowledge regarding asset failure events, causes and frequencies. The product of this activity was an asset criticality ranking for the entire utility except the wastewater collection system (**Appendix B-5**).

7.3.1.4 Assess Asset Condition

In the first workshop, the participants discussed how ongoing condition assessments of the utility's assets that evaluates and estimates of the remaining useful lives for the assets based on their condition was an integral part of any asset management program. In addition, they also discussed the various condition assessment methods and how asset criticality rankings are used in developing an effective and cost efficient strategy for their use. CDM also provided treatment plant management with visual and historical assessment protocol to help them in maintaining a consistent ranking assignments for rotating-mechanical and electrical assets moving forward.

As part of the asset management 'pilot area' effort, CDM and treatment plant management also performed visual and historical assessment on the Raw Water Pumping process assets that would be used in developing the demonstration RRRP for that area's assets.

7.3.2 Maintenance, Repair, Rehabilitation, Replacement Strategy

To demonstrate the methodology for developing alternative scenarios for maintenance, repair, rehabilitation, replacement strategies, CDM developed a demonstration RRRP (**Appendix B-6**) using CDM's asset management software application (CAMP) for the Water division's Raw Water Pumping process area. In addition to performing condition assessments for the pilot area assets, CDM examined historical maintenance history for those assets including installation date, cost, and annual maintenance costs (including major rehabilitations), performed industry research to determine current asset replacement costs (labor and material). This information was then used by CAMP to calculate the cost implications of the different maintenance strategies for the utility.

When reviewing the demonstration RRRP, it is important to keep in mind that the application has a number of predetermined assumptions that are used to generate the budgetary implications of the different maintenance scenarios. Although based on generally accepted industry estimates, these assumptions are surrogates to use until a

more refined detailed analysis has been completed and Stillwater understands how the assets age and perform over time. As each utility's experience is unique, it is important to recognize that the goal of asset management is to develop the most accurate understanding of what is happening with your own assets using techniques such as Failure Modes, Effects and Consequences Analysis, and/or Root Cause Analysis.

7.4 Findings and Recommendations

7.4.1 Overall Findings

As noted earlier in the report, this asset management project had two major goals of demonstrating and training staff in certain practical asset management techniques and assessing where Stillwater Utilities Authority was positioned for moving forward with implementing an asset management program. It is also important to keep in mind that CDM did not enlist a full-scale organizational assessment, benchmarking and gap analysis effort, but utilized a limited focus group approach involving utility management staff to assess current utility business practices and then relied on the CDM team's asset management experience to uncover any gaps between the current business practices and generally accepted best asset management practices. Acknowledging the limitations of the assessment, here are CDM's findings and recommendations uncovered during the asset management pilot program that relate to fundamental building blocks for the development of an asset management system.

- CDM found that there is a 'can do' attitude and a clear sense of overall mission among Stillwater Utilities Authority staff.
- There is a technically capable staff. While new skills will undoubtedly need to be acquired to implement the asset management system, CDM felt the work force would be quite capable of adding those skills.
- Stillwater Utilities Authority staff is already performing some asset management elements such as asset prioritization, equipment diagnostic testing, however just not in a formal, systematic method.
- Stillwater Utilities Authority staff will be challenged to record, track and analyze asset related information necessary for an asset management system without having a functional CMMS in place.
- There is a general understanding of the role that asset management can play in better managing the infrastructure at the City of Stillwater. Project team members demonstrated a good understanding of the purpose and advantages offered by a sound asset management system.
- There is a strong commitment of Stillwater staff toward making the improvements required to become more effective stewards of the infrastructure. There is a notable

willingness of staff to move forward toward better managing their responsibilities as stewards of the Stillwater infrastructure.

7.4.2 Foundational Elements Findings

7.4.2.1 Data and Knowledge

This section describes the asset management best practices and gaps that surround the collection and use of data, enabling a utility to organize and interpret the data to provide meaningful information to managers.

7.4.2.1.1 Asset Register

Best Practice:

- Asset registry maintains an inventory of major assets including their name plate data/attributes, asset identifier, asset location, basic equipment components and specifications, install date, condition, criticality, etc.

In Place:

- No organized, electronic asset registry currently exists. It appears that some equipment lists exist, but very little asset attribute and nameplate data is linked to those lists. Hard copy asset information is generally held in O&M manuals.

Needs:

- A completed asset inventory for all Stillwater assets including the asset description and function, essential component attributes such as equipment type, manufacturer, material, size and/or capacity, installation date, estimated life expectancy and replacement cost, etc.
- An information management system (CMMS) to record, store and provide for analysis of the asset information.

7.4.2.1.2 Asset Hierarchy

Best Practice:

- Information must be structured around a systematic hierarchy that organizes assets in such a way to enable a roll up or disaggregate for facilitating cost, condition analysis, and useful life evaluation.

In Place:

- Other than the asset hierarchy template and wastewater treatment plant hierarchy developed during this project, no asset hierarchy exists for the utility.

Needs:

- The completion of a comprehensive asset hierarchy for both Stillwater water and wastewater divisions covering all manageable assets including process-related assets, buildings and grounds, rolling stock, etc. This hierarchy should have

complete parent-child relationships to support the 'rollup' of costs and maintenance information to specific processes and locations, and should include related MMI's and their main child equipment components.

7.4.2.1.3 Asset Valuation

Best Practice:

- Original asset costs and ongoing repair, rehabilitation and replacement costs are tracked down to the individual "managed asset" level. The managed asset level is the level of asset detail that best facilitates accurate repair/replace decision making and planning.

In Place:

- Some hard copy information appears to exist related to original costs, replacement and major rehabilitation, but it was difficult to access for assets in the pilot area.

Needs:

- A systematic process to identify, record, and track both original and replacement costs and more accurately reflect aggregate current asset value.

7.4.2.1.4 Asset Maintenance Histories

Best Practice:

- A documented record of individual and/or cumulative corrective and preventive maintenance actions performed on an asset (or group of assets) during its lifetime.

In Place:

- Limited hard copy information appears to exist related to asset replacement and major rehabilitation, but it was difficult to access for assets in the pilot area. Generally, it appeared that most maintenance histories were held in memories of the treatment plant staff.

Needs:

- All assets need to have their individual work histories recorded and related to them, and cumulative maintenance actions for asset groups need to be available.

- Activity codes that are developed to characterize the type of maintenance being performed and the types of failures/deficiencies experienced with each asset. This will provide significant information on how assets are performing and/or deteriorating over time.

7.4.2.1.5 Job Cost Accounting

Best Practice:

- The ability to roll up the material, equipment, and labor costs associated with a maintenance activity on an asset or group of assets and to aggregate that information for groups or classes of assets over time.

In Place:

- Maintenance costs do not appear captured and tracked for individual assets or groups of assets. Again, without a functioning CMMS it is difficult and time consuming to accomplish.

Needs:

- All work order histories including labor and material costs linked to the appropriate assets.
- Activity codes developed to quantify and evaluate the type of maintenance being performed.
- A CMMS to record and track maintenance activities against particular assets and/or groups of assets.

7.4.2.2 Asset Management Processes and Procedures

Asset management processes and procedures are the methods, work practices, and management practices that are the foundation for a comprehensive asset management system. This section describes the asset management best practices and potential gaps that are essential for an Asset Management program.

7.4.2.2.1 Asset Modifications

Best Practice:

- A procedure by which asset additions, modifications, deletions and retirements, and the related valuation impacts, are identified and tracked to ensure up to date accuracy and completeness of the asset registry.

In Place:

- Some hard copy information appears to exist related to asset replacement and major rehabilitation, but it was difficult to access for assets in the pilot area.

Needs:

- Develop a procedure to update and enhance the information captured related to asset additions, modifications, deletions and retirements.
- Develop business process so that the Finance group is aware of asset-related changes.

7.4.2.2.2 Condition Assessment

Best Practice:

- A systematic assessment of managed asset condition that helps utilities develop an understanding of likely causes and probability of failure of their assets.

In Place:

- The treatment plant management currently use various predictive testing techniques on their assets to help them identify any problems before failure events occur.

- As part of normal operating activities, there are informal or ad hoc plant assessments done from time to time to address concerns that arise as part of normal operations.

Needs:

- A procedure to obtain up-to-date and accurate condition ratings for most critical facilities, equipment and assets to help develop an accurate probability of failure ranking and understanding of remaining useful life.

7.4.2.2.3 Criticality Rating/Risk Assessment

Best Practice:

- A formal process to rate and rank asset criticality, linking failure consequence and probability (developed in the condition assessment) with types of risk and potential costs. Assets deemed most critical will receive priority in terms of maintenance practice, repair/replacement planning, and capital strategy planning.

In Place:

- An informal sense of operations criticality for key assets as well as an informal sense of failure probability and level of risk based on the experience of staff.

- As part of this project, utility management helped develop the initial criticality ranking for the utility down to the sub-system level.

Needs:

- A process for identifying critical managed assets including documented criteria.

- A failure probability coding procedure.

- Risk categories defined and risks quantified.

- A formal risk assessment process developed combining failure probability and consequences that occurs on some pre-defined schedule.

7.4.2.2.4 Maintenance Practice

Best Practice:

- The establishment of maintenance work processes and procedures that ensure a quality, cost effective maintenance practice that is the foundation for replacement and capital strategy. Typically those processes and procedures include – maintenance philosophy (Reliability Centered Maintenance for example), well developed SMP's, planning & scheduling, preventive maintenance, repair/replacement strategy, CMMS use, maintenance metrics etc.

In Place:

- Obviously, a work management system exists, but it doesn't appear to be systematic, nor does it have the level of detail and recordkeeping needed to support an asset management program.

Needs:

- A system-wide approach to maintenance practice that supports asset management goals including:
  - A CMMS implemented consistently across the entire organization.
  - An overall maintenance philosophy, strategy and related metrics.
  - Examine the current predictive and preventive maintenance programs, and accompanying work plans within a CMMS to see if they support an asset management program.

7.4.2.3 Asset Information Systems

This section assesses the asset information systems that are available to the organization to assist and support an asset management program.

7.4.2.3.1 Maintenance Management System

Best Practice:

- The software application and functionality available through a maintenance management system to enable the proper development of a planned maintenance program, the recording of all unplanned maintenance and the associated linkages to inventory and job management. Also the functionality for recording the asset register and the ability of the asset register to meet asset management needs in terms of asset hierarchy, aggregation and disaggregation.

In Place:

- Currently, no maintenance management system exists.

Needs:

- The organization needs to strongly consider procuring and implementing a CMMS.

7.5 Asset Management Implementation Recommendations

7.5.1 Overview

To implement asset management practices, management and staff must think differently about the enterprise. Subsequently they should also behave differently. New work practices are initiated. New management practices are introduced. The changes need time to develop and take root. The approach must be persistent, yet gradual and iterative. Asset management is not simply a matter of installing new software, then getting it up and running.

An asset management program should focus on improving a utility's ability to project what its capital expenditures will be, to minimize the system failures and to provide a long term financial plan with repair and replacement needs fully identified. If Stillwater moves forward with implementing an asset management program, the following are CDM's implementation recommendations:

7.5.1.1 Implementation Recommendations

The asset management implementation recommendations for the City, are listed below in order of priority.

- Put in place an asset management organizational structure with a person in charge and fully responsible for asset management implementation. This person will lead the effort to structure and engage the organization in a manner that promotes acceptance and effective use of asset management tools.

- To be able to establish asset management practices and/or improve current maintenance management performance, a fully functioning CMMS is essential. The City of Stillwater should look to procure and implement a CMMS for the entire utility.

- The City should initiate the development of a maintenance management policy and procedures document. The document will include decisions regarding Stillwater Utilities Authority's maintenance philosophy (e.g. reliability centered maintenance), Standard Maintenance Plans, and the repair and replacement priorities. It will also identify key maintenance measures and reports to be generated by the CMMS.

- Build upon this projects effort and complete the overall asset criticality determination for the utility. This process should put in place a framework for assessing the overall criticality of all Stillwater assets and updating the rankings on regular schedule.

- Complete the hierarchical asset registry system to facilitate the organization and reporting of information regarding those assets.

- Develop standards and procedures for evaluating, tracking and monitoring asset information.
- Close the information gap on high-prioritized assets, including:
  - Condition assessment
  - Age and valuation
  - Remaining useful life
  - Asset Physical Information
  - Maintenance History
- Implement an asset management tool (similar to CAMP) to generate appropriate asset management reports and to increase value and confidence in capital and operating budget planning.
- For the overall asset management program implementation, and for the individual program components, decisions will need to be made regarding the timing and/or phasing of each of the various components.

PROJECT	2006	2007	2008	2009	2010	2011	2012	2013	2014
Raw Water Back Up									
OWRB-SRF	1,937,000	15,300,000			35,091,000				
Long Term Borrow	0			6,380,000	28,711,000				
Subtotal	1,937,000	15,300,000	0	6,380,000	63,802,000	0	0	0	0
Water Intake									
Long Term Borrow					1,514,000				
Subtotal	0	0	0	0	1,514,000	0	0	0	0
Water Distribution System									
Pay as Go		1,482,070		1,578,700	1,020,490		1,500,000	1,345,500	
OWRB-SRF			6,527,200			3,571,715			
Long Term Borrow	877,220	7,894,980	5,232,730			2,767,195			
Subtotal	877,220	9,377,050	11,759,930	1,578,700	1,020,490	6,338,910	1,500,000	1,345,500	0
WTP Expan. to 24 mgd, 36, 50									
Long Term Borrow	0		1,155,000	10,395,000					
Subtotal	0	0	1,155,000	10,395,000	0	0	0	0	0
Total Water System									
Pay as Go	0	1,482,070	0	1,578,700	1,020,490	0	1,500,000	1,345,500	0
SRF	1,937,000	15,300,000	6,527,200	0	35,091,000	3,571,715	0	0	0
Long Term Borrow	877,220	7,894,980	6,387,730	16,775,000	30,225,000	2,767,195	0	0	0
Total	$2,814,220	$24,677,050	$12,914,930	$18,353,700	$66,336,490	$6,338,910	$1,500,000	$1,345,500	$ -

Appendix A-1
Recommended Water Capital Projects

PROJECT	2015	2016	2017	2018	2019	2020	2021	2022	2023
Raw Water Back Up									
OWRB-SRF									
Long Term Borrow									
Subtotal	0	0	0	0	0	0	0	0	0
Water Intake									
Long Term Borrow									
Subtotal	0	0	0	0	0	0	0	0	0
Water Distribution System									
Pay as Go	1,042,910			1,817,900			408,000	1,020,000	1,020,000
OWRB-SRF		4,171,640							
Long Term Borrow		669,750	2,726,900						
Subtotal	1,042,910	4,841,390	2,726,900	1,817,900	0	0	408,000	1,020,000	1,020,000
WTP Expan. to 24 mgd, 36, 50									
Long Term Borrow				2,310,000	20,790,000				
Subtotal	0	0	0	2,310,000	20,790,000	0	0	0	0
Total Water System									
Pay as Go	1,042,910	0	0	1,817,900	0	0	408,000	1,020,000	1,020,000
SRF	0	4,171,640	0	0	0	0	0	0	0
Long Term Borrow	0	669,750	2,726,900	2,310,000	20,790,000	0	0	0	0
Total	$ 1,042,910	$ 4,841,390	$ 2,726,900	$ 4,127,900	$ 20,790,000	$ -	$ 408,000	$ 1,020,000	$ 1,020,000

Appendix A-1
Recommended Water Capital Projects (Continued)

PROJECT	2024	2025	2026	2027	2028	2029	2030	2031	2032
Raw Water Back Up									
OWRB-SRF									
Long Term Borrow									
Subtotal	0	0	0	0	0	0	0	0	0
Water Intake									
Long Term Borrow									
Subtotal	0	0	0	0	0	0	0	0	0
Water Distribution System									
Pay as Go	1,020,000	612,000	612,000	1,530,000	1,530,000	1,530,000	918,000	612,000	1,530,000
OWRB-SRF									
Long Term Borrow									
Subtotal	1,020,000	612,000	612,000	1,530,000	1,530,000	1,530,000	918,000	612,000	1,530,000
WTP Expan. to 24 mgd, 36, 50									
Long Term Borrow									
Subtotal	0	0	0	0	0	0	0	0	0
Total Water System									
Pay as Go	1,020,000	612,000	612,000	1,530,000	1,530,000	1,530,000	918,000	612,000	1,530,000
SRF	0	0	0	0	0	0	0	0	0
Long Term Borrow	0	0	0	0	0	0	0	0	0
Total	$ 1,020,000	$ 612,000	$ 612,000	$ 1,530,000	$ 1,530,000	$ 1,530,000	$ 918,000	$ 612,000	$ 1,530,000

Appendix A-1
Recommended Water Capital Projects (Continued)

PROJECT	2033	2034	2035	2036	2037	2038	2039	2040
Raw Water Back Up								
OWRB-SRF								
Long Term Borrow								
Subtotal	0	0	0	0	0	0	0	0
Water Intake								
Long Term Borrow								
Subtotal	0	0	0	0	0	0	0	0
Water Distribution System								
Pay as Go	1,530,000	1,530,000	918,000	816,000	1,224,000	1,224,000	1,224,000	1,224,000
OWRB-SRF								
Long Term Borrow					2,448,000			
Subtotal	1,530,000	1,530,000	918,000	816,000	3,672,000	1,224,000	1,224,000	1,224,000
WTP Expan. to 24 mgd, 36, 50								
Long Term Borrow							2,695,000	24,255,000
Subtotal	0	0	0	0	0	0	2,695,000	24,255,000
Total Water System								
Pay as Go	1,530,000	1,530,000	918,000	816,000	1,224,000	1,224,000	1,224,000	1,224,000
SRF	0	0	0	0	0	0	0	0
Long Term Borrow	0	0	0	0	2,448,000	0	2,695,000	24,255,000
Total	$ 1,530,000	$ 1,530,000	$ 918,000	$ 816,000	$ 3,672,000	$ 1,224,000	$ 3,919,000	$ 25,479,000

Appendix A-1
Recommended Water Capital Projects (Continued)

PROJECT	2041	2042	2043	2044	2045	2046	2047
Raw Water Back Up							
OWRB-SRF							
Long Term Borrow							
Subtotal	0	0	0	0	0	0	0
Water Intake							
Long Term Borrow							
Subtotal	0	0	0	0	0	0	0
Water Distribution System							
Pay as Go	612,000	1,530,000	1,530,000	1,530,000	918,000	816,000	1,224,000
OWRB-SRF							
Long Term Borrow				2,142,000			2,448,000
Subtotal	612,000	1,530,000	1,530,000	3,672,000	918,000	816,000	3,672,000
WTP Expan. to 24 mgd, 36, 50							
Long Term Borrow							
Subtotal	0	0	0	0	0	0	0
Total Water System							
Pay as Go	612,000	1,530,000	1,530,000	1,530,000	918,000	816,000	1,224,000
SRF	0	0	0	0	0	0	0
Long Term Borrow	0	0	0	2,142,000	0	0	2,448,000
Total	$ 612,000	$ 1,530,000	$ 1,530,000	$ 3,672,000	$ 918,000	$ 816,000	$ 3,672,000

