

HGSD Water Conservation Executive Summary

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1 Executive Summary

1.1 Study Objectives

The Harris-Galveston Subsidence District (HGSD) Water Conservation Program includes the following initiatives:

1. **A school education program entitled "H_2O Lab! School Program."** Includes water conservation education to primary-grade level students through customized lesson plans and a water conservation take-home demonstration kit.
2. **An outdoor irrigation efficiency campaign entitled "Water My Yard."** Offers free lawn watering recommendations for any user who subscribes for notifications through either email or mobile application.
3. **An online resources channel entitled "SmarterAboutWater".** Provides a "one-stop-shop" for online resources related to water efficiency. The website provides resources and guidance for local water managers, businesses, and the general public on effective water efficiency measures and tools.
4. **A Water Conservation Grant Program.** Supports projects that implement water conservation measures or promote water efficiency by providing up to 50% reimbursement on total project costs. Grant applications are accepted year-round.

Resource Innovations evaluated each initiative to determine the potential impact of the program on the total water savings within HGSD.

The objectives of this evaluation were to:

1. Inform and assess opportunities for improving the design and delivery of each of the programs individually.
2. Investigate opportunities to determine the contribution to savings from each of the programs individually.
3. Determine the potential impact of each program on the total water savings within HGSD.

The evaluation of all programs was completed in 2026. The evaluation for H_2O labs was completed in June 2026 to provide findings to benefit the upcoming school year. The WaterMyYard survey was sent out to subscribers on July 2nd, 2026, and closed on July 15th, 2026. The SmarterAboutWater survey was published to the program website on May 28th, 2026, and was removed on July 15th, 2026. Grant recipients were interviewed primarily in June and July.

1.2 Methodology

The evaluation began with staff interviews with those knowledgeable about the HGSD program offerings to help solidify the evaluation methodologies for each program. Each had different participant groups reached by different methods and the manner of participation also differed greatly. The evaluation rested on a series of program staff interviews, participant surveys, in-depth interviews, benchmarking analysis, data review, engineering analysis, and regression analysis. Table 1-1 summarizes the evaluation objectives, the data source, sampling, and approach.

Table 1-1: HGSD Program Evaluation Methodologies

Evaluation Activity/ Objective	Data Source	Data Collection Type	Sample/ Coverage	Analysis Approach
		H_2O Labs		
Obtain background context on the program	Implementer interview	Primary	Program implementers	Qualitative analysis of interview transcripts
Review program documentation and existing survey instruments	Existing program materials and survey instruments	Secondary	2024-2025 report, student survey instrument, student survey responses, teacher evaluation survey	Qualitative review of materials to identify strengths and possible improvements
Update measure level savings calculations	Publicly available or modified algorithms	Secondary	2025-2026 Student response data; publicly available data	Engineering review
		WaterMyYard		
Interview with Texas A&M program administrator	Interview	Primary	Program team	Qualitative review
Assess how the WaterMyYard app changed subscribers' watering behavior and program satisfaction	Online survey	Primary	Sent to all program subscribers in the greater Houston area; evaluated 488 of 618 responses received	Descriptive statistics, qualitative analysis

Evaluation Activity/ Objective	Data Source	Data Collection Type	Sample/ Coverage	Analysis Approach
Ascertain average weekly minutes reduction in watering behavior to determine annual savings by sprinkler type and overall	Online survey	Primary	Sent to all program subscribers in the greater Houston area; evaluated 488 of 618 responses received	Savings analysis on pre-post weekly watering
		SmarterAboutWater		
Review resource metrics	Key metrics from the online resource pages	Secondary	n/a	n/a – insufficient website traffic
Assess behavior-change actions explored in the online resources	Online anonymous survey	Primary	7 responses	Savings analysis, descriptive statistics, qualitative analysis
Determine average savings by measure type	Engineering review	Secondary	n/a	Engineering analysis and create of calculator
		Grant Program		
Obtain baseline understanding of each project scope and savings	Document reviews	Primary	Census	Document and data review
Process and impact interviews with Grant recipients	In-depth Interview	Primary	4 complete	Qualitative analysis
Quantify annual savings for each project	Data from HGSD or Grantee	Primary	Census	Engineering and regression analysis

1.3 H_2O Labs! Findings and Recommendations

Process Evaluation

We sought to evaluate the methods and instruments used by Tinker in their program evaluation. Specifically, we evaluated the existing teacher survey, teacher advisory group activity, and the student survey and suggested other activities that could supplement the current evaluation process.

