EXECUTIVE SUMMARY SHEET
CITY OF SAN DIEGO

DATE ISSUED: May 14, 2012

ATTENTION: Natural Resources & Culture Committee
Agenda of May 23, 2012

ORIGINATING DEPARTMENT: Public Utilities Department

SUBJECT: Informational Report on Water Budget Based Billing - Consultant Review of Pilot Study

COUNCIL DISTRICTS: All

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REQUESTED ACTION:

This is an informational item with no action required on the part of the Committee.

EXECUTIVE SUMMARY:

At the April 20, 2011 Natural Resources & Culture Committee meeting, the Public Utilities Department (Department) provided a presentation on the results of the 2010 Water Budget Based Billing Pilot Study (Pilot Study) for Single Family Residential (SFR) Customers. By definition, a water budget is used as a tool to price water at a reasonable rate for customers based on the projected usage requirements to sustain household and landscaping needs. The results from the Department's Pilot Study showed that a model could be created to reasonably predict water budgets for the test homes included in the study. This prompted the Department to pursue the next step in determining feasibility of instituting water budget based billing City-wide by retaining Red Oak Consulting to review the Pilot Study's methodologies and conclusions. Red Oak has experience assisting in the development and implementation of water budget based billing methodologies in municipalities throughout the western United States.

In their review of the Pilot Study (see attached report titled, "Water Budget Based Billing Project Task 1 – Validation of Single Family Residential Pilot Study"), Red Oak found that the assumptions, data and methodology utilized by the Department to develop the water budget model is a valid approach. The consultant confirmed the model and test population data that can be used as a starting point in the development of water budgets for the City of San Diego's (City) entire SFR customer class. The consultant found that the "default values" [1] used to develop water budgets are generally consistent with default values set by the American Water Works Association and State legislation. According to the consultant, at least six other southern California agencies used a similar process as was used in the Pilot Study to determine whether water budgets could be

[1] Default values are assumed values for persons per household, water use per person, and landscape watering needs.

accurately developed and applied to their entire SRF customer class. Red Oak recommends additional assessment be given to the default values used in the Pilot Study, and to the use of additional data in order to make water budgets as accurate as possible, based on the best information available and industry accepted water use efficiency standards. Additionally, the consultant recommends that alternative methodologies be considered when determining how to establish the "outdoor" portion of the water budget, such as whether to use a standardized ratio to assign a landscape area based upon parcel size (as was done in the Pilot Study) versus using a site specific landscape area measurement for each parcel.

Red Oak concluded that the findings of the Pilot Study were reasonable for purposes of moving forward with the next components of the study which include: determining the applicability of water budget structures to the City's entire customer base; identifying hurdles to overcome in order to establish a water budget program in San Diego; identifying long-term water conservation programs that support a water budget program; and determining the appropriate rate structure to support a water budget program.

EQUAL OPPORTUNITY CONTRACTING:

This Agreement is subject to the City's Equal Opportunity Contracting (San Diego Ordinance No. 18173, Section 22.2701 through 22.2702) and Non-Discrimination in Contracting Ordinance (San Diego Municipal Code Section 22.3501 through 22.3517).

PREVIOUS COUNCIL and/or COMMITTEE ACTION:

The Department provided a presentation on the Pilot Study results to the Natural Resources & Culture Committee on April 20, 2011.

COMMUNITY PARTICIPATION AND PUBLIC OUTREACH EFFORTS:

No community participation and public outreach efforts have been conducted at this point in the study. Should the City decide to implement a water budget based billing program in the future, a focused outreach and education effort will support the initiative.

KEY STAKEHOLDERS AND PROJECTED IMPACTS:

None at this time.

Roger S. Bailey
Director of Public Utilities

Attachment: Water Budget Based Billing Project Task 1 – Validation of Single Family Residential Pilot Study

City of San Diego
Public Utilities Department

Water Budget Based Billing Project

Task 1 – Validation of Single-Family Residential Pilot Study

May 5, 2012

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- Mayor Sanders and Council Member Frye Memorandum to City Council, dated September 8, 2010
- Director of Public Utilities Roger Bailey Memorandum to Natural Resources and Culture Committee, dated April 13, 2011
- Staff Presentation to Natural Resources and Culture Committee, dated April 20, 2011

1. Summary and Conclusions

The City of San Diego (the City), through its Public Utilities Department (the Department), retained Red Oak Consulting to study the feasibility of implementing a water budget based billing approach for its entire customer base. This report summarizes the findings and recommendations of Task 1 of this study. The purpose of this task is to review and validate the City-prepared Water Budget Pilot Study. The most significant findings of our Pilot Study review are as follows:

1. The Pilot Study approach, in terms of the data used and analyzed, is valid.
2. The key assumptions used in the Pilot Study to determine water allocations for the sample accounts are appropriate.
3. The assumptions used to determine the water budget values are reasonable for purposes of conducting the Pilot Study. These values include persons per household, water use per person, and landscape area for sampled accounts and do not require "finalization" at this stage of the project.
4. The assumptions used in the Pilot Study are reasonable for purposes of moving forward with the more comprehensive analyses to be completed in Tasks 2 through 5. These analyses include:
    - determining applicability of water budget structures to the City's entire customer base,
    - identifying hurdles to overcome in order to establish a water budget based billing structure,
    - identifying long-term water conservation programs that support a water budget program, and
    - determining the appropriate structure to support a water budget program.
5. The assumed water budget values referenced above and the manner in which the data is developed will be further evaluated in subsequent tasks in a collaborative manner with the City. This evaluation will include a comprehensive consideration of each variable to be used in determining account-specific water allocations and the alternative methods available to determine these parameters. For example, should "average" landscape area values be used or measurements of the landscape area of each parcel be taken to determine outdoor water use

allocations? The advantages and disadvantages of these methods will be thoroughly considered in arriving at specific recommendations.