Appendix A-1
Recommended Water Capital Projects (Continued)

PROJECT	2048	2049	2050	2051	2052	2053	2054	2055
Raw Water Back Up								
OWRB-SRF								
Long Term Borrow								
Subtotal	0	0	0	0	0	0	0	0
Water Intake								
Long Term Borrow								
Subtotal	0	0	0	0	0	0	0	0
Water Distribution System								
Pay as Go	1,224,000	1,224,000	1,224,000	816,000	1,224,000	1,224,000	1,224,000	1,224,000
OWRB-SRF								
Long Term Borrow					2,448,000			
Subtotal	1,224,000	1,224,000	1,224,000	816,000	3,672,000	1,224,000	1,224,000	1,224,000
WTP Expan. to 24 mgd, 36, 50								
Long Term Borrow								
Subtotal	0	0	0	0	0	0	0	0
Total Water System								
Pay as Go	1,224,000	1,224,000	1,224,000	816,000	1,224,000	1,224,000	1,224,000	1,224,000
SRF	0	0	0	0	0	0	0	0
Long Term Borrow	0	0	0	0	2,448,000	0	0	0
Total	$ 1,224,000	$ 1,224,000	$ 1,224,000	$ 816,000	$ 3,672,000	$ 1,224,000	$ 1,224,000	$ 1,224,000

Appendix A-1
Recommended Water Capital Projects (Continued)

PROJECT	2006	2007	2008	2009	2010	2011	2012	2013
New WW Mains								
Long Term Borrow	282,113	287,756	293,511	299,381	305,368	311,476	317,705	324,059
Subtotal	282,113	287,756	293,511	299,381	305,368	311,476	317,705	324,059
New Interceptors								
OWRB		4,165,000						
Long Term Borrow	1,190,000	6,545,000	0	0	0	0	0	0
Subtotal	1,190,000	10,710,000	0	0	0	0	0	0
Plant Expansions								
OWRB								
Long Term Borrow	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0
Major Maintenance								
Pay as Go	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0
Tertiary Filters								
OWRB					4,900,000			
Long Term Borrow	0			1,400,000	7,700,000	0	0	0
Subtotal	0	0	0	1,400,000	12,600,000	0	0	0
Sewer Rehabilitation								
Long Term Borrow	1,632,898	1,665,556	1,698,867	1,732,845	1,767,502	1,802,852	1,838,909	1,875,687
Subtotal	1,632,898	1,665,556	1,698,867	1,732,845	1,767,502	1,802,852	1,838,909	1,875,687
Lift Station Rehabilitation								
Pay as Go	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000
Subtotal	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000
Phosphorus Removal								
OWRB								
Long Term Borrow	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0
Replace Headworks and Screens								
Pay as Go	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0
Total Wastewater System								
Pay as Go	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000
OWRB	0	4,165,000	0	0	4,900,000	0	0	0
Long Term Borrow	3,105,011	8,498,312	1,992,378	3,432,226	9,772,870	2,114,328	2,156,614	2,199,746
Total	$ 3,560,011	$ 13,118,312	$ 2,447,378	$ 3,887,226	$ 15,127,870	$ 2,569,328	$ 2,611,614	$ 2,654,746

Appendix A-2
Recommended Wastewater Capital Projects

CT	2014	2015	2016	2017	2018	2019	2020	2021	2022
New WW Mains									
Long Term Borrow	330,541	337,151	343,894	350,772	357,788	364,944	372,242	379,687	387,281
Subtotal	330,541	337,151	343,894	350,772	357,788	364,944	372,242	379,687	387,281
New Interceptors									
OWRB		4,165,000							
Long Term Borrow	1,190,000	6,545,000	0	0	0	0	0	0	0
Subtotal	1,190,000	10,710,000	0	0	0	0	0	0	0
Plant Expansions									
OWRB									
Long Term Borrow	0	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0	0
Major Maintenance									
Pay as Go	0	0	0	0	0	0	0	0	1,260,000
Subtotal	0	0	0	0	0	0	0	0	1,260,000
Tertiary Filters									
OWRB									
Long Term Borrow	0	0	0						
Subtotal	0	0	0	0	0	0	0	0	0
Sewer Rehabilitation									
Long Term Borrow	1,913,201	1,951,465	1,990,494	2,030,304	2,070,910	2,112,328	2,154,575	2,197,666	2,241,619
Subtotal	1,913,201	1,951,465	1,990,494	2,030,304	2,070,910	2,112,328	2,154,575	2,197,666	2,241,619
Lift Station Rehabilitation									
s Go	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000
	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000
Phosphorus Removal									
OWRB					2,450,000				
Long Term Borrow	0	0	0	700,000	3,850,000	0	0	0	0
Subtotal	0	0	0	700,000	6,300,000	0	0	0	0
Replace Headworks and Screens									
Pay as Go	0	0	0	0	0	0	700,000	0	0
Subtotal	0	0	0	0	0	0	700,000	0	0
Total Wastewater System									
Pay as Go	455,000	455,000	455,000	455,000	455,000	455,000	1,155,000	455,000	1,715,000
OWRB	0	4,165,000	0	0	2,450,000	0	0	0	0
Long Term Borrow	3,433,742	8,833,616	2,334,388	3,081,076	6,278,698	2,477,272	2,526,817	2,577,353	2,628,900
Total	$ 3,888,742	$13,453,616	$ 2,789,388	$ 3,536,076	$ 9,183,698	$ 2,932,272	$ 3,681,817	$ 3,032,353	$ 4,343,900

Appendix A-2
Recommended Wastewater Capital Projects (Continued)

PROJECT	2023	2024	2025	2026	2027	2028	2029	2030
New WW Mains								
Long Term Borrow	395,027	402,927	410,986	419,205	427,590	436,141	444,864	453,761
Subtotal	395,027	402,927	410,986	419,205	427,590	436,141	444,864	453,761
New Interceptors								
OWRB								
Long Term Borrow	0	378,000	3,402,000	0	0	0	448,000	4,032,000
Subtotal	0	378,000	3,402,000	0	0	0	448,000	4,032,000
Plant Expansions								
OWRB					7,350,000			
Long Term Borrow	0	0	0	2,100,000	11,550,000	0	0	0
Subtotal	0	0	0	2,100,000	18,900,000	0	0	0
Major Maintenance								
Pay as Go	1,260,000	1,680,000	0	0	0	0	0	0
Subtotal	1,260,000	1,680,000	0	0	0	0	0	0
Tertiary Filters								
OWRB								
Long Term Borrow								
Subtotal	0	0	0	0	0	0	0	0
Sewer Rehabilitation								
Long Term Borrow	2,286,452	2,332,181	2,378,825	2,426,401	2,474,929	2,524,428	2,574,916	2,626,414
Subtotal	2,286,452	2,332,181	2,378,825	2,426,401	2,474,929	2,524,428	2,574,916	2,626,414
Lift Station Rehabilitation								
Pay as Go	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000
Subtotal	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000
Phosphorus Removal								
OWRB								
Long Term Borrow	0							
Subtotal	0	0	0	0	0	0	0	0
Replace Headworks and Screens								
Pay as Go	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0
Total Wastewater System								
Pay as Go	1,715,000	2,135,000	455,000	455,000	455,000	455,000	455,000	455,000
OWRB	0	0	0	0	7,350,000	0	0	0
Long Term Borrow	2,681,479	3,113,108	6,191,811	4,945,606	14,452,519	2,960,569	3,467,780	7,112,175
Total	$ 4,396,479	$ 5,248,108	$ 6,646,811	$ 5,400,606	$22,257,519	$ 3,415,569	$ 3,922,780	$ 7,567,175

Appendix A-2
Recommended Wastewater Capital Projects (Continued)

CT	2031	2032	2033	2034	2035	2036	2037	2038	2039
New WW Mains									
Long Term Borrow	462,837	472,093	481,535	491,166	500,989	511,009	521,229	531,654	542,287
Subtotal	462,837	472,093	481,535	491,166	500,989	511,009	521,229	531,654	542,287
New Interceptors									
OWRB									
Long Term Borrow	0	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0	0
Plant Expansions									
OWRB									
Long Term Borrow	0	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0	0
Major Maintenance									
Pay as Go	0	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0	0
Tertiary Filters									
OWRB									
Long Term Borrow									
Subtotal	0	0	0	0	0	0	0	0	0
Sewer Rehabilitation									
Long Term Borrow	2,678,943	2,732,522	2,787,172	2,842,916	2,899,774	2,957,769	3,016,925	3,077,263	3,138,808
Subtotal	2,678,943	2,732,522	2,787,172	2,842,916	2,899,774	2,957,769	3,016,925	3,077,263	3,138,808
Lift Station Rehabilitation									
as Go	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000
	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000
Phosphorus Removal									
OWRB									
Long Term Borrow									
Subtotal	0	0	0	0	0	0	0	0	0
Replace Headworks and Screens									
Pay as Go	0	0	0	0	700,000	0	0	0	0
Subtotal	0	0	0	0	700,000	0	0	0	0
Total Wastewater System									
Pay as Go	455,000	455,000	455,000	455,000	1,155,000	455,000	455,000	455,000	455,000
OWRB	0	0	0	0	0	0	0	0	0
Long Term Borrow	3,141,780	3,204,615	3,268,707	3,334,082	3,400,763	3,468,778	3,538,154	3,608,917	3,681,095
Total	$ 3,596,780	$ 3,659,615	$ 3,723,707	$ 3,789,082	$ 4,555,763	$ 3,923,778	$ 3,993,154	$ 4,063,917	$ 4,136,095

Appendix B-2
Recommended Wastewater Capital Projects (Continued)

PROJECT	2040	2041	2042	2043	2044	2045	2046	2047
New WW Mains								
Long Term Borrow	553,133	564,195	575,479	586,989	598,729	610,703	622,917	635,376
Subtotal	553,133	564,195	575,479	586,989	598,729	610,703	622,917	635,376
New Interceptors								
OWRB								
Long Term Borrow	0	0	0	0	350,000	3,150,000	0	0
Subtotal	0	0	0	0	350,000	3,150,000	0	0
Plant Expansions								
OWRB								
Long Term Borrow	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0
Major Maintenance								
Pay as Go	0	0	0	0	1,260,000	1,260,000	1,680,000	0
Subtotal	0	0	0	0	1,260,000	1,260,000	1,680,000	0
Tertiary Filters								
OWRB								
Long Term Borrow								
Subtotal	0	0	0	0	0	0	0	0
Sewer Rehabilitation								
Long Term Borrow	3,201,585	3,265,616	3,330,929	3,397,547	3,465,498	3,534,808	3,605,504	3,677,614
Subtotal	3,201,585	3,265,616	3,330,929	3,397,547	3,465,498	3,534,808	3,605,504	3,677,614
Lift Station Rehabilitation								
Pay as Go	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000
Subtotal	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000
Phosphorus Removal								
OWRB								
Long Term Borrow								
Subtotal	0	0	0	0	0	0	0	0
Replace Headworks and Screens								
Pay as Go	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0
Total Wastewater System								
Pay as Go	455,000	455,000	455,000	455,000	1,715,000	1,715,000	2,135,000	455,000
OWRB	0	0	0	0	0	0	0	0
Long Term Borrow	3,754,718	3,829,811	3,906,408	3,984,536	4,414,227	7,295,511	4,228,421	4,312,990
Total	$ 4,209,718	$ 4,284,811	$ 4,361,408	$ 4,439,536	$ 6,129,227	$ 9,010,511	$ 6,363,421	$ 4,767,990

Appendix A-2
Recommended Wastewater Capital Projects (Continued)

PROJECT	2048	2049	2050	2051	2052	2053	2054	2055
New WW Mains								
Long Term Borrow	648,083	661,045	674,266	687,751	701,506	715,536	729,847	744,444
Subtotal	648,083	661,045	674,266	687,751	701,506	715,536	729,847	744,444
New Interceptors								
OWRB								
Long Term Borrow	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0
Plant Expansions								
OWRB								
Long Term Borrow	0	2,100,000	18,900,000	0	0	0	0	0
Subtotal	0	2,100,000	18,900,000	0	0	0	0	0
Major Maintenance								
Pay as Go	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0
Tertiary Filters								
OWRB								
Long Term Borrow								
Subtotal	0	0	0	0	0	0	0	0
Sewer Rehabilitation								
Long Term Borrow	3,751,167	3,826,190	3,902,714	3,980,768	4,060,383	4,141,591	4,224,423	4,308,911
Subtotal	3,751,167	3,826,190	3,902,714	3,980,768	4,060,383	4,141,591	4,224,423	4,308,911
Lift Station Rehabilitation								
Pay as Go	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000
Subtotal	455,000	455,000	455,000	455,000	455,000	455,000	455,000	455,000
Phosphorus Removal								
OWRB								
Long Term Borrow								
Subtotal	0	0	0	0	0	0	0	0
Replace Headworks and Screens								
Pay as Go	0	0	700,000	0	0	0	0	0
Subtotal	0	0	700,000	0	0	0	0	0
Total Wastewater System								
Pay as Go	455,000	455,000	1,155,000	455,000	455,000	455,000	455,000	455,000
OWRB	0	0	0	0	0	0	0	0
Long Term Borrow	4,399,250	6,587,235	23,476,980	4,668,519	4,761,889	4,857,127	4,954,270	5,053,355
Total	$ 4,854,250	$ 7,042,235	$24,631,980	$ 5,123,519	$ 5,216,889	$ 5,312,127	$ 5,409,270	$ 5,508,355

Appendix A-2
Recommended Wastewater Capital Projects (Continued)

Inflated Capital Costs	2006	2007	2008	2009	2010	2011	2012	2013
Water								
Pay as Go	-	1,572,000	-	1,777,000	1,183,000	-	1,845,000	1,704,000
OWRB-SRF	1,995,000	16,232,000	7,132,000	-	40,680,000	4,265,000	-	-
Long Term Borrow	904,000	8,376,000	6,980,000	18,880,000	35,039,000	3,304,000	-	-
Total	$ 2,899,000	$26,180,000	$14,112,000	$20,657,000	$76,902,000	$ 7,569,000	$ 1,845,000	$ 1,704,000
Wastewater								
Pay as Go	469,000	483,000	497,000	512,000	527,000	543,000	560,000	576,000
OWRB-SRF	-	4,419,000	-	-	5,680,000	-	-	-
Long Term Borrow	3,198,000	9,016,000	2,177,000	3,863,000	11,329,000	2,525,000	2,652,000	2,787,000
Total	$ 3,667,000	$13,918,000	$ 2,674,000	$ 4,375,000	$17,536,000	$ 3,068,000	$ 3,212,000	$ 3,363,000

Appendix A-3
Summary of Capital Costs Inflated to Project Start Year

Inflated Capital Costs	2014	2015	2016	2017	2018	2019	2020	2021	2022
Water									
Pay as Go	-	1,402,000	-	-	2,670,000	-	-	655,000	1,686,000
OWRB-SRF	-	-	5,775,000	-	-	-	-	-	-
Long Term Borrow	-	-	927,000	3,888,000	3,392,000	31,447,000	-	-	-
Total	$ -	$ 1,402,000	$6,702,000	$3,888,000	$ 6,062,000	$31,447,000	$ -	$ 655,000	$1,686,000
Wastewater									
Pay as Go	594,000	611,000	630,000	649,000	668,000	688,000	1,799,000	730,000	2,835,000
OWRB-SRF	-	5,597,000	-	-	3,598,000	-	-	-	-
Long Term Borrow	4,480,000	11,872,000	3,231,000	4,393,000	9,220,000	3,747,000	3,937,000	4,136,000	4,345,000
Total	$ 5,074,000	$ 18,080,000	$3,861,000	$5,042,000	$13,486,000	$ 4,435,000	$ 5,736,000	$4,866,000	$7,180,000

Appendix A-3
Summary of Capital Costs Inflated to Project Start Year (Continued)

Inflated Capital Costs	2023	2024	2025	2026	2027	2028	2029	2030
Water								
Pay as Go	1,736,000	1,789,000	1,105,000	1,139,000	2,932,000	3,020,000	3,110,000	1,922,000
OWRB-SRF	-	-	-	-	-	-	-	-
Long Term Borrow	-	-	-	-	-	-	-	-
Total	$ 1,736,000	$ 1,789,000	$ 1,105,000	$ 1,139,000	$ 2,932,000	$ 3,020,000	$ 3,110,000	$ 1,922,000
Wastewater								
Pay as Go	2,920,000	3,744,000	822,000	846,000	872,000	898,000	925,000	953,000
OWRB-SRF	-	-	-	-	14,083,000	-	-	-
Long Term Borrow	4,565,000	5,459,000	11,183,000	9,200,000	27,693,000	5,843,000	7,049,000	14,891,000
Total	$ 7,485,000	$ 9,203,000	$ 12,005,000	$ 10,046,000	$ 42,648,000	$ 6,741,000	$ 7,974,000	$ 15,844,000

Appendix A-3
Summary of Capital Costs Inflated to Project Start Year

Inflated Capital Costs	2031	2032	2033	2034	2035	2036	2037	2038	2039
Water									
Pay as Go	1,320,000	3,399,000	3,501,000	3,606,000	2,228,000	2,040,000	3,152,000	3,246,000	3,344,000
OWRB-SRF	-	-	-	-	-	-	-	-	-
Long Term Borrow	-	-	-	-	-	-	6,304,000	-	7,362,000
Total	$1,320,000	$3,399,000	$3,501,000	$3,606,000	$ 2,228,000	$2,040,000	$ 9,456,000	$ 3,246,000	$10,706,000
Wastewater									
Pay as Go	981,000	1,011,000	1,041,000	1,072,000	2,803,000	1,138,000	1,172,000	1,207,000	1,243,000
OWRB-SRF	-	-	-	-	-	-	-	-	-
Long Term Borrow	6,776,000	7,118,000	7,479,000	7,857,000	8,255,000	8,672,000	9,111,000	9,572,000	10,056,000
Total	$7,757,000	$8,129,000	$8,520,000	$8,929,000	$ 11,058,000	$9,810,000	$10,283,000	$10,779,000	$11,299,000

Appendix A-3
Summary of Capital Costs Inflated to Project Start Year (Continued)

Inflated Capital Costs	2040	2041	2042	2043	2044	2045	2046	2047
Water								
Pay as Go	3,444,000	1,774,000	4,567,000	4,704,000	4,846,000	2,995,000	2,742,000	4,236,000
OWRB-SRF	-	-	-	-	-	-	-	-
Long Term Borrow	68,250,000	-	-	-	6,784,000	-	-	8,472,000
Total	$ 71,694,000	$ 1,774,000	$ 4,567,000	$ 4,704,000	$ 11,630,000	$ 2,995,000	$ 2,742,000	$12,708,000
Wastewater								
Pay as Go	1,280,000	1,319,000	1,358,000	1,399,000	5,431,000	5,594,000	7,173,000	1,575,000
OWRB-SRF	-	-	-	-	-	-	-	-
Long Term Borrow	10,565,000	11,100,000	11,662,000	12,252,000	13,980,000	23,798,000	14,207,000	14,926,000
Total	$ 11,845,000	$ 12,419,000	$ 13,020,000	$ 13,651,000	$ 19,411,000	$ 29,392,000	$ 21,380,000	$16,501,000

