HOUSEHOLD WATER SOFTENER INCENTIVE PILOT PROGRAM

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ACKNOWLEDGEMENTS

We would like to acknowledge the support of all project partners, without whom this project would not have been possible.

Special thanks to:

- Participating service providers,
- Cooperating household participants,
- The WI Salt Wise Partnership (Alison Madison, coordinator),
- Municipal Partners (Village of McFarland - Aimee Irwin, Assistant to the Public Works Director & Jim Hessling, Public Works Director; Town of Dunn – Cathy Hasslinger, Clerk-Treasurer/Business Manager & Kelsey Shepperd, Administrative Coordinator)
- the myriad data scientists who have touched this project in some way (Steve Corsi, U.S. Geological Survey Research Hydrologist; Ruoran Laura Huang, UW WISCERS Honor Program; Steven Moen & Nathan Aviles UW Statistics Ph.D/teaching assistants)

And to employees across the Madison Metropolitan Sewerage District, in nearly every department, for all the support they have given throughout the project. From leadership, monitoring and sample collection to IT support, GIS services, sample analysis and advertisements, this project has exemplified that when our diverse skills come together for a common goal, we truly are #StrongerTogether.

Most sincere thanks and appreciation to all who contributed to this endeavor.

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Background

Utility managers at a Southern Wisconsin treatment plant are seeking influent source reductions to meet stringent water quality standards for chloride in plant effluent. The largest direct source of chloride influent to the plant is cumulatively, >100,000 individual water softeners (Madison Water Utility, 2012-2014)((AECOM, 2015) present in homes throughout the service area. This study builds off previous research that establish estimates for average daily discharge from home softeners, and potential discharge reductions associated with various interventions (Lake, Erickson & Cantor, 2015), to develop and test administration of municipally administered home softener optimization/upgrade rebate program.

Pilot Approach

The Salt Savers program was launched in 2019 in a small, primarily residential area within the Madison Metropolitan Sewerage District to pilot a home softener rebate program and study the impacts on wastewater. Primary goals of the geographically focused pilot include:

1. Training service providers, shift business norms to include softener optimizations
2. Engage municipalities to lead on source reduction
3. Test methods for administration, outreach/promotion of program
4. Determine costs associated with running program

To address these goals, the District developed a water softener training class for providers (mostly plumbers), that establishes a standard water softener inspection procedure and best practices for softener salt optimization. Service providers trained through the program inspected area softeners and optimized, or made other recommendations for further service/upgrade. Partnering municipalities in the pilot area reviewed documentation from these inspections, and issued incentive payments for qualifying services. The pilot used an interconnected GIS web infrastructure to support coordinated, real-time communication and documentation between providers, municipal administrators of the program and the district. Throughout the programs' duration, various forms of advertisement/outreach were tested and wastewater was monitored.

Results

The pilot program was active in totality from March 2020-June 2022. During this time both a rebate program to support softener upgrade and optimization, and a home-softener-self-diagnostic tool were launched in partnership with municipalities in the pilot area. By the conclusion of the program, 334 self screens were submitted, and 229 rebates were issued. Rebates were issued to 210 addresses, representing about 5% of single family homes in the PS09 service area. About two thirds of rebates issued were for water softener upgrade (67% of rebates were for replacements). About 18% of rebates were issued for an estimate/recommendation inspection, and 15% of rebates issued were for optimization. The direct wastewater chloride reduction as a result of rebate interventions is estimated at 45 pounds of chloride per

day. In total, the program cost about $334,000, meaning this source reduction approach cost about $7,420/pound of chloride per day reduced (or $4,423/pound of salt/day).

Conclusion & Recommendations

This pilot catalyzed development of a number of important partnerships and tools that will outlast the pilot, and continue to be useful in the future. Development of a municipally administered rebate incentive was found to be feasible, however the overall cost per pound of chloride reduced for this project proved to be higher than other previously tested incentive programs. Even within a small pilot area, the reach for this program, however was small. Scaling this pilot to offer rebates more widely should be approached cautiously, as should investment generally in any incremental, temporary chloride reduction. Although the pilot did not yield sufficient chloride reduction to observe at the tributary pumping station, it did uncover opportunity for possible strategies or future directions for reducing salt use from home-water softeners via soft water reduction strategies.

BACKGROUND

MMSD Chloride Initiative

The Madison Metropolitan Sewerage District (MMSD or, 'the District') provides wastewater collection and treatment services to approximately 350,000 people, businesses and institutions in the Greater Madison, Wisconsin area. At the district's sole wastewater treatment plant, Nine Springs Wastewater Treatment Plant (NSWTP), an average of 40-million gallons of wastewater are received and treated each day. NSWTP provides high-level treatment, but, as is typical for modern wastewater treatment plants, does not remove dissolved solids like salt. The district is required by the Wisconsin Pollutant Discharge Elimination System (WPDES) permit (issued by the Wisconsin Department of Natural Resources), to meet criteria for effluent discharge, including for chloride. For NSWTP effluent to reliably meet the criteria for chloride in a sustainable and cost-effective manner, the district is undertaking a source reduction initiative targeted at lowering both the concentration and mass influent to the plant by working with 'upstream' sources.

