This presentation premiered at WaterSmart Innovations

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Valuable Lessons in Audits for the CII Sector: A Public/Private Collaboration

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Introduction

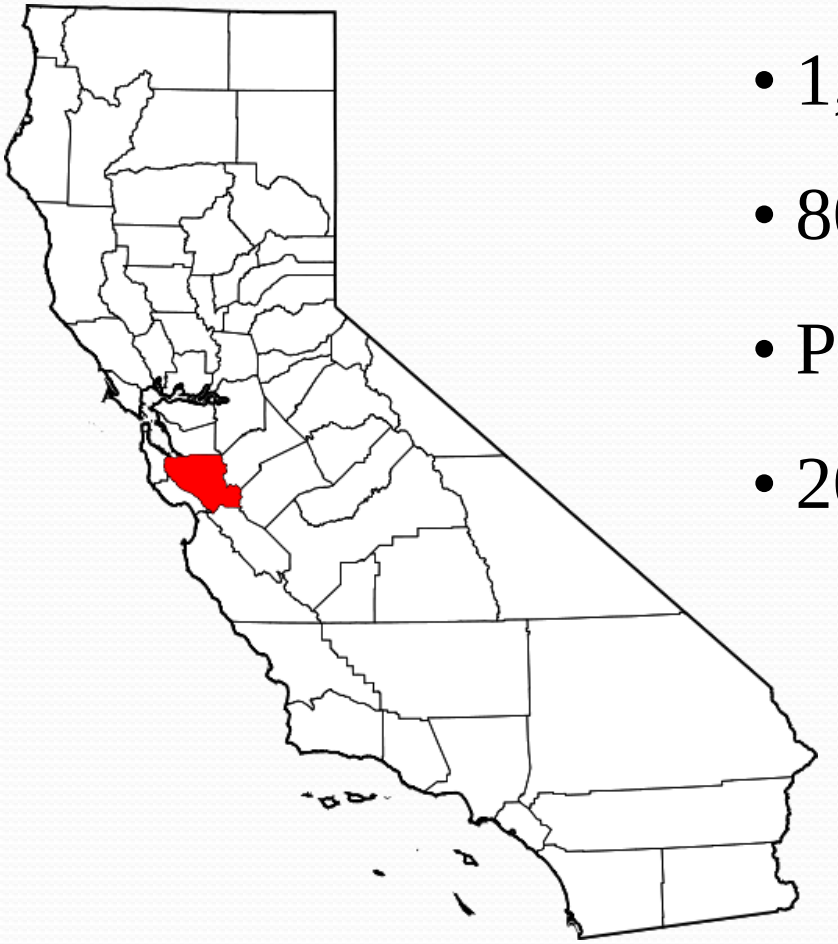
Valley Water and WaterWise share valuable lessons learned in developing a successful program, which will benefit both public and private agencies.

The Partnership

WaterWise Consulting, Inc. (WaterWise)

- A private consulting firm, in business since 2001.
- Manages conservation programs for both public and private water agencies.
- Works directly with commercial end-users to provide analysis of water use and recommendations for water efficiency improvements.
- Headquartered in California, expanding nationwide.

The Santa Clara Valley Water District manages the water resources for Santa Clara County.



- 1,300 square miles
- 800 miles of creeks and rivers
- Population of 1.8 million
- 200,000 commuters

Santa Clara Valley Water District SM

The Program

Indoor Water Use Survey Program

- Commercial, Industrial, & Institutional customers
- Third phase of program from July 2007 through August 2009.
- Approximately 300 facilities surveyed*
- Provided free of charge to customers after approval by Valley Water.

*Estimated as of 8/31/09. Program still in progress at this time.

The Participants

- **Commercial**: 64+ sites, including office buildings, shopping centers, retail stores, restaurants, hotels, health clubs, one automobile dealer, and others.
- **Industrial**: 15+ sites, including metal finishing & machining, bus and light rail maintenance, food processing, electronics manufacturing & research, medical equipment manufacturing facilities.
- **Institutional**: 94+ sites, including schools, a museum, medical centers & clinics, community centers, churches, municipal facilities, and one university.

Numbers as of 8/31/09. Program totals are higher.

Participation Rate by Sector

Sector	Total Number of Participants	Participation Rate	Percentage of Total Potential Annual Water Savings
Commercial	64	37%	48%
Industrial	15	9%	5%
Institutional	94	54%	47%
Total	173	100%	100%

**As of 7/23/2009*

Program Process Outline

	Task	Performed By	Product	Description
1	Market Water-Use Survey Program	Contractor	Phone Calls/ Emails/Letters/Etc. All Marketing Materials must be pre-approved by District	Announces program, defines eligibility, and provides contact procedure.
2	Log Customer Requests	Contractor	E-mail Request Form to District	Fill in Request Form, forward to the District
3	Authorization to perform Water Use Survey from District	District	E-mail Response Authorizing Water Use Survey	The District will provide authorization for surveys based on total water consumption, sector type and target audience
4	Maintain Project Spreadsheet	Contractor	Update Excel spreadsheet	Spreadsheet includes customer data, including service address, consumption history, and survey/recommendation information

Program Process, continued

5	Customer Contact	Contractor	Appointment for Initial Site Visit	Request needed customer data; set appointment for first visit.
6	Site Visit	Contractor *	Site Survey/Survey Report	Perform assessment of customers water usage; verify site data and potential for conservation; evaluate potential actions which would result in further District Program participation
7	Development of Survey Report	Contractor	Survey Report detailing the results of the Water-Use Survey**	Draft report is reviewed by District and finalized. Finalized Report is then sent to facility.
8	Final Program Report	Contractor	Final Report created summarizing all surveys performed to date; due at conclusion of program.	Summary of Customer Characteristics, Evaluations of Water Use Surveys and Survey Reports. Outline of potential water savings to the District

Lessons Learned

- **Documentation**
- **Relationship**
- **Staffing**
- **Marketing**
- **Knowledge**
- **Flexibility**

Lesson Learned: Documentation

- **Data Collection Forms and Notes**
- **Survey Photographs**
- **Aerial & Satellite Imagery**
- **Calculation Template**
- **User-friendly Report Template**

Lesson Learned: Relationship

Components:

- **Reporting**
- **Communication**
- **Customer Service**
- **Follow-up**

Relationship: Reporting

- Main component of program.
- Aim is to provide quality information for facility management, encourage implementation of efficiency recommendations.
- Refers customer to other conservation programs offered by Valley Water to CII customers.
- Standardized Template:
  - Excel spreadsheet for data entry & calculations
  - Publisher template for final report to customer

Relationship: Reporting

- **Contents:**
  - **Cover Letter**
  - **Facility Description**
  - **Water Allocation Breakdown**
  - **Water Use Patterns**
  - **Summary of Recommendations (Executive Summary)**
  - **Water Efficiency Measures- Detail Pages**
  - **Conclusion**

Relationship: Communication

- **Regular communication between agency and contractor.**
  - **Monthly progress reports**
  - **Regular phone calls & emails**
- **Regular communication among WaterWise staff**
  - **Staff meetings**
  - **In-house continuing education**
- **Communication with Customers**
  - **See Customer Service section**

Relationship: Customer Service

- **Return calls promptly.**
- **Deliver report within a reasonable time after audit.**
- **Accommodate customer's schedule and other needs whenever possible.**
- **Respect customer's privacy regarding information collection, picture taking and anything that might be considered proprietary (for example, industrial process details).**

Relationship: Follow-up

- **Sites need contact after report is delivered to give a “nudge” to implement recommendations.**
- **SCVWD uses their interns to call the facilities after the surveys to “hold their hand” through the next stage: implementing the recommendations.**
- **Survey is a chance to build a relationship with customer- best to build on that relationship by ongoing communication of some sort.**

Lesson Learned: The Right Staff

- **Program was understaffed in the beginning**
- **Finding & training the best people**
- **For larger sites, use a team approach**

Lesson Learned: Marketing is Key

- **Marketing is key, but it's not easy.**
- **Direct mail and cold-calling proved to be most effective.**
- **Referrals from Valley Water's website and other general outreach efforts also helpful.**
- **Network with other agencies and groups (PG&E, Green Business Program, Chamber of Commerce, IFMA, retail water agencies).**

Flyer

Santa Clara Valley Water District
Water use survey

Indoor Water Use Survey Program - Commercial, Industrial, & Institutional

Our program

The Santa Clara Valley Water District is pleased to offer a FREE Indoor Water Use Survey Program targeting the commercial, industrial and institutional sectors. A trained technician will conduct comprehensive indoor water surveys, looking at current and historic water use and providing recommendations as to how your facility can become more water efficient and save you energy and money. The survey technician will analyze indoor water uses such as:

- cooling towers
- kitchen facilities
- lab or processing equipment
- boilers
- toilets (tank & flush valve)
- urinals
- kitchen & restroom faucets
- pool & spas

Learn to save water!