6. The conclusion to be drawn from the Pilot Study is that a water budget based billing approach is feasible for use in charging the City's single-family residential customers for water service. Subsequent tasks will look at the applicability of this approach for the City's other customers.

This report should be read in its entirety for a full and complete understanding of the Pilot Study and the Red Oak review.

2. Introduction

2.1. Water Budget Pilot Study - Purpose and Background

The City's Public Utilities Department currently serves approximately 275,000 water connections. In addition to local water supplies, the City relies on water from the Sacramento-San Joaquin Bay Delta and the Colorado River conveyed through the State Water Project (SWP) and Metropolitan Water District of Southern California (MWD) delivery systems. The City has effectively managed its water resources in spite of being situated in a very dry climate located at the end of the "pipeline" in populous southern California.

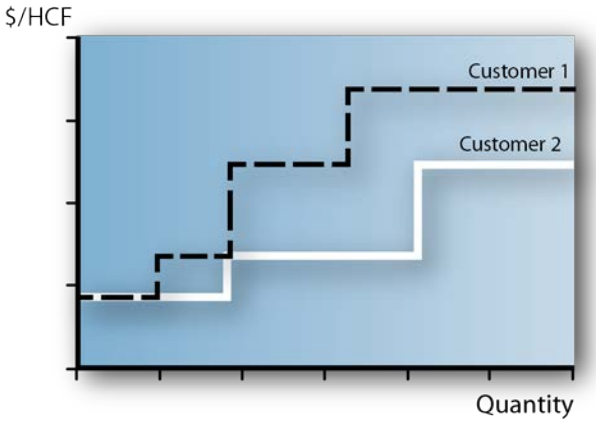
In the face of persistent State-wide drought in 2009, reduced allocations of imported water from the City's wholesale water agencies and economic recession, City staff completed research regarding various water pricing and allocation approaches to encourage customers to reduce water consumption. A methodology of water use allocations based on historic consumption was developed for use in fiscal year (FY) 2010[1], but was considered deficient given that such an approach could potentially be less onerous on past water-wasters, while creating relatively greater hardship for those that had already taken steps to minimize water consumption through conservation efforts. Ultimately, specific water use restrictions were put into place as a means of curbing water consumption during the City's period of mandatory conservation.

In their research on pricing and allocation approaches, Department staff expressed an interest in water budget based billing[2] approaches. This is an alternative to the historic water use allocation approach developed by the City in FY 2010. Based on both indoor and outdoor water use efficiency criteria, this approach determines a water allocation or budget for each individual account or property – see Figure 2-1. In this illustration customers pay the same unit price per hundred cubic feet (HCF), but the water use allocation (usage blocks or tiers) are individually calculated based on determinations of efficient indoor (e.g., persons per household) and outdoor (e.g., landscape area) water use allowances. Customer 1 in Figure 2-1 has a smaller indoor budget and moves into higher priced usage blocks sooner than Customer 2 who has a larger indoor budget (as well as a larger outdoor budget).

[1] The City's fiscal year (FY) starts on July 1 of each year. Reference to FY 2010 represents the 12 months ending June 30, 2010.

[2] Throughout this report the phrase "water budget based billing" (in whole or in part) is used with the following terms and has the same meaning and intent: system, program, rate and rate structure.

Figure 2-1: Water Budget Based Billing Structure



A water budget based billing approach can be defined as follows:

> *The budget is an estimate of how much water the household needs, based on the number of people in the household, the size of landscaped area, local weather, the amount of water plants need, as well as any water use efficiency standards and/or drought factors that may be put in place.*

During the last few years, the Mayor's Office listened to comments and suggestions regarding the use of a water budget based billing approach in San Diego. In 2009 staff initiated the single-family residential (SFR) Pilot Study – the results of which is the subject of this report (see Appendix A – April 13, 2011 Water Budget Based Billing memo and April 20, 2011 Water Budget Based Billing Pilot Study power point presentation). The Pilot Study looked at how this rate approach would work for only SFR customers. The prospect of applying such a sophisticated rate structure across a large and varied customer group would require a thorough evaluation of data requirements to calculate water use allocations based upon the unique characteristics of each of the City's nearly 275,000 connections.

With the impending upgrade of the new SAP Customer Care Solutions (CCS), the Department completed the Pilot Study in March 2010, to examine various elements of data needed to calculate water budget allocations for SFR customers. Based on a sampling of sites in three different climate zones (coastal, central, and inland), the Pilot Study concluded that water budget allocations could be calculated and this rate structure form could be applied across the entire SFR customer class.