Appendix A-3
Summary of Capital Costs Inflated to Project Start Year (Continued)

Inflated Capital Costs	2048	2049	2050	2051	2052	2053	2054	2055
Water								
Pay as Go	4,363,000	4,494,000	4,629,000	3,178,000	4,911,000	5,058,000	5,210,000	5,366,000
OWRB-SRF	-	-	-	-	-	-	-	-
Long Term Borrow	-	-	-	-	9,821,000	-	-	-
Total	$ 4,363,000	$ 4,494,000	$ 4,629,000	$ 3,178,000	$ 14,732,000	$ 5,058,000	$ 5,210,000	$ 5,366,000
Wastewater								
Pay as Go	1,622,000	1,671,000	4,368,000	1,772,000	1,825,000	1,880,000	1,937,000	1,995,000
OWRB-SRF	-	-	-	-	-	-	-	-
Long Term Borrow	15,681,000	24,185,000	88,780,000	18,184,000	19,104,000	20,071,000	21,086,000	22,153,000
Total	$ 17,303,000	$25,856,000	$ 93,148,000	$ 19,956,000	$ 20,929,000	$ 21,951,000	$ 23,023,000	$ 24,148,000

Appendix A-3
Summary of Capital Costs Inflated to Project Start Year (Continued)

Description	2006	2007	2008	2009	2010	2011	2012	2013
Water								
Inflated CIP-Revenue Bonds	16,260,000	0	0	57,223,000	0	0	0	0
Issue Amount	18,351,036	0	0	64,581,878	0	0	0	0
Projected New Revenue Bond Debt	$ -	$ 1,302,051	$ 1,302,051	$ 1,302,051	$ 5,884,294	$ 5,884,294	$ 5,884,294	$ 5,884,294
Inflated CIP-OWRB SRF Loans	1,995,000	16,232,000	7,132,000	0	40,680,000	4,265,000	0	0
Projected New SRF Debt	$ -	$ -	$ 141,006	$ 1,288,280	$ 1,792,369	$ 1,792,369	$ 4,667,622	$ 4,969,071
Wastewater								
Inflated CIP-Revenue Bonds	14,391,000	0	0	15,192,000	0	5,177,000	0	7,267,000
Issue Amount	16,241,683	0	0	17,145,691	0	5,842,762	0	8,201,536
Projected New Revenue Bond Debt	$ -	$ 1,152,387	$ 1,152,387	$ 1,152,387	$ 2,368,916	$ 2,368,916	$ 2,783,475	$ 2,783,475
Inflated CIP-OWRB SRF Loans	0	4,419,000	0	0	5,680,000	0	0	0
Projected New SRF Debt	$ -	$ -	$ -	$ 299,779	$ 299,779	$ 299,779	$ 685,103	$ 685,103

Appendix A-4
Summary of New Debt Financing

Description	2014	2015	2016	2017	2018	2019	2020	2021	2022
Water									
Inflated CIP-Revenue Bonds	0	0	4,815,000	0	34,839,000	0	0	0	0
Issue Amount	0	0	5,434,209	0	39,319,295	0	0	0	0
Projected New Revenue Bond Debt	$5,884,294	$5,884,294	$5,884,294	$6,269,865	$6,269,865	$9,059,665	$9,059,665	$9,059,665	$9,059,665
Inflated CIP-OWRB SRF Loans	0	0	5,775,000	0	0	0	0	0	0
Projected New SRF Debt	$4,969,071	$4,969,071	$4,969,071	$4,969,071	$5,377,247	$5,377,247	$5,377,247	$5,377,247	$5,377,247
Wastewater									
Inflated CIP-Revenue Bonds	0	15,103,000	0	13,613,000	0	7,684,000	0	13,046,000	0
Issue Amount	0	17,045,246	0	15,363,632	0	8,672,162	0	14,723,716	0
Projected New Revenue Bond Debt	$3,365,394	$3,365,394	$4,574,796	$4,574,796	$5,664,883	$5,664,883	$6,280,194	$6,280,194	$7,324,878
Inflated CIP-OWRB SRF Loans	0	5,597,000	0	0	3,598,000	0	0	0	0
Projected New SRF Debt	$ 685,103	$ 685,103	$ 685,103	$1,064,796	$1,064,796	$1,064,796	$1,308,880	$1,308,880	$1,308,880

Appendix A-4
Summary of New Debt Financing (Continued)

Description	2023	2024	2025	2026	2027	2028	2029	2030
Water								
Inflated CIP-Revenue Bonds	0	0	0	0	0	0	0	0
Issue Amount	0	0	0	0	0	0	0	0
Projected New Revenue Bond Debt	$ 9,059,665	$ 9,059,665	$ 9,059,665	$ 9,059,665	$ 9,059,665	$ 9,059,665	$ 9,059,665	$ 9,059,665
Inflated CIP-OWRB SRF Loans	0	0	0	0	0	0	0	0
Projected New SRF Debt	$ 5,377,247	$ 5,377,247	$ 5,377,247	$ 5,377,247	$ 5,377,247	$ 5,236,241	$ 4,088,967	$ 3,584,878
Wastewater								
Inflated CIP-Revenue Bonds	0	16,642,000	0	42,736,000	0	0	21,940,000	0
Issue Amount	0	18,782,161	0	48,231,850	0	0	24,761,484	0
Projected New Revenue Bond Debt	$ 7,324,878	$ 7,324,878	$ 8,657,519	$ 8,657,519	$ 12,079,687	$ 12,079,687	$12,079,687	$13,836,575
Inflated CIP-OWRB SRF Loans	0	0	0	0	14,083,000	0	0	0
Projected New SRF Debt	$ 1,308,880	$ 1,308,880	$ 1,308,880	$ 1,308,880	$ 1,308,880	$ 1,308,880	$ 1,964,473	$ 1,964,473

Appendix A-4
Summary of New Debt Financing (Continued)

Description	2031	2032	2033	2034	2035	2036	2037	2038	2039
Water									
Inflated CIP-Revenue Bonds	0	0	0	0	0	0	6,304,000	0	75,612,000
Issue Amount	0	0	0	0	0	0	7,114,694	0	85,335,703
Projected New Revenue Bond Debt	$ 9,059,665	$ 7,757,614	$ 7,757,614	$ 7,757,614	$ 3,175,371	$ 3,175,371	$ 3,175,371	$ 3,680,176	$ 3,680,176
Inflated CIP-OWRB SRF Loans	0	0	0	0	0	0	0	0	0
Projected New SRF Debt	$ 3,584,878	$ 709,625	$ 408,176	$ 408,176	$ 408,176	$ 408,176	$ 408,176	$ -	$ -
Wastewater									
Inflated CIP-Revenue Bonds	21,373,000	0	0	16,112,000	0	27,355,000	0	0	20,621,000
Issue Amount	24,121,568	0	0	18,184,003	0	30,872,853	0	0	23,272,861
Projected New Revenue Bond Debt	$13,836,575	$14,395,672	$14,395,672	$14,395,672	$14,469,343	$14,469,343	$16,245,290	$16,245,290	$15,663,370
Inflated CIP-OWRB SRF Loans	0	0	0	0	0	0	0	0	0
Projected New SRF Debt	$ 1,964,473	$ 1,579,149	$ 1,579,149	$ 1,579,149	$ 1,579,149	$ 1,579,149	$ 1,199,456	$ 1,199,456	$ 1,199,456

Appendix A-4
Summary of New Debt Financing (Continued)

Description	2040	2041	2042	2043	2044	2045	2046	2047
Water								
Inflated CIP-Revenue Bonds	0	0	0	0	6,784,000	0	0	8,472,000
Issue Amount	0	0	0	0	7,656,422	0	0	9,561,499
Projected New Revenue Bond Debt	$ 9,734,954	$ 9,734,954	$ 9,349,384	$ 9,349,384	$ 6,559,583	$ 7,102,825	$ 7,102,825	$ 7,102,825
Inflated CIP-OWRB SRF Loans	0	0	0	0	0	0	0	0
Projected New SRF Debt	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Wastewater								
Inflated CIP-Revenue Bonds	0	22,762,000	0	26,232,000	0	38,005,000	0	30,607,000
Issue Amount	0	25,689,193	0	29,605,435	0	42,892,443	0	34,543,060
Projected New Revenue Bond Debt	$ 17,314,637	$16,105,235	$17,927,946	$16,837,859	$18,938,437	$ 18,323,126	$ 21,366,450	$20,321,767
Inflated CIP-OWRB SRF Loans	0	0	0	0	0	0	0	0
Projected New SRF Debt	$ 955,372	$ 955,372	$ 955,372	$ 955,372	$ 955,372	$ 955,372	$ 955,372	$ 955,372

Appendix A-4
Summary of New Debt Financing (Continued)

Description	2048	2049	2050	2051	2052	2053	2054	2055
Water								
Inflated CIP-Revenue Bonds	0	0	0	0	9,821,000	0	0	0
Issue Amount	0	0	0	0	11,083,981	0	0	0
Projected New Revenue Bond Debt	$ 7,781,237	$ 7,781,237	$ 7,781,237	$ 7,781,237	$ 7,781,237	$ 8,567,672	$ 8,567,672	$ 8,567,672
Inflated CIP-OWRB SRF Loans	0	0	0	0	0	0	0	0
Projected New SRF Debt	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Wastewater								
Inflated CIP-Revenue Bonds	0	112,965,000	0	57,359,000	0	0	43,239,000	0
Issue Amount	0	127,492,299	0	64,735,367	0	0	48,799,535	0
Projected New Revenue Bond Debt	$ 22,772,682	$22,772,682	$ 30,485,933	$30,485,933	$ 31,656,898	$31,656,898	$ 31,656,898	$33,362,457
Inflated CIP-OWRB SRF Loans	0	0	0	0	0	0	0	0
Projected New SRF Debt	$ 955,372	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Appendix A-4
Summary of New Debt Financing (Continued)

Description	2006	2007	2008	2009	2010	2011	2012	2013
Projected New Debt Service								
Total New Water Debt Service	-	1,302,051	1,443,057	2,590,331	7,676,663	7,676,663	10,551,916	10,853,365
Total New Wastewater Debt Service	-	1,152,387	1,152,387	1,452,166	2,668,695	2,668,695	3,468,577	3,468,577
Total Projected New Debt Service	-	2,454,438	2,595,445	4,042,498	10,345,358	10,345,358	14,020,493	14,321,943
Existing Debt Service Scheduled								
Total Water Debt Service	2,448,010	2,677,989	2,691,958	2,704,518	1,937,817	1,371,818	1,372,579	757,418
Total Wastewater Debt Service	266,362	1,314,641	1,441,933	1,453,581	1,474,465	2,072,948	2,505,079	2,506,209
Total Existing Debt Service	2,714,372	3,992,630	4,133,890	4,158,100	3,412,282	3,444,766	3,877,659	3,263,627
Total Existing and New Debt Service	$ 2,714,372	$6,447,069	$ 6,729,335	$8,200,598	$ 13,757,640	$13,790,124	$ 17,898,152	$17,585,569
% Total Debt Service Water	90%	62%	61%	65%	70%	66%	67%	66%
% Total Debt Service Wastewater	10%	38%	39%	35%	30%	34%	33%	34%

Appendix A-5
Summary of Total Debt Service

Description	2014	2015	2016	2017	2018	2019	2020	2021	2022
Projected New Debt Service									
Total New Water Debt Service	10,853,365	10,853,365	10,853,365	11,238,936	11,647,112	14,436,912	14,436,912	14,436,912	14,436,912
Total New Wastewater Debt Service	4,050,497	4,050,497	5,259,899	5,639,592	6,729,679	6,729,679	7,589,074	7,589,074	8,633,758
Total Projected New Debt Service	14,903,862	14,903,862	16,113,264	16,878,528	18,376,791	21,166,591	22,025,986	22,025,986	23,070,670
Existing Debt Service Scheduled									
Total Water Debt Service	177,814	176,949	176,098	175,218	174,353	173,488	172,627	171,757	85,555
Total Wastewater Debt Service	1,613,023	771,469	770,233	769,021	767,762	766,526	765,290	764,064	762,818
Total Existing Debt Service	1,790,837	948,418	946,331	944,239	942,115	940,014	937,917	935,821	848,373
Total Existing and New Debt Service	$16,694,699	$15,852,280	$17,059,595	$17,822,767	$19,318,906	$22,106,605	$22,963,903	$22,961,807	$23,919,043
% Total Debt Service Water	66%	70%	65%	64%	61%	66%	64%	64%	61%
% Total Debt Service Wastewater	34%	30%	35%	36%	39%	34%	36%	36%	39%

Appendix A-5
Summary of Total Debt Service (Continued)

Description	2023	2024	2025	2026	2027	2028	2029	2030
Projected New Debt Service								
Total New Water Debt Service	14,436,912	14,436,912	14,436,912	14,436,912	14,436,912	14,295,906	13,148,632	12,644,544
Total New Wastewater Debt Service	8,633,758	8,633,758	9,966,398	9,966,398	13,388,567	13,388,567	14,044,160	15,801,048
Total Projected New Debt Service	23,070,670	23,070,670	24,403,310	24,403,310	27,825,479	27,684,473	27,192,791	28,445,591
Existing Debt Service Scheduled								
Total Water Debt Service	-	-	-	-	-	-	-	-
Total Wastewater Debt Service	761,582	638,444	516,230	516,230	-	-	-	-
Total Existing Debt Service	761,582	638,444	516,230	516,230	-	-	-	-
Total Existing and New Debt Service	$ 23,832,252	$ 23,709,114	$ 24,919,540	$ 24,919,540	$ 27,825,479	$ 27,684,473	$ 27,192,791	$ 28,445,591
% Total Debt Service Water	61%	61%	58%	58%	52%	52%	48%	44%
% Total Debt Service Wastewater	39%	39%	42%	42%	48%	48%	52%	56%

Appendix A-5
Summary of Total Debt Service (Continued)

Description	2031	2032	2033	2034	2035	2036	2037	2038	2039
Projected New Debt Service									
Total New Water Debt Service	12,644,544	8,467,239	8,165,790	8,165,790	3,583,547	3,583,547	3,583,547	3,680,176	3,680,176
Total New Wastewater Debt Service	15,801,048	15,974,821	15,974,821	15,974,821	16,048,492	16,048,492	17,444,745	17,444,745	16,862,826
Total Projected New Debt Service	28,445,591	24,442,060	24,140,611	24,140,611	19,632,039	19,632,039	21,028,292	21,124,922	20,543,002
Existing Debt Service Scheduled									
Total Water Debt Service	-	-	-	-	-	-	-	-	-
Total Wastewater Debt Service	-	-	-	-	-	-	-	-	-
Total Existing Debt Service	-	-	-	-	-	-	-	-	-
Total Existing and New Debt Service	$28,445,591	$24,442,060	$24,140,611	$24,140,611	$19,632,039	$19,632,039	$21,028,292	$21,124,922	$20,543,002
% Total Debt Service Water	44%	35%	34%	34%	18%	18%	17%	17%	18%
% Total Debt Service Wastewater	56%	65%	66%	66%	82%	82%	83%	83%	82%

Appendix A-5
Summary of Total Debt Service (Continued)

Description	2040	2041	2042	2043	2044	2045	2046	2047
Projected New Debt Service								
Total New Water Debt Service	9,734,954	9,734,954	9,349,384	9,349,384	6,559,583	7,102,825	7,102,825	7,102,825
Total New Wastewater Debt Service	18,270,009	17,060,607	18,883,319	17,793,231	19,893,810	19,278,498	22,321,823	21,277,139
Total Projected New Debt Service	28,004,963	26,795,561	28,232,702	27,142,615	26,453,392	26,381,323	29,424,647	28,379,964
Existing Debt Service Scheduled								
Total Water Debt Service	-	-	-	-	-	-	-	-
Total Wastewater Debt Service	-	-	-	-	-	-	-	-
Total Existing Debt Service	-	-	-	-	-	-	-	-
Total Existing and New Debt Service	$ 28,004,963	$ 26,795,561	$ 28,232,702	$ 27,142,615	$ 26,453,392	$ 26,381,323	$ 29,424,647	$ 28,379,964
% Total Debt Service Water	35%	36%	33%	34%	25%	27%	24%	25%
% Total Debt Service Wastewater	65%	64%	67%	66%	75%	73%	76%	75%

Appendix A-5
Summary of Total Debt Service (Continued)

Description	2048	2049	2050	2051	2052	2053	2054	2055
Projected New Debt Service								
Total New Water Debt Service	7,781,237	7,781,237	7,781,237	7,781,237	7,781,237	8,567,672	8,567,672	8,567,672
Total New Wastewater Debt Service	23,728,054	22,772,682	30,485,933	30,485,933	31,656,898	31,656,898	31,656,898	33,362,457
Total Projected New Debt Service	31,509,290	30,553,918	38,267,170	38,267,170	39,438,135	40,224,570	40,224,570	41,930,129
Existing Debt Service Scheduled								
Total Water Debt Service	-	-	-	-	-	-	-	-
Total Wastewater Debt Service	-	-	-	-	-	-	-	-
Total Existing Debt Service	-	-	-	-	-	-	-	-
Total Existing and New Debt Service	$ 31,509,290	$ 30,553,918	$ 38,267,170	$ 38,267,170	$ 39,438,135	$ 40,224,570	$ 40,224,570	$ 41,930,129
% Total Debt Service Water	25%	25%	20%	20%	20%	21%	21%	20%
% Total Debt Service Wastewater	75%	75%	80%	80%	80%	79%	79%	80%

Appendix A-5
Summary of Total Debt Service (Continued)

Description	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Replace Diffusers							307,000			
I&C Upgrades										336,000
Sewer Cleaning	330,000	339,000	350,000	540,000	556,000	573,000	590,000	608,000	626,000	645,000
Sewer Video Inspection	191,000	196,000	202,000	416,000	429,000	442,000	455,000	469,000	483,000	497,000
I/I Studies	144,000	149,000	153,000	158,000	162,000	167,000	172,000	177,000	183,000	188,000
Total	$665,000	$684,000	$705,000	$1,114,000	$1,147,000	$1,182,000	$1,217,000	$1,254,000	$1,292,000	$1,330,000

