



April 30, 2015

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Needles, California 92363

Dear Mr. Brownlee:

It is with pleasure that we submit the Final Water and Wastewater Cost of Service and Rate Studies for the Needles Public Utility Authority.

We appreciate all of the help you and your staff have provided in conjunction with this study. Please feel free to contact me directly with any questions or comments.

Very truly yours,

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Needles Public Utility Authority

**Needles Public Utility Authority
Water and Wastewater
Cost of Service and Rate Study
Final
April 30, 2015**

Prepared by:



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Executive Summary

The Needles Public Utility Authority (NPUA) retained EES Consulting, Inc. (EES) to perform a water and wastewater cost of service and rate study as part of its ongoing efforts to maintain fiscally prudent and fair rates for its water and wastewater customers. The purpose of this study is to discuss the data inputs, assumptions and results that were part of developing the rate study.

A comprehensive rate study generally consists of three separate, yet interrelated analyses. These three analyses are revenue requirement, cost of service, and rate design. Rate design will be included in a future draft report.

Revenue Requirement

A revenue requirement analysis compares the overall revenues of the utility to its expenses and helps determine the overall adjustment to rate levels that is required. For this revenue requirement analysis, a cash method was used for determining NPUA's revenue requirement. A historic fiscal year (FY) 2014 (July 1, 2013 through June 30, 2014) test period was used.

A base case was defined to develop the study results. This base case for both utilities assumed the following:

- Water consumption forecast was based on actual FY 2014 data from NPUA. Consumption was not escalated for future years.
- Number of customers based on FY 2014 actual data from NPUA. Number of customers was not escalated for future years.
- Revenue for FY 2014 and beyond was based on current rates and the consumption forecast.
- O&M, franchise fee, purchase payment and debt service expenses were provided by NPUA.
- Expenses beyond FY 2015 will grow at a rate of 3.0 percent per year.
- Addition of lease payment from City to NPUA in FY2015 for Well No. 12

Capital Improvement Projects (CIP) are related to the infrastructure of each utility. The importance of properly funding for capital improvements cannot be understated. In particular, failure to properly fund for renewals and replacement within retail rates will ultimately lead to long-term financial problems. In effect, the utility will either use cash reserves to finance these renewals and replacement projects in the short-run or worse yet, not make the necessary replacements. In general, annual depreciation expense is not sufficient and utilities tend to fund in the order of 5 to 10 percent of the gross plant for annual renewal and replacement CIP. Annual depreciation is approximated at 3.3 percent of gross plant. For this study, NPUA provided forecast capital spending and asset replacement fund plans of 4.44 percent of gross plant.

Total test period revenues were \$1.41 million for the water system and \$1.26 million for the wastewater system, excluding the Utility Users Tax. Expenses were \$2.16 million for the water system and \$2.01 million for the wastewater system. This results in a shortfall in the revenues relative to costs for both the water utility and wastewater utility. Based on this revenue

requirement, NPUA needs a system-wide increase in rate revenues for the water utility and wastewater utilities. A summary of the revenue requirement is shown in Table 1.

Table 1
Summary of the Revenue Requirement
FY 2014

	Water Utility	Wastewater Utility
Revenues		
Present Rate Revenues	\$1,407,152	\$1,260,659
Other Income	0	0
Total Revenues	\$1,407,152	\$1,260,659
Operating Expenses		
O&M	1,336,836	1,354,620
Uncollectable Accounts / Write Offs	0	0
Transfers to City	69,464	61,996
Purchase Payment	153,135	90,290
Debt Service (P&I)	603,086	505,865
CIP	0	0
Total Operating Expenses	\$2,162,521	\$2,012,771
Surplus (Deficiency) in Funds	(\$755,369)	(\$752,112)
Required Rate Increase (Decrease)	53.7%	59.7%

Cost of Service Study

A cost of service analysis (COSA) is concerned with the equitable allocation of the revenue requirement to the various customer classes of service. As is standard procedure for cost of service analyses, the revenue requirement for NPUA was functionalized, classified and allocated. Unlike most cost of service studies, this analysis kept costs functionalized throughout the analysis so that the calculation of unbundled rates could be facilitated.

A COSA can be performed using embedded costs or marginal costs. Embedded costs generally reflect the actual costs incurred by the utility and closely track the costs kept in its accounting records. Marginal costs reflect the costs associated with adding a new customer, and are based on costs of facilities and services, if incurred at the present time. This study uses an embedded COSA as its standard methodology.

A cost of service study begins by “functionalizing” a utility’s revenue requirement as water supply, pumping, water treatment, distribution, and customer for the water analysis, and as pumping, treatment, collection, and customer for the wastewater analysis. Next, the functionalized costs are “classified” to base-, excess-, and customer-related costs for water, and to flow-, strength-, and customer-related component costs for wastewater.

There are two generally accepted methodologies used to classify water system costs: Base-Extra Capacity method and Commodity-Demand method. Under the Base-Extra Capacity method, the majority of a water utility's costs are split between base and extra capacity costs. The Commodity-Demand method separates most of the water utility's costs into demand and commodity costs. For the Needles water COSA, costs have been classified based on the Base-Extra Capacity method.

Given a number of assumptions, the results show that the water utility is under-collecting from all customer classes, excluding the temporary fire hydrant meters. The wastewater results show that NPUA is under-collecting from some customer classes and over-collecting from others.

It is important to note when examining the results, that the inter-class cost allocation is based on flow data estimates and usage pattern assumptions. Therefore, deviations of less than 10 percent from the cost of service typically do not warrant interclass rate modifications. In addition, usage data for some customer classes is estimated based on limited information. This decreases the accuracy in results for these classes.

Results for the water utility are summarized in Table 2. Details underlying the results presented in Table 2 are provided in Schedules 1.1 of Appendix A. The results for the wastewater utility are provided in Table 3 with additional detail to be found in Schedule 1.1 in Appendix B.

Table 2
Summary of Cost of Service Analysis – Water Utility

	Present Rate Revenues	Net Revenue Requirement	Surplus/ (Deficiency) in Present Rates	Revenue to Cost Ratio
Residential	\$688,821	\$944,858	(\$256,037)	72.9%
Commercial	579,008	821,676	(242,668)	70.5%
Municipal	59,616	106,467	(46,851)	56.0%
Temp. Fire Hydrant Meters	3,257	1,370	1,887	237.7%
Native Village	31,343	63,353	(32,010)	49.5%
Golf Course	45,107	224,796	(179,689)	20.1%
TOTAL	\$1,407,152	\$2,162,521	(\$755,369)	65.1%

Table 3
Summary of Cost of Service Analysis – Wastewater Utility

	Present Rate Revenues	Net Revenue Requirement	Surplus/ (Deficiency) in Present Rates	Revenue to Cost Ratio
Residential	\$579,247	\$699,942	(\$120,695)	82.8%
Hotels	\$121,049	\$196,640	(\$75,591)	61.6%
Hospitals	\$10,126	\$8,772	\$1,355	115.4%
Campgrounds	\$0	\$0	\$0	0.0%
Multi-Family	\$125,218	\$188,731	(\$63,513)	66.3%
Garden & Nurseries	\$438	\$473	(\$36)	92.4%
Schools	\$31,594	\$92,463	(\$60,869)	34.2%
Needles Marina Park	\$0	\$529	(\$529)	0.0%
General Commercial	\$195,174	\$295,913	(\$100,739)	66.0%
Beauty Salon & Barber Shop	\$5,246	\$8,983	(\$3,737)	58.4%
Religious Organizations	\$16,947	\$39,991	(\$23,044)	42.4%
Food Establishments	\$49,212	\$156,979	(\$107,766)	31.3%
Government Agencies	\$82,678	\$206,910	(\$124,233)	40.0%
Gas Stations	\$26,960	\$63,678	(\$36,718)	42.3%
Tribal Villages	\$16,771	\$52,767	(\$35,996)	31.8%
Total	1,260,659	2,012,771	(\$752,112)	62.6%

Rate Design

Rate design encompasses a multitude of considerations that often are somewhat removed from the unit costs resulting from the cost of service analysis. Issues such as appropriate price signals, potential impact of rate adjustments, ability to pay, intra-class subsidies, etc., will ultimately influence the final approved rate structure.