After the survey is complete, you will receive a summary report that contains an analysis of your facility's water use, annual costs, water and cost-saving recommendations, and a detailed description of programs and rebates available to assist with water efficient measures. Your specific survey report will also include a cost-benefit analysis for implementing the recommendations.

The surveys will be conducted on a first-come, first-served basis.

To schedule your free survey, please contact Catherine Cox of WaterWise Consulting, Inc. at 1-866-685-2322.

For more information on this program, contact Karen Morvay of the Santa Clara Valley Water District at (408) 265-2607, ext. 2707.

WaterWise Consulting, Inc.

(866) 685-2322
Office fax: (408) 904-5747

What we do!

The Santa Clara Valley Water District manages water resources and provides stewardship for the county's five watersheds, including 10 reservoirs, hundreds of miles of streams and groundwater basins. Valley Water also provides flood protection throughout Santa Clara County.

Visit our website at valleywater.org.

Santa Clara Valley Water District

Valley Water website

Lesson Learned: Knowledge

- **Acquisition of knowledge an ongoing effort**
- **Solid research in the field is lacking or difficult to find**
- **Training difficult to find**
- **Better to be a generalist or specialist?**
- **Industrial processes may require outside help**

Lesson Learned: Flexibility

- **Willingness to work out issues**
- **Report template**
- **Size of audit sites**
- **Change procedures as needed**
- **Example- Data collection procedure**
- **Cut-sheets**
- **Solo surveyors vs. team approach**

Challenges

- **Customers served by 13 retail water agencies**
- **Disconnects between facility owners, managers and occupants**

Conclusions

- **Public/Private Partnership works well.**
- **Learning from one's mistakes is useful, learning from other's successes is better!**
- **Initial conditions are important.**
- **Adaptability and a good working relationship are keys to success.**

Data Template- Basic Data Entry Sheet

Survey Data Entry Sheet

Santa Clara_Version 2.1_10-16-08

		Survey ID Number:	
Field Auditor Name:	**Eddie Manguray and Ron Carrol**	ort Prepared By:	**Eddie Manguray and Steven Chov**
Audit Date:	**January 15, 2009**	Report Date:	**April 28, 2009**

General Site Information

Facility Name:	**Sample High School**		
Street Address:	401 Burnett Ave.		
City, State, Zip Code:	Morgan Hill	**CA**	95037
Telephone Number:			
Site Contact Name:		Title:	
Site Contact Phone Numbers:		E-mail:	
Mail Report To:	Peter McKenna	Title:	**Supervisor of Operations**
Adressee Phone Number	**(408) 201-6085**	E-mail:	peter.mckenna@mhu.k12.ca.us
Report Mailing Address:	*Enter below if different than site address*		
Street Address or PO Box:	15600 Concord Circle		
City, State, Zip Code	Morgan Hill	**CA**	**95037**
Prefer Mail or E-mail			

Utility Information

Water Purveyor:	**City of Morgan Hill**	Water Rate:	**$3.47**
Sewer Service Agency:	**City of Morgan Hill**	Sewer Rate:	**$2.71**
Rate Type:	**Monthly**	Other Cost	**$0.00**
Water Bill Units (HCF or CCF):	**HCF**	Other Cost	**$0.00**
Number of Meters at this Site:	**2**	Total Cost of Water:	**$6.18**

Data Template- Data Entry Sheet continued

Account Numbers or Meter Numbers	[redacted]	Size of Meter:	4"	Type:	Mixed-Use
	[redacted]	Size of Meter:	8"	Type:	Fire
	[redacted]	Size of Meter:		Type:	Well
		Size of Meter:		Type:	

Energy Rates for Water Heating

Gas Utility Company:	PGE	Cost per Therm:	$1.890	Date:	
Electric Utility Company:	PGE	Cost per Kwh:	$0.170	Date:	
Reclaimed Water Company:	Agency	Cost per Unit:	$0.00	Date:	

Facility Information

Industry Type:	Institutional	Year of Building I	
Property Size (sf or acres):	108	2004	
Building Square Footage:	190,000	Year of Renovatio	
Operating Hours per Week:	70		
Operating Days per Year:	190		
Total Number of Employees:	102		
Full Time Male Employees:	34		
Full Time Female Employees:	68		
Male Students:	787		
Female Students:	780		
Other Male Employees:	0		
Other Female Employees:	0		
Dedicated Irrigation Meter:	☑ Yes ☐ No		
No. of Dedicated Meters:	1		
Reclaimed Water Available:	☐ Yes ☐ No	tion controllers:	
Irrigated Area in Square Feet:	1,283,713	1	
Area calculated or measured?	☐ Calc. ☐ Meas.	# total stations	
Estimated condition of landscape & irrigation system: *(choose from drop-down menu)*	Good	315	

Sanitary Water Use

Existing Equipment:	Number of Units	Volume of Use	
Flush Valve Toilets	78	1.6	gpf
Flush Valve Toilets	0	3.5	gpf
Tank Toilets	0	1.6	gpf
Tank Toilets	0	3.5	gpf
High Efficiency Toilets	0	1.28	gpf
Urinals	26	1	gpf
Urinals	0	1.5	gpf
High Efficiency or Waterless Urinals	0	0.5	gpf
Showerheads	0	1.5	gpm
Showerheads	54	2	gpm
Bathroom Faucets	40	0.5	gpm
Bathroom Faucets	20	2.2	gpm
Shop Faucets	0	0	gpm
Bathroom Water Temperature	110	62	Degrees F
	Hot	Cold	

Data Template- Landscape Sheet

Landscape Water Need vs. Water Use

Sample High School

Annual ETo for Survey Area in Inches:	**49.40**
Adjustment Factor Provided by SCVWD:	**0.80**
Conversion Factor:	**1200**
Landscape Area:	**1,283,713**

ESTIMATED LANDSCAPE WATER NEED				
Total Landscape Water Need	**31,623,196**	**Gallons**	**42277**	**HCF per Year**

ESTIMATED LANDSCAPE WATER USE (Based on condition of system assigned by surveyor on Data Entry sheet)						
	Condition of Landscape and Irrigation System					
Estimated Water Use	Excellent	Good	Average	Poor- Over-watered	Poor- Under-watered	N/A (no landscape, etc.)
Gallons	**36,367,012**	**39,528,808**	**47,435,168**	**55,340,780**	**23,717,584**	**0**
HCF Units	**48619**	**52846**	**63416**	**73985**	**31708**	**0**

Formula for Water Budget from SCVWD:

Target Water Budget = ETo X Adjustment Factor (0.8) X Landscape are (sq. ft.)
Conversion Factor (1200)

Data Template- Billing Data Entry

Water Use Trend

Sample High School

Baseline Annual Water Use: **38,517,512** **Gallons**

51,494 **HCF Units**

Baseline Water Use

From water meters servicing facility		
Billing Period	**hcf**	**Gallons**
Jan-08	1,451	1,085,348
Feb-08	2,026	1,515,448
Mar-08	3,306	2,472,888
Apr-08	4,481	3,351,788
May-08	6,167	4,612,916
Jun-08	6,865	5,135,020
Jul-08	7,630	5,707,240
Aug-08	7,035	5,262,180
Sep-08	5,037	3,767,676
Oct-08	3,828	2,863,344
Nov-08	2,220	1,660,560
Dec-08	1,448	1,083,104
12-Month Total	**51,494**	**38,517,512**
Monthly Avg.	**4,291**	**3,209,668**

