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Technical Report on Optimizing the Goleta Water District Water Conservation Program

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Goleta Water District
4699 Hollister Avenue, Goleta, CA 93110

KJ Project number 1289042*00

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Introduction

Water shortages, increasing demands upon infrastructure, and a growing emphasis on water use efficiency programs have precipitated new demand reduction requirements and significant changes in the State's water conservation-related legislation. The purpose of this Technical Report on Optimizing the Goleta Water District Water Conservation Program (Report) is to assess existing Goleta Water District (District or GWD) programs and determine whether the approach identified in the Water Conservation Plan and the 2010 Urban Water Management Plan (UWMP) remains the optimal strategy for meeting the state's urban water conservation requirements and reflecting District priorities. This is done by modeling the water savings and related costs that can be expected under several program scenarios, providing the District with the data and information needed to ultimately update its conservation program and Conservation Plan, if it chooses to do so.

This Report builds on the District's 2010 Water Conservation Plan, the 2010 UWMP and 2012 Sustainability Plan, as well as its most recent 2012 BMP filings. The Report provides the District with the information it needs to make decisions on whether its current compliance approach is the right one and where to invest its resources in the future. It outlines a strategy to meet State conservation requirements and District priorities regarding efficiency, sustainability and customer service that are cost-effective, promote innovative emerging technologies and practices, as well as proven conservation measures.

There are two significant new requirements with respect to urban water conservation in California: the Water Conservation Bill of 2009 (SBX7-7) and the California Urban Water Conservation Council's (CUWCC) Best Management Practices (BMP); GWD is subject to both. Section 1 describes these requirements in more detail. There are also requirements for agricultural water conservation in SBX7-7 but this Report focuses only on the urban water use elements. The agricultural requirements are related to plan development, measurement and pricing, and do not specify a target demand reduction. The District is currently in compliance with these requirements.

One of the goals of this analysis effort was to determine whether the District had chosen the optimal method for complying with its requirements. While the Report concludes that the District should consider reevaluating its current BMP compliance approach, it also confirms that the District is reasonably close—within 5 percent— of meeting its volumetric water savings requirements established by both SBX7-7 and the CUWCC. By changing its compliance method, the District can align its regulatory requirements with flexible program options. This will enable the District to ensure the Conservation program addresses regulations and reflects the District's vision and priorities.

A number of new conservation-related requirements that address fixtures efficiencies, replacements and building codes also impact the District's practices and usage levels. Section 1 of this Report identifies these other regulatory factors that affect the District, while their impacts on demand are quantified in Section 3.

GWD has been one of the early implementers of conservation programs, initially as a response to the drought in the late 1980s. These efforts were remarkably successful in helping the District weather the drought, resulting in 50 percent reduction in per-capita residential water use, 30 percent reduction in total District water use, and a 40 percent reduction in wastewater flow.

Section 2 provides a brief description of the District’s historic and current conservation programs.

The District has considerable flexibility in meeting its demand reduction goals. Section 3 identifies three cost-effective and implementable conservation program packages, quantifying their water savings and costs. These packages are meant to serve as examples of how the District could proceed.

This analysis has yielded the following highlights, which can guide the District as it develops the next stages of its conservation program:

1. The District can more readily comply with the CUWCC MOU through a “flex track” approach,
2. The District’s volumetric goals—584 AFY by 2020— are driven by SBX7-7,
3. Most of the volumetric savings can be achieved through "passive" conservation (i.e., plumbing standards, see Section 3.1); however, active conservation is needed to achieve balance,
4. Complying with SB407, which addresses fixture upgrades, and achieving the projected passive savings, will require programmatic support by the District,
5. Compliance with the CUWCC MOU also requires that the District implement the Foundational BMPs, and
6. The three Program packages have been designed to demonstrate how the District could meet and exceed its requirements, as well as the associated costs.

Growing concerns regarding the reliability of imported water supplies, regional growth, increasing demand for quality water, and uncertain climate change impacts coupled with new regulatory requirements are driving the need for increased water use efficiency. These long-term trends will continue to challenge the efforts of California water agencies. GWD has long recognized that the implementation of conservation programs is an effective strategy to meet the future demand and that significant water savings can be achieved by providing customers with the tools, incentives and education they need to use water efficiently.

Section 1: Background

The District has been one of the early implementers of conservation programs, from water meters to fixture rebates. The District was an early installer of water meters to address system accountability and was featured as a case study by the U.S. EPA for its early leadership in strategic water conservation programs (*Cases in Water Conservation: How Efficiency Programs Help Water Utilities Save Water and Avoid Costs*, July 2002). The initial catalyst for these efforts was the late 1980s drought. Programs included installation of high-efficiency toilets and showerheads and free onsite water surveys. The program provided rebates for 15,000 toilets between 1987 and 1991 and is largely credited with stabilizing single-family demand, reducing per-capita residential water use by 50 percent, total District water use by 30 percent and wastewater flow by 40 percent.

Conservation activities remain a core District activity. In 1994 GWD became a signatory to the CUWCC's Memorandum of Understanding Regarding Water Conservation in California (MOU), establishing a firm commitment to implementation of BMPs. GWD has been implementing conservation programs locally and in conjunction with the Santa Barbara County Water Agency for years.

In 2010, GWD prepared a Water Conservation Plan ("Plan") that established water conservation goals and program needs. The Plan was designed to provide guidelines for implementing the BMPs in Fiscal Year (FY) 2010-2011, with regular revisions to meet the evolving conditions as well as changing BMP and State requirements. The Plan identifies the following goals for the District's Conservation Program:

1. **Policy.** Support the MOU as well as other State water conservation programs and policies.
2. **Save water.** Reduce avoidable water waste, inefficiencies and unnecessary losses.
3. **Drought.** Adapt to changing climate patterns and reduced precipitation.
4. **Security.** Increase available water storage through improved water use efficiency to enable GWD to have the necessary water supply capabilities during emergency events.
5. **21st Century Approach.** Enhance and update the conservation program to reflect state-of-the-art water saving approaches, technologies and practices.
6. **Environment.** Promote water use that will help reduce unnecessary pollution and runoff as well as avoidable degradation of streams and wildlife habitat.
7. **Community and Open Space Preservation.** Maintain community quality of life and open space preservation goals.
8. **Public Credibility.** Demonstrate GWD's commitment to an efficient and environmentally sustainable water system through measurable and significant water savings.

The Plan also identifies programs and resources to enable GWD to address its BMP requirements. Beyond water conservation, the District is invested in developing effective approaches to delivering sustainable services to its customers.

1.1 Regulatory Requirements

GWD is subject to the Urban Water Management Planning Act (Act), AB 1420 and the requirements of the Water Conservation Bill of 2009 (SBX7-7). In addition to this is the commitment of compliance with the BMPs as a signatory to the CUWCC.

The Act requires preparation of a plan that:

- Accomplishes water supply planning over a 20-year period in five year increments,
- Identifies and quantifies adequate water supplies, including recycled water, for existing and future demands in normal, single-dry and multiple-dry years, and
- Implements conservation and efficient use of urban water supplies.

The District submitted its 2010 UWMP to the Department of Water Resources (DWR).

In terms of specific conservation goals or activities, the two drivers are SBX7-7 and MOU compliance. Both SBX7-7 and the MOU identify specific per capita or volumetric demand reduction targets and/or conservation activities that an agency must implement.

AB 1420, which passed in 2007 and went into effect January 2009, changed the funding eligibility requirements of Section 10631.5 of the Water Code. For any urban water supplier to be eligible for grant or loan funding administered by DWR, the State Water Resources Control Board (SWRCB) or the Bay-Delta Authority (such as Propositions 50 and 84), the supplier must show implementation of water use efficiency demand management measures (DMM)/BMPs listed and described in the Act and the CUWCC MOU, or show the schedules and budgets by which the supplier will begin implementing the DMMs/BMPs. In other words, AB1420 now ties eligibility for grant funding to compliance with the MOU.