The City retained Red Oak Consulting to study the feasibility of implementing a water budget based billing system for its entire customer base. Initially, the Department tasked Red Oak to:

- Validate results of Pilot Study (Task 1).

- Determine applicability of a water budget based billing structure to the City's entire customer base (Task 2).
- Identify hurdles that need to be overcome in order to establish a water budget based billing program in San Diego (Task 3).
- Identify long-term water conservation programs that support a water budget based billing program (Task 4).

This Task 1 report reviews and, where indicated, validates the Pilot Study methodology, data assumptions and findings.

2.2. Water Budget Based Billing System Approach

The City of San Diego is evaluating a water budget based billing system that can accomplish a wide range of goals that are important to the City, Department and its citizens/customers. These goals are intended to:

- Promote long-term management of water resources through cost-effective, sustainable conservation programs.
- Provide equity to each customer. The City is large and has diverse customer water needs and weather, e.g., precipitation and temperature variations. Equity or "fairness" is an important goal for the City with respect to water rates in general and specifically in considering a water budget based billing approach and associated water allocations.
- Meet customer expectations and understanding. It is paramount to use "good data" to develop individualized budgets.
- Recognize efficient water users. Most customers, as identified in the Pilot Study, are efficient water users. A successful rate structure needs to identify and reward efficient water use.
- Establish accurate water efficiency standards across all types and classes of customers.
- Meet water efficiency targets and maintain savings gains. The City must manage a limited supply of water, avoid placing undue constraints on business/economic development, commerce and lifestyle, and yet meet State legislated water conservation requirements. At the same time, the City wants a rate structure to recognize past efforts and conservation achieved by customers.
- Meet requirements of both State legislation SBX7-7, which calls for a 20% reduction in water consumption per capita by 2020, and the City's Landscape Ordinance.
- Meet customer class proportionality and public approval/voting requirements of Proposition 218 (Right to Vote on Taxes Act) and as appropriate, Proposition 26 (Supermajority Vote to Pass New Taxes and Fees Act).

- Stabilize water sales revenue.

Many of these goals are important elements to consider when assessing the Department-prepared Pilot Study for SFR customers and the applicability of a water budget based billing structure.

3. Review of Pilot Study

3.1. Methodology

The Pilot Study that the Department completed follows a similar process used by at least six other southern California agencies to test assumptions and required variables for determining a SFR water budget allocation, including:

Irvine Ranch Water District	Eastern Municipal Water District
Western Municipal Water District	City of Corona
Moulton Niguel Water District	Rancho California Water District

This process has been used by other agencies to determine if water budgets can be accurately determined, and if the basic methodology and structure can be applied to all SFR accounts.

3.2. Assumptions

Red Oak found the assumptions used to develop the SFR budget billing methodology in the Pilot Study reasonable and generally consistent with those used by other water providers. Those assumptions include:

- Indoor water needs of 60 gallons per capita per day (gpcd) and an average of four people per household. The indoor use of 60 gpcd is based on extensive national and State research conducted by the American Water Works Association[3] (AWWA). As an additional point of reference, California legislation (SBX7-7) adopted in 2009 establishes its indoor efficiency target as 55 gpcd to be achieved by 2020. The assumption of four people per household is a common starting point for estimating SFR household size.
- Landscape factor of 80% of local evapotranspiration (ET), as established in 2009 by the adoption of AB 1881 (Water Conservation in Landscaping Ordinance), was properly used in the Pilot Study for estimating irrigation water budgets. ET is used for estimating plant water needs. The ET data was collected from local California Irrigation Management Information System (CIMIS) stations in the three test regions of the City and averaged over four years.
- The final data point for estimating outdoor water budgets is the size of the landscape area. For the Pilot Study the landscape area per SFR site was determined by using existing parcel data (lot size), conducting hand-

[3] Residential End Uses of Water, AWWA Research Foundation, 1999. The AWWA Research Foundation (AWWARF) is now known as the Water Research Foundation.

measurements over parcel images (geographic information system [GIS] parcel images) of select sites, and determining a typical percentage (%) of landscape area per parcel size. The methodology estimates landscape area for SFR home sites in the test areas using existing Department data and technology. The results of this approach are shown in Table 1 and form the basis for estimating landscape area for different sized SFR parcels:

Table 3-1:
Single-Family Residential Landscape Areas by Property Size

Total SFR Property Size	Percent of SFR Property Landscaped
<= 1/8 acre	28%
> 1/8 acre but <= ¼ acre	39%
> ¼ acre but <= ½ acre	59%
> ½ acre but <= ¾ acre	60%
> ¾ acre but <= 1 acre	67%
> 1 acre	72%

The assumptions used by the Pilot Study mimic accepted water budget allocation "standards" established from AWWA and University of California research and those embedded in State legislation. Similar assumptions are used by California water agencies to create individualized water allocations for use in water budget based billing approaches. For more information on the Pilot Study assumptions see Appendix A: the staff Report to City of San Diego Natural Resources & Culture Committee, dated April 13, 2011.