The teacher advisory group and survey activities and the student survey were strong in that the surveys were relatively quick to complete, and they had good coverage of different themes and topic areas. The teacher advisory group activity allows teachers the opportunity to elaborate on their thoughts and influence program direction. The student survey is also useful as it reminds students of actions they can take to conserve water.

Capturing perspectives from a more diverse sample of teachers would be beneficial. This would ensure that all recommendations derived from the evaluation are applicable to all schools in the district. The teacher and the student survey instruments would benefit from additional questions that aim to capture more perspectives and context about their experience with the program. We also recommend the addition of a parent survey to the evaluation process. This would be useful for corroborating student findings and would allow for a condensed version of the student survey as some topics that are currently in the student survey (e.g., installation) would be better suited to parent respondents.

Additional evaluation activities were suggested and described in the program chapter. Overall, the suggested activities are in line with increasing educational opportunities, determining the most effective way to teach students about water conservation, enhance program participation, and ensuring a representative sample of the school districts in future evaluations.

Water Savings

Water savings calculation methodologies for each kit measure included in the 2024-2025 Tinker report were reviewed and updated using primary survey data where possible and publicly available data. A savings analysis calculator was provided to update inputs in future program years. The 2025-2026 school year boasted 31,291 participating students which resulted in an evaluated savings of over 309 million gallons of water saved annually. The per-unit measure savings with and without in-service rate (ISR, which means the percentage of measures that were installed or in use), as well as the annual water savings for the program are shown in Table 1-2 below.

Table 1-2: Per-Unit Water Savings Values for the 2025-2026 School Year

Measure	Per Unit Savings (Not Including ISR) (gal/yr)	Per Unit Savings (Including ISR) (gal/yr)	Annual Savings (gal/yr)
Toilet Tank Water Displacement Bag	1,438	1,002	31,354,357
Toilet Leak Detector Tablets + Toilet Flapper	10,512	3,113	97,402,308
Bathroom Faucet Aerator #1	789	383	11,977,995
Bathroom Faucet Aerator #2	789	332	10,374,862
Shower Timer	6,353	4,251	133,003,462
Outdoor Sprinkler Gauge	1,635	824	25,790,761
Total	**N/A**	**N/A**	**309,903,745**

Recommendations

The following recommendations were derived from evaluation activities:

Recommendation 1: Updates are recommended to student and teacher surveys to be able to evaluate the program in greater depth and obtain actionable insights.

Recommendation 2: We recommend the addition of a parent survey in the evaluation activities to corroborate student survey findings.

Recommendation 3: Incorporate updated savings algorithms and apply primary survey data for installation rates and any other variables possible (e.g. number of people per home).

Recommendation 4: We recommend consideration of the inclusion of additional measures, particularly the multi-pattern spray nozzle, and behavior tracking, particularly faucet shutoff while brushing teeth and washing dishes, to capture more water savings program-wide.

Recommendation 5: Other proposed activities may be considered as optional additions to the implementation of the program to evaluate program impacts and effectiveness in greater depth. The suggested activities are in line with increasing educational opportunities, determining the most effective way to teach students about water conservation, enhance program participation, and ensuring a representative sample of the school districts in future evaluations.

1.4 WaterMyYard Findings and Recommendations

Process Evaluation

Respondents are largely satisfied with the WaterMyYard program. WaterMyYard users are diverse, with differing yard sizes and sprinkler systems. Most respondents are using WaterMyYard for assistance with watering their yards that consist mostly of grass, and some garden beds. 85% of respondents reported that the program changed the way they irrigate their yard, with 66% of respondents interacting with the program once a week. Of note, most respondents are interacting with the program through email notifications, as opposed to using the program app.