Based on the calculations in the subsequent sections the more aggressive target, and therefore the limiting factor, is SBX7-7 compliance, which requires a total demand reduction of about 584 AF by 2020.¹ However, in addition to meeting this target, the District must also implement the Foundational BMPs. These concepts and requirements are described below.

1.1.1 SBX7-7 Compliance

The Water Conservation Bill of 2009 (SBX7-7) is one of four policy bills enacted as part of the November 2009 Comprehensive Water Package (Special Session Policy Bills and Bond Summary). SBX7-7 provides the regulatory framework to support the 20 percent statewide reduction in urban per capita water use described in the 20 X 2020 Water Conservation Plan. Compliance with the urban water conservation elements of SBX7-7 requires that each water supplier determine and report its existing baseline water consumption and establish future water use targets in gallons per capita per day (GPCD); reporting began with the 2010 UWMP.

¹ While the focus of this report is conservation, this demand reduction can be met in a variety of ways that result in an offset of potable supply, including increased use of recycled water.

The two primary calculations required by SBX7-7 are:

1. Base Daily Water Use calculation (average GPCD used in past years)
2. Compliance Water Use Target (target gallons per capita per day in 2015 and 2020)

Section 2.3 of the 2010 UWMP details the calculations utilized to determine the District's SBX7-7 baseline and target. There are 4 ways that an agency can calculate its compliance target and GWD selected the Hydrologic Region method. Since GWD is well below the hydrologic region target, its reduction goal is only five percent. The District's base daily use was determined to be 119 GPCD, and its 2020 to be 111 GPCD. Based on 2010 use of 117 GPCD, the District has to save 6 GPCD by 2020. Assuming current population levels, that is a reduction in use of about 292 AFY in 2015 and 584 AFY by 2020. This target is relatively low and reasonably achievable compared with other suppliers in the state who have 20 percent reduction goals and per capita targets in some cases of 30 GPCD and more.

1.1.2 CUWCC Compliance

The CUWCC is a voluntary organization and, as a signatory to the MOU, the District has committed to implementing its BMPs. From a practical perspective, however, the UWMP Act requires that agencies comply with the DMMs, which are functionally equivalent to the BMPs. Signatories to the MOU are allowed by Water Code Section 10631(j) to include their biennial CUWCC BMP reports in an UWMP to meet the requirements of the DMMs sections of the UWMP Act. To comply with AB1420, agencies must complete forms which gauge specific compliance with the BMPs. Compliance with AB 1420 is required to be eligible for state grants.

The MOU and BMPs were revised by the CUWCC in 2008. The revised BMPs now contain a category of "Foundational BMPs" that signatories are expected to implement as a matter of their regular course of business. These include Utility Operations (metering, water loss control, pricing, conservation coordinator, wholesale agency assistance programs, and water waste ordinances) and Public Education (public outreach and school education programs). The new category of Foundational BMPs is a significant shift in the revised MOU because they are considered a required best practice and therefore not eligible for a traditional exemption. These revisions are reflected in the reporting database, starting with reporting year 2009. The District is currently in compliance with the Foundational BMPs and must continue to implement them through the duration of the MOU.

A key intent of the recent MOU revision was to provide retail water agencies with more flexibility in meeting requirements and allow them to choose program options most suitable to their specific needs. Therefore, as alternatives to the traditional Programmatic BMP requirements, agencies can also choose to comply with the programmatic BMPs through either the Flex Track or GPCD options.

The **BMP option** was the only approach until the MOU was revised. This method defines specific programs (for example, toilet rebates) and, based on the agencies' service area characteristics, defines activity levels for each program. The District had been implementing BMPs since it signed the MOU. The BMP compliance assessment included in the 2010 UWMP indicated that in order for the District to be on track with meeting its BMP requirements it would have to increase the number of surveys and rebates it provides. In addition, the District had not yet met the requirements of the Foundational BMPs that address water loss. For this, the District must implement the American Water Works Association (AWWA) Standard Water Audit

Approach per the M36 manual. The process consists of a component analysis of leaks into “revenue” and “non-revenue” categories, among others, and an economic analysis of recoverable loss.

The **GPCD option** sets a water use reduction goal of 18 percent reduction by 2018. Notably, the GPCD option is similar to, but different from the SBX7-7 targets in the methods for setting baselines and compliance requirements. The MOU is more prescriptive in its calculation of the water agency’s baseline, defining it as a 10 year period starting in 1997. For the District, the GPCD option yields a goal of 96.4 GPCD by 2018 (Table 1), 13 percent lower than the 2020 goal for SBX7-7, and a very challenging target to reach (for comparison, agencies whose use is 100 GPCD or lower are not subject to reduction requirements). For many agencies, the SBX7-7 and GPCD targets align; however, for the District they do not. There are a subset of agencies, the District included, generally those who have an existing low use or who invested in conservation prior to 1997, who find that the CUWCC GPCD target is unrealistic or significantly more aggressive than SBX7-7. (Note that the CUWCC Board is currently beginning to examine the options in aligning these two goals).

Table 1: GPCD Option Results

<p>Baseline / Initial GPCD (Use option buttons to select)</p> <p>GPCD in 2006 ● 102.1</p> <p>Baseline GPCD (1997 to 2006) ● 117.6</p> <p>GPCD in 2010 108.9</p> <p>GPCD Target for 2018 96.4</p>	<p>Potable Water GPCD for each Year in the Baseline Period</p> <table border="1"> <thead> <tr> <th>Year</th> <th>GPCD</th> </tr> </thead> <tbody> <tr><td>2006</td><td>102.1</td></tr> <tr><td>2005</td><td>114.4</td></tr> <tr><td>2004</td><td>111.5</td></tr> <tr><td>2003</td><td>104.8</td></tr> <tr><td>2002</td><td>117.8</td></tr> <tr><td>2001</td><td>113.1</td></tr> <tr><td>2000</td><td>122.4</td></tr> <tr><td>1999</td><td>124.7</td></tr> <tr><td>1998</td><td>131.6</td></tr> <tr><td>1997</td><td>133.1</td></tr> </tbody> </table>	Year	GPCD	2006	102.1	2005	114.4	2004	111.5	2003	104.8	2002	117.8	2001	113.1	2000	122.4	1999	124.7	1998	131.6	1997	133.1																		
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<p>Biennial GPCD Compliance Table</p> <table border="1"> <thead> <tr> <th rowspan="2">Year</th> <th rowspan="2">Report</th> <th colspan="2">Target</th> <th colspan="2">Highest Acceptable Bound</th> </tr> <tr> <th>% Base</th> <th>GPCD</th> <th>% Base</th> <th>GPCD</th> </tr> </thead> <tbody> <tr><td>2010</td><td>1</td><td>96.4%</td><td>113.3</td><td>100%</td><td>117.6</td></tr> <tr><td>2012</td><td>2</td><td>92.8%</td><td>109.1</td><td>96.4%</td><td>113.3</td></tr> <tr><td>2014</td><td>3</td><td>89.2%</td><td>104.9</td><td>92.8%</td><td>109.1</td></tr> <tr><td>2016</td><td>4</td><td>85.6%</td><td>100.6</td><td>89.2%</td><td>104.9</td></tr> <tr><td>2018</td><td>5</td><td>82.0%</td><td>96.4</td><td>82.0%</td><td>96.4</td></tr> </tbody> </table>		Year	Report	Target		Highest Acceptable Bound		% Base	GPCD	% Base	GPCD	2010	1	96.4%	113.3	100%	117.6	2012	2	92.8%	109.1	96.4%	113.3	2014	3	89.2%	104.9	92.8%	109.1	2016	4	85.6%	100.6	89.2%	104.9	2018	5	82.0%	96.4	82.0%	96.4
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2014	3	89.2%	104.9	92.8%	109.1																																				
2016	4	85.6%	100.6	89.2%	104.9																																				
2018	5	82.0%	96.4	82.0%	96.4																																				