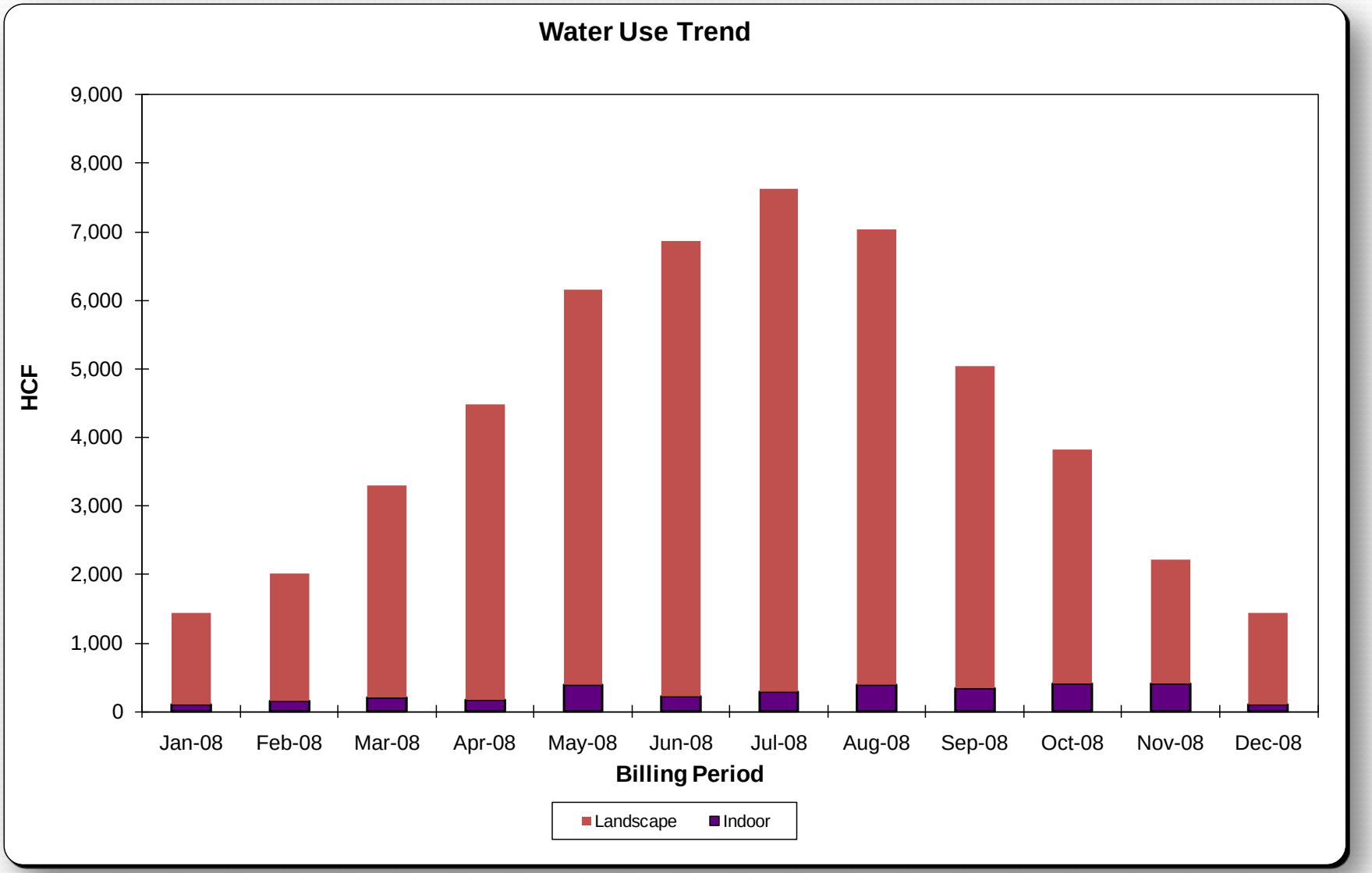
Water Meter 1

Indoor	Meter Data	
Meter No.	**026-1745-00**	
Billing Period	**hcf**	**Gallons**
Jan-08	110	82,280
Feb-08	165	123,420
Mar-08	210	157,080
Apr-08	185	138,380
May-08	395	295,460
Jun-08	225	168,300
Jul-08	300	224,400
Aug-08	400	299,200
Sep-08	340	254,320
Oct-08	419	313,412
Nov-08	417	311,916
Dec-08	107	80,036
12-Month Total	**3,273**	**2,448,204**
Monthly Avg.	**273**	**204,017**

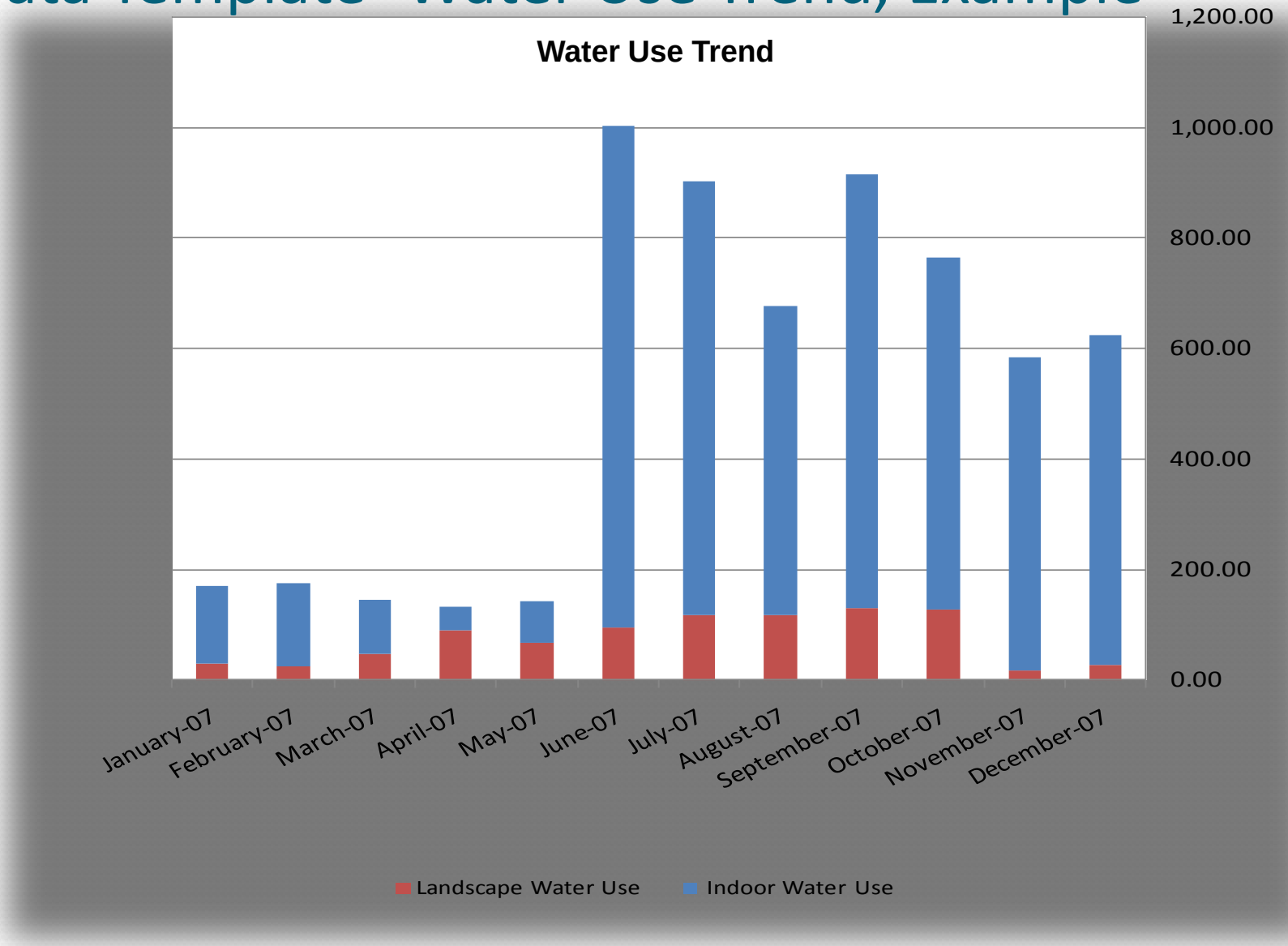
Water Meter #2

Well - landscape	Meter
Meter No.	**09S03E**
Billing Period	**hcf**
Jan-08	1,341
Feb-08	1,861
Mar-08	3,096
Apr-08	4,296
May-08	5,772
Jun-08	6,640
Jul-08	7,330
Aug-08	6,635
Sep-08	4,697
Oct-08	3,409
Nov-08	1,803
Dec-08	1,341
12-Month Total	**48,221**
Monthly Avg.	**4,018**