Description	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Replace Diffusers					389,000					
I&C Upgrades										903,000
Sewer Cleaning	664,000	684,000	705,000	726,000	748,000	770,000	793,000	817,000	842,000	867,000
Sewer Video Inspection	512,000	528,000	543,000	560,000	576,000	594,000	612,000	630,000	649,000	668,000
I/I Studies	194,000	200,000	206,000	212,000	218,000	225,000	231,000	238,000	245,000	253,000
Total	$1,370,000	$1,412,000	$1,454,000	$1,498,000	$1,542,000	$1,589,000	$1,636,000	$1,685,000	$1,736,000	$1,788,000

Appendix A-6
Wastewater System Annual Renewal and Replacement (Continued)

Description	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Replace Diffusers			493,000							
I&C Upgrades										607,000
Sewer Cleaning	893,000	920,000	947,000	976,000	1,340,000	1,380,000	1,422,000	1,464,000	1,508,000	1,553,000
Sewer Video Inspection	688,000	709,000	730,000	752,000	775,000	798,000	822,000	847,000	872,000	898,000
I/I Studies	260,000	268,000	276,000	285,000	293,000	302,000	311,000	320,000	330,000	340,000
Total	$1,841,000	$1,897,000	$1,953,000	$2,013,000	$2,408,000	$2,480,000	$2,555,000	$2,631,000	$2,710,000	$2,791,000

Appendix A-6
Wastewater System Annual Renewal and Replacement (Continued)

Description	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Replace Diffusers	625,000								792,000	
I&C Upgrades										1,631,000
Sewer Cleaning	1,600,000	1,648,000	1,697,000	1,748,000	1,801,000	1,855,000	1,911,000	1,968,000	2,534,000	2,610,000
Sewer Video Inspection	925,000	953,000	981,000	1,011,000	1,041,000	1,072,000	1,105,000	1,138,000	1,758,000	1,810,000
I/I Studies	350,000	361,000	371,000	382,000	394,000	406,000	418,000	430,000	443,000	457,000
Total	$2,875,000	$2,962,000	$3,049,000	$3,141,000	$3,236,000	$3,333,000	$3,434,000	$3,536,000	$4,735,000	$4,877,000

Appendix A-6
Wastewater System Annual Renewal and Replacement (Continued)

Description	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055
Replace Diffusers							1,003,000			
I&C Upgrades										1,096,000
Sewer Cleaning	2,688,000	2,769,000	2,852,000	2,937,000	3,025,000	3,116,000	3,210,000	3,306,000	3,405,000	3,507,000
Sewer Video Inspection	1,865,000	1,921,000	1,978,000	2,038,000	2,099,000	2,162,000	2,227,000	2,293,000	2,362,000	2,433,000
I/I Studies	470,000	484,000	499,000	514,000	529,000	545,000	562,000	579,000	596,000	614,000
Total	$5,023,000	$5,174,000	$5,329,000	$5,489,000	$5,653,000	$5,823,000	$5,999,000	$6,178,000	$6,363,000	$6,554,000

Appendix A-6
Wastewater System Annual Renewal and Replacement (Continued)

	2006	2007	2008	2009	2010	2011	2012	2013
Water								
Sources								
Revenues	$ 5,777,933	$ 9,883,280	$ 10,085,639	$ 11,818,727	$ 15,488,873	$ 17,684,920	$ 19,953,010	$ 20,543,124
Transfers In	4,986,795	3,538,408	3,585,777	3,935,537	4,365,419	4,239,445	4,432,790	4,497,627
Total--Sources	10,764,727	13,421,688	13,671,416	15,754,264	19,854,291	21,924,365	24,385,800	25,040,751
Outflows								
Expenses	2,929,014	3,016,060	3,105,716	3,380,063	3,653,640	4,800,424	4,943,611	5,699,094
Capital	30,900	1,603,827	32,782	1,810,765	1,217,778	35,822	1,881,896	1,742,003
Debt Service	2,448,010	3,980,040	4,135,015	5,294,850	9,614,479	9,048,481	11,924,496	11,610,783
Reserves	856,803	21,761	1,397,903	68,587	68,394	2,539,639	35,797	188,871
Transfers Out	**4,500,000**	**4,800,000**	**5,000,000**	**5,200,000**	**5,300,000**	**5,500,000**	**5,600,000**	**5,800,000**
Total--Outflows	10,764,727	13,421,688	13,671,416	15,754,264	19,854,291	21,924,365	24,385,800	25,040,751
Wastewater								
Sources								
Revenues	5,524,515	5,529,438	5,622,411	6,261,398	9,508,269	10,483,250	12,100,014	10,586,107
Transfers In	554,088	2,168,702	2,292,546	2,119,135	1,870,894	2,183,957	2,183,314	2,316,960
Total--Sources	6,078,603	7,698,139	7,914,957	8,380,533	11,379,162	12,667,207	14,283,329	12,903,066
Outflows								
Expenses	2,480,919	2,554,134	2,747,976	3,218,004	3,313,862	4,010,606	4,437,202	4,254,336
Capital	703,634	724,673	745,923	768,391	791,083	815,005	840,165	864,570
Debt Service	1,314,641	2,594,320	2,605,969	2,926,632	4,741,643	5,173,775	5,974,786	5,081,600
Reserves	179,409	425,012	415,089	117,507	1,132,575	1,267,821	1,531,175	1,202,560
Transfers Out	**1,400,000**	**1,400,000**	**1,400,000**	**1,350,000**	**1,400,000**	**1,400,000**	**1,500,000**	**1,500,000**
Total--Outflows	$ 6,078,603	$ 7,698,139	$ 7,914,957	$ 8,380,533	$ 11,379,162	$ 12,667,207	$ 14,283,329	$ 12,903,066
Total--Transfers Out	**$ 5,900,000**	**$ 6,200,000**	**$ 6,400,000**	**$ 6,550,000**	**$ 6,700,000**	**$ 6,900,000**	**$ 7,100,000**	**$ 7,300,000**

Appendix A-7
Projected Transfers out to General Fund

	2014	2015	2016	2017	2018	2019	2020	2021	2022
Water									
Sources									
Revenues	$ 18,149,545	$ 19,610,222	$ 18,775,208	$ 19,385,144	$ 23,051,759	$ 22,824,829	$ 23,473,448	$ 24,245,420	$ 26,684,090
Transfers In	4,632,556	5,060,717	4,840,214	4,908,722	4,818,984	5,370,402	5,363,893	5,524,810	5,423,809
Total--Sources	22,782,102	24,670,939	23,615,422	24,293,866	27,870,743	28,195,232	28,837,340	29,770,229	32,107,899
Outflows									
Expenses	5,869,242	6,212,494	6,398,044	6,589,160	6,786,010	6,988,765	7,382,603	7,603,256	8,600,528
Capital	39,143	1,442,317	41,527	42,773	2,714,056	45,378	46,739	703,141	1,735,585
Debt Service	11,031,179	11,030,314	11,029,463	11,414,154	11,821,465	14,610,400	14,609,539	14,608,669	14,522,467
Reserves	42,537	85,813	46,387	47,779	49,212	50,689	98,459	55,163	249,318
Transfers Out	**5,800,000**	**5,900,000**	**6,100,000**	**6,200,000**	**6,500,000**	**6,500,000**	**6,700,000**	**6,800,000**	**7,000,000**
Total--Outflows	22,782,102	24,670,939	23,615,422	24,293,866	27,870,743	28,195,232	28,837,340	29,770,229	32,107,899
Wastewater									
Sources									
Revenues	10,602,497	11,393,775	12,643,839	13,253,809	14,561,253	15,614,793	16,103,885	16,992,900	17,921,512
Transfers In	2,386,468	2,168,879	2,606,269	2,761,156	3,080,990	2,766,571	3,017,190	3,107,705	3,467,681
Total--Sources	12,988,965	13,562,654	15,250,109	16,014,965	17,642,243	18,381,364	19,121,075	20,100,606	21,389,193
Outflows									
Expenses	4,382,084	4,848,525	4,795,739	4,940,249	5,087,834	5,618,588	6,174,943	5,960,000	6,137,868
Capital	891,227	917,144	945,328	973,788	1,002,532	1,032,568	2,153,905	1,095,552	3,211,519
Debt Service	4,821,966	4,820,730	6,028,920	6,407,354	7,496,205	7,494,969	8,353,138	8,351,892	9,395,340
Reserves	1,093,688	1,076,255	1,480,122	1,593,574	1,955,672	1,935,239	139,089	2,193,162	44,467
Transfers Out	**1,800,000**	**1,900,000**	**2,000,000**	**2,100,000**	**2,100,000**	**2,300,000**	**2,300,000**	**2,500,000**	**2,600,000**
Total--Outflows	$ 12,988,965	$ 13,562,654	$ 15,250,109	$ 16,014,965	$ 17,642,243	$ 18,381,364	$ 19,121,075	$ 20,100,606	$ 21,389,193
Total--Transfers Out	**$ 7,600,000**	**$ 7,800,000**	**$ 8,100,000**	**$ 8,300,000**	**$ 8,600,000**	**$ 8,800,000**	**$ 9,000,000**	**$ 9,300,000**	**$ 9,600,000**

Appendix A-7
Projected Transfers out to General Fund (Continued)

	2023	2024	2025	2026	2027	2028	2029	2030
Water								
Sources								
Revenues	$ 26,659,478	$ 27,013,250	$ 26,924,524	$ 27,274,178	$ 30,004,761	$ 30,293,005	$ 30,018,635	$ 28,990,061
Transfers In	5,586,524	5,754,119	5,635,264	5,804,322	5,359,991	5,520,790	5,248,998	4,955,929
Total--Sources	32,246,002	32,767,369	32,559,788	33,078,499	35,364,752	35,813,796	35,267,633	33,945,990
Outflows								
Expenses	8,857,719	9,122,626	9,395,479	9,676,518	9,965,989	10,264,143	10,571,243	10,887,555
Capital	1,787,073	1,841,605	1,159,183	1,194,809	2,989,483	3,079,208	3,170,984	1,984,813
Debt Service	14,436,912	14,436,912	14,436,912	14,436,912	14,436,912	14,295,906	13,148,632	12,644,544
Reserves	64,298	66,227	68,213	70,260	72,368	74,539	76,775	79,078
Transfers Out	7,100,000	7,300,000	7,500,000	7,700,000	7,900,000	8,100,000	8,300,000	8,350,000
Total--Outflows	32,246,002	32,767,369	32,559,788	33,078,499	35,364,752	35,813,796	35,267,633	33,945,990
Wastewater								
Sources								
Revenues	18,175,915	19,073,533	21,091,775	19,745,079	23,942,767	24,614,641	26,327,836	29,100,991
Transfers In	3,571,712	3,678,863	4,080,708	4,203,129	4,947,684	5,096,114	5,686,414	6,307,546
Total--Sources	21,747,626	22,752,396	25,172,483	23,948,209	28,890,451	29,710,756	32,014,250	35,408,536
Outflows								
Expenses	6,321,662	6,511,500	7,609,503	6,969,796	7,179,398	7,886,608	9,141,564	9,750,159
Capital	3,307,814	4,143,449	1,233,432	1,269,775	1,308,488	1,347,583	1,388,070	1,429,963
Debt Service	9,272,202	9,149,988	10,482,628	9,966,398	13,388,567	13,388,567	14,044,160	15,801,048
Reserves	45,949	47,459	2,846,920	2,642,239	3,813,998	3,787,998	3,990,456	4,577,367
Transfers Out	2,800,000	2,900,000	3,000,000	3,100,000	3,200,000	3,300,000	3,450,000	3,850,000
Total--Outflows	$ 21,747,626	$ 22,752,396	$ 25,172,483	$ 23,948,209	$ 28,890,451	$ 29,710,756	$ 32,014,250	$ 35,408,536
Total--Transfers Out	**$ 9,900,000**	**$ 10,200,000**	**$ 10,500,000**	**$ 10,800,000**	**$ 11,100,000**	**$ 11,400,000**	**$ 11,750,000**	**$ 12,200,000**

Appendix A-7
Projected Transfers out to General Fund (Continued)

	2031	2032	2033	2034	2035	2036	2037	2038	2039
Water									
Sources									
Revenues	$ 28,819,941	$ 28,173,407	$ 28,568,726	$ 29,162,849	$ 25,766,975	$ 24,341,804	$ 26,189,715	$ 26,863,904	$ 27,391,978
Transfers In	5,104,607	4,182,297	4,184,687	4,310,227	2,350,342	2,420,852	2,354,951	2,425,599	2,645,330
Total--Sources	33,924,548	32,355,703	32,753,413	33,473,077	28,117,317	26,762,655	28,544,666	29,289,503	30,037,308
Outflows									
Expenses	11,213,356	11,548,932	11,894,575	12,250,587	12,617,279	11,301,106	11,639,314	11,987,669	12,346,473
Capital	1,384,698	3,465,639	3,569,638	3,676,697	2,300,818	2,115,002	3,229,252	3,325,570	3,425,957
Debt Service	12,644,544	8,467,239	8,165,790	8,165,790	3,583,547	3,583,547	3,583,547	3,680,176	3,680,176
Reserves	81,450	83,894	86,411	89,003	91,673	-	84,552	87,089	89,701
Transfers Out	8,600,500	8,790,000	9,037,000	9,291,000	9,524,000	9,763,000	10,008,000	10,209,000	10,495,000
Total--Outflows	33,924,548	32,355,703	32,753,413	33,473,077	28,117,317	26,762,655	28,544,666	29,289,503	30,037,308
Wastewater									
Sources									
Revenues	29,355,076	28,794,270	28,932,447	29,200,558	28,090,386	28,328,742	29,680,114	29,921,473	29,531,595
Transfers In	6,496,772	7,767,123	8,123,216	8,366,912	10,707,112	11,028,325	11,497,702	11,842,633	12,050,949
Total--Sources	35,851,848	36,561,393	37,055,663	37,567,470	38,797,498	39,357,067	41,177,815	41,764,106	41,582,544
Outflows									
Expenses	10,129,162	10,433,375	10,745,464	11,067,636	12,006,103	12,366,085	12,093,805	12,454,497	12,828,400
Capital	1,472,271	1,517,010	1,562,190	1,608,826	3,355,930	1,707,518	1,758,604	1,811,202	1,865,328
Debt Service	15,801,048	15,974,821	15,974,821	15,974,821	16,048,492	16,048,492	17,444,745	17,444,745	16,862,826
Reserves	4,549,367	4,580,187	4,550,187	4,519,187	2,813,972	4,478,972	4,933,661	4,898,661	4,658,989
Transfers Out	3,900,000	4,056,000	4,223,000	4,397,000	4,573,000	4,756,000	4,947,000	5,155,000	5,367,000
Total--Outflows	$ 35,851,848	$ 36,561,393	$ 37,055,663	$ 37,567,470	$ 38,797,498	$ 39,357,067	$ 41,177,815	$ 41,764,106	$ 41,582,544
Total--Transfers Out	**$ 12,500,500**	**$ 12,846,000**	**$ 13,260,000**	**$ 13,688,000**	**$ 14,097,000**	**$ 14,519,000**	**$ 14,955,000**	**$ 15,364,000**	**$ 15,862,000**

Appendix A-7
Projected Transfers out to General Fund (Continued)

	2040	2041	2042	2043	2044	2045	2046	2047
Water								
Sources								
Revenues	$ 31,531,796	$ 31,729,973	$ 33,586,257	$ 40,678,580	$ 38,966,182	$ 38,074,834	$ 39,130,026	$ 41,241,299
Transfers In	5,298,009	5,612,862	5,299,477	5,623,869	4,259,254	4,737,994	4,337,897	4,654,202
Total--Sources	36,829,805	37,342,835	38,885,734	46,302,449	43,225,435	42,812,828	43,467,923	45,895,501
Outflows								
Expenses	12,716,043	13,096,699	13,488,775	19,153,613	19,727,396	20,318,393	20,927,119	21,554,108
Capital	3,528,416	1,860,948	4,656,557	4,796,244	4,941,011	3,092,861	2,842,797	4,339,821
Debt Service	9,734,954	9,734,954	9,349,384	9,349,384	6,559,583	7,102,825	7,102,825	7,102,825
Reserves	92,392	1,633,234	98,019	1,416,210	143,446	147,749	152,182	156,747
Transfers Out	10,758,000	11,017,000	11,293,000	11,587,000	11,854,000	12,151,000	12,443,000	12,742,000
Total--Outflows	36,829,805	37,342,835	38,885,734	46,302,449	43,225,435	42,812,828	43,467,923	45,895,501
Wastewater								
Sources								
Revenues	34,241,112	33,113,458	35,453,845	34,487,534	37,105,909	37,977,429	40,611,808	40,438,439
Transfers In	9,839,159	9,978,421	10,759,544	10,916,922	12,777,761	12,810,132	13,736,673	13,962,605
Total--Sources	44,080,271	43,091,879	46,213,389	45,404,456	49,883,670	50,787,561	54,348,481	54,401,044
Outflows								
Expenses	13,213,760	13,609,831	14,018,874	14,438,159	16,755,961	18,073,568	17,041,273	17,552,560
Capital	1,920,998	1,979,228	2,038,035	2,099,436	6,152,449	6,337,092	7,938,385	2,363,347
Debt Service	18,270,009	17,060,607	18,883,319	17,793,231	19,893,810	19,278,498	22,321,823	21,277,139
Reserves	5,114,503	4,652,213	5,251,161	4,828,631	579,451	329,402	-	5,871,999
Transfers Out	5,561,000	5,790,000	6,022,000	6,245,000	6,502,000	6,769,000	7,047,000	7,336,000
Total--Outflows	$ 44,080,271	$ 43,091,879	$ 46,213,389	$ 45,404,456	$ 49,883,670	$ 50,787,561	$ 54,348,481	$ 54,401,044
Total--Transfers Out	**$ 16,319,000**	**$ 16,807,000**	**$ 17,315,000**	**$ 17,832,000**	**$ 18,356,000**	**$ 18,920,000**	**$ 19,490,000**	**$ 20,078,000**

Appendix A-7
Projected Transfers out to General Fund (Continued)