Output from the COSA studies were designed to facilitate the development of rate designs. Unit cost determinations, by function, typically represent the starting point from which final rate design determinations can be developed. Schedules 1.1 and 1.2 detail the unbundled unit cost determinations in Appendix A and B for the water and wastewater systems, respectively.

Following the review of this draft study, NPUA will need to make the following decisions before rate design options are developed:

- Overall rate increase needed for each utility
- Rate increase by customer class versus across-the-board

Recommendation

Based on the projected revenue requirement and COSA, EES makes the following recommendations:

■ Water System

- Using current water rates, NPUA is not collecting sufficient revenues to meet costs.
- Based on the current inter-class results for the water system, an adjustment to the rate design may be considered.
- It is important to remember than any rate increase above 10 percent is generally considered rate shock and it is therefore recommended that NPUA keep rate changes below 10 percent for any single customer class.
- Based on Executive Order B-29-15 (dated April 1, 2015) and direction from NPUA staff, it is recommended the water utility consider implementing a residential commodity charge for the first block of 1,000 cf (currently no charge for this block) subject to legal review for compliance with California Proposition 218. The charge would be set equal to the commodity charge for all other usage.
- NPUA may also consider implementing tiered water rates to promote conservation per Executive Order B-29-15, subject to legal review of California Proposition 218. The recommended first block would be set at a 25 percent reduction over 2013 average use. The basis for this block is to achieve the requested reductions in Executive Order B-29-15. Usage in excess of the first block would be subject to additional costs related to maintaining compliance.

■ Wastewater System

- Using current wastewater rates, NPUA is not collecting sufficient revenues to meet base case costs.
- Based on the current inter-class results for the wastewater system COSA, an adjustment to rate design may be considered.
- It is important to remember than any rate increase above 10 percent is generally considered rate shock and it is therefore recommended that NPUA keep rate changes below 10 percent for any single customer class.

These recommendations reflect the uncertainty inherent in the COSA study based on the uncertainty associated with the load data and other input assumptions. However, before implementing any new rates, NPUA should obtain legal review and approval to ensure compliance with California propositions 13, 26, 218 and other legal requirements.

Overview of Rate Setting Principles

EES Consulting, Inc. (EES) was retained by Needles Public Utility Authority (NPUA) to perform a comprehensive water and wastewater cost of service and rate study.

In conducting this study, three inter-related analyses were performed. The first analysis performed was a revenue requirement analysis. This analysis examines the various sources and applications of funds for the utilities and determines the overall revenue (rate) adjustment required of the utilities. The next analysis developed is a cost of service analysis. The cost of service analysis is used to determine the fair and equitable allocation of the total revenue requirement to the various customer classes of service. Finally, based on the results of the cost of service analysis and other policy considerations, rate design options are developed.

Overview and Organization of Report

In developing water and wastewater rates for NPUA, a major goal of the study is to develop cost-based unbundled rates that meet NPUA's revenue requirement needs. It is important to understand that a revenue requirement consists of both operational expenses and capital costs. Failure to collect the full revenue requirement may lead to a system that is more expensive to operate in the long run, and more susceptible to periodic failures.

This report is organized such that it follows the steps taken in analyzing and developing NPUA's cost of service. Contained in this section is a generic discussion of the theory and financial principles behind setting rates. This is followed by a section for each utility, discussing the development of the revenue requirement analysis, the cost of service study, and the results of that process. Finally, rate design options are discussed.

Technical appendices are attached at the end of this report that detail the results for the water utility and the wastewater utility. The schedules contained in the technical appendices are referenced throughout the report.

The setting of utility rates that are "fair, just, reasonable and not unduly discriminatory" is a complex process. This process is directed, however, by "generally accepted methodologies" that can be used as a guide in developing NPUA's water and wastewater rates. At the same time, there are often a number of financial principles or guidelines that must be taken into consideration during this process. Therefore, the setting of rates that are "fair and equitable" is an integration of these generally accepted methodologies and the financial policies or specific considerations for NPUA. For the purpose of developing the cost of service studies, EES assumed that each utility must be financially stable and "stand on its own".

The purpose of this section of the report is to provide a brief overview of the basic fundamentals of cost identification and allocation for purposes of developing rates. From this base-level of

knowledge, more insight and understanding can be obtained from the following sections of the report that discuss the specifics of the review of NPUA's allocated costs.

Overview of the Analyses

As discussed previously, there are a number of “generally accepted methodologies” for allocating costs for ratemaking purposes. However, all of these methodologies share the same basic framework. That is, in allocating costs two separate yet interrelated analyses are generally performed. It is within these two separate analyses that different methodologies exist. The two analyses contained within the basic framework for allocating costs are the revenue requirement analysis and the cost of service analysis.

The revenue requirement analysis reviews the various sources of funds and applications of funds for the utility. For purposes of this report, only NPUA's application of funds is reviewed.

Within the next step of the study, the cost of service analysis takes the results of the revenue requirement analysis and attempts to equitably allocate those costs to the various customer classes of service (e.g., residential, commercial, etc.). This analysis provides a determination of the level of revenue responsibility of each class of service and the adjustments required to meet the cost of service.

Types of Utilities

As noted above, there are different methodologies that exist for setting rates. The first distinction often made in developing a methodology is the type of utility that is attempting to set the rates. Utilities are generally divided into two types by ownership—public and private utilities.

Public utilities are generally owned by a municipality, cooperative, county, or special district and are operated on a not-for-profit basis. Public utilities are generally capitalized by issuing debt and soliciting funds from customers through direct capital contributions or user rates. Through statute and/or the lack of profit motive, public utilities do not pay state and federal income taxes. Finally, a public utility is usually regulated by a publicly elected or appointed City Council, Board of Commissioners, or Board of Trustees. As a point of reference, NPUA is a public utility regulated by the City Council.

In contrast, private utilities are capitalized by issuing debt or equity (stock) to the general public. The owners of the private utility are its equity contributors, or shareholders. Private utilities are taxable entities, and finally, they are generally regulated by state public utility commissions. Golden State Water Company is an example of a private water utility.

These differences in ownership and other characteristics often lead to two different methods for reviewing revenue requirement needs. A more detailed discussion of the different methodologies that may be used is provided below.

Overview of Revenue Requirement Methodologies

By virtue of differences noted above for a public versus a private utility, their revenue requirements are based upon different elements or methodologies. Most private utilities use what is known as an “accrual” or “utility” basis of determining revenue requirement or setting rate levels. This convention calculates a utility’s annual revenue requirement by aggregating a period’s operation and maintenance (O&M) expenses, taxes, depreciation expense, and a “fair” return on investment. Operating expenses include the labor, materials, supplies, etc., that are needed to keep the utility functioning. Private utilities must also pay state and federal income taxes, along with any applicable property, franchise, sales or other forms of taxes. Next, depreciation expense is a means of recouping the cost of capital facilities over the useful lives of those facilities and also a means of generating internal cash. Finally, a return on the capital invested pays for the utility’s interest expense on indebtedness, provides funds for a return to the utility’s equity holders in the form of dividends, and leaves a balance for retained earnings and cash flow purposes.

In contrast to the “accrual” or “utility” method of developing revenue requirement for private utilities, a different method of determining annual revenue requirement is often used for public utilities. The convention used by most public utilities is called the “cash basis” of cost accounting. As the name implies, a public utility aggregates its cash expenditures to determine its total revenue requirement for a specified period of time. This methodology conforms nicely to most public utility budgetary processes, and is a very straightforward and easily understood calculation.