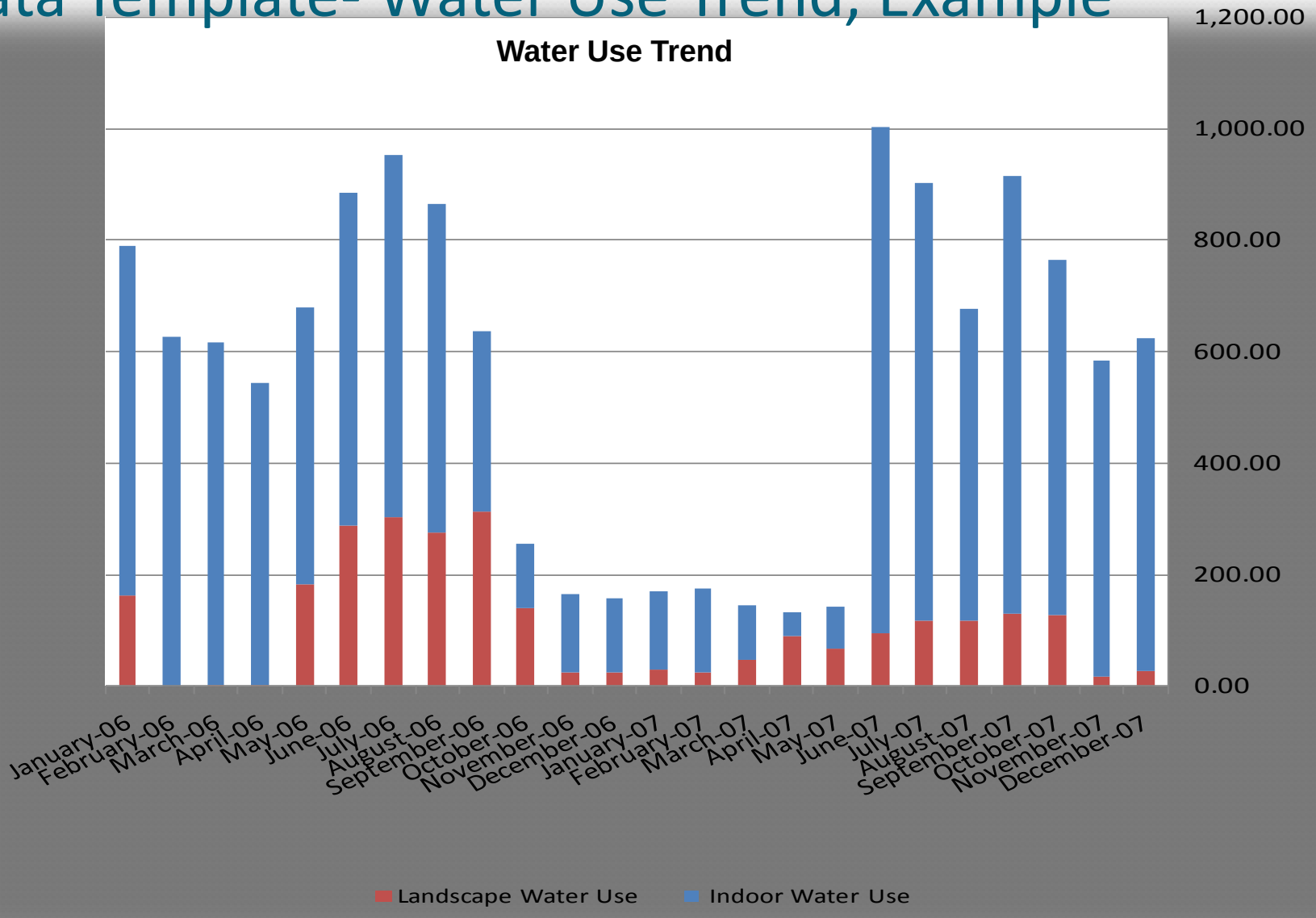
Data Template- Water Use Trend



Data Template- Water Use Trend, Example



Data Template- Water Use Trend, Example



Water Allocation Worksheet

Sample High School

SERVICE		BASIS		WATER USAGE Existing		WATER USAGE Proposed		FREQUENCY		DAYS PER YEAR		PRESENT HCF/YR
Sanitary Water Use												
Full-time Staff	**Group A**											
TOILETS	FVT* at 1.6 gpf	68	women	1.6	gpf	1.60	gpf	2.6	flush/pers/day	190.0	days	72
	FVT at 1.6 gpf	34	men	1.6	gpf	1.60	gpf	2.0	flush/pers/day	190.0	days	28
	FVT > 1.6 gpf		women	3.5	gpf	1.28	gpf		flush/pers/day		days	0
	FVT > 1.6 gpf		men	3.5	gpf	1.58	gpf		flush/pers/day		days	0
	Tank-Type		women		gpf		gpf		flush/pers/day		days	0
	Tank-Type		men		gpf		gpf		flush/pers/day		days	0
	URINALS	10	men	1.0	gpf	0.50	gpf	2.0	flush/pers/day	190.0	days	5
	SHOWERS		people		gpm	1.50	gpm		min/pers/day		days	0
	SINKS	51	people	0.5	gpm	0.5	gpm	3.0	min/pers/day	190.0	days	19
	SINKS	51	people	2.2	gpm	0.5	gpm	3.0	min/pers/day	190.0	days	86
	FOUNTAINS	102	people	0.5	gpm	0.50	gpm	1.0	min/pers/day	190.0	days	13
	***FVT: Flush Valve Toilets**										**Subtotal Sanitary, A**	222
Students	**Group B**											
TOILETS	FVT* at 1.6 gpf	780	women	1.6	gpf	1.60	gpf	0.3	flush/pers/day	180.0	days	90
	FVT at 1.6 gpf	787	men	1.6	gpf	1.60	gpf	0.3	flush/pers/day	180.0	days	91
	FVT > 1.6 gpf		women	3.5	gpf	1.28	gpf		flush/pers/day		days	0
	FVT > 1.6 gpf		men	3.5	gpf	1.58	gpf		flush/pers/day		days	0
	Tank-Type		women		gpf		gpf		flush/pers/day		days	0
	Tank-Type		men		gpf		gpf		flush/pers/day		days	0
	URINALS	787	men	1.0	gpf	0.50	gpf	1.0	flush/pers/day	180.0	days	189
	SHOWERS	400	people	2.0	gpm	1.50	gpm	3.0	min/pers/day	30.0	days	96
	SINKS	1,567	people	0.5	gpm	0.5	gpm	0.5	min/pers/day	180.0	days	94
	FOUNTAINS	1,567	people	0.5	gpm	0.50	gpm	0.5	min/pers/day	180.0	days	94
	***FVT: Flush Valve Toilets**										**Subtotal Sanitary, B**	655

Data Template- Data Entry & Calculation

Water Efficiency Measures

Sample High School

Incremental Water Cost: $6.07

Bathroom Water Use

Replace Flush Valve Toilets (3.5 gpf) with HET Models

Retrofit Flush Valve Toilets (1.6 gpf) with Dual-Flush Handles

Existing flushometer toilets use	1.6	gpf
nd retrofit with Dual Flush valves at	1.28	gpf
Recommend valve retrofit for	44	toilets
Estimated implementation cost:	$50	per kit
Estimated water savings:	11668.48	Gal per year
Estimated water savings:	16	hcf per year
This is worth:	$95	per year

Note: It is not advisable to retrofit a flushometer valve to a flow rate of less than 3.5 gpf without replacing the bowl.