Monthly GPCD Data for Weather Normalization

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	108.9	108.9	108.9	108.9	108.9	108.9	108.9	108.9	108.9	108.9	108.9	108.9
Baseline avg*	117.6	117.6	117.6	117.6	117.6	117.6	117.6	117.6	117.6	117.6	117.6	117.6

* The average for each month is based on the baseline period 1997 to 2006

Under the **Flex Track option**, an agency is responsible for achieving water savings greater than or equal to those it would have achieved using only the BMP list items. The CUWCC has developed three Flex Track Menus – Residential, CII, and Landscape – and each provides a list of program options that may be implemented in part or any combination to meet the water savings goal of that BMP. Custom measures can also be developed and require documentation on how savings were realized and the method and calculations for estimating savings. This option does introduce technical nuances, as the water agency must calculate their savings

goals and document their activities and associated water savings. However, this approach does afford a greater deal of flexibility in choosing which conservation measures an agency may implement.

In the 2010 UWMP the District chose to comply with the MOU by implementing a BMP approach. This approach was consistent with the District Conservation Plan. In addition, the Flex Track approach had not been fully developed by the CUWCC and the tools were not yet available to calculate the District’s past savings and 2018 targets (agencies receive credit for past conservation activities which count towards their Flex Track goals).

Once the GPCD goal was determined to be an unrealistic target, GWD started to examine the Flex Track approach. The CUWCC released its new database for Beta testing along with the Flex Track input pages in the first quarter of 2013. The District was included in the beta testing and staff has been working closely with the CUWCC to determine its current status and goals and provide savings for non-traditional programs like the Smart Landscape Rebates (see Section 2). Table 2 shows the results of that analysis. The District has achieved about 122 AFY of water savings through conservation measures, including the issuance of water-wise landscape rebates, exceeding its goal of 105 AFY that the model predicts would be achieved through implementation of the standard BMPs. BMPs 1 and 2 are not included in the analysis because they are Foundational and are mandatory regardless of the compliance option an agency chooses. Foundational BMPs are also considered “non-quantifiable”. Finally, although the savings are identified by BMP, the goals can be achieved using any strategy an agency deems appropriate. For example, if an agency chooses to implement only landscape programs or rely on aggressive water rates to achieve a savings target, that is an acceptable approach under the Flex Track option as long as the agency can document the savings resulting from the program.

Since the current MOU sunsets in 2018, the District must continue its efforts, saving about 105 AFY over the next 6 years. Note that this target will be somewhat lower because GWD is currently exceeding its requirement and because the CUWCC has not yet fully integrated data to recognize past conservation efforts implemented by agencies; that analysis is still underway and is expected to be completed by July 2013.

Table 2: 2012 Flex Track Results (in AFY)

BMP	Total Measured Water Savings			Flex Track Target
	From BMP Implementation	From other conservation efforts	Total	
BMP 3 Residential	2.99	19.06	22.05	31.35
BMP 4 Commercial	43.73	48.27	92	64.85
BMP 5 Large Landscape	0.44	7.67	8.11	9.05
Total	47.16	75	122.16	105.25

1.1.3 Other Regulatory Considerations

In addition to SBX7-7 and the MOU, the District is subject to the following recent regulatory changes:

AB 715: Requires that, on or after January 1, 2014, 100% of toilets and urinals (other than blow-out urinals) sold or installed in California be high-efficiency (maximum of 1.28 gallons per flush for high-efficiency toilets – HETs - and 0.5 gallons per flush for high-efficiency urinals - HEUs).

SB 407: Requires that, on or before January 1, 2019, all noncompliant plumbing fixtures in multi-family residential and commercial properties be replaced by the property owner with water-conserving plumbing fixtures. For single-family residential property, the compliance date is January 1, 2017. Triggers for the requirement include building alterations or improvements requiring a certificate of final completion and occupancy or final permit or sale of a single-family residence.

WaterSense: Effective January 1, 2011 the EPA WaterSense specification for residential clothes washers is 6.0 or less.

CalGreen: (new construction only) “Green” Building Code that specifies fixtures and practices that reduce consumption by 20%, in addition to mandatory outdoor measures.

1.2 Analysis Approach - MOU and Regulatory Compliance

The steps below summarize the process to determine options for implementing the CUWCC MOU, and to remain compliant with regulations including SBX7-7. These regulations require demonstration of water savings. Therefore, the process consisted of the following steps:

1. Calculating the GPCD option for the District to determine whether it was a feasible option for the District.
2. Gathering billing data and analyzing water use patterns by customer class, including seasonal variability.
3. Working with the District and the CUWCC to enter 2011 and 2012 data into the new BMP database in order to identify the Districts goals.
4. Gathering data for structured evaluation of each conservation measure, including customer base, decay factors, cost, and implementation considerations. Professional judgment and staff input from previous experiences and the nature of the customer base also played an important role in this assessment.
5. Calculating expected demand reductions from natural replacement (replacement of a device because it is no longer functional. Toilets, for example, have a natural replacement of 4 percent or lifetime of about 25 years).
6. Developing an initial and comprehensive set of conservation devices, practices and policies that the District could potentially employ.
7. Screening the list of measures developed above to identify reasonable options, and further evaluating cost-effectiveness, potential for water savings and implementation feasibility.
8. Determining costs and benefits of implementing each conservation measure using the Alliance for Water Efficiency (AWE) model. The AWE model is standard tool used by

water agencies throughout the nation to determine the potential costs and water savings associated with specific conservation measures and based on agency-specific data and characteristics. For each measure, total costs include the cost of saved water, capital, and staff resources to implement the program.

9. Combining the measures into a conservation package or options that are technically feasible for GWD to implement to meet 2020 goals, and meet criteria for economic feasibility, including cost-benefit analysis.

Section 2: Existing Conditions

GWD has been implementing conservation programs since the drought in the late 1980s. Like most agencies, the program in the early years focused on demand in the residential sector and fixture upgrades. Noteworthy efforts have included the installation of high-efficiency toilets and showerheads, and free onsite water surveys resulting in a 50% reduction in per-capita residential water use, 30% reduction in total District water use and 40% reduction in wastewater flow that allowed the District to successfully weather the drought.

With the regional receipt of a Water Smart grant targeting water-wise landscape retrofits and rebates, the District recently targeted efforts to its landscape and large commercial, industrial and institutional (CII) users. Although CII users account for a smaller portion of consumption than do residential—20 percent compared with 60 percent—they tend to be large single users with significant conservation potential. For example, the District has worked with the University of California, Santa Barbara (UCSB), which accounts for about 6 percent of total consumption, since 1988 to retrofit fixtures and has continued its efforts by expanding to cooling tower retrofits, recycled water for irrigation, landscaping and more. The District recently supported UCSB in its development of a water conservation plan that also examined the relationship and opportunities resulting from the water and energy nexus.

Over the years there has been a robust mix of programs that have included regulatory, incentive and public information/education efforts. The following list identifies the programs the District has implemented and/or participated in to date; for a complete description of the programs and participation rates see Chapter 7 of the 2010 UWMP.

- Residential single and multi-family water audits.
- High efficiency clothes washer rebates.
- High efficiency toilet rebates.
- Toilet retrofit program for low income customers.
- Distribution of conservation devices (showerheads, leak detection tablets, aerators, etc.)
- Smart Landscape Rebate for residential and commercial customers to convert to water-wise landscapes. The program provided up to 50 percent of the cost for of irrigation equipment, water-wise plants and mulch, and/or smart irrigation controllers.
- Surveys for large landscape areas with dedicated irrigation meters.
- Free water check-ups and services required for certification in the Santa Barbara Green Business Program.
- Public information programs both in collaboration with and independent from the Santa Barbara County Water Agency (SBCWA). Outreach activities include special events, advertising, direct mailing, newsletters and more.
- School education programs have been implemented since 1998 in collaboration with SBCWA. The program provides materials that meet state education framework

requirements and are grade-level appropriate, as well as a conservation-related video competition for high school students.