Under the “cash basis” approach, there are four component costs. They are operation and maintenance expenses, taxes, debt service, and capital improvements funded from rates. The operating portion of the revenue requirement, i.e., O&M and taxes, are similar under either methodology. The major difference between the two methodologies is the way in which capital costs are viewed and handled. Capital costs under the cash basis approach are calculated by adding debt service to capital improvements financed with rate revenues. A utility’s depreciation expense is sometimes used as a measure of the reasonable level of funding required from rates for capital improvement activities. Depreciation expense represents the current investment of the utility and that portion that has become worn out or obsolete and must be renewed or replaced. It should further be noted that the two portions of the capital expense component are necessary under the cash basis approach because utilities often cannot finance all capital facilities with long-term debt.

Table 4 may be helpful in comparing the cash and accrual accounting conventions.

Table 4
Cash vs. Accrual Basis Comparison

Cash Basis	Accrual (Utility) Basis
+ O&M Expense	+ O&M Expense
+ Taxes	+ Taxes
+ Capital Improvements Financed with Operating Revenues (Depreciation Expense)	+ Depreciation Expense
<u>+ Debt Service (P&I)</u>	<u>+ Return on Investment</u>
Σ = Revenue Requirement	Σ = Revenue Requirement

For this study, cash basis accounting was used to determine the utility’s revenue requirement.

Overview of Cost Allocation Procedures

After the total revenue requirement has been determined, it is allocated to the various customer classes of service based upon a fair and equitable methodology that reflects the cost-causal relationships for the production and delivery of the services. This analytical exercise usually takes the form of a “cost-of-service” study. A cost of service study begins by “functionalizing” a utility’s revenue requirement as water supply, pumping, water treatment, distribution, and customer for the water analysis. The wastewater revenue requirement is functionalized into pumping/lift stations, treatment, collection system and customer. Next, the functionalized costs are “classified” to base-, excess-, and customer-related costs for water systems and to wastewater flow, strength and customer related for the wastewater system.

Water excess related costs are those that the utility incurs to meet a customer’s water demand above the base. Base related costs for water systems are those associated with the base or average day water demand. Customer related costs for water systems vary with the number and type of customer served.

Wastewater flow related costs are those which tend to vary according to the quantity of wastewater collected and treated. Strength related costs for wastewater systems are those costs associated with the additional handling and treatment of high “strength” sewage. Strength of sewage is usually measured in biochemical oxygen demand (BOD) and suspended solids (SS). Customer related costs for wastewater systems vary with the number and type of customer served.

These component costs are then “allocated” to each class of service based upon the most equitable method available for each specific cost. At that point, the revenue requirement has been allocated to each class of service and a determination of the necessary revenue adjustments between classes of service can be made.

Rate Design and Economic Theory

The final step in the rate study process is to design rates for each utility's customer classes taking into consideration the results of the revenue requirement and cost of service analysis. Rates can take many forms, but ultimately they should reflect the component costs that the utility incurs and collect the desired level of revenues. The rate process utilizes the results of the revenue requirement and cost of service to develop rates which achieve the overall goals and objectives of NPUA. These goals and objectives may include consideration of cost based rates, but may also consider items such as the customer's ability to pay, continuity of past rate philosophy, economic development, ease of administration, etc. It is important to understand that cost of service is only one goal or objective in designing final water or wastewater rates, however, it is an important one.

Revenue Requirement and Cost of Service Analysis

This section of the report presents the introduction to the revenue requirements and the cost of service analysis (COSA) for the water and wastewater systems of NPUA.

Overview of NPUA’s Revenue Requirement Methodology

In developing the revenue requirement, a number of decisions must be made regarding the basic methodology to be used. As discussed in the previous section of the report, the first decision NPUA must make is the method of accumulating costs. For this analysis, a cash basis method is used in determining NPUA’s revenue requirement. In summary form, NPUA’s components to its revenue requirement include the elements shown in Table 5.

Table 5
Elements of Cash Basis Revenue Requirement

+	Operation and Maintenance Expenses (O&M)
✓	Water Supply, Pumping & Treatment Expense (water)
✓	Wastewater lift station & Treatment (wastewater)
✓	Transmission Expense
✓	Distribution Expense
✓	Customer Service Expense
✓	Administrative and General Expense
+	Debt Service
+	Other Contributions
+	Taxes/Transfers
+	Capital Improvements
=	Total Revenue Requirement
-	Miscellaneous Revenue Sources
Σ	Net Revenues Required From Rates

From this basic analytical framework, the next step in determining the revenue requirement methodology is to select a time period over which to review revenue and expenses. In the case of NPUA, a fiscal year test period was utilized. A historic period, fiscal year (FY) 2014, was chosen as the test period for the cost of service study. NPUA provided audited financial documents for FY 2014 and budgeted cost projections for FY 2015 budget for both the water and wastewater utilities. Revenues were based on actual revenues collected. The revenue requirement allocated to customer classes of NPUA’s water and wastewater systems can be found in Schedule 2.4 for Appendix A and B, respectively.

COSA Definition and General Principles

A COSA allocates the costs of providing utility service to the various customer classes served by the utility based upon the cost-causal relationship associated with specific expense items. This

approach is taken to develop a fair and equitable designation of costs to each customer class, where customers pay for the costs that they incur. Because the majority of costs are not incurred by any one type of customer, the COSA becomes an exercise in spreading joint and common costs among the various classes using factors appropriate to each type of expense.

The COSA is the second step in a traditional three-step process for developing retail rates. The first step is the development of the test period revenue requirement for the utility, which is the starting input for the COSA. The COSA spreads the revenue requirement across the various customer classes, creating per unit costs by class. In the third step, rates are designed for each customer class, with per unit costs being one consideration in setting the appropriate rate levels.

A COSA can be performed using embedded costs or marginal costs. Embedded costs generally reflect the actual costs incurred by the utility and closely track the costs kept in its accounting records. Marginal costs reflect the cost associated with adding a new customer, and are based on costs of facilities and services if incurred at the present time. While marginal costs can be valuable for designing rates in certain instances, marginal costs are generally higher than embedded costs. Therefore, the use of a marginal COSA approach to cost allocation usually requires that all costs be scaled back to a level equal to the embedded cost revenue requirement established using actual or projected costs from an “accounting” perspective.

This study uses an embedded COSA as its standard methodology for both utilities. Therefore, NPUA’s embedded cost revenue requirement and existing rate base investment are used in developing the COSA results.

There are three basic steps to follow in developing a COSA, namely:

- Functionalization
- Classification
- Allocation

Functionalization separates costs into major categories that reflect the utility’s plant investment and different services provided to customers. The primary functional categories are source of supply, pumping, water treatment, customer, and general for the water utility. The wastewater revenue requirement is functionalized into pumping/lift stations, treatment, collection system and customer.

Classification determines the portion of the cost that is related to specific cost-causal factors, such as those that are base-related, excess-related, or customer-related for water systems and flow-related, strength-related and customer-related for the wastewater system.

The allocation of costs to specific customer classes is based on the customer’s contribution to the specific classifier selected. For instance, demand-related costs are allocated to a customer group using that customer group’s contribution to the particular measurement of system demand, whether coincident peak, non-coincident peak or some variation determined to be appropriate

for the particular cost item. An analysis of customer requirement and usage characteristics is completed to develop allocation factors reflecting each of the classifiers employed within the COSA. The analysis may include an evaluation of the system design and operations, its accounting and physical asset records, customer flow data, and special studies.

Capital Improvement Projects

Capital Improvement Projects (CIP) are related to the infrastructure of each utility. Capital improvement projects are of an ongoing basis and are generally divided into two types or categories. These two categories are capital improvement projects which are related to renewal and replacement, and growth related facilities. Renewal and replacements are, as the name suggests, the replacement of existing and worn out (depreciated) facilities. Growth related facilities are those related to system expansion, system upgrades and new customers.

The importance of properly funding for capital improvements cannot be understated. In particular, failure to properly fund for renewals and replacement within retail rates will ultimately lead to long term financial problems. In effect, the utility will either use cash reserves to finance these renewals and replacement projects in the short-run, or worse yet, not make the necessary replacements.