Total fixture cost: $2,200

The payback is: 23.2 years

Replace Tank-Type Toilets

Repair Toilet Leaks

Retrofit Urinal Flush Valve Kit

isting urinal flush valves operate at	1.0	gpf
nal valve retrofit kits use as little as	0.5	gpf
Recommend retrofit for	13	urinals
Estimated implementation cost:	$0	per valve
Estimated water savings:	62830	Gal per year
Estimated water savings:	84	hcf per year
This is worth:	$510	per year

SCVWD has a program to replace valves flushing 1.5 gal or more with new 0.5 gal valves. The total project cost below automatically goes to zero if flush volume on existing valves is 1.5 gal or more.

Total fixture cost: $0

WET Rebate: $0

Net Implemen $0

Free Program

The payback is: Immediate years

Report Template- Cover

Water Use Survey Report

Provided By:

Santa Clara Valley Water District

5750 Almaden Expressway
San Jose, CA 95118
(408) 265-2600
www.valleywater.org

April 28, 2009

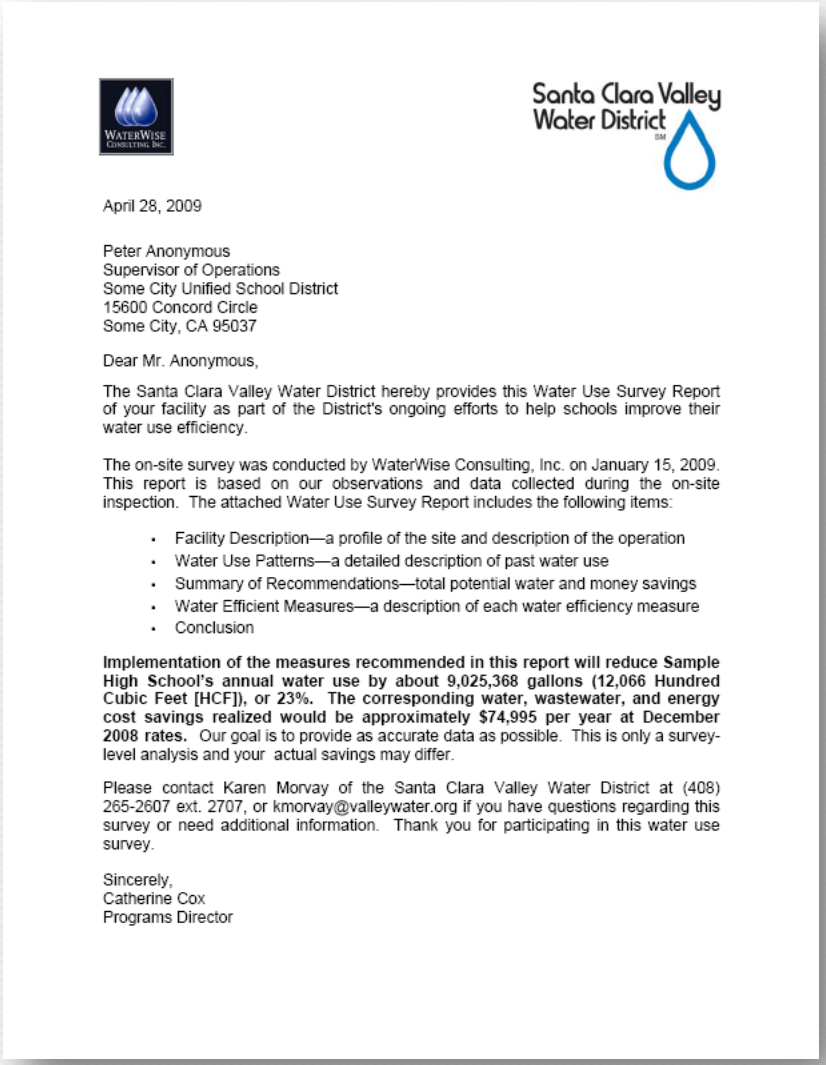
Sample High School
401 Any Ave.
Some City, CA 95037

Prepared By:

WaterWise Consulting, Inc.

1590 Oakland Rd, Suite B211
San Jose, CA 95131
(408) 496-6965
www.waterwise-consulting.com

Report Template- Cover Letter/Executive Summary



WATERWISE CONSULTING, INC.

Santa Clara Valley Water District SM

April 28, 2009

Peter Anonymous
Supervisor of Operations
Some City Unified School District
15600 Concord Circle
Some City, CA 95037

Dear Mr. Anonymous,

The Santa Clara Valley Water District hereby provides this Water Use Survey Report of your facility as part of the District's ongoing efforts to help schools improve their water use efficiency.

The on-site survey was conducted by WaterWise Consulting, Inc. on January 15, 2009. This report is based on our observations and data collected during the on-site inspection. The attached Water Use Survey Report includes the following items:

- Facility Description—a profile of the site and description of the operation
- Water Use Patterns—a detailed description of past water use
- Summary of Recommendations—total potential water and money savings
- Water Efficient Measures—a description of each water efficiency measure
- Conclusion

Implementation of the measures recommended in this report will reduce Sample High School's annual water use by about 9,025,368 gallons (12,066 Hundred Cubic Feet [HCF]), or 23%. The corresponding water, wastewater, and energy cost savings realized would be approximately $74,995 per year at December 2008 rates. Our goal is to provide as accurate data as possible. This is only a survey-level analysis and your actual savings may differ.

Please contact Karen Morvay of the Santa Clara Valley Water District at (408) 265-2607 ext. 2707, or kmorvay@valleywater.org if you have questions regarding this survey or need additional information. Thank you for participating in this water use survey.

Sincerely,
Catherine Cox
Programs Director

Report Template- Facility Description

Facility Description

Sample High School is part of the Some City Unified School District, located in Some City. The school provides educational opportunities for up to 1,567 students from ninth grade through twelfth grade. There are 102 full-time employees on-site. School is in session from late August through June, and the average school year is 180 days. Sample High School also provides summer school from the end of June through July.

Sample High School was built in 2004 and has not had any major renovations to the water-using fixtures since construction. The school has a total of 13 buildings. There is one pool, a large gym, eight tennis courts, men's and women's locker rooms with showers, a full kitchen, and two 150 ton cooling towers that are used during the warmer months of the year. The cooling towers are operated for about six hours per day, for about 90 days out of the year. The conductivity and water for the towers is not metered, and blowdown is controlled manually. The facility has a cover for the pool, but according to the site contact, it is rarely used. Sample High School's kitchen prepares all of the breakfasts and lunches for each elementary and middle school in the Some City Unified School District.

The total building size is 190,000 square feet, and the landscaping is approximately 1,283,713 square feet (29.5 acres). The facility has one water meter for indoor water use and one dedicated meter for landscape irrigation. Sample High School's landscape irrigation water is distributed from a well. The facility has one irrigation controller with a total of 315 stations. Sample High School irrigates the large playing fields for the campus, in addition to several large turf grass areas surrounding the campus and a large field that is part of the high school's property. The school is out of range of any recycled water pipelines, so recycled water is not considered for use in the facility.

Average Facility Water Use	
Sample High School Average Water Use per Capita	7.7 gallons /day
Average Water Use per Capita in Facility of this Size and Type	15 gallons/day
Sample High School Water Use per Capita	Lower than Average

Report Template- Facility Description/Inventory

Facility Description

Table 1 provides an itemized list of all water-using fixtures, plumbing, and water-using equipment on the premises.