	2048	2049	2050	2051	2052	2053	2054	2055
Water								
Sources								
Revenues	$ 42,866,700	$ 43,880,109	$ 45,953,554	$ 45,453,719	$ 48,150,648	$ 49,853,016	$ 51,017,422	$ 52,449,871
Transfers In	4,793,828	4,937,643	4,068,617	4,190,676	4,316,396	4,668,183	4,808,228	4,716,643
Total--Sources	47,660,528	48,817,751	50,022,172	49,644,395	52,467,044	54,521,199	55,825,650	57,166,514
Outflows								
Expenses	22,199,906	22,865,078	23,550,205	24,255,886	24,982,738	25,731,395	26,502,511	27,296,762
Capital	4,469,936	4,604,144	4,742,448	3,294,851	5,031,357	5,181,968	5,337,687	5,497,517
Debt Service	7,781,237	7,781,237	7,781,237	7,781,237	7,781,237	8,567,672	8,567,672	8,567,672
Reserves	161,450	166,293	171,282	176,420	181,713	187,164	192,779	198,563
Transfers Out	**13,048,000**	**13,401,000**	**13,777,000**	**14,136,000**	**14,490,000**	**14,853,000**	**15,225,000**	**15,606,000**
Total--Outflows	47,660,528	48,817,751	50,022,172	49,644,395	52,467,044	54,521,199	55,825,650	57,166,514
Wastewater								
Sources								
Revenues	44,165,041	43,277,432	53,080,564	53,487,679	59,519,890	59,291,105	59,860,591	63,612,875
Transfers In	14,381,483	14,812,928	16,274,470	16,762,704	17,265,585	17,561,258	18,088,096	18,866,571
Total--Sources	58,546,524	58,090,359	69,355,034	70,250,383	76,785,475	76,852,363	77,948,687	82,479,446
Outflows								
Expenses	18,078,655	18,620,882	19,178,577	19,754,082	24,359,753	24,056,223	24,777,308	26,616,476
Capital	2,433,997	2,507,357	5,229,448	2,659,291	2,738,910	2,821,327	2,906,567	2,993,654
Debt Service	23,728,054	22,772,682	30,485,933	30,485,933	31,656,898	31,656,898	31,656,898	33,362,457
Reserves	6,682,819	6,299,439	6,302,077	8,898,077	9,254,914	9,199,914	9,142,914	9,681,860
Transfers Out	**7,623,000**	**7,890,000**	**8,159,000**	**8,453,000**	**8,775,000**	**9,118,000**	**9,465,000**	**9,825,000**
Total--Outflows	$ 58,546,524	$ 58,090,359	$ 69,355,034	$ 70,250,383	$ 76,785,475	$ 76,852,363	$ 77,948,687	$ 82,479,446
Total--Transfers Out	**$ 20,671,000**	**$ 21,291,000**	**$ 21,936,000**	**$ 22,589,000**	**$ 23,265,000**	**$ 23,971,000**	**$ 24,690,000**	**$ 25,431,000**

Appendix A-7
Projected Transfers out to General Fund (Continued)

Description	2006	2007	2008	2009	2010	2011	2012	2013
Operations & Maintenance								
Existing	$ 2,929,014	$ 3,016,060	$ 3,105,716	$ 3,198,063	$ 3,293,180	$ 3,391,150	$ 3,492,059	$ 3,595,996
New Project	-	-	-	182,000	360,460	1,409,274	1,451,552	2,103,099
Total--O&M	2,929,014	3,016,060	3,105,716	3,380,063	3,653,640	4,800,424	4,943,611	5,699,094
Capital Expenses	30,900	31,827	32,782	33,765	34,778	35,822	36,896	38,003
Debt Service Existing	2,448,010	2,677,989	2,691,958	2,704,518	1,937,817	1,371,818	1,372,579	757,418
New	-	1,302,051	1,443,057	2,590,331	7,676,663	7,676,663	10,551,916	10,853,365
Pay-as-you-go Existing	-	-	-	-	-	-	-	-
New	-	1,572,000	-	1,777,000	1,183,000	-	1,845,000	1,704,000
Total--Capital	2,478,910	5,583,867	4,167,797	7,105,615	10,832,258	9,084,303	13,806,392	13,352,786
Reserve Fund Deposits								
O&M Reserve Fund	-	21,761	22,414	68,587	68,394	286,696	35,797	188,871
Debt Service Coverage	856,803	-	1,375,489	-	-	2,252,943	-	-
Total--Reserve Deposits	856,803	21,761	1,397,903	68,587	68,394	2,539,639	35,797	188,871
Transfers Out to General Fund	4,500,000	4,800,000	5,000,000	5,200,000	5,300,000	5,500,000	5,600,000	5,800,000
Total Expenses	**10,764,727**	**13,421,688**	**13,671,416**	**15,754,264**	**19,854,291**	**21,924,365**	**24,385,800**	**25,040,751**
Sales Tax Revenue	4,986,795	3,538,408	3,585,777	3,935,537	4,365,419	4,239,445	4,432,790	4,497,627
Misc. Revenues	264,710	272,651	280,831	289,256	297,933	306,871	316,078	325,560
Rate Revenue Requirement	**$ 5,513,223**	**$ 9,610,629**	**$ 9,804,808**	**$ 11,529,472**	**$ 15,190,939**	**$ 17,378,049**	**$ 19,636,933**	**$ 20,217,564**

Appendix A-8
Projected Water Revenue Requirement

Description	2014	2015	2016	2017	2018	2019	2020	2021	2022
Operations & Maintenance									
Existing	$ 3,703,051	$ 3,813,317	$ 3,926,891	$ 4,043,873	$ 4,164,364	$ 4,288,470	$ 4,416,299	$ 4,547,963	$ 4,683,576
New Project	2,166,192	2,399,177	2,471,153	2,545,287	2,621,646	2,700,295	2,966,304	3,055,293	3,916,952
Total--O&M	5,869,242	6,212,494	6,398,044	6,589,160	6,786,010	6,988,765	7,382,603	7,603,256	8,600,528
Capital Expenses	39,143	40,317	41,527	42,773	44,056	45,378	46,739	48,141	49,585
Debt Service Existing	177,814	176,949	176,098	175,218	174,353	173,488	172,627	171,757	85,555
New	10,853,365	10,853,365	10,853,365	11,238,936	11,647,112	14,436,912	14,436,912	14,436,912	14,436,912
Pay-as-you-go Existing	-	-	-	-	-	-	-	-	-
New	-	1,402,000	-	-	2,670,000	-	-	655,000	1,686,000
Total--Capital	11,070,323	12,472,632	11,070,990	11,456,927	14,535,521	14,655,778	14,656,278	15,311,810	16,258,053
Reserve Fund Deposits									
O&M Reserve Fund	42,537	85,813	46,387	47,779	49,212	50,689	98,459	55,163	249,318
Debt Service Coverage	-	-	-	-	-	-	-	-	-
Total--Reserve Deposits	42,537	85,813	46,387	47,779	49,212	50,689	98,459	55,163	249,318
Transfers Out to General Fund	5,800,000	5,900,000	6,100,000	6,200,000	6,500,000	6,500,000	6,700,000	6,800,000	7,000,000
Total Expenses	**22,782,102**	**24,670,939**	**23,615,422**	**24,293,866**	**27,870,743**	**28,195,232**	**28,837,340**	**29,770,229**	**32,107,899**
Sales Tax Revenue	4,632,556	5,060,717	4,840,214	4,908,722	4,818,984	5,370,402	5,363,893	5,524,810	5,423,809
Misc. Revenues	335,327	345,387	355,748	366,421	377,413	388,736	400,398	412,410	424,782
Rate Revenue Requirement	**$17,814,219**	**$19,264,836**	**$18,419,459**	**$19,018,723**	**$22,674,345**	**$22,436,094**	**$23,073,050**	**$23,833,010**	**$26,259,308**

Appendix A-8
Projected Water Revenue Requirement (Continued)

Description	2023	2024	2025	2026	2027	2028	2029	2030
Operations & Maintenance								
Existing	$ 4,823,259	$ 4,967,131	$ 5,115,320	$ 5,267,955	$ 5,425,168	$ 5,587,098	$ 5,753,886	$ 5,925,677
New Project	4,034,460	4,155,494	4,280,159	4,408,564	4,540,821	4,677,045	4,817,357	4,961,878
Total--O&M	8,857,719	9,122,626	9,395,479	9,676,518	9,965,989	10,264,143	10,571,243	10,887,555
Capital Expenses	51,073	52,605	54,183	55,809	57,483	59,208	60,984	62,813
Debt Service Existing	-	-	-	-	-	-	-	-
New	14,436,912	14,436,912	14,436,912	14,436,912	14,436,912	14,295,906	13,148,632	12,644,544
Pay-as-you-go Existing	-	-	-	-	-	-	-	-
New	1,736,000	1,789,000	1,105,000	1,139,000	2,932,000	3,020,000	3,110,000	1,922,000
Total--Capital	16,223,985	16,278,517	15,596,096	15,631,721	17,426,395	17,375,114	16,319,616	14,629,357
Reserve Fund Deposits								
O&M Reserve Fund	64,298	66,227	68,213	70,260	72,368	74,539	76,775	79,078
Debt Service Coverage	-	-	-	-	-	-	-	-
Total--Reserve Deposits	64,298	66,227	68,213	70,260	72,368	74,539	76,775	79,078
Transfers Out to General Fund	7,100,000	7,300,000	7,500,000	7,700,000	7,900,000	8,100,000	8,300,000	8,350,000
Total Expenses	**32,246,002**	**32,767,369**	**32,559,788**	**33,078,499**	**35,364,752**	**35,813,796**	**35,267,633**	**33,945,990**
Sales Tax Revenue	5,586,524	5,754,119	5,635,264	5,804,322	5,359,991	5,520,790	5,248,998	4,955,929
Misc. Revenues	437,525	450,651	464,171	478,096	492,439	507,212	522,428	538,101
Rate Revenue Requirement	**$ 26,221,953**	**$ 26,562,599**	**$ 26,460,354**	**$ 26,796,082**	**$ 29,512,322**	**$ 29,785,793**	**$ 29,496,207**	**$ 28,451,960**

Appendix A-8
Projected Water Revenue Requirement (Continued)

Description	2031	2032	2033	2034	2035	2036	2037	2038	2039
Operations & Maintenance									
Existing	$ 6,102,622	$ 6,284,876	$ 6,472,597	$ 6,665,950	$ 6,865,103	$ 7,070,231	$ 7,281,513	$ 7,499,133	$ 7,723,282
New Project	5,110,734	5,264,056	5,421,978	5,584,637	5,752,176	4,230,875	4,357,801	4,488,535	4,623,191
Total--O&M	11,213,356	11,548,932	11,894,575	12,250,587	12,617,279	11,301,106	11,639,314	11,987,669	12,346,473
Capital Expenses	64,698	66,639	68,638	70,697	72,818	75,002	77,252	79,570	81,957
Debt Service Existing	-	-	-	-	-	-	-	-	-
New	12,644,544	8,467,239	8,165,790	8,165,790	3,583,547	3,583,547	3,583,547	3,680,176	3,680,176
Pay-as-you-go Existing	-	-	-	-	-	-	-	-	-
New	1,320,000	3,399,000	3,501,000	3,606,000	2,228,000	2,040,000	3,152,000	3,246,000	3,344,000
Total--Capital	14,029,241	11,932,878	11,735,428	11,842,487	5,884,365	5,698,549	6,812,799	7,005,746	7,106,133
Reserve Fund Deposits									
O&M Reserve Fund	81,450	83,894	86,411	89,003	91,673	-	84,552	87,089	89,701
Debt Service Coverage	-	-	-	-	-	-	-	-	-
Total--Reserve Deposits	81,450	83,894	86,411	89,003	91,673	-	84,552	87,089	89,701
Transfers Out to General Fund	8,600,500	8,790,000	9,037,000	9,291,000	9,524,000	9,763,000	10,008,000	10,209,000	10,495,000
Total Expenses	**33,924,548**	**32,355,703**	**32,753,413**	**33,473,077**	**28,117,317**	**26,762,655**	**28,544,666**	**29,289,503**	**30,037,308**
Sales Tax Revenue	5,104,607	4,182,297	4,184,687	4,310,227	2,350,342	2,420,852	2,354,951	2,425,599	2,645,330
Misc. Revenues	554,244	570,871	587,997	605,637	623,806	642,521	661,796	681,650	702,100
Rate Revenue Requirement	**$28,265,698**	**$27,602,535**	**$27,980,729**	**$28,557,212**	**$25,143,169**	**$23,699,283**	**$25,527,918**	**$26,182,254**	**$26,689,878**

Appendix A-8
Projected Water Revenue Requirement (Continued)

Description	2040	2041	2042	2043	2044	2045	2046	2047
Operations & Maintenance								
Existing	$ 7,954,156	$ 8,191,955	$ 8,436,889	$ 8,689,170	$ 8,949,020	$ 9,216,666	$ 9,492,341	$ 9,776,286
New Project	4,761,887	4,904,744	5,051,886	10,464,442	10,778,376	11,101,727	11,434,779	11,777,822
Total--O&M	12,716,043	13,096,699	13,488,775	19,153,613	19,727,396	20,318,393	20,927,119	21,554,108
Capital Expenses	84,416	86,948	89,557	92,244	95,011	97,861	100,797	103,821
Debt Service Existing	-	-	-	-	-	-	-	-
New	9,734,954	9,734,954	9,349,384	9,349,384	6,559,583	7,102,825	7,102,825	7,102,825
Pay-as-you-go Existing	-	-	-	-	-	-	-	-
New	3,444,000	1,774,000	4,567,000	4,704,000	4,846,000	2,995,000	2,742,000	4,236,000
Total--Capital	13,263,370	11,595,902	14,005,940	14,145,627	11,500,594	10,195,686	9,945,622	11,442,646
Reserve Fund Deposits								
O&M Reserve Fund	92,392	95,164	98,019	1,416,210	143,446	147,749	152,182	156,747
Debt Service Coverage	-	1,538,070	-	-	-	-	-	-
Total--Reserve Deposits	92,392	1,633,234	98,019	1,416,210	143,446	147,749	152,182	156,747
Transfers Out to General Fund	10,758,000	11,017,000	11,293,000	11,587,000	11,854,000	12,151,000	12,443,000	12,742,000
Total Expenses	**36,829,805**	**37,342,835**	**38,885,734**	**46,302,449**	**43,225,435**	**42,812,828**	**43,467,923**	**45,895,501**
Sales Tax Revenue	5,298,009	5,612,862	5,299,477	5,623,869	4,259,254	4,737,994	4,337,897	4,654,202
Misc. Revenues	723,163	744,858	767,203	790,219	813,926	838,344	863,494	889,399
Rate Revenue Requirement	**$ 30,808,633**	**$ 30,985,116**	**$ 32,819,054**	**$ 39,888,361**	**$ 38,152,256**	**$ 37,236,490**	**$ 38,266,532**	**$ 40,351,900**

Appendix A-8
Projected Water Revenue Requirement (Continued)

Description	2048	2049	2050	2051	2052	2053	2054	2055
Operations & Maintenance								
Existing	$ 10,068,749	$ 10,369,986	$ 10,680,261	$ 10,999,844	$ 11,329,014	$ 11,668,059	$ 12,017,276	$ 12,376,969
New Project	12,131,157	12,495,092	12,869,944	13,256,043	13,653,724	14,063,336	14,485,236	14,919,793
Total--O&M	22,199,906	22,865,078	23,550,205	24,255,886	24,982,738	25,731,395	26,502,511	27,296,762
Capital Expenses	106,936	110,144	113,448	116,851	120,357	123,968	127,687	131,517
Debt Service Existing	-	-	-	-	-	-	-	-
New	7,781,237	7,781,237	7,781,237	7,781,237	7,781,237	8,567,672	8,567,672	8,567,672
Pay-as-you-go Existing	-	-	-	-	-	-	-	-
New	4,363,000	4,494,000	4,629,000	3,178,000	4,911,000	5,058,000	5,210,000	5,366,000
Total--Capital	12,251,172	12,385,380	12,523,685	11,076,088	12,812,594	13,749,640	13,905,359	14,065,190
Reserve Fund Deposits								
O&M Reserve Fund	161,450	166,293	171,282	176,420	181,713	187,164	192,779	198,563
Debt Service Coverage	-	-	-	-	-	-	-	-
Total--Reserve Deposits	161,450	166,293	171,282	176,420	181,713	187,164	192,779	198,563
Transfers Out to General Fund	13,048,000	13,401,000	13,777,000	14,136,000	14,490,000	14,853,000	15,225,000	15,606,000
Total Expenses	**47,660,528**	**48,817,751**	**50,022,172**	**49,644,395**	**52,467,044**	**54,521,199**	**55,825,650**	**57,166,514**
Sales Tax Revenue	4,793,828	4,937,643	4,068,617	4,190,676	4,316,396	4,668,183	4,808,228	4,716,643
Misc. Revenues	916,081	943,563	971,870	1,001,026	1,031,057	1,061,989	1,093,848	1,126,664
Rate Revenue Requirement	**$ 41,950,619**	**$ 42,936,546**	**$ 44,981,684**	**$ 44,452,692**	**$ 47,119,591**	**$ 48,791,028**	**$ 49,923,573**	**$ 51,323,207**

Appendix A-8
Projected Water Revenue Requirement (Continued)

Description	2006	2007	2008	2009	2010	2011	2012	2013
Operations & Maintenance								
Existing	$ 1,815,919	$ 1,870,134	$ 1,925,976	$ 1,983,494	$ 2,042,736	$ 2,103,757	$ 2,166,607	$ 2,231,344
New Project	665,000	684,000	822,000	1,234,510	1,271,125	1,906,849	2,270,595	2,022,992
Total--O&M	2,480,919	2,554,134	2,747,976	3,218,004	3,313,862	4,010,606	4,437,202	4,254,336
Capital Expenses	234,634	241,673	248,923	256,391	264,083	272,005	280,165	288,570
Debt Service Existing	1,314,641	1,441,933	1,453,581	1,474,465	2,072,948	2,505,079	2,506,209	1,613,023
New	-	1,152,387	1,152,387	1,452,166	2,668,695	2,668,695	3,468,577	3,468,577
Pay-as-you-gc Existing								
New	469,000	483,000	497,000	512,000	527,000	543,000	560,000	576,000
Total--Capital	2,018,275	3,318,993	3,351,892	3,695,023	5,532,725	5,988,780	6,814,952	5,946,170
Reserve Fund Deposits								
O&M Reserve Fund	179,409	18,304	48,461	117,507	23,965	174,186	106,649	-
Debt Service Coverage	-	406,708	366,629	-	1,108,610	1,093,635	1,424,526	1,202,560
Total--Reserve Deposits	179,409	425,012	415,089	117,507	1,132,575	1,267,821	1,531,175	1,202,560
Transfers Out to General Fund	1,400,000	1,400,000	1,400,000	1,350,000	1,400,000	1,400,000	1,500,000	1,500,000
Total Expenses	**6,078,603**	**7,698,139**	**7,914,957**	**8,380,533**	**11,379,162**	**12,667,207**	**14,283,329**	**12,903,066**
Sales Tax Revenue	554,088	2,168,702	2,292,546	2,119,135	1,870,894	2,183,957	2,183,314	2,316,960
Misc. Revenues	107,120	110,334	113,644	117,053	120,565	124,181	127,907	131,744
Rate Revenue Requirement	**$ 5,417,395**	**$ 5,419,104**	**$ 5,508,768**	**$ 6,144,345**	**$ 9,387,704**	**$ 10,359,069**	**$ 11,972,108**	**$ 10,454,363**