- Community Demonstration Garden, which debuted in 1999 and renewed and expanded in 2013 to include a water-wise edible garden.
- The University of California, Santa Barbara Chancellor's Sustainability Subcommittee on Water.
- Pre-screening audits in preparation for the American Water Works Association (AWWA) Standard Water Audit Approach for identifying and managing system leaks per the M36 manual.
- A conservation rate structure as defined by the CUWCC.

The District actively pursues grant funding for its efforts. The Smart Landscape Rebate Program, as described above, received funding through the Water Smart grant program. The District has also applied for funding with the Cachuma Resource Conservation District for surveys of its agricultural customers to inform future water efficiency incentive programs.

Section 3: Water Savings and Potential Programs

The following section provides different options for the District in meeting its regulatory requirements. These options illustrate approaches the District might wish to pursue but there are numerous ways to combine and design a set of programs to meet its requirements. For the purposes of this report, three distinct combinations of conservation programs have been defined and their costs and savings quantified. The packages represent strategies that could work in the service area, and provide a framework for decision making. Notably, these packages could be deconstructed and combined in whatever way best reflects District priorities.

The volumetric program goal is defined by compliance with SBX7-7, calculated in Section 1.1 to be about 584 AFY in 2020, and is combined with the ongoing implementation of the Foundational BMPs. The modeling in this section utilizes the AWE model and standard assumptions about savings, costs and decay rates (the rate of water savings decrease over time, typically due to fixture degradation) as defined by AWE and the CUWCC unless specific information was provided by the District. The modeling is based on the District's customer characteristics and uses. Appendix A describes the results of a billing analysis that identifies patterns and potential opportunities.

The AWE Water Conservation Tracking Tool (Version 1.2 Cal Tex Edition) is a robust model that will allow the District to evaluate the water savings, costs, and benefits of various water conservation programs based on Agency-specific data and characteristics. It is a strong planning and analytical model and is ideal for the development and evaluation of new conservation programs.

The AWE Tool is also useful for programmatic decision-making, allowing the District to make choices about implementation levels over time. For example, if the District experiences an unanticipated low or high level of participation in one or more of its conservation programs, annual activity projections for all of its programs could be adjusted to better reflect reality and project final water savings at the end of the year. Multiple conservation program portfolios can be saved within the AWE Tool, to compare different mixes of programs and levels of implementation and understand how decisions regarding each of its conservation programs affect overall water savings, costs, and benefits. Such capabilities will allow the District to be financially responsible, receptive to market responses to its programs, and flexible in its approach to implementing its water conservation programs.

There are a number of factors to consider when developing a conservation program. Some, like costs and savings, are standard considerations for almost every agency. Beyond that, each agency needs to identify its own values and priorities. Other potential considerations can include:

- Staffing needs.
- Equity among customer types: is it important for all types of customers to be eligible to participate in a program?
- Do certain customers merit a more robust focus? Some agencies, for example, provide direct installation programs for low income customers. Others choose to focus on their largest users.

- Will incentives be provided for savings that will be realized without the program, usually due to efficiency code requirements?
- Customer acceptance/ease of implementation: a program may be cost effective and save water, but if the community will be resistant, is it still a worthwhile investment? And if it is, how does an agency make it palatable to its customers?
- Alignment with other agency efforts and concerns. For example, if peaking or runoff is a significant agency concern, it might be best to prioritize irrigation programs.

Typically, agencies use a Conservation Plan to assist in identifying these goals. Through this type of document, the District can expand the list to best reflect its vision and direction.

3.1 Savings from Codes and Standards

The first step in this analysis was to quantify the impact of building and plumbing codes, statewide retrofit on resale requirements, and fixture standards (AB 715, SB 407, and plumbing codes adopted prior to CALGreen) because these activities are required by state law. This type of savings is often referred to as “passive conservation.” Passive conservation is the installation of conservation devices due to natural replacement, remodeling, or demolition in the presence of more efficient plumbing codes and statewide legislation requiring the retrofit of inefficient fixtures. It is considered passive because it can occur without requiring effort from an agency, though this is not always the case.

It’s important to distinguish the impacts of passive conservation and to what extent, if any, the savings expected from a program would have been realized without the program, so as not to double-count the expected savings. Some programs, such as toilet replacement programs, may operate in tandem with efficiency code requirements that are intended to do the same thing, but in a different way and usually over a different amount of time. An agency can choose to accelerate these savings or it can choose for them to occur naturally. In such circumstances, it is necessary to predict the amount of water savings that would occur with and without the program.²

Modeling results, shown in Table 3, indicate that compliance with these regulations will save the District about 460 AF in 2020.

Table 3: Savings from New Codes and Standards

Year	2014	2015	2016	2017	2018	2019	2020
Water Savings	89	158	224	287	347	405	461

These savings play a significant role in meeting the SBX7-7 targets. However, it is important to understand that in order to effectively achieve these savings, the District must have policies and procedures in place to actively implement, monitor, and enforce these State codes. That task is not insignificant, particularly with regards to SB 407 which requires developing, administering and monitoring a program that ultimately ends in replacement of all noncompliant plumbing fixtures by 2019. For this particular requirement the District is recommended to consider how

² For more information, the CUWCC has published a report on Freeriders (program participants who, without a program, would still have replaced their fixtures) which is available at <http://www.cuwcc.org/docDetail.aspx?id=1810>

best to work with local municipalities, such as the City of Goleta and Santa Barbara County, to implement such a program.

3.2 Analysis of Potential Program Combinations

The next step of the analysis was to identify potential conservation programs, quantify the water savings (considering the remaining opportunity for savings), costs and staffing needs, and pull them together into packages with annual implementation levels. Based on the individual conservation program analysis and a practical understanding of the service area and the community, District staff worked with Kennedy/Jenks to develop three program packages, or hypothetical combination of conservation measures, all of which are forecasted to exceed the District’s SBX7-7 water savings target.

The packages are distinguished in their approach to water conservation. Package 1 relies on more traditional programs to achieve additional water savings and is applied to each customer type. Package 2 takes a more innovative approach, employing new strategies such, as on-bill financing, to achieve water savings among each of GWD’s customer classes. Finally, Package 3 narrows its focus on GWD’s large commercial customers with programs designed to address their specific water uses.

3.2.1 Package 1

Package 1 is made up of traditional water conservation programs that mimic the CUWCC’s BMPs and with which District staff has experience implementing. The package targets each of GWD’s different customer classes, including residential, commercial and landscape customers (Table 4). Programs include rebates for retrofitting residential and commercial indoor water fixtures, irrigation system surveys and water budgets aimed at reducing water use among GWD’s large landscapes.

Some of the programs included in Package 1, such as the distribution of low flow showerheads and the Smart Landscape Rebate Program, have been implemented by GWD in the past. Other programs, such as the Ultra High Efficiency Toilet (UHET) Rebate Program are new and use a traditional incentive implemented by many water agencies across California — rebates— to encourage the installation of a new, more efficient fixture. UHET’s flush at 0.8 gallons per flush (gpf), while traditional high efficiency toilets (HETs), flush at 1.28 gpf – a 20 percent increase in water use efficiency. While the District has successfully implemented similar programs in the past, Program 1 builds on these efforts, targeting customers and inefficient water uses that still exist within the service area.