Table 1— Inventory of Water-Using Equipment and Plumbing

Existing Equipment	Number of Units	Volume of Use		Annual Use (gal)	Annual Use (HCF)
		Use	Units		
Flush Valve Toilets	78	1.6	gpf	209,808	280
Urinals	26	1.0	gpf	145,460	194
Showerheads	54	2.0	gpm	72,000	96
Bathroom Faucets	40	0.5	gpm	85,050	114
Bathroom Faucets	20	2.2	gpm	63,954	86
Cooling Towers	2	150.0	ton	178,920	239
Door-Type Dishwasher	1	0.7	gal/cycle	6,660	9
Kitchen Handwashing Faucets	7	2.7	gpm	17,010	23
Food Prep Faucets	2	2.2	gpm	391,500	523
Pot Sink Faucets	1	7.5	gpm	5,400	7
Pasta Cookers	3	38.0	gal/day	61,560	82
Steam Tables	10	2.0	gal/bin	7,200	10
Drinking Fountains	26	0.5	gpm	80,205	107
Hose Spigots	18	17.5	gpm	33,750	45
Swimming Pools	1			1,085,569	1,451
Irrigation Controller	1	315	stations	36,069,308	48,221
Unaccounted Water Use				4,488	6
TOTAL				**38,517,512**	**51,494**

Note: HCF=Hundred Cubic Feet, a standard unit of billing for water; 1 HCF is equivalent to 748 gallons of water.

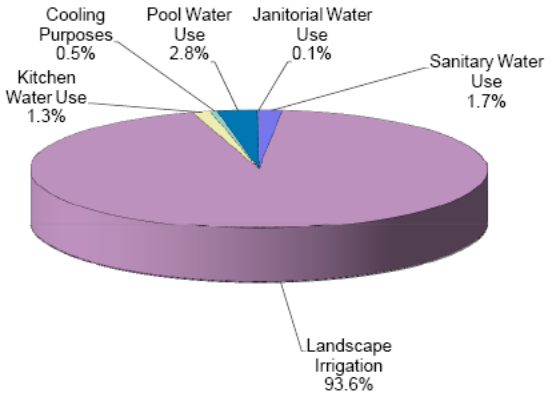
Report Template- Water Allocation

Water Allocation

Primary water uses for Sample High School include landscape irrigation, pool water use, sanitary and kitchen uses. Water is provided by the City of Some City at the rate of $3.47 per HCF, and sewer service is provided by the City of Some City at the rate of $2.71 per HCF, based upon December 2008 rates. Well water for landscape irrigation is provided by the Santa Clara Valley Water District at the rate of $0.47 per HCF. PG&E supplies electricity at a rate of $0.17 per kilowatt hour (kWh) and gas at a rate of $1.89 per therm, also based on December 2008 rates.

Figure 1 shows the allocation of water use for the facility, organized by category of use. Of the total water use: approximately 94% is used for landscape irrigation, 3% for pool water use, 2% is used for sanitary purposes, 1% for kitchen activities, and less than 1% is used for cooling purposes and janitorial water use.

Figure 1– Allocation of Water Use



Note: HCF=Hundred Cubic Feet, a standard unit of billing for water; 1 HCF is equivalent to 748 gallons of water.

Report Template- Water Use Patterns

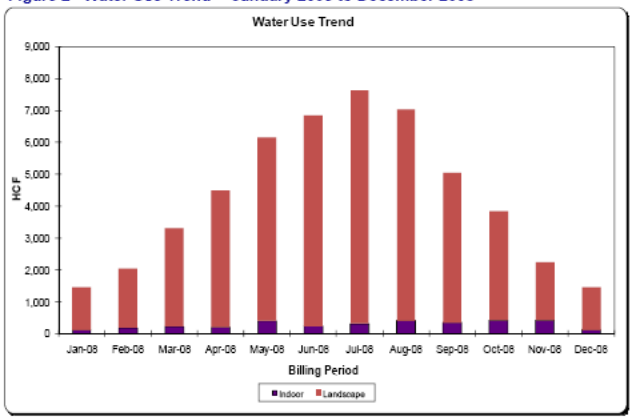
Water Use Patterns

The total water use at Sample High School for a recent 12 month period, from January 2008 to December 2008, was 38,517,512 gallons (51,494 HCF). The average monthly water use for this facility was 3,209,668 gallons (4,291 HCF). Figure 2 illustrates the average trend in monthly water use, analyzed from one year of billing data.

The month with the highest water use during this time period was July 2008, in which the facility used 5,707,240 gallons (7,630 HCF) of water. The month with the lowest water use during this period was December 2008, in which the facility used 1,083,104 gallons (1,448 HCF).

There was a significant decrease in irrigation water use during the months of January through March 2008 and October through December 2008. This is likely attributed to the reduction in seasonal landscape irrigation requirements. Landscape irrigation water is significantly higher during the warmer, summer months. Sample High School irrigates a large area of landscaping adjacent to the main campus, which is part of the school's property. This accounts for the large volume of water used for irrigation. The interior building water use is relatively consistent throughout the year, however there are some increases during the warmer months for cooling purposes, and also when school attendance is higher.

Figure 2– Water Use Trend— January 2008 to December 2008



Note: HCF=Hundred Cubic Feet, a standard unit of billing for water; 1 HCF is equivalent to 748 gallons of water.

Report Template- Summary of Recommendations

Summary of Recommendations

Based on an on-site inspection and data analysis, the following water efficiency measures are recommended to reduce the overall annual water use at Sample High School. These recommendations are listed by category of use and in order of total estimated volume of water saved by implementing the water efficiency measures.

1. Replace 20 bathroom faucet aerators with a flow rate of 2.2 gallons per minute (gpm) with new low-flow bathroom faucet aerators, which flow at 0.5 gpm.
2. Replace 54 showerheads that flow at a rate of 2.0 gallons per minute (gpm) with new low-flow showerheads, which flow at 1.5 gpm.
3. Retrofit 4 flush valve toilets with a flush volume of 1.6 gpf with dual-flush handles, which allow for a reduced flush volume.
4. Replace 7 kitchen handwashing faucet aerators that flow at a rate of 2.7 gpm with new low-flow faucet aerators, which flow at 0.5 gpm.
5. Use existing pool cover to reduce evaporation.
6. Install cooling tower conductivity controllers.
7. Complete a landscape audit and implement efficient irrigation practices.
8. Replace high-water using landscape (i.e. turf grass) with low-water using plants and/or permeable hardscape.
9. Install weather-based irrigation controllers.

The following page provides a detailed summary of the costs and savings associated with each of the water efficiency recommendations in this report.

Report Template- Summary Table

Summary of Recommendations

The table below summarizes our recommendations for improving water use efficiency at this facility. This analysis includes the costs associated with implementing each water efficiency measure, any available rebates or incentives, total annual water savings, and the estimated annual financial savings resulting from improved efficiency in water, sewer, and energy use. The "simple payback" is the number of years it will take for the cost savings to pay for the cost of implementing the measure. Payback calculations do not account for inflation, equipment life, or operation and maintenance costs.

Table 2 – Summary of Recommended Measures

Water Efficiency Measure	Initial Cost	Rebates& Incentives	Water Savings (gal/yr)	Water Savings (HCF/Yr)	Annual Savings[1]	Simple Payback[2] (Years)
Sanitary Water Efficiency Recommendations						
Replace Bathroom Faucet Aerators	$40	$0	49,368	66	$674	Immediate
Replace Showerheads with Low-Flow Models	$540	$0	17,952	24	$245	2.2
Retrofit Flush Valve Toilets (1.6 gpf) with Dual-Flush Handles[3]						
Kitchen Water Efficiency Recommendations						
Replace Kitchen Handwashing Faucet Aerators	$14	$0	14,212	19	$181	Immediate
Pool Water Efficiency Recommendations						
Use Existing Pool Cover	$0	$0	715,088	956	$5,909	Immediate
Cooling Purposes Water Efficiency Recommendations						
Install a Cooling Tower Conductivity Controller[3]						
Landscape Irrigation Recommendations						
Complete a Landscape Audit and Implement Efficient Irrigation Practices[4]	$0	Free Program	4,446,112	5,944	$36,734	Immediate
Replace Unused Areas of Lawn	$307,118	$20,000	3,782,636	5,057	$31,252	9.2
Install a Weather-Based Irrigation Controller	$19,845	$1,100	2,223,056	2,972	$18,387	1.0
Totals:	**$327,557**	**$21,100**	**9,025,368**	**12,066**	**$74,995**	**4.1**

1) Savings for water, sewer and energy costs.
2) The total simple payback period is based on the total implementation costs and the total savings amount (the bottom line).
3) Savings figures for this measure are unavailable.
4) Costs may be involved if repairs to the irrigation system are required, rebates may be available.