Savings Analysis

To determine the impact of the program information on subscribers' watering behavior, survey respondents were asked on average, how many times per week did they water and for how long in duration each watering, before using the program and after using the program. After analyzing the data individually to determine if the participant's response provided a comprehensive overview of usage, 488 responses evaluated to determine program-wide water use data. Overall, the pre- and post-program usage behavior averaged to the results shown in Table 1-3, and resulted in an overall average reduction in weekly watering of 40-minutes.

Table 1-3 Average Pre- and Post-Watering Behavior

Variable	Average Pre-Program	Average Post-Program
Watering Sessions per Week (Days)	3	2
Watering Length per Session (Minutes)	34	33
Total Minutes per Week	114	74

To illustrate the approximate water savings achieved by the WaterMyYard program it is necessary to assign a flow rate to each sprinkler type, then extrapolate to the number of weeks irrigation occurs, and the total population of program subscribers. For this analysis, 26 weeks was assumed as the irrigation season for the spring and summer months, and the population is the 6,100 subscribers supported by HGSD's sponsored weather stations. The proportion of each sprinkler head type from the survey was applied to the population of 6,100. Drip irrigation, hose-ended sprinklers, and other were assumed to have a flow rate of 4 gal/min, whereas spray, rotor, and multi-stream were assumed to use 13 gal/min. Table 1-4 shows the average minutes saved by sprinkler type, along with gallons per minute, population estimate for each sprinkler type, and the corresponding total gallons saved.

Given these estimated extrapolations, the WaterMyYard program saves nearly 66 million gallons of water each year.

Table 1-4: Savings Extrapolation Estimate

Sprinkler Type	Average Watering Time Reduction (Min/Home/Wk)	Assumed Flow Rate (Gal/Min)	Survey Proportion	Population Estimate	Annual Savings (Gal)
Drip	49.4	4	1%	63	321,100
Spray	30.6	13	47%	2,888	29,858,075
Rotor	47.4	13	20%	1,238	19,819,475
Multi-stream	40.9	13	13%	763	10,530,813
Hose-ended sprinklers	42.1	4	15%	925	4,053,725
Other	47.5	4	4%	225	1,112,150
	Total		**100%**	**6,100**	**65,695,338**

Recommendations

Recommendation 1: On average overall, the program appears to induce a reduction of weekly watering time of about 40 minutes, and collectively results in potentially 66 million gallons saved annually. Consider utilizing the information provided about the average and spread of minutes saved per week to entice additional subscribers and increase visibility to the program.

Recommendation 2: It is worth exploring whether the "adjust rainfall" tool can be integrated into the program beyond the app. Most respondents do not interact with the app, and many respondents reported that they thought that the rainfall in their area was not accurately captured.

Recommendation 3: If the intention is for the app to be the main delivery source of the program, additional marketing of the app may be warranted. Primarily, any features that are added to the app should be advertised in email correspondence to build awareness of the value of the app. With that being said, most respondents are using email notifications, and most respondents are either very satisfied or somewhat satisfied with the program in its current form.

Recommendation 4: In the open-text response, it became apparent that program participants would appreciate more tailored recommendations and may be willing to input additional information manually into the app in order to receive more specific

recommendations (e.g., manually adjust rainfall, input projected rainfall for the following week, add more descriptors about their yard). It is worth investigating the possibility of making the app more customizable, or highlighting through education the existing capabilities.

1.5 SmarterAboutWater Findings and Recommendations

Process Evaluation

There was insufficient website traffic volume to be able to evaluate key resource metrics. A longer time horizon to assess these metrics, or additional marketing to increase traffic to the website, may be required for future evaluations.