Table 4: Package 1 Programs and Implementation Levels

Program	Customer Class	Implementation Through 2020
Low Flow Showerhead Distribution	Single Family Residential	700 Showerheads
Low Flow Showerhead Distribution	Multi-family Residential	700 Showerheads
Ultra High Efficiency Toilet (UHET, 0.8 gpf) Rebate	Single Family Residential	420 UHET Rebates
Ultra High Efficiency Toilet (UHET, 0.8 gpf) Rebate	Multi-family Residential	280 UHET Rebates

Program	Customer Class	Implementation Through 2020
High Efficiency Toilet (HET, 1.28 gpf) Rebate	Commercial	70 HET Rebates
High Efficiency Urinal Rebate	Commercial	70 HE Urinal Rebates
Water Efficient Ice Machines Rebate	Commercial	70 Ice Machine Rebates
Smart Landscape Rebate Program	All	350 Landscape Rebates
Large Landscape Water Budgets	Landscape Irrigation	210 Water Budgets
Large Landscape Water Surveys - Mixed Use Accts	Commercial	28 Landscape Surveys

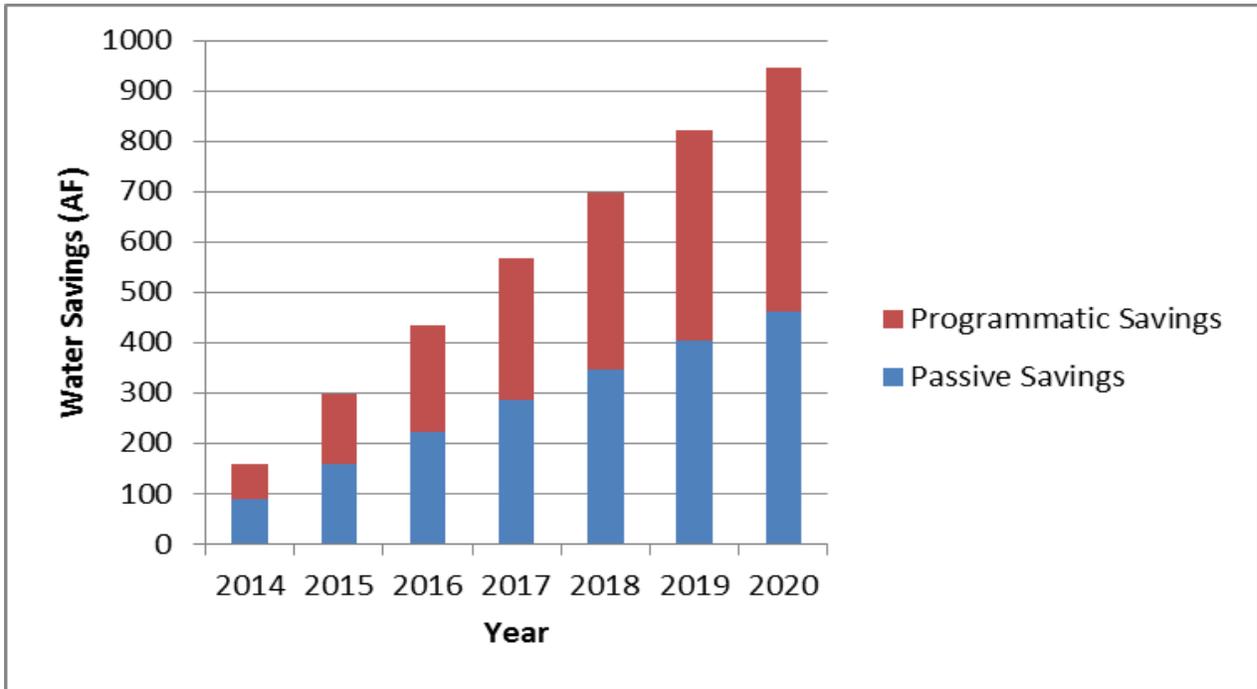
Package 1 is expected to save approximately 485 AF of water per year by 2020.

As illustrated in and Figure 1 below, annual water savings increase over time as additional water using fixtures are retrofitted, additional landscapes are converted to increase water use efficiency, and additional large landscapes are better managed as a result of surveys and water budgets. In combination with passive savings, Package 1 is expected to result in total savings of 946 AF by the year 2020.

Table 5: Package 1 Annual Water Savings (AF)

	2014	2015	2016	2017	2018	2019	2020
Annual Programmatic Water Savings	71	141	211	281	350	418	485
Annual Passive Water Savings	89	158	224	287	347	405	461
Total Water Savings	160	299	435	568	698	823	946
SBX7-7 Target		292					584

Figure 1: Package 1 Cumulative Total Water Savings Through 2020



The average annual materials cost to implement the programs in Package 1 is approximately \$76,100, excluding staffing (Table 6). Using conservative workload assumptions, two to three staff paid an average burdened rate of \$52.75 an hour (Senior Water Resources Analyst, entry level Associate Water Resources Analyst and an intern)³ could be needed to implement this option. A significant portion of the staff time would be dedicated to processing rebates for this package. With staffing, the total average annual cost would be approximately \$392,600. For comparison, the FY 12-13 budget for the District conservation program was approximately \$255,000 in materials and staffing costs.

Table 6: Package 1 Annual Implementation Costs

Program	Customer Class	Average Annual Cost
Low Flow Showerhead Distribution	Single Family Residential	\$400
Low Flow Showerhead Distribution	Multi-family Residential	\$400
Ultra High Efficiency Toilet (UHET, 0.8 gpf) Rebate	Single Family Residential	\$5,300
Ultra High Efficiency Toilet (UHET, 0.8 gpf) Rebate	Multi-family Residential	\$3,500
High Efficiency Toilet (HET, 1.28 gpf) Rebate	Commercial	\$400
High Efficiency Urinal Rebate	Commercial	\$600
Water Efficient Ice Machines Rebate	Commercial	\$11,100
Smart Landscape Rebate Program	All	\$44,600

³ Misty Williams, personal communication, email dated 06/05/13

Program	Customer Class	Average Annual Cost
Large Landscape Water Budgets	Landscape Irrigation	\$7,300
Large Landscape Water Surveys - Mixed Use Accts	Commercial	\$2,500
Package 1 Average Annual Cost	-	\$76,100
Average Annual Staffing Cost	-	\$317,500
Package 1 Average Annual Cost, Including Staffing	-	\$392,600

Package 1 is highly cost-effective with an average implementation cost of \$58 per AF of water saved, or \$298 per AF of water saved when staffing costs are included. A cost: benefit ratio greater than one means that a program is cost-effective or, in other words, it is less costly to save a unit of water than to purchase that same unit. The ratio is calculated by comparing the cost to save an AF of water through, for example, low flow showerheads, with the District's cost to purchase and AF of water from the State, recently at \$370/AF. In this example, it is six times more cost-effective to save an AF of water through showerhead replacement than through purchase.

Table 7 shows the cost-benefit ratios for each of the programs included in Package 1, as well as the package as a whole.

Table 7: Package 1 Cost Benefit Ratios

Program	Cost Benefit Ratio
Low Flow Showerhead Distribution	6.0
Low Flow Showerhead Distribution	6.0
Ultra High Efficiency Toilet (UHET, 0.8 gpf) Rebate	7.6
Ultra High Efficiency Toilet (UHET, 0.8 gpf) Rebate	7.6
High Efficiency Toilet (HET, 1.28 gpf) Rebate	13.5
High Efficiency Urinal Rebate	5.6
Water Efficient Ice Machines Rebate	12.9
Smart Landscape Rebate Program	7.8
Large Landscape Water Budgets	30.0
Large Landscape Water Surveys - Mixed Use Accts	2.1
Complete Package 1 – Without Staffing	10.5
Complete Package 1 – Staffing Included	2.0

3.2.2 Package 2

Package 2 takes somewhat of an opposite approach to Package 1. Instead of using traditional programs to achieve additional water savings, Package 2 is made up of new programs that utilize innovative and cutting edge strategies to generate water savings within GWD's service area.