While the data set and sample size for this analysis is not statistically valid (was too small and not randomly generated[4]), the results are generally consistent with other water agencies and are sufficient to support a conclusion that a water budget based billing approach can be used by the City. However, the City will want to consider the benefit in conducting more detailed site-specific analysis before implementing this approach. Additional recommendations on this topic are included in Section 5 of this report.

[4] The pilot study did use a random sample data set to create water budgets for 900 households - the results were then used to create Figure 3-1 (Bills Exceeding Budget). The data set that was chosen to develop actual landscape area measurements for creation of Table 3-1 (Landscape Area by Property Size) was not random so as to ensure good representation of various parcel sizes.

Red Oak finds the Pilot Study methodology, assumptions and approach for testing water budget allocations in SFR homes are appropriate and consistent with similar studies completed by agencies in southern California.

3.3. Data Needs

A water budget based billing system requires individualized account data including actual and/or estimated residents per household, landscape area, and local weather (ET) set against the efficiency "standard" depicted in California legislation (AB 1881, SBX7-7).

The Department approach for the Pilot Study used the same type of weather data (e.g., CIMIS) and the legislative "efficiency standard" used at other California agencies that have implemented and experienced water budget rate structure "success".

The water budget allocation equation is provided below.

Individualized Water Allocation = Indoor Budget + Outdoor Budget:

Indoor Budget
(No. of residents) x (Use per capita per day) x (No. of days in billing period)

PLUS

Outdoor Budget
(Daily ET) x (No. of days in billing period) x (Landscape factor) x (Landscape area)

Tables 3-2 and 3-3 illustrate the development of water budgets for two SFRs with differing budget billing criteria. Under a water budget based billing structure, rates in Tiers 1 and 2 are set lower compared to Tier 3, which is considered excessive water use. For example, based on the unique characteristics of his site, Customer No. 1 can use up to 40 HCF per billing cycle without stepping up into the more expensive Tier 3. By comparison, Customer No. 2 can use up to 72 HCF before stepping into Tier 3.

Table 3-2:
Single-Family Customer No. 1
4 People; 3000 SF of Landscape Area
Bimonthly Water Budget Calculation

Budget Billing Criteria

No. of residents	= 4	Average daily ET	= 0.18 in. (0.015 ft.)
Daily use per capita	= 60 gals.	Landscape Factor	= 0.8
Billing period	= 60 days	Landscape Area	= 3000 sq.ft.

Rate Structure	Budget Description	Formula	Bimonthly Tier Range *(HCF)*
Tier 1	Indoor	4 people x 60 gpcd x 60 days x (1 HCF per 748 gals)	0 to 19.3
Tier 2	Outdoor	3000 sq ft x 0.015 ft. ET per day x 60 days x 0.8 LF x (1 HCF per 100 cu.ft.)	19.4 to 40.9
Tier 3	Excess		Greater than 40.9

Table 3-3:
Single-Family Customer No. 2
6 People; 6000 SF of Landscape Area
Bimonthly Water Budget Calculation

Budget Billing Criteria

No. of residents	= 6	Average daily ET	= 0.18 in. (0.015 ft.)
Daily use per capita	= 60 gals.	Landscape Factor	= 0.8
Billing period	= 60 days	Landscape Area	= 6000 sq.ft.

Rate Structure	Budget Description	Formula	Bimonthly Tier Range *(HCF)*
Tier 1	Indoor	6 people x 60 gpcd x 60 days x (1 HCF per 748 gals)	0 to 28.9
Tier 2	Outdoor	6000 sq ft x 0.015 ft. ET per day x 60 days x 0.8 LF x (1 HCF per 100 cu.ft.)	29.0 to 72.1
Tier 3	Excess		Greater than 72.1

3.4. Pilot Study Findings

The Pilot Study concluded that the Department, with approximately 220,000 SFR water connections, could utilize existing data to calculate individualized water budgets using a water budget based billing structure.

Furthermore, the Pilot Study implied that data is not an overwhelming or limiting obstacle to the development of a water budget based billing structure given the size of the customer base. The findings of the Pilot Study showed that:

- Assumptions for an indoor water use efficiency "standard" were already established in California legislation (SBX7-7).
- Weather data (ET) is available for select areas for use in calculating landscape water budgets.
- Assumptions for an outdoor water use efficiency "standard" were already established in California legislation (AB 1881).
- Landscape area for each parcel could be calculated based on existing data (parcel size) and ratio of percentage of landscape area to parcel size categories, as established in Table 1.

The Pilot Study concluded that:

- Estimated water budget allocations could be calculated and be effective as a "starting point" for implementing this billing system. This finding is reinforced by experience of other agencies.
- A "variance" or "allocation adjustment" process would be appropriate and necessary to accommodate differences in water needs per property (medical needs, family size, etc.).
- Consideration for how to include a "variance" or "adjustment" into billing system and potential water budget based billing structure design is important.
- A significant amount of time would be needed for customer outreach, engagement, education and partnering to obtain and/or verify site data in order to determine an accurate allocation of water for each customer.