Appendix A-9
Projected Wastewater Revenue Requirement

Description	2014	2015	2016	2017	2018	2019	2020	2021	2022
Operations & Maintenance									
Existing	$ 2,298,022	$ 2,366,701	$ 2,437,440	$ 2,510,301	$ 2,585,348	$ 2,662,647	$ 2,742,264	$ 2,824,270	$ 2,908,736
New Project	2,084,062	2,481,824	2,358,299	2,429,948	2,502,486	2,955,941	3,432,679	3,135,729	3,229,131
Total–O&M	4,382,084	4,848,525	4,795,739	4,940,249	5,087,834	5,618,588	6,174,943	5,960,000	6,137,868
Capital Expenses	297,227	306,144	315,328	324,788	334,532	344,568	354,905	365,552	376,519
Debt Service Existing	771,469	770,233	769,021	767,762	766,526	765,290	764,064	762,818	761,582
New	4,050,497	4,050,497	5,259,899	5,639,592	6,729,679	6,729,679	7,589,074	7,589,074	8,633,758
Pay-as-you-gc Existing									
New	594,000	611,000	630,000	649,000	668,000	688,000	1,799,000	730,000	2,835,000
Total–Capital	5,713,193	5,737,874	6,974,248	7,381,142	8,498,737	8,527,537	10,507,043	9,447,444	12,606,859
Reserve Fund Deposits									
O&M Reserve Fund	31,937	116,610	-	36,128	36,896	132,688	139,089	-	44,467
Debt Service Coverage	1,061,751	959,645	1,480,122	1,557,446	1,918,775	1,802,551	-	2,193,162	-
Total–Reserve Deposits	1,093,688	1,076,255	1,480,122	1,593,574	1,955,672	1,935,239	139,089	2,193,162	44,467
Transfers Out to General Fund	1,800,000	1,900,000	2,000,000	2,100,000	2,100,000	2,300,000	2,300,000	2,500,000	2,600,000
Total Expenses	**12,988,965**	**13,562,654**	**15,250,109**	**16,014,965**	**17,642,243**	**18,381,364**	**19,121,075**	**20,100,606**	**21,389,193**
Sales Tax Revenue	2,386,468	2,168,879	2,606,269	2,761,156	3,080,990	2,766,571	3,017,190	3,107,705	3,467,681
Misc. Revenues	135,696	139,767	143,960	148,279	152,728	157,309	162,029	166,889	171,896
Rate Revenue Requirement	**$10,466,800**	**$11,254,008**	**$12,499,879**	**$13,105,530**	**$14,408,526**	**$15,457,484**	**$15,941,857**	**$16,826,011**	**$17,749,616**

Appendix A-9
Projected Wastewater Revenue Requirement (Continued)

Description	2023	2024	2025	2026	2027	2028	2029	2030
Operations & Maintenance								
Existing	$ 2,995,737	$ 3,085,347	$ 3,177,645	$ 3,272,713	$ 3,370,632	$ 3,471,489	$ 3,575,372	$ 3,682,371
New Project	3,325,925	3,426,153	4,431,857	3,697,083	3,808,766	4,415,119	5,566,192	6,067,788
Total--O&M	6,321,662	6,511,500	7,609,503	6,969,796	7,179,398	7,886,608	9,141,564	9,750,159
Capital Expenses	387,814	399,449	411,432	423,775	436,488	449,583	463,070	476,963
Debt Service Existing	638,444	516,230	516,230	-	-	-	-	-
New	8,633,758	8,633,758	9,966,398	9,966,398	13,388,567	13,388,567	14,044,160	15,801,048
Pay-as-you-gc Existing								
New	2,920,000	3,744,000	822,000	846,000	872,000	898,000	925,000	953,000
Total--Capital	12,580,016	13,293,436	11,716,060	11,236,173	14,697,055	14,736,150	15,432,230	17,231,010
Reserve Fund Deposits								
O&M Reserve Fund	45,949	47,459	274,501	-	52,400	176,803	313,739	152,149
Debt Service Coverage	-	-	2,572,419	2,642,239	3,761,598	3,611,196	3,676,717	4,425,218
Total--Reserve Deposits	45,949	47,459	2,846,920	2,642,239	3,813,998	3,787,998	3,990,456	4,577,367
Transfers Out to General Fund	2,800,000	2,900,000	3,000,000	3,100,000	3,200,000	3,300,000	3,450,000	3,850,000
Total Expenses	**21,747,626**	**22,752,396**	**25,172,483**	**23,948,209**	**28,890,451**	**29,710,756**	**32,014,250**	**35,408,536**
Sales Tax Revenue	3,571,712	3,678,863	4,080,708	4,203,129	4,947,684	5,096,114	5,686,414	6,307,546
Misc. Revenues	177,053	182,365	187,836	193,471	199,275	205,253	211,411	217,753
Rate Revenue Requirement	**$ 17,998,862**	**$ 18,891,168**	**$ 20,903,939**	**$ 19,551,609**	**$ 23,743,493**	**$ 24,409,388**	**$ 26,116,425**	**$ 28,883,238**

Appendix A-9
Projected Wastewater Revenue Requirement (Continued)

Description	2031	2032	2033	2034	2035	2036	2037	2038	2039
Operations & Maintenance									
Existing	$ 3,792,580	$ 3,906,096	$ 4,023,017	$ 4,143,445	$ 4,267,487	$ 4,395,249	$ 4,526,845	$ 4,662,388	$ 4,801,998
New Project	6,336,582	6,527,279	6,722,447	6,924,191	7,738,617	7,970,835	7,566,960	7,792,109	8,026,402
Total--O&M	10,129,162	10,433,375	10,745,464	11,067,636	12,006,103	12,366,085	12,093,805	12,454,497	12,828,400
Capital Expenses	491,271	506,010	521,190	536,826	552,930	569,518	586,604	604,202	622,328
Debt Service Existing	-	-	-	-	-	-	-	-	-
New	15,801,048	15,974,821	15,974,821	15,974,821	16,048,492	16,048,492	17,444,745	17,444,745	16,862,826
Pay-as-you-gc Existing									
New	981,000	1,011,000	1,041,000	1,072,000	2,803,000	1,138,000	1,172,000	1,207,000	1,243,000
Total--Capital	17,273,319	17,491,831	17,537,011	17,583,647	19,404,422	17,756,010	19,203,349	19,255,947	18,728,154
Reserve Fund Deposits									
O&M Reserve Fund	94,751	76,053	78,022	80,543	234,617	89,995	-	90,173	93,476
Debt Service Coverage	4,454,616	4,504,134	4,472,165	4,438,644	2,579,355	4,388,977	4,933,661	4,808,488	4,565,513
Total--Reserve Deposits	4,549,367	4,580,187	4,550,187	4,519,187	2,813,972	4,478,972	4,933,661	4,898,661	4,658,989
Transfers Out to General Fund	3,900,000	4,056,000	4,223,000	4,397,000	4,573,000	4,756,000	4,947,000	5,155,000	5,367,000
Total Expenses	**35,851,848**	**36,561,393**	**37,055,663**	**37,567,470**	**38,797,498**	**39,357,067**	**41,177,815**	**41,764,106**	**41,582,544**
Sales Tax Revenue	6,496,772	7,767,123	8,123,216	8,366,912	10,707,112	11,028,325	11,497,702	11,842,633	12,050,949
Misc. Revenues	224,285	231,014	237,944	245,083	252,435	260,008	267,809	275,843	284,118
Rate Revenue Requirement	**$29,130,790**	**$28,563,256**	**$28,694,503**	**$28,955,476**	**$27,837,951**	**$28,068,733**	**$29,412,305**	**$29,645,630**	**$29,247,477**

Appendix A-9
Projected Wastewater Revenue Requirement (Continued)

Description	2040	2041	2042	2043	2044	2045	2046	2047
Operations & Maintenance								
Existing	$ 4,945,796	$ 5,093,908	$ 5,246,463	$ 5,403,595	$ 5,565,441	$ 5,732,143	$ 5,903,845	$ 6,080,698
New Project	8,267,964	8,515,923	8,772,411	9,034,563	11,190,520	12,341,426	11,137,428	11,471,861
Total–O&M	13,213,760	13,609,831	14,018,874	14,438,159	16,755,961	18,073,568	17,041,273	17,552,560
Capital Expenses	640,998	660,228	680,035	700,436	721,449	743,092	765,385	788,347
Debt Service Existing	-	-	-	-	-	-	-	-
New	18,270,009	17,060,607	18,883,319	17,793,231	19,893,810	19,278,498	22,321,823	21,277,139
Pay-as-you-gc Existing								
New	1,280,000	1,319,000	1,358,000	1,399,000	5,431,000	5,594,000	7,173,000	1,575,000
Total–Capital	20,191,007	19,039,835	20,921,353	19,892,667	26,046,258	25,615,590	30,260,207	23,640,485
Reserve Fund Deposits								
O&M Reserve Fund	96,340	99,018	102,261	104,821	579,451	329,402	-	127,822
Debt Service Coverage	5,018,163	4,553,195	5,148,901	4,723,810	-	-	-	5,744,177
Total–Reserve Deposits	5,114,503	4,652,213	5,251,161	4,828,631	579,451	329,402	-	5,871,999
Transfers Out to General Fund	5,561,000	5,790,000	6,022,000	6,245,000	6,502,000	6,769,000	7,047,000	7,336,000
Total Expenses	**44,080,271**	**43,091,879**	**46,213,389**	**45,404,456**	**49,883,670**	**50,787,561**	**54,348,481**	**54,401,044**
Sales Tax Revenue	9,839,159	9,978,421	10,759,544	10,916,922	12,777,761	12,810,132	13,736,673	13,962,605
Misc. Revenues	292,642	301,421	310,464	319,777	329,371	339,252	349,429	359,912
Rate Revenue Requirement	**$ 33,948,470**	**$ 32,812,037**	**$ 35,143,381**	**$ 34,167,756**	**$ 36,776,538**	**$ 37,638,177**	**$ 40,262,379**	**$ 40,078,526**

Appendix A-9
Projected Wastewater Revenue Requirement (Continued)

Description	2048	2049	2050	2051	2052	2053	2054	2055
Operations & Maintenance								
Existing	$ 6,262,857	$ 6,450,481	$ 6,643,734	$ 6,842,784	$ 7,047,805	$ 7,258,978	$ 7,476,485	$ 7,700,518
New Project	11,815,797	12,170,401	12,534,843	12,911,298	17,311,947	16,797,246	17,300,823	18,915,958
Total–O&M	18,078,655	18,620,882	19,178,577	19,754,082	24,359,753	24,056,223	24,777,308	26,616,476
Capital Expenses	811,997	836,357	861,448	887,291	913,910	941,327	969,567	998,654
Debt Service Existing	-	-	-	-	-	-	-	-
New	23,728,054	22,772,682	30,485,933	30,485,933	31,656,898	31,656,898	31,656,898	33,362,457
Pay-as-you-gc Existing								
New	1,622,000	1,671,000	4,368,000	1,772,000	1,825,000	1,880,000	1,937,000	1,995,000
Total–Capital	26,162,051	25,280,038	35,715,380	33,145,224	34,395,808	34,478,225	34,563,465	36,356,111
Reserve Fund Deposits								
O&M Reserve Fund	131,524	135,557	139,424	143,876	1,151,418	-	180,271	459,792
Debt Service Coverage	6,551,295	6,163,882	6,162,653	8,754,200	8,103,497	9,199,914	8,962,643	9,222,068
Total–Reserve Deposits	6,682,819	6,299,439	6,302,077	8,898,077	9,254,914	9,199,914	9,142,914	9,681,860
Transfers Out to General Fund	7,623,000	7,890,000	8,159,000	8,453,000	8,775,000	9,118,000	9,465,000	9,825,000
Total Expenses	**58,546,524**	**58,090,359**	**69,355,034**	**70,250,383**	**76,785,475**	**76,852,363**	**77,948,687**	**82,479,446**
Sales Tax Revenue	14,381,483	14,812,928	16,274,470	16,762,704	17,265,585	17,561,258	18,088,096	18,866,571
Misc. Revenues	370,710	381,831	393,286	405,085	417,237	429,754	442,647	455,926
Rate Revenue Requirement	**$ 43,794,331**	**$ 42,895,601**	**$ 52,687,278**	**$ 53,082,594**	**$ 59,102,653**	**$ 58,861,350**	**$ 59,417,945**	**$ 63,156,949**

Appendix A-9
Projected Wastewater Revenue Requirement (Continued)

Asset Category	R/R Cost (Original $)	Yrs Until Replacement	Distribution of Costs to Year Needed 2007	2008	2009	2010	2011	2012	2013
Water Bldg	559,551	24							
Hydrants, Meters and Valves	359,893	-	15,000	15,000	15,000	15,000	15,000	15,000	15,000
Pumps, Piping and Mains	6,672,631	2	267,000	267,000	267,000	267,000	267,000	267,000	267,000
Water Treatment Plant	18,362,375	20							
Water Tower/Tank	1,041,485	20							
Pumps, Piping and Mains	5,621,270	22	188,000	188,000	188,000	188,000	188,000	188,000	188,000
Operations Service Center	86,482	19							
Water Tanks	341,580	1	114,000	114,000	114,000				
Kaw Pipeline and Pump House	27,211,066	28							
Total Water Assets for Replacement	$ 60,256,333		$ 584,000	$ 584,000	$ 584,000	$ 470,000	$ 470,000	$ 470,000	$ 470,000
Transfer In to Renewal and Replacement Fund			600,000	600,000	600,000	1,000,000	1,000,000	1,000,000	1,500,000
Transfer Out of Renewal and Replacement Fund			584,000	584,000	584,000	470,000	470,000	470,000	470,000
End of Year Balance in Renewal and Replacement Fund			16,000	32,000	48,000	578,000	1,108,000	1,638,000	2,668,000

Appendix A-10
Stillwater Water Assets
Renewal and Replacement Fund Schedule

Asset Category	R/R Cost (Original $)	Yrs Until Replacement	Distribution of Costs to Year Needed 2014	2015	2016	2017	2018	2019
Water Bldg	559,551	24						
Hydrants, Meters and Valves	359,893	-	15,000	15,000	15,000	15,000	15,000	15,000
Pumps, Piping and Mains	6,672,631	2	267,000	267,000	267,000	267,000	267,000	267,000
Water Treatment Plant	18,362,375	20						
Water Tower/Tank	1,041,485	20						
Pumps, Piping and Mains	5,621,270	22	188,000	188,000	188,000	188,000	188,000	188,000
Operations Service Center	86,482	19						
Water Tanks	341,580	1						
Kaw Pipeline and Pump House	27,211,066	28						
Total Water Assets for Replacement	$ 60,256,333		$ 470,000	$ 470,000	$ 470,000	$ 470,000	$ 470,000	$ 470,000
Transfer In to Renewal and Replacement Fund			1,500,000	1,500,000	2,000,000	2,000,000	2,000,000	3,000,000
Transfer Out of Renewal and Replacement Fund			470,000	470,000	470,000	470,000	470,000	470,000
End of Year Balance in Renewal and Replacement Fund			3,698,000	4,728,000	6,258,000	7,788,000	9,318,000	11,848,000

Appendix A-10
Stillwater Water Assets
Renewal and Replacement Fund Schedule (Continued)

Asset Category	R/R Cost (Original $)	Yrs Until Replacement	Distribution of Costs to Year Needed					
			2020	2021	2022	2023	2024	2025
Water Bldg	559,551	24						
Hydrants, Meters and Valves	359,893	-	15,000	15,000	15,000	15,000	15,000	15,000
Pumps, Piping and Mains	6,672,631	2	267,000	267,000	267,000	267,000	267,000	267,000
Water Treatment Plant	18,362,375	20						
Water Tower/Tank	1,041,485	20						
Pumps, Piping and Mains	5,621,270	22	188,000	188,000	188,000	188,000	188,000	188,000
Operations Service Center	86,482	19						
Water Tanks	341,580	1						87,000
Kaw Pipeline and Pump House	27,211,066	28						
Total Water Assets for Replacement	$ 60,256,333		$ 470,000	$ 470,000	$ 470,000	$ 470,000	$ 470,000	$ 557,000
Transfer In to Renewal and Replacement Fund			3,000,000	3,000,000	3,000,000	3,000,000	4,000,000	4,000,000
Transfer Out of Renewal and Replacement Fund			470,000	470,000	470,000	470,000	470,000	557,000
End of Year Balance in Renewal and Replacement Fund			14,378,000	16,908,000	19,438,000	21,968,000	25,498,000	28,941,000

Appendix A-10
Stillwater Water Assets
Renewal and Replacement Fund Schedule (Continued)

Asset Category	R/R Cost (Original $)	Yrs Until Replacement	Distribution of Costs to Year Needed 2026	2027	2028	2029	2030	2031
Water Bldg	559,551	24					560,000	
Hydrants, Meters and Valves	359,893	-	15,000	15,000	15,000	15,000	15,000	15,000
Pumps, Piping and Mains	6,672,631	2	267,000	267,000	267,000	267,000	267,000	267,000
Water Treatment Plant	18,362,375	20	18,363,000					
Water Tower/Tank	1,041,485	20	1,042,000					
Pumps, Piping and Mains	5,621,270	22	188,000	188,000	188,000	188,000	188,000	188,000
Operations Service Center	86,482	19						
Water Tanks	341,580	1						
Kaw Pipeline and Pump House	27,211,066	28						
Total Water Assets for Replacement	$ 60,256,333		$ 19,875,000	$ 470,000	$ 470,000	$ 470,000	$ 1,030,000	$ 470,000
Transfer In to Renewal and Replacement Fund			4,000,000	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000
Transfer Out of Renewal and Replacement Fund			19,875,000	470,000	470,000	470,000	1,030,000	470,000
End of Year Balance in Renewal and Replacement Fund			13,066,000	16,596,000	20,126,000	23,656,000	26,626,000	30,156,000

Appendix A-10
Stillwater Water Assets
Renewal and Replacement Fund Schedule (Continued)

Asset Category	R/R Cost (Original $)	Yrs Until Replacement	Distribution of Costs to Year Needed 2032	2033	2034	2035	2036	Total
								$ -
Water Bldg	559,551	24						560,000
Hydrants, Meters and Valves	359,893	-	15,000	15,000	15,000	15,000	15,000	450,000
Pumps, Piping and Mains	6,672,631	2	267,000	267,000	267,000	267,000	267,000	8,010,000
								-
Water Treatment Plant	18,362,375	20						18,363,000
Water Tower/Tank	1,041,485	20						1,042,000
Pumps, Piping and Mains	5,621,270	22	188,000	188,000	188,000	188,000	188,000	5,640,000
								-
Operations Service Center	86,482	19						87,000
Water Tanks	341,580	1						342,000
								-
Kaw Pipeline and Pump House	27,211,066	28	27,212,000					27,212,000
								-
Total Water Assets for Replacement	$ 60,256,333		$ 27,682,000	$ 470,000	$ 470,000	$ 470,000	$ 470,000	$ 61,706,000
Transfer In to Renewal and Replacement Fund			4,000,000	4,000,000	4,000,000	4,000,000	4,000,000	$ 82,300,000
Transfer Out of Renewal and Replacement Fund			27,682,000	470,000	470,000	470,000	470,000	61,706,000
End of Year Balance in Renewal and Replacement Fund			6,474,000	10,004,000	13,534,000	17,064,000	20,594,000	