As a general “rule of thumb” NPUA should, at a minimum, be funding renewals and replacements from rates at an amount greater than or equal to the annual depreciation expense. Annual depreciation expense reflects the current investment in plant that is being depreciated or “losing” its useful life. Therefore, this portion of plant investment needs to be replaced to maintain the existing level of infrastructure and service to customers. In general, annual depreciation is not sufficient and utilities tend to fund in the order of 5 to 10 percent of the gross plant for annual renewal and replacement CIP.

It must be kept in mind that the minimum suggested assumes that funding for replacement and renewal has occurred over time. If replacement and renewal projects have not been done in the past, the minimum funding equal to annual depreciation expense is not sufficient to update the system. In such a case, consideration may be given to funding within rates some amount greater than annual depreciation expense for the funding of renewal and replacement programs.

For this study, it has been assumed that rates shall support an amount equal to 4.44 percent of gross plant for the water and wastewater utilities beginning in FY 2015.

General Ratemaking Principles

It is important to note that the COSA results will be one of the considerations when the process of designing rates for various customer classes begins. The basic goals of rate design include:

- The utility’s ability to collect the appropriate revenue requirement
- Utility revenues and customer rates are stable and predictable

- Proper price signals are sent to create efficiency of resources
- Rates are fair and equitable among customers and avoid undue discrimination
- Rates are simple, easy to understand and feasible for the utility to implement

The COSA is generally used to assist in meeting the second and fourth goals of rate design. Price signals are best if they reflect the specific costs incurred. Rates are generally considered fair and equitable if customers are deemed to pay their fair share of the costs incurred by the utility. Additionally the first goal is met as long as the COSA is based on the appropriate revenue requirement, and the use of a consistent COSA methodology contributes towards the second goal. Rates are more stable through time if the COSA methodology is not significantly changed every time a rate application is made.

Water Cost of Service Analysis

This section includes the development of the revenue requirement and the cost of service analysis for the water utility.

Revenue Requirement

This section of the report outlines the development of the water utility revenue requirement. Simply stated, a revenue requirement analysis compares the overall revenues of the utility to its expenses and determines the overall adjustment to rate levels that is required. The comparison between the source and application of funds can then be used to determine a revenue excess and shortfall.

Development of the Projected Flow Forecast and Forecast Revenues

It was assumed that the water use and the number of customers will not grow over the planning period.

The water revenues are collected based on a base charge dependent on the size of the customers meter and a usage charge. For the COSA study revenues were forecasted using flow characteristics and current rates.

Operations and Maintenance Expenses

Operating expenses (O&M) are classified to the various cost components based on the same classification factors used to classify the total rate base. Total FY 2014 O&M expense for NPUA's water system were approximately \$1.3 million. Operating costs were divided between source of supply, pumping, treatment, transmission and distribution, customer service, accounts and sales, and administrative and general expense categories through the revenue requirement development process.

Franchise Fee and Purchase Payment

This category includes \$69,464 for franchise fee transfers to NPUA. In addition, \$153,135 is included as a share of the purchase payment is paid by the water utility.

Capital Improvement Projects

Historic FY 2014 expenses did not include capital spending. In FY 2015 \$485,343 is included for capital spending and asset replacement, or 4.44 percent of gross plant.

Debt Service

The water system revenue requirement includes debt service and bank service charges for FY 2014. This adds approximately \$603,086 to NPUA's water system revenue requirement.

Miscellaneous Revenues

NPUA's water system did not receive additional operating and non-operating revenues in FY 2014. However, a lease payment to NPUA for use of Well No. 12 is included beginning in FY 2015 for \$148,000.

Summary of Revenue Requirement

Once all of the components of the cash basis revenue requirement have been forecast, the total revenue requirement can be derived. A summary of NPUA's water system revenue requirement for the forecasted period can be seen in summary Table 6.

Table 6 Summary of the Water Revenue Requirement FY 2014	
Applications of Funds	FY 2014
Operation and Maintenance Exp.	
Total O&M Expenses	\$1,336,836
Uncollectable Accounts / Write Offs	0
Franchise Fee	69,464
Purchase Payment	153,135
Debt Service (P&I)	603,086
Capital Improvements	0
Total Revenue Requirement	\$2,162,521
Less: Other Revenues/Net	(\$0)
Net Revenue Requirement	\$2,162,521
Revenues at Current Rates	\$1,407,152
Needed Increase	53.7%

Based on this revenue requirement, NPUA needs a system-wide increase in rate revenues of 53.7 percent. The 5-year forecast of revenues at present rates and expenses is provided below in Table 7. This projection demonstrates that NPUA currently does not receive sufficient revenues to cover costs.

Table 7
5-Year Projected Rate Increase

	2014	2015	2016	2017	2018
Projected Revenues from Rates	1,407,152	1,321,883	1,321,883	1,321,883	1,321,883
Net Expenses	2,162,521	2,591,661	2,543,442	2,584,750	2,627,298
Surplus/Deficit	(755,369)	(1,269,778)	(1,221,559)	(1,262,867)	(1,305,415)
Rate Increase over Current Rates	53.7%	96.1%	92.4%	95.5%	98.8%
Net Expenses Excluding CIP	2,162,521	2,106,318	2,058,099	2,099,407	2,141,955
Surplus/Deficit	(755,369)	(784,435)	(736,216)	(777,524)	(820,072)
Rate Increase over Current Rates	53.7%	59.3%	55.7%	58.8%	62.0%

One source driving the needed rate increase is the capital plan funding \$485,343 per year, or 4.44 percent of gross plant. The importance of properly funding for capital improvements cannot be understated. In particular, failure to properly fund for renewals and replacement within retail rates will ultimately lead to long-term financial problems. In effect, the utility will either use cash reserves to finance these renewals and replacement projects in the short-run or worse yet, not make the necessary replacements. In general, annual depreciation is not sufficient and utilities tend to fund in the order of 5 to 10 percent of the gross plant for annual renewal and replacement CIP.

It is important for NPUA to continually monitor the relationship between its current revenues and costs. Further, the projection in Table 7 demonstrates that, under the current assumptions, NPUA’s water system is not funding to meet the proposed target.

Cost of Service Analysis

The objective of the cost of service analysis (COSA) is to analyze costs and equitably assign those costs to customers commensurate with the cost of serving those customers. The founding principle of cost allocation is the concept of cost-causation. Cost-causation evaluates which customer or group of customers causes the utility to incur certain costs by linking system facility investments and operating costs to serve certain facilities to the services used by different customers. This section of the report will discuss the general approach used to apportion the water utility’s cost of service, and provide a summary of the results.

Functionalization of Costs

The first step in the COSA process following finalization of the revenue requirement is to functionalize the revenue requirement. Functionalization is the separation of cost data into the functional activities performed in the operation of a utility system (i.e., water supply, treatment,

pumping, and distribution). Functionalization was accomplished using NPUA's system of accounts.

In addition to the functionalized costs, certain joint costs are spread to each functional category based on the relationship of the joint cost to the business function. These joint costs include such items as administrative and general costs.

Standard Functionalization

Plant investment costs or rate base are generally functionalized into water supply, treatment, distribution and customer cost categories. The functionalization of rate base typically is very straightforward as costs for the different functions are readily identifiable and rate base accounts are maintained by functional categories.

Expense accounts are also typically kept according to these basic functional categories, with expense items associated with certain types of plant being treated in the same manner as the corresponding plant account.

The two areas where there generally are differences in functionalization among utilities are in the treatment of general plant and A&G expenses. Typically, general plant is considered a separate functional category. Some utilities, when their internal accounting systems can support such an assignment process, will record general plant investment by loading the costs into the other functional categories, much like an overhead assignment or a form of activity based accounting.

On the expense side, A&G costs can be treated in much the same way. Generally, they are treated as a separate expense category that can be spread to functions based upon all other O&M expenses. However, they can also be spread to functions on the basis of total net plant, labor ratios, or, in some cases, directly assigned as part of the activity based accounting approach.