4. Evaluation of Pilot Study

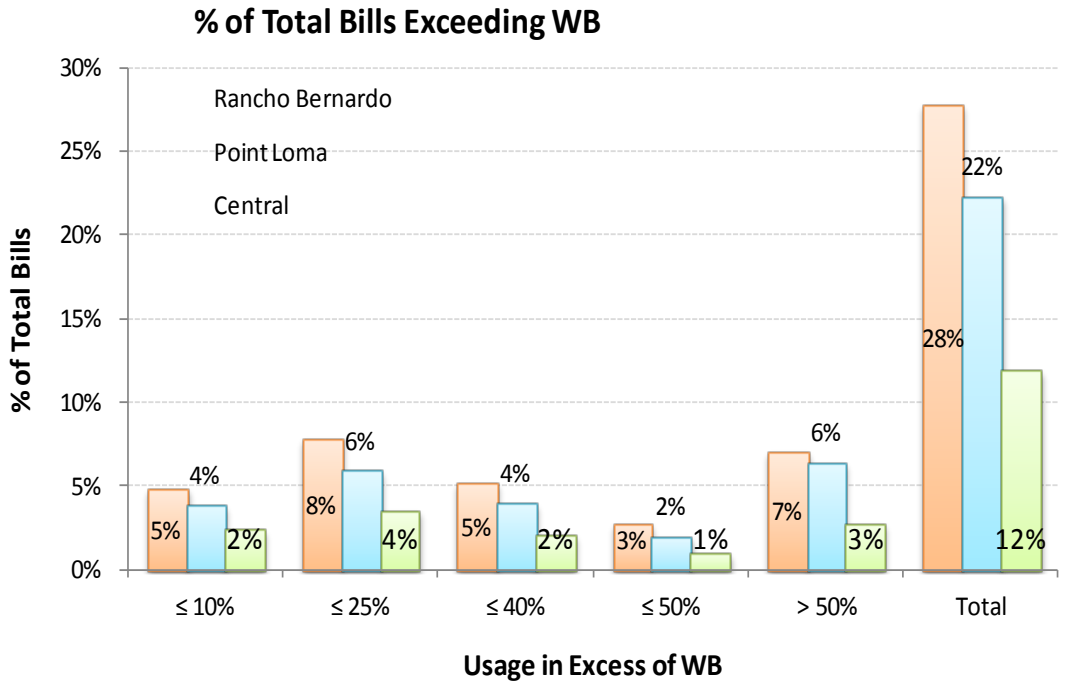
The Department designed and conducted a pilot study that is consistent with similar analyses conducted by other California water agencies. Agencies have used similar assumptions to determine number of residents, a per capita indoor water use standard, daily historical ET, landscape factor and a percentage of landscape area per parcel as used in the Department's Pilot Study. Agencies have used the same methodology or process to test assumptions across the customer base. Red Oak found the assumptions and methodology appropriate and the Pilot Study sound as completed by Department staff.

After review of the Pilot Study assumptions, methodology, spreadsheets, and policy discussions, Red Oak makes the following suggestions:

- The data required for implementing a water budget allocation for SFR accounts exists and/or can reasonably be developed, even with a large customer base and large and varied service area as exists in San Diego.
- Integration with new billing system is critical.
- A well-designed internal education and external outreach and education program is integral to successful implementation of a water budget based billing structure.

Based upon the assumptions and defaults selected, the Pilot Study determined that approximately 80% of bills from the combined three test areas already meet a projected water budget allocation, i.e., the use for these accounts was within their estimated water budget or allocation. Figure 4-1 shows that the average number of bills exceeding their budget was 20.7%. (Nearly 80% of the bills in the Pilot Study met their budget).

Figure 4-1: Bills Exceeding Budget



Such high level of conformance with established water budgets(80%) is likely to lead to successful implementation of this structure to the entire customer class.

- Other agencies with similar compliance to the water budget have seen a positive reaction by the vast majority of customers who agree that "rewarding water efficiency and penalizing water waste" is fair and expected in a region that has limited water supplies.
- Most customer accounts would essentially be "rewarded" for their efficiency efforts, and would not have to change their behavior or lifestyle to meet allocations.

It is Red Oak's experience based on the actual implementation of new water budget based billing structures, that a strategic and highly coordinated public outreach effort is required.

The implementation of a rate structure change in agencies of any size, in today's political climate, requires careful planning and interdepartmental coordination. The City of San Diego should allow ample time for an "education" effort in order to produce acceptable results for the City Council, its customers and stakeholders for a "change" in rate design. Any change to water agency rates, even a straightforward rate increase pass-through, requires a well-planned public relations effort. No time frame can be set or estimated for

public outreach until water budget based billing policy decisions and a financial study are complete.

Based on our experiences with rates of all kinds, it is important for agencies to reach out early, often and to the right customers to share facts about the new water rates. Without the positive facts presented in a clear fashion and presented repeatedly, particularly with respect to individual impacts of a new rate structure, customers will naturally draw their own conclusions about the agency, the rate structure and associated issues. As a result, customers will likely develop a false image of what the agency is doing based on their lack of information. Armed with misinformation, customer perception can become customer reality.

Any rate or rate structure change requires a thoughtful and coordinated outreach strategy for success. Design of a coordinated and comprehensive public outreach campaign is a part of Tasks 5 and 6 of this project.