Appendix A-10
Stillwater Water Assets
Renewal and Replacement Fund Schedule (Continued)

Appendix B-1
Glossary of Terms

accounts [1]	The accounts prescribed in this system of accounts.
accumulated depreciation [2]	A valuation account to record the accumulation of periodic credits made to record the expiration of the estimated useful life of fixed assets. For example, an asset worth $1 million with 25% of its useful life expired would have accumulated depreciation of $250,000 and a remaining book value of $750,000. The schedule by which depreciation accumulates can vary depending upon the type of asset, the maintenance practices of the agency, and the conditions in which the asset is used, such as soil and temperature. For example, depreciation can accumulate on a straight-line basis, in which an equal amount of the useful life is assumed to be expired each year; or, the depreciation can accumulate based upon a series of "plateaus," in which the value remains constant for several years at a time before decreasing.
actually issued [1]	As applied to securities issued or assumed by the utility, means those which have been sold to bona fide purchasers for a valuable consideration, those issued as dividends on stock, and those which have been issued in accordance with contractual requirements direct to trustees of sinking funds.
actually outstanding [1]	As applied to securities issued or assumed by the utility, means those which have been actually issued and are neither retired nor held by or for the utility provided, however, that securities held by trustees shall be considered as actually outstanding.
AM team (asset management team) [2]	A team composed of stakeholders empowered to develop and execute an asset management program. The team leader provides expertise to ensure that there is a focal point within the agency for the program's activities. The AM team consists of representatives of groups or functions including: Engineering and Construction, Operations and Maintenance, Planning and CIP Development, Finance/Budgeting, and Information Technology/Information Solutions. In a small utility system, the AM team may be one person or a small group of "double-hatted" team members. In a large utility

[1] National Association of Regulatory Commissioners. 1996. *Uniform System of Accounts for Class B Water Utilities.* Washington, DC: National Association of Regulatory Commissioners.
[2] AMSA. *Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance.* AMSA (Association of Metropolitan Sewerage Agencies)

	system, the AM Team may include several full-time members and as many as a dozen people who spend a substantial portion of their time contributing to the development and execution of the asset management plan.
amortization [1]	The gradual extinguishment of an amount in an account by distributing such amount over a fixed period, over the life of the asset or liability to which it applies, or over the period during which it is anticipated the benefit will be realized.
AMU (asset management unit) [2]	An individual asset or group of similar and/or related assets that have the same replacement value, condition, and capital renewal and replacement schedules.
API (application programming interfaces) [2]	APIs provide data exchange (import and export) capabilities between various application software packages.
asset [2]	Anything owned that has a commercial or exchange value and will provide the owner with some form of future benefit. Asset management programs for water and wastewater utilities generally focus on capital or infrastructure assets.
asset hierarchy	Relationship of assets determined by maintenance organization needs and cost accounting structures.
asset inventory [2]	A list of assets that includes details on the type, size, materials of construction and other attributes of each asset, or the process of developing a list of assets including details on type, size, materials of construction, etc.
associated companies [1]	Companies or persons that, directly or indirectly, through one or more intermediaries, control, or are controlled by, or are under common control with, the accounting company.
book cost [1]	The amount at which property is recorded in these accounts without deduction of related provisions for accrued depreciation, amortization, or for other purposes.
CAPEX (capital expenditures) [2]	Expenditures used to create new assets or increase the capacity of existing assets beyond their current capacity or service capabilities.
capital asset	A long-term asset that has a value that can appreciate or depreciate and that is used to conduct the utility's business; typically includes fixed assets such as land, buildings, machinery, equipment, and fixtures.

capital improvement [2]	Generally refers to all capital expenditures that are included in a utility's capital improvement plan (CIP).
capital renewal [2]	A term encompassing rehabilitating, refurbishing, or replacing capital assets to restore an asset, facility, or system to its original condition and function.
capital renewal strategy [2]	A formal set of policies and procedures establishing a utility's asset management performance measurements, policies, decision-making rules, and management activities that will be used to achieve the utility's asset management objectives.
capitalization policy [2]	The procedures and protocols that are used by an agency to determine which expenditures are considered "capital" expenditures that enter the fixed asset register of the system, and which expenditures are considered operating expenses. Criteria that are used to determine which expenditures are capitalized may include: 1) value of the expenditure; 2) useful life of the asset; and 3) purpose of the expenditure (e.g., whether renewal expenditures extend the life of an asset or maintain it within an existing life span).
chart of accounts	A chart explaining the numerical codes identifying the ledger accounts in an accounting system.
CIP (capital improvement plan)	A plan for prioritized improvement expenditures taking into consideration the fundamental strategic goals for a utility system, including growth, expansion, renewal and replacement, regulatory compliance, and stakeholder service needs. Typically, CIP documents show the projected annual expenditures by project and category for at least five years. Increasingly, utilities are extending their CIP documents to 10- or 20-year time frames and including projected sources of revenue where available. Traditionally, CIPs have been updated on a regular cycle, such as once per year or every other year. Some agencies have begun the practice of updating their CIP documents on a continuous basis and posting the current CIP on either Intranet or Internet sites.
CIS/CRM (customer information systems/customer relationship management) [2]	Computer applications allowing organizations to manage customer information and relationships, and predict customer behavior based on databases that store prior interactions with those customers.

CMMS (computerized maintenance management system)	Software that aids in managing the maintenance of assets. The basic functions of a computerized maintenance management system include asset inventory, preventive maintenance scheduling, work order documentation, spare parts inventory control, and inspection documentation.
CMOM (capacity, management operation, and maintenance)	A program to be required by the EPA to eliminate sanitary sewer overflows (SSOs) and backups. CMOM process is designed around managing the wastewater infrastructure assets at a determined level of service.
COBIT (control objectives for information and related technology) [2]	Policy guidance from the Information Systems Audit and Control Association (ISACA) to promote an authoritative, up-to-date, international set of generally accepted IT Control Objectives for day-to-day use by business managers as well as security, control, and audit practitioners.
commission [1]	Unless otherwise indicated by the context, means the commission prescribing this system of accounts.
composite depreciation rate [1]	A percentage based on the weighted average service life of a number of units of plant, each of which may have a different individual life expectancy. Composite depreciation rates may be determined for (a) a single depreciable plant account, (b) a single rate for several depreciable accounts, or (c) a single composite rate may be determined for all depreciable plant of the utility.
condition assessment [2]	Periodic assessments, either judgmental or definitive, to evaluate the physical state of an asset and the current and projected levels of performance. The product of a condition assessment should be a replicable determination of the objective status of an asset or group of assets.
control [1]	Control (including the terms "controlling", "controlled by", and "under common control with") means the possession, directly or indirectly, of the power to direct or cause the direction of the management and policies of a company, whether such power is exercised through one or more intermediary companies, or alone, or in conjunction with, or pursuant to an agreement, and whether such power is established through a majority or minority ownership or voting of securities, common directors, officers, or stockholders, voting trusts, holding trusts, associated companies, contract or any other direct or indirect means.

CORBA (common object request broker architecture) [2]	Communications standards including application-programming interfaces (APIs) fostered by the Object Management Group (OMG) to allow any client/ server software to communicate.
corrective maintenance [2]	An activity that is performed following the failure of an asset or after the asset has reached a point of unacceptable performance that is needed to return the asset to service.
cost [1]	The amount of money actually paid for property or service. When the consideration given is other than cash, the value of such consideration shall be determined on a cash basis.
cost of removal [1]	The cost of demolishing, dismantling, tearing down or otherwise removing utility plant, including the cost of transportation and handling incidental thereto.
coverage; coverage ratio [2]	The margin of safety ratios associated with bonded indebtedness and preferred stocks reflecting the ratio of the actual or projected net revenue available for debt service to debt service or other costs. These ratios range from debt-service coverage of principal and interest, to interest only, to all fixed charges, including preferred stock dividends and lease payments. For utility systems, coverage requirements often relate to coverage of principal plus interest on outstanding debt. Coverage may be expressed as a ratio or as a percentage.
critical path scheduling [2]	Critical path scheduling, sometimes called critical path method (CPM), involves the identification of key tasks and subtasks required to complete a project or accomplish some other specified objective. Durations for each task and subtask are identified as well as the relationships among the tasks (e.g., whether tasks can be performed simultaneously or whether certain tasks need to precede other tasks). The resulting schedule identifies those tasks that are on the critical path (i.e., tasks which, if delayed, would result in delays in the overall schedule for completion of the project or program).
debt expense [1]	All expenses in connection with the issuance and initial sale of evidences of debt, such as fees for drafting mortgages and trust deeds; fees and taxes for issuing or recording evidences of debt; cost of engraving and printing bonds and certificates of indebtedness; fees paid trustees; specific costs of obtaining governmental authority; fees for legal services; fees and commissions paid underwriters, brokers, and salesmen or

	marketing such evidences of debt; fees and expenses of listing on exchanges; and other like costs.
depreciation [1]	As applied to depreciable utility plant, the loss in service value not restored by current maintenance, incurred in connection with the consumption or prospective retirement of utility plant in the course of providing service from causes which are known to be in current operation and against which the utility is not protected by insurance. Among the causes to be given consideration are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in the art, changes in demand, and requirements of public authorities.
depreciation [2]	The process of spreading the cost of a capital asset over the estimated useful life of the asset. Typically, an expense is charged annually against revenue to write off the cost of an asset due to wear and obsolescence resulting in a reduction in the book or market value of the asset.
discount [1]	As applied to the securities issued or assumed by the utility, the excess of the par (stated value of no-par stocks) or face value of the securities plus interest or dividends accrued at the date of the sale over the cash value of the consideration received from their sale.
earned value reporting [2]	A progress reporting approach that takes into consideration the estimated percent complete for major project tasks and compares this to the percentage of the budget spent. Graphic and tabular summaries are prepared that show the estimated total cost at completion based on the delivery efficiency trend at any point in the execution of the project.
echo wave [2]	The pattern or graphical representation that reflects a previous pattern or graphical representation after a perceivable delay in time.
enterprise fund [2]	A fund established to account for operations that provide services that are financed primarily by user charges or revenue bonds or activities where periodic measurement of net income is appropriate for capital maintenance, public policy, management control, or other purposes. Many municipal water utilities and sewerage utilities are established for accounting purposes as enterprise funds.

ERP (enterprise resource planning)	A business management system that integrates all facets of the business, including planning, asset management, human resources, financials, and purchasing. As the ERP methodology has become more popular, software applications have emerged to help business managers implement ERP.
failure analysis [2]	An analysis of the range of possible ways an asset can fail in order to identify the likely timing and mode of failure.
failure mode [2]	The manner in which an asset can fail to provide the function it was installed for.
fire main [1]	Any main forming part of an integrated system used exclusively for fire protection purposes.
fixed assets [2]	Capital assets included in a utility's financial reports.
full service scenario [2]	Financial planning scenarios that identify all future revenue requirements for a utility system. Full-service scenarios include renewal and replacement needs of the system plus other identified expenditure requirements, which may include: new capital to address expansion and regulatory compliance needs, operation and maintenance requirements, reserve requirements, and current and anticipated debt service requirements.
GAAP (generally accepted accounting principles) [2]	Standards and guidelines pertinent to financial accounting and reporting including conventions, rules, and procedures that define accepted accounting practices. Established by an authoritative body designated by the American Institute of Certified Public Accountants Council. For government entities, this authority is the Governmental Accounting Standards Board.
GASB (Governmental Accounting Standards Board) [2]	An operating arm of the Financial Accounting Foundation that establishes standards of financial accounting and reporting for state and local governmental entities.
GASB Statement 34 [2]	A standard released by GASB in June 1999 that establishes accounting and financial reporting requirements for general purpose external financial reporting by state and local governments.

general capital assets [2]	The subset of capital assets associated with governmental, rather than enterprise, activities.
general infrastructure [2]	Long-lived capital assets that normally are stationary in nature and normally can be preserved for a significantly greater number of years than most capital assets. General infrastructure assets of municipal government agencies typically are supported primarily through property taxes and other general fund revenues.
GIS (geographic information system) [2]	GIS is used to store, display, and analyze any data with a locational (spatial) component.
gross-up of contributions in aid of construction [1]	The method by which a utility extracts, from developers or others, a sum of money sufficient to pay all or a portion of the tax obligation due to the change in the federal tax law in 1987 which resulted in contributions made to utilities in aid of construction (CIAC) being considered ordinary income instead of contributions of capital. Because the sum extracted to pay the tax is also considered income subject to tax, the term tax-on-tax has been used to describe the additional sum of money that must be extracted in order to pay the tax on the initial amount. Common gross-up methods include the full gross-up method and the net present value method. Under the full gross-up method, a sum sufficient to meet the full tax obligation, including the tax-on-tax, is extracted. Under the net present value method, the sum extracted is the net present value of the estimated future stream of tax benefits resulting from the depreciation deductions for the contributed asset to be taken on the tax returns of the utility.
GUI (Graphical User Interface)	A program interface that takes advantage of the computer's graphics capabilities to make the program easier to use.
infrastructure asset [2]	Long-lived assets that are normally stationary in nature and provide the services of the organization, including pipelines, treatment facilities, and their equipment and appurtenances.
inventory [2]	An accounting of assets at a facility or site. An inventory includes information such as size and/or capacity, materials of construction, location, installation date, original cost, replacement cost, condition assessment, performance assessment, original service life, etc. Also refers to the actions

	taken to account for assets at a facility or site. This includes the initial actions to account for assets, as well as ongoing actions to update or improve the asset inventory.
investment advances [1]	Advances, represented by notes or by book accounts only, with respect to which it is mutually agreed or intended between the creditor or debtor that they shall be settled by the issuance of securities or shall not be subject to current settlement.
IT (information technology)	The broad subject concerned with all aspects of managing and processing information, especially within a large organization or company. Because computers are central to information management, computer departments within companies and universities are often called *IT departments.* Development, installation, and implementation of computer systems and applications.
LAN (Local Area Network)	A computer network that spans a relatively small area. Most LANs are confined to a single building or group of buildings.
life-cycle costs [2]	The total cost of owning an asset over the estimated period of time during which an asset is expected to be able to be used or the benefits represented by the asset are expected to be derived. Costs include both capital costs and those of a recurring nature. Examples include design, construction, maintenance, insurance, rehabilitation, operating, and disposal costs.
master plan [2]	A plan that anticipates by at least 20 years future demands on assets because of growth in the service area. Periodic updates (three to five years) are typically used to help keep fundamental assumptions current and in alignment with the other programs. Many progressive utility systems are using 50- or 100-year time frames in their master planning processes to anticipate the effects of longer-term demographic and other trends on facility and. financial needs. For large systems, it is often desirable to have separate component master plans (e.g., WWTP master plan, collection system master plan) that roll up into an overall system master plan. Typical categories of needs that are addressed in master planning processes include: safety and risk reduction, regulatory requirements, capacity needs, quality needs, reliability of operation, optimization opportunities, and public/stakeholder inputs.

materiality [2]	This relates to cost estimating or acquisition date estimating practices employed by a government entity for the minor versus major and subsystem and network reporting.
MD&A (management discussion and analysis) [2]	One of the reporting formats that are specified in the Government Accounting Standards Board's statements that identify appropriate financial reporting protocols for government agencies. The MD&A often serves as a clearinghouse for reporting financial statements such as changes to a capitalization policy for the reporting of infrastructure assets. GASB's Statement 34 specifies topics to be covered in the MD&A for both the traditional (depreciation) and optional (asset management) methods for reporting of general infrastructure assets.
minor items of property [1]	The associated parts or items of which retirement units are composed.
multiple family dwelling [1]	A residential structure or group of structures which is capable of separately housing more than one family unit.
net salvage value [1]	The salvage value of property retired less the cost of removal.
nominally issued [1]	As applied to securities issued or assumed by the utility means those which have been signed, certified, or otherwise executed, and placed with the proper officer for sale and delivery, or pledged, or otherwise placed in some special fund of the utility, but which have not been sold, or issued direct to trustees of sinking funds in accordance with contractual requirements.
nominally outstanding [1]	As applied to securities issued or assumed by the utility, means those which, after being actually issued, have been reacquired by or for the utility under circumstances which require them to be considered as held alive and not retired; provided, however, that securities held by trustees shall be considered as actually outstanding.
NPV (net present value) [2]	The total discounted value of all cash inflows and outflows from a project or investment, based on an assumed time value of money. NPV is used in alternative evaluations to put investment or expenditure options on a comparable financial basis. The methodology for computing NPV is defined in standard engineering economics textbooks and in microcomputer spreadsheet model help sections. The appropriate discount rate takes into consideration such factors as the net cost of capital for an agency and whether

	the projected stream of expenditures includes inflation. For projects that include federal funding, the Office of Management and Budget annually updates the recommended discount rate and posts the resulting factors at the following Web site: OMB Circular A-94, Appendix C: http://www.whitehouse.gov/omb/circulars/a094/a094.html.
O&M (operations and maintenance) [2]	Expenses incurred in operating and maintaining facilities. Operating expenses include costs for maintaining facilities that provide services, including administrative services. Maintenance includes the labor and materials necessary to keep facilities in proper operating condition.
OLAP (on-line analytical processing) [2]	Procedures and protocols to enable fast analysis of shared multidimensional information in a data warehouse. OLAP enables rapid access to large data repositories.
operating reserve fund [2]	Funds dedicated to support the operation and maintenance activities of an agency. In some cases, utilities agree to set aside a reserve of some specified amount or portion of their operating budgets as part of their bonding covenants in order to ensure that there is an adequate cash flow to fund the ongoing operation of the system. The availability of dedicated funds enhances the creditworthiness of the utility, as investors know that utilities will have a reasonable funding basis to support the proper maintenance of the facilities.
OPEX (operating expenditures) [2]	Expenditures used to directly support the day-to-day operations including wages, maintenance, supplies, and utilities.
optimization problem [2]	A problem where the objective is to find the best of all possible solutions.
original cost [1]	As applied to utility plant, the cost of such property to the person first devoting it to the public service.
person [1]	An individual, a corporation, a partnership, an association, a joint-stock company, a business trust, or any organized group of persons whether incorporated or not, or any receiver or trustee.
PM/CM Ratio	Ratio of preventive maintenance to corrective maintenance activities performed.

predictive maintenance (PdM) [2]	Activities that monitor the operating condition of an asset to determine when maintenance is required. Examples include vibration analysis and performance monitoring.
premium [1]	As applied to the securities issued or assumed by the utility, the excess of the cash value of the consideration received from their sale over the sum of their par (stated value of no-par stocks) or face value and interest or dividends accrued at the date of sale.
preventive maintenance (PM) [2]	Activities that are performed prior to failure of an asset and before the asset reaches a point of unacceptable performance that will prevent, minimize, or delay failure and/or shutdowns. Examples include adjustments, cleaning, and replacement of minor components.
primary government [2]	Entity that has primary responsibility for managing an infrastructure asset.
proactive maintenance [2]	Activities that are routinely planned, scheduled, and performed to prevent, minimize, or delay failures and/or shutdowns.
production function [2]	A mathematical model that describes the relationship between quantities or levels of productive factors and the amount of product obtained.
property retired [1]	As applied to utility plant, property which has been removed, sold, abandoned, destroyed, or which for any cause has been permanently withdrawn from service.
R&R (renewal and replacement) [2]	Activities that rehabilitate, restore, or replace assets within a utility's infrastructure system.
RDBMS (relational database management systems) [2]	RDBMS databases allow data to be stored and verified using any number of relational integrity (relationships between data elements) and business rules (data validation guidelines.
reactive maintenance [2]	Activities that are performed on an as-needed basis to address or correct deteriorating performance, failure, or shutdown.
Reclaimed water [1]	Water that has received at least secondary treatment and basic disinfection and is reused after flowing out of a wastewater treatment plant.