NPUA's Water System Functionalization Method

The specific functions used for NPUA's water COSA are defined below. The functions generally follow standard cost of service approaches.

- *Source of Supply.* The water supply function category includes all costs related to wells and other sources of water supply.
- *Pumping.* The pumping function includes all assets and costs related to the pumping of water.
- *Water Treatment.* Water treatment services include all assets and services related to water treatment. These include items such as the treatment plant, chemicals and lab fees.
- *Distribution.* Distribution services include all services required to move the water from the point of water supply to the end user of the water.
- *Customer.* Customer related services include all services related to the presence of customers on the system, not to customer usage. These services include meter reading, billing, collections, advertising, etc.

Classification of Costs

The second step in performing a cost of service study is to classify the functionalized expenses to traditional cost causation categories. These cost causation categories can be directly related to specific consumption behavior or system configuration measurements such as peak demand, volumetric usage, or number of customers. Each classification category will have a specific allocation factor that, when applied, will distribute those costs among the appropriate customer classes during the allocation phase of the analysis.

Standard Water Classification

There are two generally accepted methodologies used to classify water system costs: Base-Extra Capacity method and Commodity-Demand method. Under the Base-Extra Capacity method, the majority of a water utility's costs are split between base and extra capacity costs. In its simplest form, base costs are incurred to meet the constant or average daily water needs on the water system, while extra capacity costs are incurred to serve above average or peak day water needs.

The Commodity-Demand method separates most of the water utility's costs into demand and commodity costs. Demand costs are associated with providing facilities to meet the peak rates of use (or demand) placed on the water system by customers. These costs include capital-related costs on plants designed to meet peak demands and any associated O&M expenses. Commodity costs are costs that tend to vary by the quantity of water consumed by the customers. These costs include expenses such as pumping, chemicals, and power costs.

NPUA's Water Classification Method

Classification for NPUA's water utility was done using the Base-Extra Capacity methodology. The following are the specific classifiers used in NPUA's water COSA:

- **Base Use**

Base Use costs are costs that tend to vary with the total quantity of water used and operation under average flow conditions. Costs included are O&M expenses of water supply, treatment, pumping and distribution, in addition to capital costs related to plant investments associated with serving customers at a constant or average annual rate of use.

- **Extra Capacity – Maximum Day**

Extra capacity costs are costs of capital and O&M associated with meeting customer usage above average use requirements. These costs are associated with meeting the maximum day and maximum hour water requirements of customers.

- **Fire Protection**

Fire protection costs are costs related to providing both public and private fire protection services to the communities served by the water utility. Usually, these costs include both the direct capital and O&M costs for fire hydrants and private fire connections, as well as applicable indirect costs for source of supply, treatment and distribution of water for fire protection.

- **Customer Related Costs**

Customer related services include all services related to the presence of customers on the system, not to customer usage. These services include meter reading, billing, collections, advertising, etc. Customer related costs vary with the number and type of customers. They do not vary with system supply levels. These costs are sometimes referred to as "readiness to serve" or "availability" charges. Customer costs are incurred by the utility to have water supply readily available for a customer whether it is utilized or not.

Table 8 illustrates the classification categories associated with each function in a water COSA.

Table 8
Water Cost of Service Classification of Cost Components

Function Category	Classification
Source of Supply	Base Use
Pumping	Base Use Extra Capacity Fire Protection
Water Treatment	Base Use Extra Capacity
Transmission & Distribution	Customer Extra Capacity Fire Protection
Customer	Customer

Direct Assignment

Some costs can be directly assigned to certain customer classes without being classified to one of the functions previously described. These are generally costs associated with specific services, such as dedicated capital facilities, or with specific customer classes, such as fire protection in water systems.

Allocation of Costs

The third step in performing a cost of service study is the allocation of the utility's total functionalized and classified revenue requirement to the customer classes of service. This is performed through the application of an appropriate allocation methodology.

Standard Allocation

In general, the allocation of costs is straightforward once the costs have been classified to a specific category.

NPUA's Allocation Methodology

The following are the specific allocation methods used in NPUA's water COSA. The specific method of cost allocation by customer can be found in Schedule 2.3 of Appendix B.

- **Base Allocation Factor.** The Base allocation factor is a percentage measure of each customer class' contribution to the total water supplied. Those expenses classified as Base Costs use the base cost allocation factor to allocate expenses to all customer classes.

- **Maximum Day Allocation Factor.** This allocation factor is based on the ratio of maximum day to average day consumption. The maximum day peaking factor of 1.7 times the average day was developed using NPUA water system flow data.

- **Maximum Hour Allocation Factor.** This allocation factor is based on the ratio of maximum hour to average hour consumption. Those expenses classified to Maximum Hour use this allocation factor to allocate expenses to all customer classes.

- **Fire Protection allocator factor.** The allocation of fire protection expenses in the water cost of service analysis typically involves an analysis which takes into account the gallons per minute flow requirements in the event of a fire.

- **Customer Allocation Factor.** This allocation factor is separated into three different allocation factors, one for each of the customer cost components.
 - Equivalent meters are used to allocate all expenses related to meters.
 - Average number of services is used as the allocation factor for service-related expenses.
 - Number of customers is used to allocate costs associated with monthly bills and are derived from accounting data.

Review of Customer Classes of Service

Customer classes of service refer to the arrangement of customers into groups that reflect common usage characteristics or facility requirement. The classes of service used within this study were as follows:

- Residential
- Commercial
- Municipal
- Temporary Fire Hydrant Meter
- Native Village
- Golf Course

Major Assumptions of the Cost of Service Study

Major assumptions used in conducting the water cost of service study for NPUA are as follows:

- FY 2014 was selected as the test period for the allocation of costs within the cost of service study.
- The water system revenue requirement as outlined in this section was used for the cost of service study.
- Water usage and number of customers is assumed not to grow over the planning period.

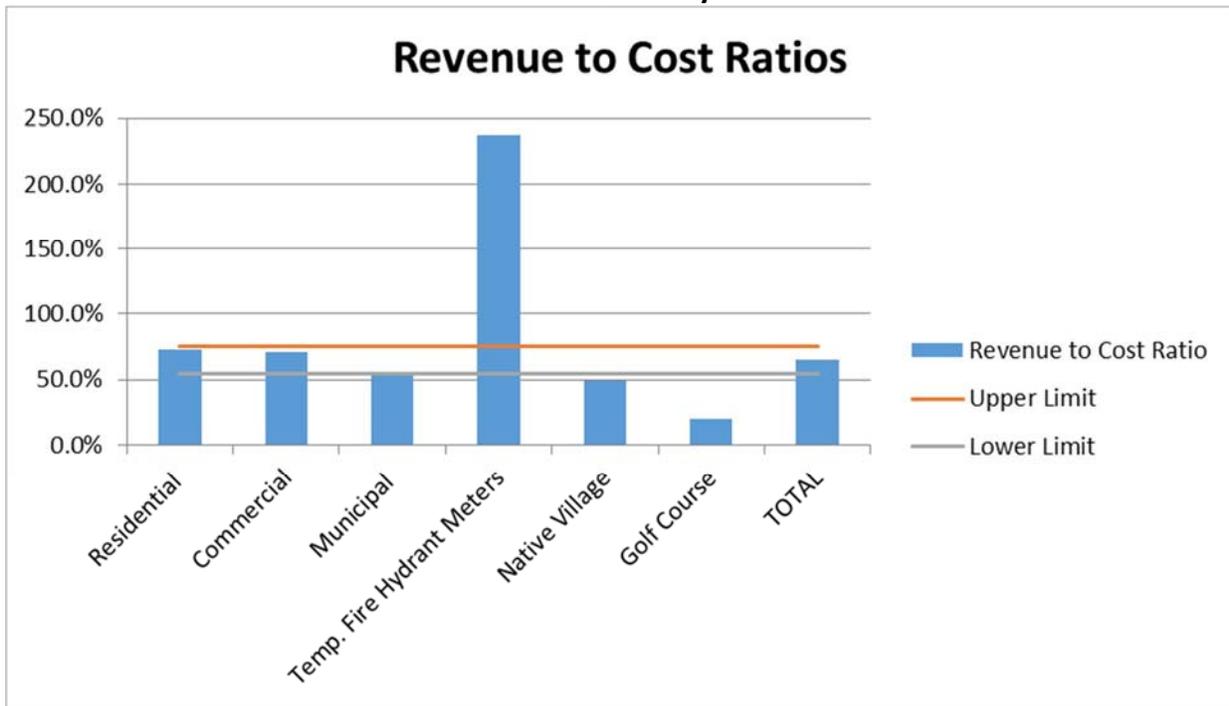
Given these key assumptions, the cost of service analysis could be completed. Schedules 2.3 and 4.2 of Appendix A show the functionalized and classified rate base and revenue requirement, allocated to each class of service.