The survey sample was also limited, but the preliminary findings suggest that word-of-mouth or conference/events are important strategies for people to learn about the program. Most respondents found what they were looking for on the website and note that the resources prompted them to take an action. A larger sample would allow for a more in-depth understanding of who the website users are, what they come to the website for, and what the most useful resources are. This would allow for tailored marketing of the website and would be informative for future resource development.

Savings Analysis

In order to provide an assessment of the potential savings impact of the website information on water savings in the region, an average per home savings were calculated and then a conservative adoption rate applied and extrapolated to the average number of people shown to visit the "Homeowner Resources" page annually (approximately 625 people). Table 1-5 shows the residential measure full savings per home that may undertake the action, the adoption rate, and the resulting savings when extrapolated to the website visitors. The result is potentially over half a million gallons of water saved per year.

Table 1-5: Estimated Average Annual Savings Due to SAW Website Information - Residential

Measure/Behavior	Full Possible Savings per Home (gal)	Adoption Assumption %	Savings Estimate (gal)
Early/Late Outdoor Watering	3,315	1%	20,719
Outdoor Leak Detection + Repair	51,840	0.1%	32,400

Measure/Behavior	Full Possible Savings per Home (gal)	Adoption Assumption %	Savings Estimate (gal)
Indoor Leak Detection + Repair	26,280	0.1%	16,425
Native Plants	1,345	2%	16,813
Pool Cover	3,505	1%	21,906
Avoid Excess Dishwasher Use	317	2%	3,963
Avoid Excess Laundry Use	1,612	2%	20,150
Reduce Shower Time	4,390	2%	54,875
Turn Off Faucets While Brushing Teeth	7,139	2%	89,238
Turn Off Faucets While Washing Dishes	5,475	2%	68,438
Install Low-Flow Showerhead	2,578	2%	32,225
Install Low-Flow Sink Aerator	488	2%	6,100
Install High-Efficient Toilet	11,304	2%	141,300
Total			**545,550**

Recommendations

Recommendation 1: Consider re-running the online survey again for a longer period of time while increasing marketing to bring more traffic to the website. A sufficient response size could help program staff understand which measure suggestions are being adopted most often, and could use that data for updated annual savings analysis.

Recommendation 2: Utilize the savings calculator and update inputs as they become available.

Recommendation 3: Indications suggest that people find the website helpful and engaging, so additional efforts to gain traffic will likely result in additional savings. HGSD staff already do a lot to promote the website via social media and in-person events. Perhaps consider reaching out to other organizations to include additional SAW marketing.

1.6 Grants Program Findings and Recommendations

Process Findings

Process evaluation findings are based on just the four interviews completed, but generally grant recipients found the application process reasonable, and enjoyed working with HGSD on their projects. In some cases, the grant allowed the project to move forward, while in other cases, it helped the project be completed sooner or helped the financial situation of the project overall.

Savings Analysis

The grant projects varied in the amount of savings achieved. Overall, many projects produced savings validated through engineering or regression analysis, or weather and rainfall normalization of consumption data. The nature of many projects occurring within half a decade meant that project documentation was not always complete, and repeated attempts to interview someone affiliated with the project were not always successful. Ultimately, four of ten grant projects completed an interview. Another challenge was the granularity of data, or lack thereof. For large, city-wide or school district-wide systems, without devoted metering for the treated end-use, finding the savings was not always possible. Lastly, the long time horizons often meant changes to either the project itself or the functioning of the jurisdiction, such as adding additional irrigated acreage over the years. Table 1-6 shows the savings summary of the seven non-AMI projects, showing a combined annual savings of 46 million gallons.

Table 1-6. Grant Project Savings Summary (Non-AMI projects)

Project Name	Annual Savings (Gal)
Terranova West MUD (TWMUD)	4,662,036
Harris County MUD 50 (HCMUD 50)	1,089,918
Harris County Fresh Water Supply District 1A	0
City of League City	33,799,000
CCISD Centralized Irrigation Control	944,313
KISD Centralized Irrigation Control*	2,105,323
City of West University Place (COWUP)	3,412,026
Total	**46,012,616**

*Note, not an annual value, and based on just 4 months of available data.