For example, in Package 2 the retrofit of inefficient toilets with UHET's is also incentivized but the mechanism used to incentivize the customer is on-bill financing rather than a rebate. On-bill financing programs allow customers to make water efficiency improvements without a significant up front investment. In an on-bill financing program the District "loans" its customers money to retrofit their inefficient toilets and then the customers pay back the District, interest free⁴, in small payments included on each water bill over a set period of time. An on-bill financing program has minimal costs to the District; the primary costs include staff time to administer the program and any interest lost in the loan.

Another innovative program included in Package 2 is the FreeSprinklerNozzles.com (FSN) program, which directly addresses the large amounts of landscape water use in the service area. Originally designed by Western Municipal Water District (Western), the FSN program pares web-based ease of access with an easy-to-install, proven water saving technology – the Toro Precision™ Series Spray Nozzle. Under the FSN Program model, water customers are directed to the FSN website in order to obtain a voucher for free Toro Precision™ Series Spray Nozzles, redeemable at local irrigation supply stores. The nozzles are specifically designed to more efficiently deliver water to an irrigated landscape, thus reducing water waste associated with landscape irrigation, and are compatible with most existing sprinkler systems. Vouchers for free nozzles are delivered to customers via email only after the customer has reviewed a series of short, targeted educational online videos. The videos explain how the nozzles work, describe the installation process, and teach the customer how to perform an irrigation system survey prior to redeeming their free nozzle voucher and installing their new nozzles. The FSN program has successfully and cost-effectively engaged the landscape market across southern California, yielding impressive results. A few years ago, Western began allowing other water agencies to offer the FSN program to their customers after signing a simple MOU.

Similar to Package 1, Package 2 includes programs targeted at each of GWD's customer classes as shown in Table 8 below.

Table 8: Package 2 Programs and Implementation Levels

Program	Customer Class	Implementation Through 2020
Ultra High Efficiency Toilet (UHET, 0.8 gpf) On-Bill Financing	Single Family	420 UHETs
Ultra High Efficiency Toilet (UHET, 0.8 gpf) On-Bill Financing	Multi Family	280 UHETs
FreeSprinklerNozzles.com Nozzle Distribution	Single Family	1400 Nozzles
FreeSprinklerNozzles.com Nozzle Distribution	Commercial	700 Nozzles
FreeSprinklerNozzles.com Nozzle Distribution	Irrigation	700 Nozzles
Smart Landscape Rebate Program	All	350 Landscape Rebates

With the implementation levels outlined in Table 8 above, Package 2 is expected to save approximately 352 AF of water a year by the year 2020 (Table 9, Figure 2). With an additional

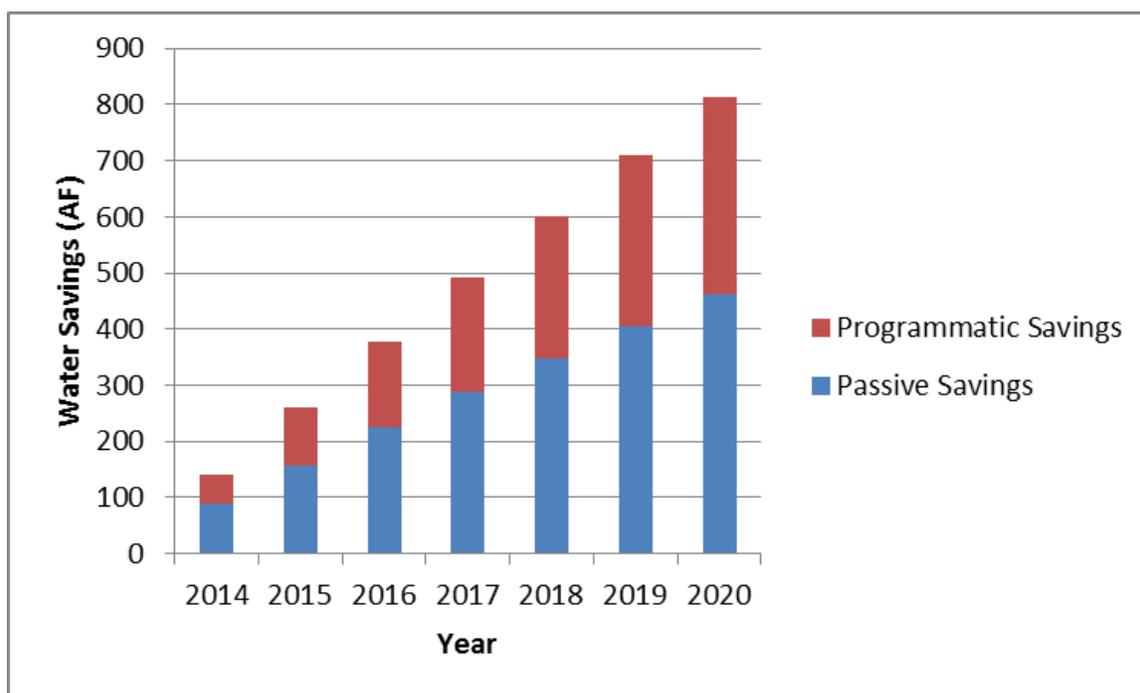
⁴ The District can charge an interest rate though this is often waived, particularly for these relatively low loan amounts.

461 AF of average annual water savings through passive conservation, Package 2 is expected deliver a total savings of 813 AF in the year 2020.

Table 9: Package 2 Annual Water Savings (AF)

	2014	2015	2016	2017	2018	2019	2020
Annual Programmatic Water Savings	51	102	153	204	254	303	352
Annual Passive Water Savings	89	158	224	287	347	405	461
Total Water Savings	140	260	377	491	602	709	813
SBX7-7 Target		292					584

Figure 2: Package 2 Cumulative Total Water Savings Through 2020



The average annual cost to implement the programs in Package 2 is approximately \$51,000, excluding staffing (Table 10). Assuming one staff (Senior Water Resources Analyst) paid an average burdened rate of \$76.86 an hour⁵, the average annual cost increases to approximately \$204,700.

⁵ Misty Williams, personal communication, email dated 06/05/13

Table 10: Package 2 Annual Implementation Costs

Program	Customer Class	Average Annual Cost
Ultra High Efficiency Toilet (UHET, 0.8 gpf) On-Bill Financing	Single Family	\$2,200
Ultra High Efficiency Toilet (UHET, 0.8 gpf) On-Bill Financing	Multi Family	\$1,500
FreeSprinklerNozzles.com Nozzle Distribution	Single Family	\$1,300
FreeSprinklerNozzles.com Nozzle Distribution	Commercial	\$700
FreeSprinklerNozzles.com Nozzle Distribution	Irrigation	\$700
Smart Landscape Rebate Program	All	\$44,600
Package 2 Average Annual Cost	-	\$51,000
Average Annual Staffing Cost	-	\$153,700
Package 2 Average Annual Cost, Including Staffing	-	\$204,700

Package 2 is also a highly cost-effective option for GWD with an average implementation cost of \$88 per AF of water saved, or \$355 per AF of water saved when staffing costs are included.

Table 11 shows the cost-benefit ratios for each of the programs included in Package 2, as well as the package as a whole.