Regulatory assets and liabilities [1]	Assets and liabilities that result from rate actions of regulatory agencies. Regulatory assets and liabilities arise from specific revenues, expenses, gains or losses that would have been included in determination of net income in one period under the general requirements of the Uniform System of Accounts but for it being probable that; 1) such items will be included in a different period(s) for purposes of developing the rates the utility is authorized to charge for its utility services; or 2) in the case of regulatory liabilities, that refunds to customers, not provided for in other accounts, will be required.
rehabilitation [2]	Restoring an asset's condition to the expected level of service, an "as-new" condition, using identical materials and parts.
remaining useful life [2]	Estimated life remaining of an asset from current date to anticipated date of retirement, assuming that a reasonable and normal level of preventive maintenance is performed.
renewal [2]	Rehabilitation to restore an asset's performance and condition to a "like-new" condition and extend its life.
renewal and replacement [2]	A term used interchangeably with capital renewal.
replacing or replacement [1]	When not otherwise indicated in the context, the construction or installation of utility plant in place of property of retired, together with the removal of the property retired.
research and development [1]	Expenditures incurred by public utilities which represent research and development costs in the experimental or laboratory sense. The term includes generally all such costs incident to the development of an experimental or pilot model, a plant process, a product, a formula, an invention, or similar property, and the improvement of already existing property of the type mentioned.
retained earnings [1]	The accumulated net income of the utility less distributions to stockholders and transfers to other capital accounts, and other adjustments (See account 439 - Adjustments to Retained Earnings).
retirement units [1]	Those items of utility plant which, when retired, with or without replacement, are accounted for by crediting the original costs.

reuse [1]	The deliberate application of reclaimed water, in compliance with Federal and State environmental rules and regulations, for a beneficial purpose.
revenue bond [2]	A bond where the debt service (principal and interest) are payable solely from net or gross nontax revenues derived from tolls, charges, or rents paid by users of the facility constructed with the proceeds of the bond issue.
salvage value [1]	The amount received for property retired, less any expenses incurred in connection with the sale or in preparing the property for sale, or, if retained, the amount at which the material recoverable is chargeable to materials and supplies, or other appropriate account.
service life [1]	The time between the date utility plant is includible in utility plant in service, or utility plant leased to others, and the date of its retirement. If depreciation is accounted for on a production basis rather than on a time basis, then service life should be measured in terms of the appropriate unit of production.
service life [2]	Expected life of an asset from installation date to anticipated date of retirement assuming a "normal" level of preventive maintenance is performed. This is the estimated period of time over which a depreciable asset is expected to be able to be used, or the benefits represented by the asset are expected to be derived.
service value [1]	The difference between the original cost and net salvage value of utility plant.
SRF (state revolving fund) [2]	Financing programs making low interest loans available to government owned utilities for water and wastewater infrastructure made available by states pursuant to federal legislation.
stakeholder [2]	An individual or group that has or may have an interest in a project, program, or enterprise.
straight-line method [1]	As applied to depreciation accounting, the plan under which the service value of property is charged to operating expenses (and to clearing accounts if used), and credited to the accumulated depreciation account through equal annual charges during its service life. Estimates of the service life and salvage will be reexamined periodically and depreciation

	rates will be corrected to reflect any changes in these estimates.
straight-line remaining life method [1]	As applied to depreciation accounting, means the plan under which the service value of property is charged to operating expenses (and to clearing accounts if used), and credited to the accumulated depreciation account through equal annual charges during its service life. "Remaining life" implies that estimates of future life and salvage will be reexamined periodically and that depreciation rates will be corrected to reflect any changes in these estimates.
subsystem [2]	Grouping of units of infrastructure for the development of a composite property record rather than a detailed property record for financial reporting purposes. For example, an entire pump station may be recorded as opposed to listing individual components (e.g., building, pumps, plumbing system, etc.)
supply main [1]	Any main, pipe, aqueduct or canal the primary purpose of which is to convey water from one unit to another unit in the source of supply, water treatment or pumping plant and generally providing no service connections with customers.
TMDL (total maximum daily load) [2]	Limits on substances discharged to water bodies that are required by state regulatory agencies pursuant to the Clean Water Act.
transmission and distribution main [1]	Any main the primary purpose of which is to convey water, requiring no further processing except incidental chlorination or pressure boosting, from a unit in the source of supply, water treatment or pumping plant and generally providing no service connection with customers.
utility [1]	As used herein and when not otherwise indicated in the context, any public utility to which this system of accounts is applicable.
WAN (Wide Area Network)	A computer network that spans a relatively large geographical area. Typically, a WAN consists of two or more local-area networks (LANs).
work order	A document providing authorization for a task to be performed.
work request	A document that requests work to be performed. This document is routed for approval to create a Work Order.

Appendix B-2
Asset Data Collection Template

…ting …g No	New Tag No	Equipment Description	Belongs To	Chemical Fed	Type of Feeder	Manufac-turer	Serial #	Model	Capacity Range	Size	Type	Safety Plan	Date Installed	Misc.	Misc.	Misc.	Plant Name	Process	Building	Level	Room Name

Appendix B-3
Asset Hierarchy Template

Process	Sub-Process
Water Treatment Plant	
Raw Water System	
	Intake Conduit System
	Raw Water Screening
	Raw Water Pumping
	Distribution Valving
	Raw Water Tank
	Raw Water Pipeline
	Electrical Distribution
Coagulation/Flocculation/Softening System	
	Structure
	Chemical Feed System
	Mixing
Disinfection System	
	Chlorine System
	Ammonia System
	Ozone System
Recarbonation System	
	Chemical Feed System
	Structure
	Injection System
Filtration System	
	Cells (12)
	Backwash
Floridation System	
Solids Management System	
	Structure
	Dewatering System
Finished Water Storage System	
ibution Pumping System	

Appendix B-3
Asset Hierarchy Template

Process	Sub-Process
Water Distribution System	
Transmission Piping	
	Transmission from WTP to Towers/Ground Storage
	Other transmission lines
Distribution Storage System	
	Washington Tank/Booster Station
	Grandview Tank/Booster Station
	3rd and Ballard Tank/Booster Station
	Hiway 51 and Country Club Booster Station
	North Perkins Tower
	19th and Range Rd. Tower
Distribution Piping	
	Pipes
	Valves
	Hydrants
	Meters

Appendix B-3
Asset Hierarchy Template

Process	Sub-Process
Wastewater Treatment Plant	
Headworks	Valves
Preliminary Treatment	
	Screening
	Grit Removal
	Lift Pumping
Primary Treatment	
	Equalization Basin
	Primary Clarification
	Primary Sludge Pumping
	Primary Scum Pumping
Secondary Treatment	
	Aeration Basins
	Blower Air Filtration
	Aeration Blowers
	Secondary Clarification
Disinfection	
	UV Disinfection
Cascade Metering	
	Parshall Flume
	Cascade Structure
Sludge Thickening	
	Sludge Transfer Pumping System
	Sludge Digestion Heat Transfer System
	Sludge Digestion Waste Gas
	Primary Sludge Digestion
	Secondary Sludge Digestion
	Sludge Mixing

Appendix B-4
Wastewater Tre nt Plant Hierarchy

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Headworks					
	Hydraulic Valve #1				
		Gate			
		Hydraulic Cylinder			
	Hydraulic Valve #2				
		Gate			
		Hydraulic Cylinder			
	Hydraulic Unit #1				
Preliminary Treatment					
	Screening				
		Bar Screen #1			
			Rake		
			Motor		
			Geardrive		
			Structure		
		Bar Screen #1			
			Rake		
			Motor		
			Geardrive		
			Structure		
	Grit Removal				
		Grit Tank #1			
			Influent Valve #1 (MOV)		
				Motor	
				Geardrive	
				Gate	
			Structure		
			Mixer		
			Motor		
			Geardrive		
			Grit Pump #1		
				Pump	
				Motor	
			Discharge Valve #1		
				Motor	

Appendix B-4
Wastewater Tr[illegible]nt Plant Hierarchy

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
				Geardrive	
				Gate	
		Grit Tank #2			
			Influent Valve #2 (MOV)		
				Motor	
				Geardrive	
				Gate	
			Structure		
			Mixer		
			Motor		
			Geardrive		
			Grit Pump #2		
				Pump	
				Motor	
			Discharge Valve #2		
				Motor	
				Geardrive	
				Gate	
		Grit Classifier			
			Auger		
			Motor		
			Geardrive		
			Structure		
		Screening/Grit Conveyance			
			Conveyor		
			Motor		
			Geardrive		
			Structure		
		Wet Well #1			
			Influent Valve #1		
				Gate	
			Structure		
		Wet Well #2			
			Influent Valve #2		

Appendix B-4
Wastewater Tre nt Plant Hierarchy

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
				Gate	
			Structure		
	Lift Pumping				
		Isolation Valve #1			
			Gate		
		Pump #1			
			Pump		
			Motor		
			Variable Frequency Drive		
			Check Valve		
		Pump #2			
			Pump		
			Motor		
			Variable Frequency Drive		
			Check Valve		
		Pump #3			
			Pump		
			Motor		
			Variable Frequency Drive		
			Check Valve		
		Pump #4			
			Pump		
			Motor		
			Variable Frequency Drive		
			Check Valve		
		Flow Meter			
		Seal Water System			
			Tank		
			Controls		
			Pump #1		
			Pump #2		
Primary Treatment					
	Equalization Basin				
		Structure			
		Mixing Pump #1			
			Pump		
			Motor		

Appendix B-4
Wastewater Tre nt Plant Hierarchy

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
		Mixing Pump #2			
			Pump		
			Motor		
		Equalization Basin Bypass Valve			
			Valve		
			Motor		
			Geardrive		
			Flow Meter		
	Primary Clarification				
		Clarifier #1			
			Rake		
			Motor		
			Geardrive		
			Structure		
			Telescopic Valve		
				Gate	
		Clarifier #2			
			Rake		
			Motor		
			Geardrive		
			Structure		
			Telescopic Valve		
				Gate	
		Clarifier #3			
			Rake		
			Motor		
			Geardrive		
			Structure		
			Telescopic Valve		
				Gate	
		Clarifier #4			
			Rake		
			Motor		
			Geardrive		
			Structure		
			Telescopic Valve		
	Primary Sludge Pumping			Gate	
		Thickening Sludge Pump #1			

Appendix B-4
Wastewater Tre[illegible]nt Plant Hierarchy

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
			Pump		
			Motor		
			Variable Frequency Drive		
		Thickening Sludge Pump #2			
			Pump		
			Motor		
			Variable Frequency Drive		
		Primary Sludge Pump #1			
			Pump		
			Motor		
			Variable Frequency Drive		
		Primary Sludge Pump #2			
			Pump		
			Motor		
			Variable Frequency Drive		
			Density Meter		
			Flow Meter		
	Primary Scum Pumping				
		Scum Pump #1			
			Pump		
			Motor		
Secondary Treatment					
	Aeration Basins				
		Aeration #1			
			Intake Valve		
				Gate	
			Diffusers		
			Structure		
			Dissolved Oxygen Supply		
				D.O. Monitor	
				Flow Meter	
				Air Flow Valve	
					Valve
					Motor
		Aeration #2			
			Intake Valve		
				Gate	
			Diffusers		

Appendix B-4
Wastewater Tr[illegible]nt Plant Hierarchy

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
			Structure		
			Dissolved Oxygen Supply		
				D.O. Monitor	
				Flow Meter	
				Air Flow Valve	
					Valve
					Motor
		Aeration #3			
			Intake Valve		
				Gate	
			Diffusers		
			Structure		
			Dissolved Oxygen Supply		
				D.O. Monitor	
				Flow Meter	
				Air Flow Valve	
					Valve
					Motor
		Aeration #4			
			Intake Valve		
				Gate	
			Diffusers		
			Structure		
			Dissolved Oxygen Supply		
				D.O. Monitor	
				Flow Meter	
				Air Flow Valve	
					Valve
					Motor
	Blower Air Filtration				
		Pre-Filter			
			Filter Media		
			Motor		
			Geardrive		
		Ionizer			
		Final Filter			
			Filter Media		
	Aeration Blower				
		Blower #1			

Appendix B-4
Wastewater Tr[illegible]nt Plant Hierarchy

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
			Intake Valve		
				Motor	
				Geardrive	
				Valve	
			Blower		
				Blower	
				Motor	
				Blower Monitor	
			Isolation Valve		
				Valve	
		Blower #2			
			Intake Valve		
				Motor	
				Geardrive	
				Valve	
			Blower		
				Blower	
				Motor	
				Blower Monitor	
			Isolation Valve		
				Valve	
		Blower #3			
			Intake Valve		
				Motor	
				Geardrive	
				Valve	
			Blower		
				Blower	
				Motor	
				Blower Monitor	
			Isolation Valve		
				Valve	
		Blower #4			
			Intake Valve		
				Motor	
				Geardrive	
				Valve	
			Blower		
				Blower	

Appendix B-4
Wastewater Tre nt Plant Hierarchy

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
				Motor	
				Blower Monitor	
			Isolation Valve		
				Valve	
	Secondary Clarification				
		Secondary Clarifier #1			
			Intake Valve		
				Valve	
			Collector Rake		
				Rake	
				Motor	
				Geardrive	
			Telescopic Valve		
				Valve	
			Structure		
		Secondary Clarifier #2			
			Intake Valve		
				Valve	
			Collector Rake		
				Rake	
				Motor	
				Geardrive	
			Telescopic Valve		
				Valve	
			Structure		
		RAS/WAS Pumping			
			RAS/WAS Pump #1		
				Pump	
				Motor	
				Variable Frequency Drive	
			RAS/WAS Pump #2		
				Pump	
				Motor	
				Variable Frequency Drive	
			RAS/WAS Pump #3		
				Pump	
				Motor	
				Variable Frequency Drive	
			Isolation Valve #1		

Appendix B-4
Wastewater Tre[illegible]nt Plant Hierarchy

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
				Valve	
			Isolation Valve #2		
				Valve	
			Isolation Valve #3		
				Valve	
			RAS/WAS Junction Box		
				Structure	
			WAS Flow		
				Flow Meter	
				Control Valve	
					Motor
					Geardrive
Disinfection					Valve
	UV Disinfection				
		Modules (8)			
		Intake Isolation Valve #1			
			Valve		
			Motor		
			Geardrive		
		Intake Isolation Valve #2			
			Valve		
			Motor		
			Geardrive		
		Bypass Isolation Valve #1			
			Valve		
			Motor		
			Geardrive		
		Bypass Isolation Valve #2			
			Valve		
			Motor		
			Geardrive		
		UV Monitors (2)			
		Structure			
		Wash Tank			
			Structure		
			Air Blower		
Cascade Metering					
	Parshall Flume				

Appendix B-4
Wastewater Tr nt Plant Hierarchy

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Sludge Thickening	Cascade	Structure			
		Structure			
	Sludge Transfer Pumping System				
	Sludge Digestion Heat Transfer System				
	Sludge Digestion Waste Gas				
	Primary Sludge Digestion				
	Secondary Sludge Digestion				
	Sludge Mixing				

Appendix B-5
Criticality Ranking

Process	Sub-Process	Criticality 10 to 1	Probability 10 to 1	Critical Asset Ranking
Water Treatment Plant				
Raw Water System				
	Intake Conduit System	10	1	10
	Raw Water Screening	3	2	6
	Raw Water Pumping	10	3	30
	Distribution Valving	3	1	3
	Raw Water Tank	3	2	6
	Raw Water Pipeline	10	9	90
	Electrical Distribution	10	5	50
Coagulation/Flocculation/ Softening System				
	Structure	5	1	5
	Chemical Feed System	4	3	12
	Mixing	3	3	9
Disinfection System				
	Chlorine System	10	4	40
	Ammonia System	8	3	24
	Ozone System	5	5	25
Recarbonation System				
	Chemical Feed System	2	2	4
	Structure	10	1	10
	Injection System	2	1	2
Filtration System				
	Cells (12)	5	3	15
	Backwash	3	3	9
Floridation System		1	1	1
Solids Management System				
	Structure	2	1	2
	Dewatering System	2	3	6
Finished Water Storage System		7	1	7
Di ɔn Pumping System		10	3	30

Appendix B-5
Criticality Ranking

Process	Sub-Process	Criticality 10 to 1	Probability 10 to 1	Critical Asset Ranking
Water Distribution System				
Transmission Piping				
	Transmission from WTP to Towers/Ground Storage	10	4	40
	Other transmission lines	6	4	24
Distribution Storage System				
	Washington Tank/Booster Station	4	2	8
	Grandview Tank/Booster Station	4	2	8
	3rd and Ballard Tank/Booster Station	4	2	8
	Hiway 51 and Country Club Booster Station	10	6	60
	North Perkins Tower	8	2	16
	19th and Range Rd. Tower	7	2	14
Distribution Piping				
	Pipes	2	5	10
	Valves	2	5	10
	Hydrants	2	5	10
	Meters	2	5	10

Appendix B-5
Criticality Ranking

Process	Sub-Process	Criticality 10 to 1	Probability 10 to 1	Critical Asset Ranking
Wastewater Treatment Plant				
Headworks	Valves	2	3	6
Preliminary Treatment				0
	Screening	5	4	20
	Grit Removal	4	6	24
	Lift Pumping	7	4	28
Primary Treatment				
	Equalization Basin	1	1	1
	Primary Clarification	6	2	12
	Primary Sludge Pumping	7	3	21
	Primary Scum Pumping	2	2	4
Secondary Treatment				
	Aeration Basins	8	2	16
	Blower Air Filtration	8	2	16
	Aeration Blowers	10	3	30
	Secondary Clarification	6	2	12
Disinfection				
	UV Disinfection	10	3	30
Cascade Metering				
	Parshall Flume	10	2	20
	Cascade Structure	2	1	2
Sludge Thickening				
	Sludge Transfer Pumping System	8	4	32
	Sludge Digestion Heat Transfer System	7	2	14
	Sludge Digestion Waste Gas	9	2	18
	Primary Sludge Digestion	10	3	30
	Secondary Sludge Digestion	8	3	24
	Sludge Mixing	5	3	15