Cost of Service Results

Given the above assumptions regarding the water system cost of service analysis, the various costs were classified and allocated to the customer classes of service. A summary comparison of the allocated water system cost of service and anticipated revenue from present rates can be found in Table 9 and Figure 1. More detail behind the results shown in Table 9 is presented in Schedule 1.1 of Appendix B.

Table 9 Summary of Water System Cost of Service Analysis				
	Present Rate Revenues	Net Revenue Requirement	Surplus/ (Deficiency) in Present Rates	Revenue to Cost Ratio
Residential	\$688,821	\$944,858	(\$256,037)	72.9%
Commercial	579,008	821,676	(242,668)	70.5%
Municipal	59,616	106,467	(46,851)	56.0%
Temp. Fire Hydrant Meter	3,257	1,370	1,887	237.7%
Native Village	31,343	63,353	(32,010)	49.5%
Golf Course	45,107	224,796	(179,689)	20.1%
TOTAL	\$1,407,152	\$2,162,521	(\$755,369)	65.1%

Figure 1
Water Utility



For the water utility, the COSA results show that NPUA is under-collecting from all but the temporary fire hydrant meter class. It is important to note when examining the results by customer class, that the inter-class cost allocation is based on flow data estimates and usage pattern assumptions. Therefore, interclass revenue to cost deviations of less than +/- 10 percent of system average does not warrant interclass rate modifications.

Wastewater Cost of Service Analysis

This section includes the development of the revenue requirement and the cost of service analysis for the wastewater utility, followed by a discussion of rate design.

Revenue Requirement

This section of the report outlines the development of the wastewater utility revenue requirement. Simply stated, a revenue requirement analysis compares the overall revenues of the utility to its expenses and determines the overall adjustment to rate levels that is required. The results of this revenue requirement analysis provide a framework around which to evaluate the adequacy of current rates for the utility.

Development of the Projected Flow Forecast and Forecast Revenues

It was assumed that the wastewater use and number of customers will not grow over the planning period. Wastewater usage is not metered and was estimated based on metered water consumption and NPUA's EDU study.

Projected revenues were determined based on actual FY 2014 revenues and the EDU study.

Operations and Maintenance Expenses

Operating expenses (O&M) are functionalized to the various cost components based on the same classification factors used to classify the total rate base. Total FY 2014 O&M expense for NPUA's wastewater system was \$1,354,620. Budgeted operating costs were divided between pumping, wastewater treatment, collection, customer service, accounts and sales, and administrative and general expense categories through the revenue requirement development process.

Franchise Fee and Purchase Payment

This category includes \$61,996 in franchise fee transfers to NPUA and \$90,290 for the wastewater utility share of NPUA's purchase payment.

Debt Service

The wastewater system revenue requirement includes a share of NPUA's debt service payment for FY 2014. This added approximately \$505,865 to NPUA's wastewater system revenue requirement in FY 2014.

Capital Improvement Projects

For this draft report, the wastewater system revenue requirement does not include rate funded capital spending in FY 2014. Beginning in FY 2015, NPUA included 4.44 percent of gross plant or \$529,928 in rate funded capital and asset replacement fund.

Miscellaneous Revenues

NPUA's wastewater revenue requirement does not include any additional operating and non-operating revenues.

Summary of Revenue Requirement

Once all of the components of the cash basis revenue requirement have been determined, the total revenue requirement can be derived. A summary of NPUA's wastewater system revenue requirement for the test period can be seen in summary Table 10.

Table 10
Summary of the Wastewater Revenue Requirement
FY 2014

Applications of Funds	FY 2014
O&M Expenses	\$1,354,620
Uncollectable Accounts / Write Offs	0
Transfer to City	61,996
Purchase Payment	90,290
Debt Service (P&I)	505,865
CIP	0
Total Revenue Requirement	\$2,012,771
Less: Other Revenues/Net	\$0
Net Revenue Requirement	\$2,012,771
Revenues at Current Rates	\$1,260,659
Needed Increase	59.7%

Based on this draft revenue requirement, NPUA needs a system-wide increase in rate revenues in of 59.7 percent. This does not include funding of capital projects.

The importance of properly funding for capital improvements cannot be understated. In particular, failure to properly fund for renewals and replacement within retail rates will ultimate lead to long-term financial problems. In effect, the utility will either use cash reserves to finance these renewals and replacement projects in the short-run or worse yet, not make the necessary

replacements. In general, annual depreciation is not sufficient and utilities tend to fund in the order of 5 to 10 percent of the gross plant for annual renewal and replacement CIP.

The 5-year forecast of revenues at present rates and expenses are provided below in Table 11.

Table 11 5-Year Projected Rate Increase					
	2014	2015	2016	2017	2018
Projected Revenues from Rates	1,260,659	1,269,373	1,269,373	1,269,373	1,269,373
Net Expenses	2,012,771	2,736,701	2,674,482	2,716,340	2,759,453
Surplus/Deficit	(752,112)	(1,467,328)	(1,405,109)	(1,446,967)	(1,490,080)
Needed Rate Increase	59.7%	115.6%	110.7%	114.0%	117.4%
Net Expenses Excluding CIP	2,012,771	2,206,773	2,144,554	2,186,411	2,229,525
Surplus/Deficit	(752,112)	(937,400)	(875,181)	(917,038)	(960,152)
Needed Rate Increase	59.7%	73.8%	68.9%	72.2%	75.6%

As with the water system, it is important for NPUA to continually monitor the relationship between its current revenues and costs.

Cost of Service Analysis

The objective of the cost of service analysis (COSA) is to analyze costs and equitably assign those costs to customers commensurate with the cost of serving those customers. The founding principle of cost allocation is the concept of cost-causation. Cost-causation evaluates which customer or group of customers causes the utility to incur certain costs by linking system facility investments and operating costs to serve certain facilities to the services used by different customers. This section of the report will discuss the general approach used to apportion the wastewater utility's cost of service, and provide a summary of the results.

Functionalization of Costs

The first step in the COSA process following finalization of the revenue requirement is to functionalize the revenue requirement. Functionalization is the separation of cost data into the functional activities performed in the operation of a utility system (i.e., wastewater treatment, pumping, and collection). Functionalization was accomplished using NPUA's system of accounts.

In addition to the functionalized costs, certain joint costs are spread to each functional category based on the relationship of the joint cost to the business function. These joint costs include such items as administrative and general costs.

Standard Functionalization

Plant investment costs or rate base are generally functionalized into wastewater treatment, pumping, collection and customer cost categories. The functionalization of rate base typically

is very straightforward as costs for the different functions are readily identifiable and rate base accounts are maintained by functional categories.

Expense accounts are also typically kept according to these basic functional categories, with expense items associated with certain types of plant being treated in the same manner as the corresponding plant account.

The two areas where there generally are differences in functionalization among utilities are in the treatment of general plant and A&G expenses. Typically, general plant is considered a separate functional category. Some utilities, when their internal accounting systems can support such an assignment process, will record general plant investment by loading the costs into the other functional categories, much like an overhead assignment or a form of activity based accounting.