Table 11: Package 2 Cost Benefit Ratios

Program	Cost Benefit Ratio
Ultra High Efficiency Toilet (UHET, 0.8 gpf) On-Bill Financing	18.4
Ultra High Efficiency Toilet (UHET, 0.8 gpf) On-Bill Financing	18.4
FreeSprinklerNozzles.com Nozzle Distribution	2.3
FreeSprinklerNozzles.com Nozzle Distribution	2.3
FreeSprinklerNozzles.com Nozzle Distribution	2.3
Smart Landscape Rebate Program	7.8
Complete Package 2 – Without Staffing	8.3
Complete Package 2 – Staffing Included	2.1

3.2.3 Package 3

Package 3 differentiates itself by specifically targeting commercial customers. Like most water agencies in California, GWD has been very successful in providing programs to its residential customers and reducing per capita use in this sector. Less effort has been directed toward commercial customers, typically because they are less homogenous and require a higher level of sophistication or expertise than do their residential counterparts. Also, the improvements in residential properties are usually less costly. Combined, these characteristics have resulted in a focus on the “low hanging fruit” that is indoor residential water savings. Commercial customers, however, can offer a unique opportunity for water savings because just a few customers account for the majority of commercial water use. The highest consuming commercial customer accounted for almost 6% of total commercial use in 2012 while the two highest commercial customers used over 10% of total commercial consumption. That means that two single

accounts used just under 1.5 percent of the District’s total use. Clearly, savings among those types of customers can create a significant dent in the District reaching its overall targets.

Package 3 programs (Table 12) are specifically targeted to the commercial sector, such as connectionless food steamers in restaurants and dry vacuum pumps in dentist’s offices. Package 3 also includes programs to reduce landscape water use since the billing data analysis shows water use within the commercial sector doubling during high use months.

Table 12: Package 3 Programs and Implementation Levels

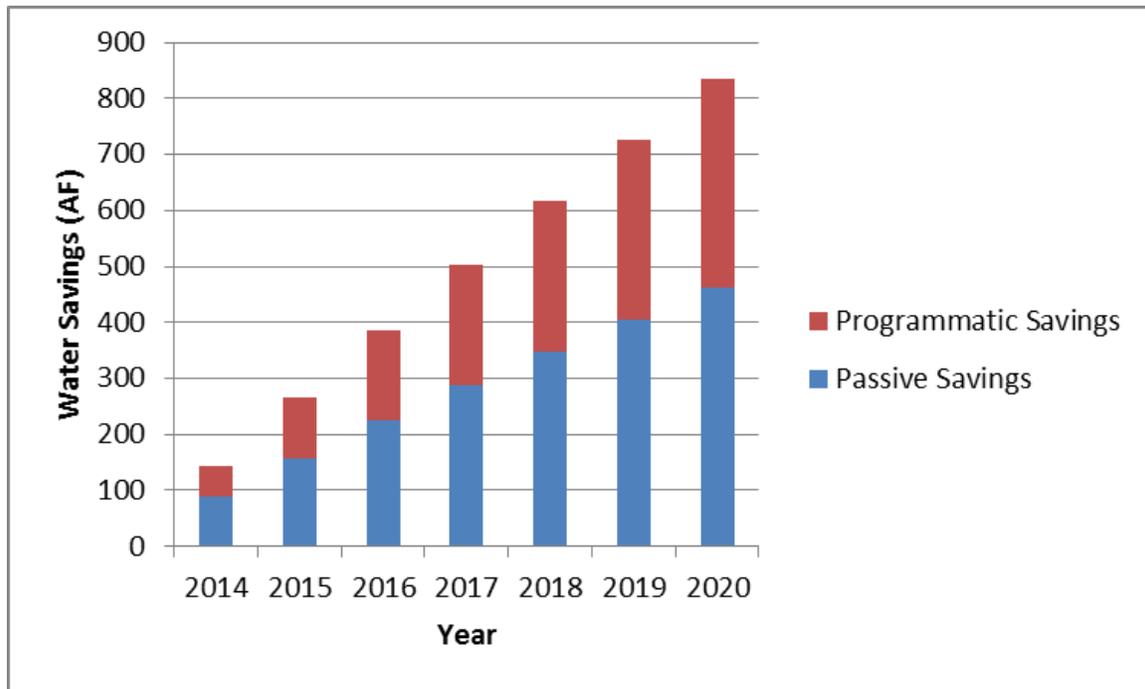
Program	Customer Class	Implementation Through 2020
Connectionless Food Steamer Rebate	Commercial	70 Food Steamer Rebates
Dry Vacuum Pump Rebate	Commercial	70 Vacuum Pump Rebates
Large Landscape Water Surveys - Mixed Use Accts	Commercial	28 Landscape Surveys
FreeSprinklerNozzles.com Nozzle Distribution	Commercial	700 Nozzles
FreeSprinklerNozzles.com Nozzle Distribution	Irrigation	700 Nozzles
Smart Landscape Rebate Program	All	350 Landscape Rebates

Package 3 is expected to save approximately 374 AF of water a year by the year 2020 (Table 13, Figure 3). With passive conservation, package 3 is expected to save a total of 835 AF in the year 2020.

Table 13: Package 3 Annual Water Savings (AF)

	2014	2015	2016	2017	2018	2019	2020
Annual Programmatic Water Savings	54	108	162	216	270	322	374
Annual Passive Water Savings	89	158	224	287	347	405	461
Total Water Savings	143	266	386	503	617	727	835
SBX7-7 Target		292					584

Figure 3: Package 3 Cumulative Total Water Savings Through 2020



The average annual cost to implement the programs in Package 2 is approximately \$60,600, excluding staffing (Table 14). Assuming one staff paid an average burdened rate of \$76.86 an hour⁶ (Senior Water Resources Analyst), the average annual cost increases to approximately \$214,300.

Table 14: Package 3 Annual Implementation Costs

Program	Customer Class	Average Annual Cost
Connectionless Food Steamer Rebate	Commercial	\$5,500
Dry Vacuum Pump Rebate	Commercial	\$6,600
Large Landscape Water Surveys - Mixed Use Accts	Commercial	\$2,500
FreeSprinklerNozzles.com Nozzle Distribution	Commercial	\$700
FreeSprinklerNozzles.com Nozzle Distribution	Irrigation	\$700
Smart Landscape Rebate Program	All	\$44,600
Package 3 Average Annual Cost	-	\$60,600
Average Annual Staffing Cost	-	\$153,700
Package 3 Average Annual Cost, Including Staffing	-	\$214,300

Package 3 is also highly cost-effective option for GWD with an average implementation cost of \$79 per AF of water saved, or \$280 per AF of water saved when staffing costs are included.

⁶ Misty Williams, personal communication, email dated 06/05/13

Table 15 shows the cost-benefit ratios for each of the programs included in Package 3, as well as the package as a whole.

Table 15: Package 3 Cost Benefit Ratios

Program	Cost Benefit Ratio
Connectionless Food Steamer Rebate	12.2
Dry Vacuum Pump Rebate	12.9
Large Landscape Water Surveys - Mixed Use Accts	2.1
FreeSprinklerNozzles.com Nozzle Distribution	2.3
FreeSprinklerNozzles.com Nozzle Distribution	2.3
Smart Landscape Rebate Program	7.8
Complete Package 3 – Without Staffing	8.4
Complete Package 3 – Staffing Included	2.4

3.2.4 Comparison of Packages

All three packages offer strong, cost-effective options to meeting District requirements. As illustrated in Table 16, Package 1 generates the most water savings but is also the most costly to implement. Package 2 is the least expensive to implement but produces the least amount of savings, while Package 3 sits in the middle in terms of both cost and water savings, yet has the best cost-benefit ratio.

Table 16: Comparison of Packages: Water Savings and Cost

Package	Total Water Savings in 2020 (AF)	Average Annual Cost		Cost Benefit Ratio		Staff required
		With Staffing	Without staffing	With Staffing	Without staffing	
Package 1	946	\$392,600	\$76,100	2	10.5	3
Package 2	813	\$204,700	\$51,000	2.1	8.3	1
Package 3	835	\$214,300	\$60,600	2.4	8.4	1

Since all the packages are cost effective and all provide, and exceed, the required savings, it is for the District to decide which approach best aligns with its larger vision. Table 17 provides a brief assessment of the pros and cons of each approach.