5. Feasibility of Implementing Water Budget Based Billing Structure for all Single Family Customers

5.1. Introduction

The Pilot Study was conducted with proper assumptions applied by the proper methodology in order to assess if existing data can be used to help calculate water budget allocations for a large and diverse customer base as represented by the City of San Diego. The Department's conclusion was "yes existing data can be used" and Red Oak agrees with this assessment.

However, it is important for the City to take measured steps, ask every question and consider every answer before considering any change to the rate structure methodology. The Pilot Study also mentions a wider range of objectives, such as political and public relations impacts, coordination of budget structure and rate design with the new CCS billing software and an appropriate public outreach program, should the City move forward with water budget based billing. Red Oak is very cognizant of inherent challenges, myths and realities of water budgets, as well as the requirements of Proposition 218 and the importance of public acceptance.

That agencies are succeeding with water budget based billing structures, in terms of defining efficient use budgets/allocations as well as stable and adequate revenue, increased conservation, generation of a new conservation-funding source and improved customer service, is testament to the attention to detail in the billing methodology process. Completing the Pilot Study was an appropriate first step in this ethic of "attention to detail". We see no fatal flaw in the Pilot Study conclusions and recommend moving forward with the evaluation of water budget based billing as directed in Tasks 2 through 4 of this project.

Based on information developed from the Pilot Study, Red Oak recommends discussion and consideration of the following items that connect a robust water budget based billing system with a pro-active education and outreach program, a clear Proposition 218 process, and success at meeting City objectives (customer equity, revenue stability, continued and/or increased water use efficiency).

5.2. Recommendations

Setting Allocation Defaults: Policy and Practicality

Agencies that change to a water budget based billing structure should consider how to balance the allocation of customer service time dedicated to gathering (and maintaining) required information for each customer. A customer may expect that the data used to build their individual budget should be precise (number of people per household, landscape area, weather data). The reality is that the City of San Diego has approximately 220,000 SFR water connections. How can the Department establish these representative "defaults" in a cost effective manner?

Definition:
Default – this is the "starting" point for a budget based billing approach with regard to calculating an individualized water budget allocation. In the context of a water budget based billing approach, "default" is the term for data that has been calculated, estimated and/or otherwise selected by the agency to populate the billing system allocation variables, such as number of residents per household or landscape area.

At the initial implementation of a water budget based billing approach it is important to gather accurate site-by-site[5] data. The accuracy of customer data is a key marker used by customers to assess the credibility of the water agency with regard to defining a water budget and charging for water use, particularly over-allocation use (higher tier prices). The following recommendations revolve around gathering the "right" data, setting accurate allocations and using this process as an opportunity to educate and partner with customers.

Recommendation No. 1: Set Indoor Allocation to comply with current standards

Rational: The State of California, using Water Research Foundation (WRF – formerly known as the AWWA Research Foundation or AWWARF) studies (of which the City/Department was a contributing agency) has established 55 gallons per capita per day (gpcd) as the indoor water use efficiency standard. This value is written into State legislation (SBX7-7) and allows the City to use independent, credible data as the foundation for residential indoor allocation of water.

Recommendation No. 2: Set "default" number of residents per household using recent census data estimates from San Diego Association of Governments

Rational: By definition, the use of "average" data means that many customers will fall above and below the "average". Customers requesting a change from the default values will be asked, as per a "variance" or "adjustment" process, to verify the number of people

[5] "Site-by-site" refers to the development of data for an individual parcel or property.

per household. If the actual number of residents is two or three in a household, and the default value is four people, relatively few customers will report less than the default number set as a billing system default. This will mean that more water is allocated for the site with less people per household. By setting the budget default for all SFRs at a lower number of residents per site, a more accurate accounting of actual number of household residents will be achieved over time through the variance process, thus allowing / promoting a more accurate water budgeting process.

Example:
Western Municipal Water District started the water budget based billing process by assuming four people per household. A separate and unrelated survey of customers revealed that most households fell below three people per account. Western subsequently adjusted their "default" to three people per household to more accurately reflect their customers' circumstances. This default created more accurate allocations to "start" the water budget billing allocations.

Recommendation No. 3A: Calculate residential landscape area with highest level of automated accuracy for each parcel.

Rational: Estimating landscape area for a parcel based on "averages" from sample sites (see Table 1) will mean that many or most of the estimated landscape area "defaults" will be inaccurate – either higher or lower. For purposes of a "pilot-level analysis" and the modeling to be done in Tasks 2 through 4 of this project, using "averages" as noted on Table 3-1 is acceptable and reasonable. However, if the City elects to move forward with a water budget based billing system, consideration should be given to limitations associated with using "averages" and developing more site-specific, individualized data. While the Pilot Study "averages" could be used to determine budgets/allocation for SFR customers, the following discussion highlights some of the shortcomings of using of this type of information.

When customers receive their landscape area estimate and determine it is "off" by some amount, they may assume the worst about the agency, e.g., "How can the agency calculate my water budget if they could not even get my (landscape) square footage right?" (source: Moulton Niguel Water District [MNWD] customer complaints related to preliminary agency estimates of residential landscape area).