On the expense side, A&G costs can be treated in much the same way. Generally, they are treated as a separate expense category that can be spread to functions based upon all other O&M expenses. However, they can also be spread to functions on the basis of total net plant, labor ratios, or, in some cases, directly assigned as part of the activity based accounting approach.

NPUA's Wastewater System Functionalization Method

The specific functions used for NPUA's wastewater COSA are defined below. The functions generally follow standard cost of service approaches.

- *Pumping.* The pumping function includes all assets and costs related to the pumping of wastewater.
- *Wastewater Treatment.* Wastewater treatment services include all assets and services related to wastewater treatment. These include items such as the treatment plant, chemicals and lab fees.
- *Collection.* Collection services include all services required to move the wastewater from the customer to the wastewater treatment plant.
- *Customer.* Customer related services include all services related to the presence of customers on the system, not to customer usage. These services include meter reading, billing, collections, advertising, etc.

Classification of Costs

The second step in performing a cost of service study is to classify the functionalized expenses to traditional cost causation categories. These cost causation categories can be directly related to specific consumption behavior or system configuration measurements such as wastewater flow, wastewater strength, or number of customers. Each classification category will have a specific allocation factor that, when applied, will distribute those costs among the appropriate customer classes during the allocation phase of the analysis.

NPUA's Wastewater Classification Method

Classification for NPUA's wastewater utility was done by reviewing each cost and attempting to determine why the cost was incurred and what type of need was met. The following are the specific classifiers used in NPUA's wastewater COSA:

- **Flow Related**

Flow related costs are those which tend to vary according to the quantity of wastewater collected and treated. A majority of collection system costs and treatment costs are included in this component. An example of a volume related cost is chemicals for the treatment process. The total cost incurred for chemicals is generally related to the total flow of wastewater.

- **Strength Related**

Strength related costs are those costs associated with the additional handling and treatment of high "strength" wastewaterage. Strength of wastewaterage is typically measured in biochemical oxygen demand (BOD) and suspended solids (SS). The higher the level of BOD and SS, the higher the cost of treatment. Pre-treatment is generally required if the discharge is known to regularly exceed typical waste strength.

- **Customer Related Costs**

Customer related services include all services related to the presence of customers on the system, not to customer usage. These services include meter reading, billing, collections, advertising, etc. Customer related costs vary with the number and type of customers. These costs are sometimes referred to as "readiness to serve" or "availability" charges.

- **Direct Assignment**

Some costs can be directly assigned to certain customer classes without being classified to one of the functions previously described. These are generally costs associated with specific services, such as dedicated capital facilities, or with specific customer classes.

The classification of most of the wastewater plant is classified as 100% volume related, meaning that all plant is in place due to volume constraints rather than customer or wastewater strength constraints. However, the treatment plant was classified as 50% volume related, 25% biochemical oxygen demand (BOD) related and 25% suspended solids (SS) related.

Operating expenses are generally functionalized and classified in a manner similar to plant in service. Therefore, in classifying O&M it has generally been assumed that O&M is incurred in the same manner (percentage) as the plant in service. The only exception to this methodology occurs in instances where the expense account is very specific and identifies the plant which received the benefits of the cost. This approach is keeping with generally accepted cost of service techniques.

Allocation of Costs

The third step in performing a cost of service study is the allocation of the utility's total functionalized and classified revenue requirement to the customer classes of service. This is performed through the application of an appropriate allocation methodology.

Standard Allocation

In general, the allocation of costs is straightforward once the costs have been classified to a specific category.

NPUA's Allocation Methodology

The following are the specific allocation methods used in NPUA wastewater COSA. The specific method of cost allocation by customer can be found in Schedule 2.4 of Appendix B.

- **Flow Allocation Factor.** Flow related costs are usually allocated on the basis of contribution to flows of the treatment plant. In order to determine this allocation factor, some knowledge of the contribution of flows must be determined. Given that wastewater flows are not metered, water consumption is generally utilized as the surrogate for wastewater flows. In the case of residential customers, winter time water usage or average winter water use (AWWU) is used as a "base" wastewater flow. This level of flow is then annualized to provide a relative measure of each class's contribution to flow. The use of winter water usage is necessary to avoid including lawn watering consumption in the allocation factor.

For the commercial customer classes, two methods were used to determine the wastewater flow. For the metered commercial customers, the annual water consumption was used as a proxy for wastewater flows, since most of the water they use does tend to end up within the wastewater flow. For the unmetered commercial customers, NPUA's EDU study was used to determine the annual wastewater flow.

- **Strength Allocation Factor.** Strength related costs were classified between biochemical oxygen demand (BOD) and suspended solids (SS). Each of these types of costs were allocated to the various classes of service based on the relative estimated strengths that each class of service contributed to the overall flow at the plant. Individual allocation factors were developed for both BOD and SS strengths. Strength for BOD and SS were measured in milligrams per liter, and multiplied times the annual estimated flows to develop an overall relationship of total pounds. For this study, strength information (estimates) were utilized from the previous study.

- Customer Allocation Factor. Customer related costs are allocated to various customer classes based upon their respective customer counts. Customer costs do not vary by the flow or strength characteristics of the class or service. The customer allocation factor is separated into three different allocation factors, one for each of the customer cost components.
 - Average number of services is used as the allocation factor for service-related expenses.
 - Number of customers is used to allocate costs associated with monthly bills and are derived from accounting data.

Review of Customer Classes of Service

Customer classes of service refer to the arrangement of customers into groups that reflect common usage characteristics or facility requirement. The classes of service used within this study were as follows:

Flat Rate

- Residential
- Hotel
- Hospital
- Campground
- Multifamily
- Garden & Nursery
- Laundromat – no current customers
- Schools
- Needles Marina Park

Metered Rates

- General Commercial
- Beauty Salon & Barber Shop
- Religious Organizations
- Food Establishments
- Government
- Gas Stations
- Native Village

Major Assumptions of the Cost of Service Study

Major assumptions used in conducting the wastewater cost of service study for NPUA are as follows:

- FY 2014 was selected as the test period for the allocation of costs within the cost of service study.
- The wastewater system revenue requirement as outlined in this section was used for the cost of service study.
- Wastewater usage and customer count is assumed not to grow over the study period.
- The classification of plant for the wastewater utility was developed based on utility specific data, when available. When utility specific data was not available, EES estimated the classification based upon its experience with previous cost of service studies of a similar nature or the previous COSA performed for NPUA.
- The various strength levels (BOD/SS) used within the wastewater cost of service were estimated based on published data from SWRCB for southern California per the previous COSA study.
- Wastewater flow and customer figures used within this study was estimated, for each customer class, from historical usage information provided by NPUA and the EDU study.

Given these key assumptions, the cost of service analysis could be completed. Schedules 2.4 and 4.3 of Appendix B show the functionalized and classified rate base and revenue requirement, allocated to each class of service.