Table 17: Comparison of Packages: Pros and Cons

Package	Approach	Pros	Cons
Package 1	Traditional approach, similar to BMP implementation, all customers participate	Available to entire customer base, District staff are familiar with implementation, largest savings	Staff intensive, significant amount of savings that serve to accelerate eventual code impacts
Package 2	Innovative, all customers participate, focus on landscape	Available to entire customer base, Staffing replaced with innovative delivery mechanisms, potential ancillary benefits due to focus on landscape uses, leverages existing Western program.	Some savings will be captured in code.
Package 3	Targeted at commercial customers	Focused on high users and efficiencies that are not captured in existing code, potential ancillary benefits due to focus on landscape uses	Less diversified - does not provide opportunity to all (residential) customers.

Section 4: Conclusions

Conservation planning for the District is directed by two requirements: SBX7-7 and the BMPs. The analysis in Section 1 indicates that the District should shift from its Traditional BMP approach in favor of Flex Track, given the long-standing nature of conservation efforts in the District and the increased flexibility it affords.

As determined in Section 1, SBX7-7 is the more aggressive of the two requirements, with a demand reduction target of about 584 AFY by 2020, thereby setting the District's programmatic conservation goal. In addition to achieving these savings, the District must also continue to implement the Foundational BMPs.

Section 3 presents three packages, defined by District staff, for consideration. The three packages, all similarly cost-effective and compliant, represent different approaches or direction the District can take in implementing conservation. Implementation of the Foundational BMPs, though non-quantifiable, should also increase conservation savings. It is prudent to have some cushion in this planning process because uncertainties exist regarding, among other things, the permanence of current demand levels. A combination of dry weather from 2007 to 2009 and recent poor economic conditions have led to unusually low water consumption throughout the state and some rebound in demand is generally expected.

It is important to note that these packages are simply examples that illustrate approaches the District might wish to pursue, forecasted outcomes and costs. There are numerous ways to combine and design a set of programs and the District is fortunate that it has considerable flexibility, especially when compared with other water suppliers in the state, on how it can meet its requirements. With this information, the District could develop numerous packages for analysis, but for the purposes of this report, three distinct packages have been reviewed. The packages represent strategies that could work in the service area, provide a framework for decision making, and can be deconstructed and combined in whatever way best reflects District priorities.

Appendix A: Water Use

An analysis of GWD's customer water use was conducted using customer billing data for December 2011 through November 2012 (we will refer to the time period as 2012). The intent of the analysis was to gain an understanding of how water is being used, when, and by whom, and use that to inform conservation program choices and development. This section provides highlights of that analysis. For more detail see Appendix A.

The District serves almost 16,000 accounts in several customer categories.⁷ Table 18 shows consumption and number of accounts. Notably, certain classifications, such as residential users, consume considerably more than others, for example, commercial or institutional users, and the use per account of the latter is exponentially larger.

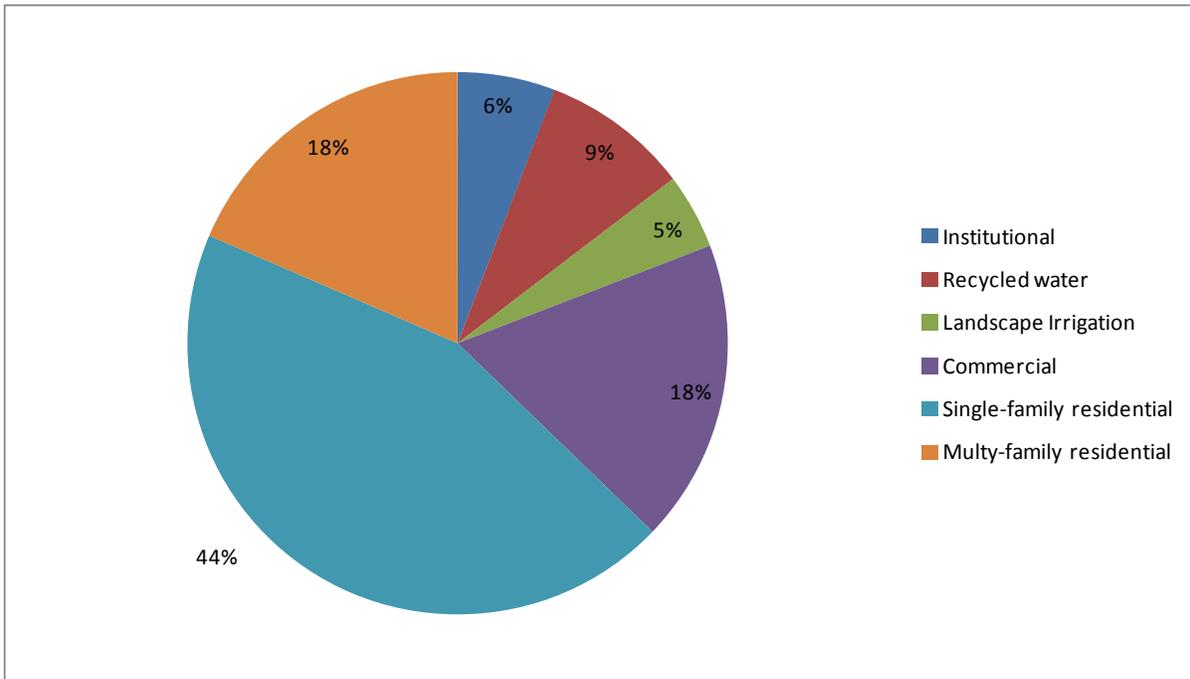
Table 18: 2012 Water Deliveries and Accounts

Customer Type	Total Use (AF)	Number Of Accounts	Average Use Per Account (AF)
Landscape Irrigation	457	189	2
Institutional	591	7	84
Agriculture	892	99	26
Recycled	892	34	26
Multi-family residential	1,784	1,105	2
Commercial	1,835	914	2
Ag Residential	2,459	105	23
Single-family residential	4,492	13,151	0.34
Total	13,402	15,604	

Excluding agricultural uses for the purpose of this report, residential use is by far the largest single type of use, accounting for over 60 percent of total urban consumption. Figure 4 shows the relative uses by customer class.

⁷ For the purpose of this analysis, "Fire" accounts aren't included in the total number of accounts.

Figure 4: Urban Water Use by Customer Class



Landscape water use has been identified as a conservation priority statewide, with some inland regions using up to 60 percent of their total consumption for irrigation. Results in Table 19 indicate that additional conservation measures could target landscaping water use in the District, where seasonal variability ranged from 33 to 87 percent during 2012.

Table 19: Seasonal variability by customer class

Customer Type	Highest Use Month	Highest Monthly Use (AF)	Lowest Use Month	Lowest Monthly Use (AF)	Seasonal Variation
Multi-family residential	Jun	189	Jan	123	0.33
Commercial	Aug	196	Dec	112	0.43
Single-family residential	Aug	499	Dec	269	0.46
Institutional	Jun	63	Jan	29	0.54
Landscape Irrigation	Aug	67	Dec	11	0.84
Recycled water	Aug	139	Feb	18	0.87

Another potentially important programmatic consideration is high users. Some highlights include:

- Single Family Residential customers had the lowest variability, but these high users may still be a potentially good target for efficiency improvements. The average SF account

consumed 0.34 AF (304 gpd) while the median use was 254 gpd; this 50 gpd difference is caused by the high users bringing up the average.

Table 20 shows the consumption of the top 10 users in each customer class as a percentage of total use in that category. MF was not included due to outliers; institutional was not included either as it has only seven accounts.

Table 20: Consumption of top 10 users by customer class

Customer Type	Percentage of class use by top 10 customers
Single-family residential	1.01%
Commercial	24.93%
Landscape Irrigation	44.13%
Recycled water	87.02%