The three AMI projects were unfortunately not able to be interviewed and thus the pre- and post-project consumption data could not be discussed with the Grantees. In all cases, the usage appeared to increase. The evaluation team does not believe that the implementation of AMI technology inherently increases usage, but likely is witnessing a case of greater accuracy of measurement. Table 1-7 shows the increases in annual usage observed.

Table 1-7. AMI Project Annual Usage Observed Change

AMI Projects	Increase in Annual Usage (Gal)
City of Galveston	117,709,704
City of Webster	258,302,550
City of Friendswood	16,096,367

Recommendations

Recommendation 1: Require monthly usage of all included systems. Partial year data does not provide the full picture of project impacts. Anywhere possible, also require end-use specific metering (such as irrigation only, not whole property).

Recommendation 2: Track and save local Evapotranspiration values. These analyses used evapotranspiration values to adjust the smart irrigation system's raw usage to reflect the usage of a year with average weather conditions. To this end, we used the Turc equation to estimate the reference evapotranspiration value. The Turc equation is convenient as it can be calculated using common weather metrics. However, the value calculated from the Penman-Monteith equation would be more robust and offer more accurate results.

Therefore, it would be useful for future analyses to use the Penman-Monteith equation to calculate and save the reference Evapotranspiration for the local area.

Recommendation 3: Require recipients to report irrigated square footage changes. Multiple grant recipients expanded their irrigated area after or shortly before their new system was installed. This complicated the results as it was difficult to sperate how changes in their usage were due to the new system or the expansion of the irrigation area. However, future analysis can account for this by comparing the water usage per square foot pre and post project. Therefore, we recommend asking recipients to report the pre and post irrigated square footage if they expand their irrigation system.

Recommendation 4: Have recipients report system relocations. One of the grant recipients reduced their irrigation area by replacing a field with turf. As a result, they relocated irrigation network controllers to new sites. The full story around this was not known until this evaluation effort interviewed the site manager. It is possible that such relocation will occur again in the future. Therefore, we recommend asking recipients to report any major changes to their system.

Recommendation 5: Evaluate behavior programs at an individual level. Part of the AMI rollout often included customer portals, education programs, and water saving incentive programs. These initiatives may have effectively reduced customer water usage in ways that are not immediately noticeable in the total population usage data because the population is affected by many other factors such as weather. Therefore, we recommend evaluating these programs individually via randomized treatment and control groups.

Recommendation 6: Account for changes in sensor accuracy. A potential confounding factor in AMI based analysis is the sensors and infrastructure used to measure usage changed before and after the project. This may cause a mirage where false savings or losses may appear in the data because of different sensor accuracy instead of actual changes in usage. Future analysis should account for these differences by either trying to directly measure the accuracy of the pre-post system or find studies estimating the accuracy direct of the previous equipment.

Recommendation 7: Begin analysis with raw billing data. The COF water project included data that spiked every other month. This is likely the result of billing cycles beginning and ending in different months. Future analysis can account for bill cycles by calendarizing the data, i.e. using bills to estimate the monthly usage instead. However, this process requires using raw billing data. Therefore, we recommend starting analysis with the raw billing data instead of data that has already been aggregated to monthly level, if available.

Recommendation 8: Evaluate leak effects at individual/localized level. The current analysis evaluates the impact of leak detection and repair at the population level. However,

population usage is affected by factors such as weather. Therefore, future analysis should use best practices to determine water loss for each individual leak or evaluate usage data on a more localized scale.

1.7 Program Savings Totals

The savings produced by the four evaluated programs have varying degrees of certainty, but overall, the programs appear to save over 422 million gallons of water per year.

Table 1-8. Annual Estimated Savings Due to HGSD Programs

Program	Annual Gallons
H2O Labs!	309,903,745
SmarterAboutWater	524,550
WaterMyYard	65,695,338
Grants	46,012,616
Total	**422,136,249**