Table 2 – Summary of Recommended Measures

Water Efficiency Measure	Initial Cost	Rebates& Incentives	Water Savings (gal/yr)	Water Savings (HCF/Yr)	Annual Savings[1]	Simple Payback[2] (Years)
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Pool Water Efficiency Recommendations						
Use Existing Pool Cover	$0	$0	715,088	956	$5,909	Immediate
Cooling Purposes Water Efficiency Recommendations						
Install a Cooling Tower Conductivity Controller[3]						
Landscape Irrigation Recommendations						
Complete a Landscape Audit and Implement Efficient Irrigation Practices[4]	$0	Free Program	4,446,112	5,944	$36,734	Immediate
Replace Unused Areas of Lawn	$307,118	$20,000	3,782,636	5,057	$31,252	9.2
Install a Weather-Based Irrigation Controller	$19,845	$1,100	2,223,056	2,972	$18,367	1.0
Totals:	**$327,557**	**$21,100**	**9,025,368**	**12,066**	**$74,995**	**4.1**

1) Savings for water, sewer and energy costs.

2) The total simple payback period is based on the total implementation costs and the total savings amount (the bottom line),

3) Savings figures for this measure are unavailable.

4) Costs may be involved if repairs to the irrigation system are required, rebates may be available.

Report Template- Detailed Recommendation

Water Efficiency Measure: Bathroom Faucet Aerators

Sample High School has 20 bathroom faucets that flow at a rate of 2.2 gallons per minute (gpm). We recommend replacing the existing faucet aerators with new low-flow bathroom faucet aerators, which flow at 0.5 gpm. Low-flow faucet aerators are available from plumbing supply manufacturers and retailers.

The estimated water savings from this retrofit equal 49,368 gallons (66 HCF) per year, which will yield an annual savings of approximately $674. This amount includes water and sewer savings, as well as energy savings resulting from the reduction in hot water used.

Low-Flow Faucet Aerator (0.5 gpm)

Low-Flow Bathroom Faucet Aerators	
Estimated Annual Water Savings	49,368 gallons (66 HCF)
Estimated Annual Water, Sewer, and Energy Cost Savings	$674
Estimated Cost of Fixtures*	$40
Simple Payback	Immediate

**Estimated cost of fixtures is $2 per aerator; this does not include any associated labor or installation costs.*

Report Template- Detailed Recommendation

Water Efficiency Measure: Showerheads

Sample High School has 54 showerheads installed in the men's and women's locker rooms. The average water flow of each showerhead is 2.0 gallons per minute (gpm). We recommend replacing the 54 showerheads with new low-flow showerheads that flow at 1.5 gpm. Low-flow showerheads are available from plumbing supply manufacturers and retailers.

The estimated annual water savings for replacing the showerheads is 17,952 gallons (24 HCF). In addition to water savings, this will also result in reduced sewer and gas charges. The estimated annual financial savings (in water, sewer, and energy costs) for implementing this water efficient measure is $245.

Low-Flow Showerheads (1.5 gpm)

Low-Flow Showerheads	
Estimated Annual Water Savings	17,952 gallons (24 HCF)
Estimated Annual Water, Sewer, and Energy Cost Savings	$245
Estimated Initial Project Cost*	$540
Simple Payback	2.2 years

**Estimated cost of fixtures is $10 per showerhead; this does not include any associated labor or installation costs.*

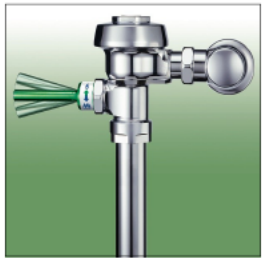
Report Template- Detailed Recommendation

Water Efficiency Measure: Dual-Flush Handle Retrofits

Sample High School currently has four flush valve toilets in the staff restrooms using a flush volume of 1.6 gallons per flush (gpf). We suggest that facility management consider installing dual-flush handle retrofit kits on these toilets. These kits, which retail at about $50 each, replace the current flush handle and add a unique water-saving option.

The *dual-flush handle* allows for a reduced flush of only 1.1 gallons when the lever is pulled up to flush liquid waste. A full flush of 1.6 gpf is activated when the lever is pushed down to flush solid waste. These handles, which are easy to install, also generally come with small signs which explain how they operate.

This change is anticipated to decrease the flush volume to an *average* of 1.3 gpf. Because the savings will vary based on user choices, and because reliable study data is not yet available, we cannot quantify the savings at this time.



Dual-Flush Handle Retrofit Kit
1.6 gpf for solids,
1.1 gpf for liquids only

Dual-flush handles
come with a sign to educate
users how to save water

Report Template- Detailed Recommendation

Water Efficiency Measure:
Kitchen Handwashing Faucet Aerators

Sample High School has seven faucets in the kitchen that are used primarily for handwashing purposes, which currently flow at 2.7 gallons of water per minute (gpm). Because of their function, they can be replaced with low-flow faucet aerators that flow at 0.5 gpm. Low-flow faucet aerators are available from plumbing supply manufacturers and retailers.

The estimated water savings from this retrofit equal 14,212 gallons (19 HCF) per year, which will yield an annual savings of approximately $181. This amount includes water and sewer savings, as well as energy savings from a reduction in hot water used.

Low-Flow Faucet Aerator (0.5 gpm)

Kitchen Handwashing Faucet Aerators	
Estimated Annual Water Savings	14,212 gallons (19 HCF)
Estimated Annual Water, Sewer, and Energy Cost Savings	$181
Estimated Cost of Fixtures*	$14
Simple Payback	Immediate

**Estimated cost of fixtures is $2 per aerator; this does not include any associated labor or installation costs.*

Report Template- Detailed Recommendation

Water Efficiency Measure: Efficient Pool Management Practices

Although Sample High School has a pool cover, it is not currently being used when the pool is closed. Pool water use accounts for approximately 3% of the total water used at the facility. In addition to using pool covers, facility management may want to consider implementing some of the following water-efficient management practices for the pool at the facility.

- Repair any swimming pool leaks immediately to avoid significant water losses.
- If heated, reduce the water temperature of the pool and spa, as warmer water evaporates more quickly.
- Backwash the pool only when necessary, and consider cleaning the filter manually to use less water.
- Manage chemical levels very carefully, to ensure safety and cleanliness. This will also reduce the need to drain and refill the pool, or use excessive water to compensate for imbalances in chemical levels.
- When filling pools, carefully observe the water level, and remember to plug the overflow line when adding water.
- Discontinue use of tile-spray devices on automatic pool cleaners. A significant volume of water can be lost through evaporation and overspray with these devices.

Significant water and cost savings can be achieved by implementing these water efficiency measures.

Sample High School Pool

Pool Cover Water Savings	
Estimated Annual Water Savings	715,088 gallons (956 HCF)
Estimated Annual Water, Sewer, and Energy Cost Savings	$5,909

Report Template- Detailed Recommendation

Water Efficiency Measure:
Cooling Tower Conductivity Controller

Cooling Towers at Site Name

Cooling tower water use at Sample High School currently accounts for approximately 178,772 gallons (239 HCF), or 0.5% of total water used each year. Cooling towers remove heat from buildings by evaporating water. To maintain an acceptable level of dissolved solids in the cooling tower water, some water from the basin must be bled off and discarded as waste water. Conductivity is an indirect measurement of the dissolved solids in water.

Automated monitoring and control are the keys to maintaining cooling system efficiency. By accurately transmitting information to the valves that control the amount of blow down (water drained from the cooling tower reservoir) and subsequent makeup water, a conductivity controller can potentially help reduce facility operating expenses.

Conductivity is not currently being measured at Sample's two cooling towers, and water flow to the towers is not sub-metered. We recommend installing automatic conductivity controllers for the cooling towers. Costs and savings for this measure could not be estimated at this time with the available data. However, use of conductivity controllers has been shown to help a facility save up to 40% on water costs associated with cooling tower operation.

We recommend consulting Sample's existing HVAC or cooling tower service company to determine the cost of installing conductivity controllers. This facility may also qualify for a rebate for each conductivity controller through the Water Efficient Technologies (WET) Program.