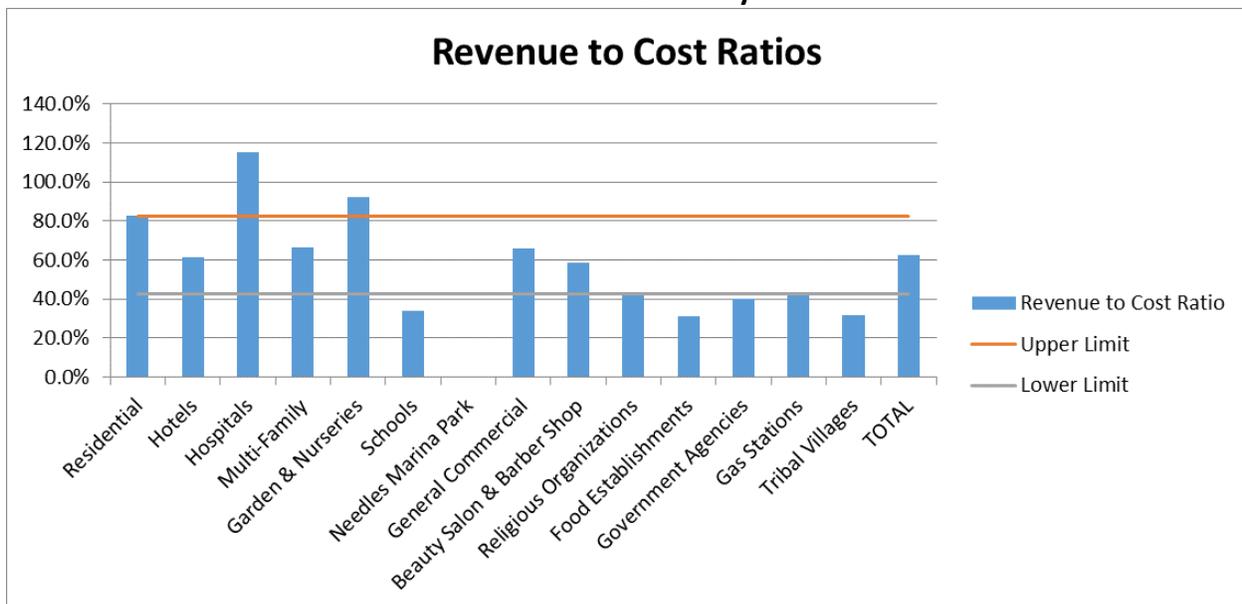
Cost of Service Results

Given the above assumptions regarding the wastewater system cost of service analysis, the various costs were functionalized, classified and allocated to the customer classes of service. A summary comparison of the allocated wastewater system cost of service and anticipated revenue from present rates can be found in Table 12 and Figure 2. More detail behind the results shown in Table 25 is presented in Schedules 1.1 and 1.2 of Appendix B.

Table 12
Summary of Cost of Service Analysis – Wastewater Utility

	Present Rate Revenues	Net Revenue Requirement	Surplus/ (Deficiency) in Present Rates	Revenue to Cost Ratio
Residential	\$579,247	\$699,942	(\$120,695)	82.8%
Hotels	\$121,049	\$196,640	(\$75,591)	61.6%
Hospitals	\$10,126	\$8,772	\$1,355	115.4%
Campgrounds	\$0	\$0	\$0	#DIV/0!
Multi-Family	\$125,218	\$188,731	(\$63,513)	66.3%
Garden & Nurseries	\$438	\$473	(\$36)	92.4%
Schools	\$31,594	\$92,463	(\$60,869)	34.2%
Needles Marina Park	\$0	\$529	(\$529)	0.0%
General Commercial	\$195,174	\$295,913	(\$100,739)	66.0%
Beauty Salon & Barber Shop	\$5,246	\$8,983	(\$3,737)	58.4%
Religious Organizations	\$16,947	\$39,991	(\$23,044)	42.4%
Food Establishments	\$49,212	\$156,979	(\$107,766)	31.3%
Government Agencies	\$82,678	\$206,910	(\$124,233)	40.0%
Gas Stations	\$26,960	\$63,678	(\$36,718)	42.3%
Native Village	\$16,771	\$52,767	(\$35,996)	31.8%
Total	1,260,659	2,012,771	(\$752,112)	62.6%

Figure 1
Wastewater Utility



The wastewater results show that some classes are under-collecting while other classes may be over-collecting. When examining the results for the wastewater utility, it is important to remember that the inter-class cost allocation is based on estimates about flow and strength for each customer class. Therefore, interclass deviations of less than 10-20 percent from the system average cost of service typically do not warrant interclass rate modifications.

Rate Design Principles

Rates need to be designed to recover the utility's cost of service. In the current environment, NPUA will have to be increasingly diligent in reviewing certain key components of its revenue requirement to ensure revenue sufficiency. Rate designs that track volatile costs and that acknowledge the effects of price elasticity will become more prominent and important in the coming years.

This section of the report will identify rate setting principles as well as provide a framework for evaluation of the various rate design options. This section will be completed following the review of the draft COSA results.

Rate Setting Principles

Prudent rate administration requires that several viewpoints be considered in setting rates to the extent that the consumer remains a captive customer of the utility. These views balance the needs of the consumer, the utility, and society as a whole. All three need to be considered when designing rates.

Consumer

From a consumer's perspective, several issues predominate.

- Rates should foster fairness and equity. Customers should pay the cost incurred to provide them with service. This means that one customer class should not subsidize another customer class.
- Rates should be comparable. Customers that place similar demands on the utility's system should be served under the same rate. Alternatively, consumers that receive materially different types and/or levels of service should be charged differently. Discrimination should be avoided.
- Rates should be "affordable." Since utility services are seen as a necessity, service from the utility should be affordable to all customers within its service area or provisions should be made to ensure that this would be the case.
- The consumers should easily understand rates. Unless consumers can reasonably ascertain how their consumption patterns affect the price they pay, they will not be able to make rational decisions pertaining to usage. Clear price signals will drive a more competitive market for generated power.
- Rates should be designed so that they are stable, predictable and do not unnecessarily create adverse impacts on the consumer. Unstable rates can hinder planning, particularly for larger customers. For example, unstable rates have the effect of putting industrial customers at a competitive disadvantage versus similar companies with more stable rates.

Utility

Utilities have their own set of issues and concerns.

- Rates must fully recover the utility’s revenue requirement.
- Rates for publicly owned utilities should allow for sufficient funds to cover needed capital improvements.
- Rates should be fair and equitable and send proper price signals. Rates that are fair and equitable promote good customer service.
- The rate structure should promote economic efficiency. The rate structure should facilitate good decision-making and foster efficient expansion of the system, and encourage efficient use of the existing system.
- The rate structure should provide for revenue stability and predictability.
- Just as the rate structure should be simple and easy to understand by the consumer, it should also be easy to administer by the utility.

Society

From a societal perspective, a number of further issues should be examined when designing rates. Rates should foster economic efficiency. The rate structure should ensure the optimal use of society’s scarce energy resources. Efficiency not only leads to optimal use, it also should lead to optimal non-use, or conservation. With achievement of this level of efficiency as a goal, rates should closely reflect the cost of service. This will also ensure that rates are both fair and equitable among users. As another means of assuring equity in ratemaking, there should be continuity in ratemaking philosophy.

Recommendations

Based on the projected revenue requirement and COSA, EES makes the following recommendations:

- Water System
 - Using current water rates, NPUA is not collecting sufficient revenues to meet costs.
 - Based on the current inter-class results for the water system, an adjustment to the rate design may be considered.
 - It is important to remember than any rate increase above 10 percent is generally considered rate shock and it is therefore recommended that NPUA keep rate changes below 10 percent for any single customer class.

- Based on Executive Order B-29-15 (dated April 1, 2015) and direction from NPUA staff, it is recommended the water utility consider implementing a residential commodity charge for the first block of 1,000 cf (currently no charge for this block) subject to legal review for compliance with California Proposition 218. The charge would be set equal to the commodity charge for all other usage.
- NPUA may also consider implementing tiered water rates to promote conservation per Executive Order B-29-15, subject to legal review of California Proposition 218. The recommended first block would be set at a 25 percent reduction over 2013 average use. The basis for this block is to achieve the requested reductions in Executive Order B-29-15. Usage in excess of the first block would be subject to additional costs related to maintaining compliance.

■ Wastewater System

- Using current wastewater rates, NPUA is not collecting sufficient revenues to meet base case costs.
- Based on the current inter-class results for the wastewater system COSA, an adjustment to rate design may be considered.
- It is important to remember than any rate increase above 10 percent is generally considered rate shock and it is therefore recommended that NPUA keep rate changes below 10 percent for any single customer class.

These recommendations reflect the uncertainty inherent in the COSA study based on the uncertainty associated with the load data and other input assumptions. However, before implementing any new rates, NPUA should obtain legal review and approval to ensure compliance with California propositions 13, 26, 218 and other legal requirements.

Appendix A – Water COSA

Appendix B – Wastewater COSA