Estimating landscape area based on a small data set similar to that used in the Pilot Study will most likely result in: (1) lower accuracy, (2) lower credibility in the eyes of customers, and (3) higher customer service costs to handle customer complaints (and to accurately determine irrigated areas) during and after implementation.

Example:
MNWD anticipated using landscape area data provided by Municipal Water District of Orange County (MWDOC) (estimated percentage of parcel size) for establishing SFR landscape area and water budgets. A review of selected site data revealed an error range of 12%-20% across SFR accounts. The agency determined that this level of inaccuracy would hurt credibility with customers. They conducted a search and review of how to calculate more accurate landscape area estimates, verified and incorporated the more accurate process into the water budget based billing structure time-line and budget. MNWD concluded that greater accuracy would result in greater customer acceptance. MNWD conducted a analysis of each parcel size and reduced the error range to approximately 5% to 7%.

Example:
In 1991, IRWD did not have access to county parcel data in electronic form, nor GIS images and software for estimating area of each parcel. IRWD purposely selected a "low" landscape area default to "start" its billing system allocation calculations. The default landscape area was set "low" in order to motivate customers to contact the agency with more accurate information. While this initially resulted in greater staff time to work with customers to obtain and verify the "customer-specific" square footage date, it also resulted in enhanced customer acceptance and relations.

As IRWD has annexed small agencies and added to their service area, they initially used the percentage of parcel size as landscape area as the method to calculate each parcel's area (same method used in the Department's Pilot Study). IRWD found the landscape area data was not accurate enough, caused over and under allocations and resulted in increased staff time to gain accurate landscape area data. IRWD has approved a project to measure all of the SFR sites in the service area with high-resolution accuracy in order to update customer variables and allocate water as accurately as possible. This project used an outside digital imaging firm to determine landscape areas for each parcel to ensure accurate data for use in determining water use allocations and ultimately customer bills.

The site-by-site approach is preferred if the City implements a water budget based billing approach. However, such detailed and accurate data is not a requirement for this project's modeling effort; Table 3-1 data will suffice. Either average data (via Table 3-1) or each parcel's data may be used. The decision on which to use will be made as a part of Task 5 of this project and will be done so in a collaborative manner/discussion with staff representing a wide range of Department and City interests.

Recommendation No. 3B: Use public outreach efforts to (1) educate customers on a proposed change of rate structures, (2) ask for and/or validate customer parcel data, and (3) obtain any other pertinent information to help the City establish accurate allocation data and customer buy-in within the capacity of the CCS billing system

Rational: Should the City move forward with water budget based billing, customers would be educated in a variety of ways as to what the change is, how it works and what are the benefits for the community. Adopting default assumptions that are inaccurate, either in reality or in public perception, creates a loss of customers' confidence in the agency. In contrast, by starting the education and outreach effort early, the Department can solicit accurate customer data and be seen by customers as a credible part of calculating water budgets. The outreach would employ a strategy of asking customers to "partner with the City" to insure the accuracy of indoor and outdoor allocation for their site. The returned information will be used to: (1) check and/or update existing default assumptions (number of residents, landscape area); (2) determine other water needs (pool, medical need, large animals, etc.); (3) build buy-in/knowledge of a water budget based billing structure; and (4) collect other data that might be of interest to the Department. The above data can be returned to the Department via mail, email and/or a dedicated website that can auto-populate customer records.

By starting early with the customer outreach, the Department can spread the customer service volume over time for a manageable workload to verify and educate a large customer group. Our experience with other agencies adopting water budget based billing structures shows that:

- Accuracy is the most important feature to customers of water budget allocations.
- Agencies need to "ask" for customer data in any event (variances), so it is best to anticipate the task and utilize the opportunity to educate, gather more accurate data and seek a partnership with customers to allocate water accurately for their specific needs.

Recommendation No. 4: Utilize private sector microclimate level ET data for improved accuracy and customer acceptance.

Rational: In every agency where water budget based billing has been adopted, customers tend to focus on the quality/accuracy of weather data. People seem to sense that weather is very site specific, changes frequently, and that their location is different from the location of the weather station.

In many respects, the customer is right on this topic. The first water budget based billing structure (IRWD in 1991) used historical ET from CIMIS station No. 75. Customers