Cooling Tower Conductivity Controller

The Water Efficient Technologies (WET) Program is a rebate program provided to financially assist facilities that upgrade their water-using equipment or devices to more water efficient models. The program is jointly funded and administered by the City of San Jose/Santa Clara Water Pollution Control Plant and the Santa Clara Valley Water District. Rebate amounts are based on the annual volume of water that is saved as a result of the water efficiency project.

For more information on WET, contact:
Ray Wong
Santa Clara Valley Water District
(408) 265-2607 ext. 2288
rwong@valleywater.org

Report Template- Detailed Recommendation

Water Efficiency Measure: Landscape Audit

Although the primary purpose of this survey is to evaluate indoor water use, a brief inspection of the landscape was conducted to assess its role in overall water use. The landscape assessment in this report serves only as an estimate of water savings potential. The landscape at Sample High School consists of large lawn areas, shrub and plant sections, and a small turf area in the front parking lot area.

Landscape Area at Sample High School

The total landscape area is 1,283,713 square feet (approximately 29.5 acres). Landscape irrigation water is metered separately from the building interior water use. Approximately 36,069,308 gallons (48,221 HCF) of water are used each year for landscape irrigation.

The Santa Clara Valley Water District offers several programs to assist facilities use water more efficiently in landscaping. This site qualifies for a free landscape irrigation audit through the Irrigation Technical Assistance Program.

The Irrigation Technical Assistance Program (ITAP) is a free landscape irrigation audit for sites with one acre or more of irrigated landscape. This program provides a detailed analysis of the entire irrigation system and identifies inefficiencies. Participants are provided a full report with recommendations for how to improve irrigation system efficiency, as well as information on financial assistance available to assist with implementing irrigation hardware upgrades.

Based on an optimal water budget, Sample High School could potentially save up to 4,446,112 gallons (5,944 HCF) of water each year, which is an annual savings of approximately $36,734. Implementing other landscape water efficiency measures may yield additional savings.

For more information and to schedule an ITAP survey, contact:
Kevin Galvin
Santa Clara Valley Water District
(408) 265-2607 ext. 2639
kgalvin@valleywater.org

Improve Irrigation Efficiency	
Estimated Annual Water Savings	4,446,112 gallons (5,944 HCF)
Estimated Annual Cost Savings	$36,734
Initial Cost*	Free Program
Simple Payback	Immediate

** ITAP is a free survey, but some cost may be involved if repairs to the irrigation system are needed. Consult a landscaper or a qualified irrigation contractor for assistance. Rebates may be available.*

Report Template- Detailed Recommendation

Water Efficiency Measure: Landscape Rebate

Sample High School has approximately 153,559 square feet of high-water using landscape (i.e. turf grass), which may be replaced with a low-water using landscape for a rebate through the Water Efficient Landscape Rebate Program.

High-water using landscapes (i.e. turf grass) can be replaced with low-water using plants and hardscape.

The Water Efficient Landscape Rebate Program (WELRP) offers an incentive to replace high-water using landscape (i.e. irrigated turf grass) with low-water using plants or certain types of non-plant groundcover, such as mulch, gravel, or paving stones. The rebate is based upon the total amount of turf grass removed through the program and replaced with approved plants and/or permeable hardscape for a water-efficient landscape.

The rebate amount is $1.50 per square foot of turf replaced. Sites must gain pre-approval before starting a re-landscaping project. Sample High School may be eligible to receive a rebate of up to $20,000.

For program details, contact:
Kurt Elvert
Santa Clara Valley Water District
(408) 265-2607 ext. 2205
kelvert@valleywater.org

Native to California, the California Poppy is one of the approved low-water using plant species.

Install Low-Water Using Landscape	
Estimated Annual Water Savings	3,782,636 gallons (5,057 HCF)
Estimated Annual Cost Savings	$31,252
Estimated Cost of Materials*	$307,118
Estimated Rebate Available	$20,000
Simple Payback with Rebate	9.2 years

**Material cost estimates are based upon an average calculation of $2 per square foot of entire turf area; project costs may vary.*

Report Template- Detailed Recommendation

Water Efficiency Measure: Irrigation Controller

Sample High School has one irrigation controller with 315 irrigation stations for the landscaped area. We recommend installing Weather-Based Irrigation Controllers (WBIC) to assist with improving the efficiency of the irrigation schedule. Weather-based irrigation controllers control the irrigation schedule for optimal efficiency, so utilizing a WBIC can potentially capture up to 100% of the projected total savings from improving irrigation system efficiency. The expected savings from this measure are included in this report as a percentage of total overall savings from landscape irrigation efficiency improvements. This estimate is derived from a brief survey of the overall irrigation system and analysis of any additional irrigation hardware upgrades or repairs that need to be made to maximize the system's efficiency.

Sample High School could potentially save up to 50% of its annual irrigation water use and costs by installing a Weather-Based Irrigation Controller (WBIC). This amounts to a savings of approximately 2,223,056 gallons (2,972 HCF) each year, for an annual cost savings of $18,367. Sample High School may be eligible to receive a rebate from the Santa Clara Valley Water District through the Weather-Based Irrigation Controller Rebate Program.

The Weather-Based Irrigation Controller Rebate Program offers rebates to commercial, industrial, and institutional sites with 12 or more irrigation stations for installing a Weather-Based Irrigation Controller (WBIC). This type of controller uses local weather conditions to calculate and automatically adjust an irrigation schedule to meet the specific water needs of a landscape. The rebate amount is based upon the cost of the WBIC and the number of stations it has. This site may be eligible to receive a rebate of up to $1,100.

For program details and application information, contact:
Kevin Galvin
Santa Clara Valley Water District
(408) 265-2607 ext. 2639
kgalvin@valleywater.org

Weather-Based Irrigation Controller

Install Weather-Based Irrigation Controller	
Estimated Annual Water Savings	2,223,056 gallons (2,972 HCF)
Estimated Annual Cost Savings	$18,367
Estimated Initial Cost of WBIC*	$19,845
Estimated Rebate Amount	$1,100
Simple Payback with Rebate	1 year

**WBIC cost is an estimate of $63 per station. Rebate does not include associated installation or labor costs; rebate will not exceed cost of WBIC.*

Report Template- Conclusion

Conclusion

Based on our on-site inspection and data analysis, we provide the following report conclusions:

- **Annual water use for Sample High School from January 2008 to December 2008 was 38,517,512 gallons (51,494 HCF).** The total water use and billing rates for this time period were used to calculate potential annual savings in this report. All findings are based on a survey-level analysis and your actual savings may differ.
- Landscape irrigation water use constitutes 94% of total water use, the largest category of use for this site. The total volume of water used for irrigation from January 2008 to December 2008 was 36,069,308 gallons (48,221 HCF). Sample High School could potentially save up to 8,228,748 gallons (11,001 HCF) each year by improving irrigation system efficiency, replacing the high-water using landscape with low-water using plants and/or permeable hardscape, and installing weather-based irrigation controllers. This amounts to a total annual cost savings of $67,986.
- Pool water use accounts for approximately 3% of total annual water use. The estimated current annual water use for sanitary purposes is approximately 1,085,348 gallons (1,451 HCF). Based on the water efficiency measures included in this report, Sample High School could potentially save an estimated 715,088 gallons (956 HCF) of water for a cost savings of $5,909 each year on sanitary water use.
- Other water efficiency measures, including retrofitting sanitary and kitchen fixtures, amount to a potential savings of 81,532 gallons (109 HCF), or $1,100 each year.
- **The total estimated annual water savings for this facility, after implementation of all recommended measures, equals 9,025,368 gallons (12,066 HCF). This represents approximately a 23% decrease in annual water use for this facility.**
- **The total estimated annual cost savings after implementation of all recommended measures is $74,995.**
- **The average simple payback for implementation of all recommended measures, including rebates and incentives, is 4.1 years.**

Thank you for participating in Santa Clara Valley Water District's **Water Use Survey Program**. If you have questions about this survey report, please contact Karen Morvay of the Santa Clara Valley Water District at (408) 265-2607 ext. 2707 or by email, at kmorvay@valleywater.org.

WaterWise Consulting, Inc.

Contact:
David Isaacson
disaacson@waterwise-consulting.com
(707) 703-7940