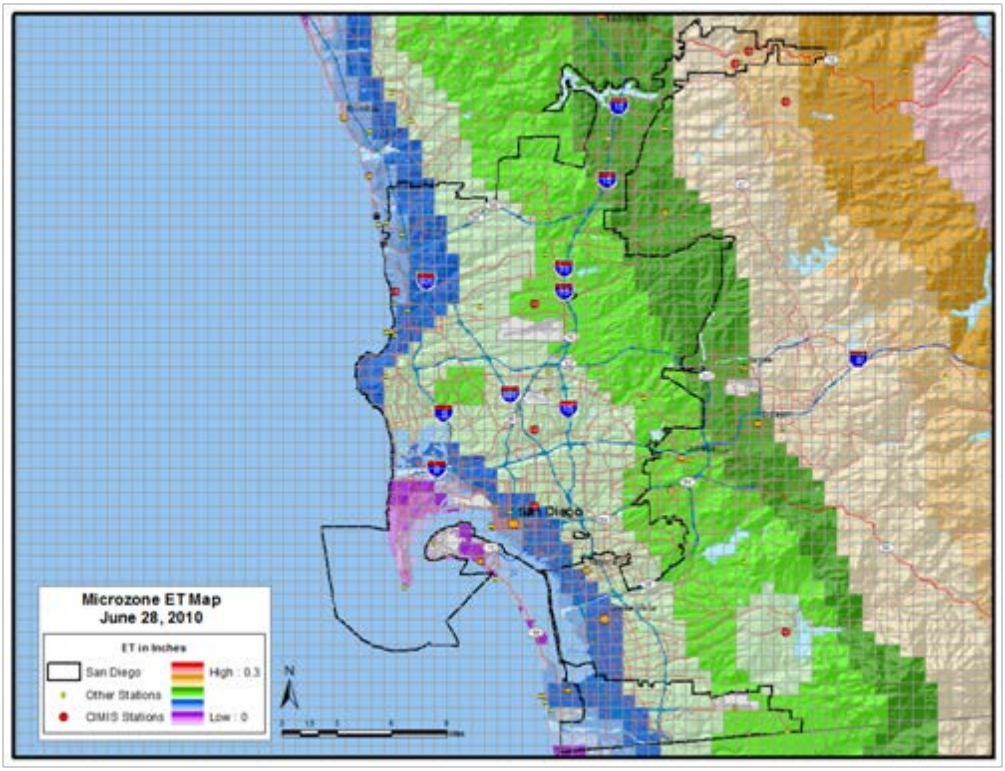
quickly learned historical data was not accurate compared to real-time ET. IRWD switched to use real-time data from CIMIS No. 75.

Real-time ET, by definition, provides more accurate information for use in determining a customer's water allocation and as such is preferred over historical data. Historical data fails to reflect current weather conditions and therefore accurate water needs and as a result, is subject to criticism and challenge by customers. If real-time ET is used to determine a customer's water use allocation for the current 60-day billing period on a daily basis, there is no need to reconcile between an estimated and actual allocation amount. From a customer communication perspective, it may be advantageous to provide an estimated budget in advance based on historical ET. This would provide the customer with some degree of "advance notice" to assist in managing water use. This form of "advance notice" is used by many agencies that have implemented water budget based billing approaches.

Customers whose sites were not close to the weather station discovered that microclimate differences could mean the difference between using water within allocations or being driven into penalty tiers. At the same time, IRWD discovered that CIMIS station data can be "missing" for days at a time. For an agency calculating water budgets and billing customers every day, missing daily ET from a weather station created a significant problem out of the control of the agency. IRWD addressed the problems with installing three of their own ET weather stations in their coastal, central and foothill areas. These stations helped but did not completely placate customers, particularly the landscape industry, golf course operators and homeowner associations who required specific and accurate daily ET for their locations.

Today, agencies with water budget rates typically purchase daily ET for one square kilometer (.06 square mile) microzones. The "microclimate" level daily ET is very accurate for any address within the agency service area. An example of City of San Diego microzones appears in Figure 5-1.

Figure 5-1: City of San Diego ET Microzones



The San Diego service area is large (325 square miles) and varied, stretching from the cooler coastal areas to hot inland valleys with significant canyons and hills and substantial differences in wind patterns, fog and cloud cover. This wide variation of microclimates makes the use of a few regional weather stations problematic for accurately determining the landscape water use requirements. Agencies using CIMIS stations may find that data is incomplete, i.e., missing for days, or receive complaints from customers claiming that their location is much different from the location of the weather station. Table 5-1 illustrates the missing ET data from a CIMIS station.

Table 5-1:
Example – Missing ET Data

Missing ET data from Torrey Pines No. 173

12/20/201	0.00 R	0.00	61	15.8 Y	59.6	53.5	57.8	97	96	96 Y	56.8 Y	1.0 I	24.1 I	59.6
12/21/201	0.00 R	0.00	39	14.2	58.1	52.0	54.9	97	93	97	54.0	1.0 I	24.1 I	59.1

The San Diego water service area, with hundreds of microclimates, may benefit from the customer perception (and reality) of the accuracy of using daily ET per microzone. Customers in agencies who purchase this daily ET data are impressed with the highly accurate data for their address/neighborhood.

Example:
Moulton Niguel Water District has a similar terrain to that of the City of San Diego. MNWD stretches from near the coast through steep valleys to hot inland foothills. The District purchases an FTP file on a daily basis with microzone numbers and ET ready for download into the billing system. This real time data allows the District to actively educate its customers about the accuracy of ET data for every address in the District. This relatively small cost has been far out-weighed by the credibility of important customer data of changing weather (ET).

Recommendation No. 5: Use "Drought Factor" to adjust total allocation, if needed

Rational: The use of a "drought factor" in the allocation equation can be used to adjust either: (1) the landscape portion of the allocation or (2) the overall allocation of customers in the customer group. Agencies have different philosophies depending upon their service area situation. A typical reaction by agencies to drought is to restrict the application of landscape water (2 or 3 days per week). Our recommendation is to use the drought factor to adjust the entire allocation and allow customers to choose how they use water in a drought. Different policies may be appropriate for different customer groups, such as commercial and institutional accounts.