Sources of salt influent to the plant were estimated in previous studies published by the district (AECOM, 2015). The major direct source is ion exchange water softeners. Water softeners are pervasive in nearly all buildings, in the area due to very hard groundwater. In total, it's estimated that they contribute, on average, 80,500 lbs of the total 140,000 lbs of chloride (57.5%) influent to the treatment plant per day (AECOM, 2015).

Although softeners are common across nearly all building uses/types- residential, commercial, industrial, institutional, different use patterns, water quality needs, and ownership type, lend to different scales (size of softener, comprehensiveness of softening), different decision-making hierarchies, barriers to action, risk tolerance, motivations, and financial situations. As such, the district's source reduction initiative has evolved to address each 'sector' of softening with unique programs.

Of the influent softening sources, single-family residential softening is estimated to be one of the largest, while also the most diffuse source. Of chloride influent to the treatment plant from softeners, an estimated 60% of that, or nearly 50,000 pounds per day, comes from single family houses in the district's service area (Lake, Erickson, & Cantor, 2015). In addition to calculations indicating home softeners as a major direct contributing source, collection system sampling initiatives have confirmed high influent chloride levels from residential areas (respective to plant influent generally) (Table 1).

Table 1: Example Illustrating High Influent Concentration at Pumping Station 09 vs Plant Influent

	Approximate Weekly Avg. Comparison*	
	PS 09 Average Concentration from User Charge Composite Samples (in Mg/L)	Combined Plant Effluent Average Concentration (in Mg/L)
7/31/14-8/6/14	463	392
10/3/14-10/8/14	489	408
5/16/17-5/22/17	451	365
7/24/17-7/29/17	424	343
5/17/19-5/23/19	409	347

7/29/19-8/3/19	392	336
10/23/19-10/29/19	394	321
2/20/20-2/26/20	410	374
5/13/20-5/19/20	398	347
7/29/20-8/5/20	384	322
11/2/20-11/7/20	422	356
2/2/21-2/8/21	409	388
5/18/21-5/21/21	441	404
7/28/21-8/3/21	451	381
11/24/21-11/30/21	470	392
2/10/22-2/15/22	448	409
5/2/22-5/7/22	434	380
8/15/22-8/18/22	482	377

*note the comparison is approximate because these two data points use different methods of creating a 24 hour composite, on different timelines. This table should not be interpreted as a direct comparison, but rather as an illustration that generally during a similar period of time, Plant Combined Effluent is consistently lower than concentration at this pumping station.

PREVIOUS STUDIES

The 2015 Paired Sewershed Study by Lake, Erickson, & Cantor, established two methods for reducing home softener chloride discharge using currently available technology: optimization & replacement. These methods were shown on average to reduce household chloride discharge on average 27% (optimization) and 48% (replacement). What's more, this study also showed that people were actually willing to take these actions; 88% of homes in the replacement area, and 48% of homes in the optimization study area participated.

Although these methods hold promise to reduce chloride discharge from individual home softeners, the results of this pilot were proven not scalable because of the high cost of these interventions, and possible challenges with public perception. During this study, both optimization and replacement costs were fully covered by the district, at a cost $1,350 per unit for replacement, and $180 per optimization, or in dollars per pound, a cost of $5,220, and $1,186 (respectively), which raises the questions: 1) would participation be as high if the cost were not fully covered by the district? 2) If costs were split between the homeowner and the district, would we see similar levels of participation? 3) Would optimization and replacement be feasible source reduction strategies, should the majority of the cost be paid by private homeowners?

In the 2015 study, there was no control group in which participants were invited to undertake the interventions without fully lowering cost as a barrier, so, to what extent the incentive had on participation is not known. In 2016, a small pilot study in Madison's near-eastside Tenney-Lapham neighborhood was undertaken to start to understand what the expected percentage of participation could be. The Tenney-Lapham pilot focused on optimizations exclusively, and found that a $75 optimization incentive, promoted by an email and mailed flyer garnered a total of 38 optimizations (out of about 900-1000 residential addresses considered within this neighborhood). It is estimated that 4-10% of the population of this study completed an

optimization, which could be partially attributable to a high percentage of non-owner-occupied homes (rentals) in this pilot area.

To follow up on the question how if/how much homeowners would be able and willing to put into softener upgrades, the sewerage district surveyed a random sample of adult service area residents about their willingness to participate in and pay for a water softener optimization in Fall 2019. Among homeowner respondents who report having a water softener, an overwhelming majority (70%) were willing or very willing to participate in an optimization program (described as "*a program in which residents schedule an appointment to have a professional come in to their home and tune-up their water softener so it uses less salt.").* The average amount they would were willing to pay for this was $40.03. When asked about their willingness to get and pay for a new high-efficiency softener to be installed only 46% of respondents were willing. When later asked about how much of a rebate would motivate replacement, respondents said about $375.34 on average, would be enough for them to participate.

SALT SAVERS PILOT PROGRAM

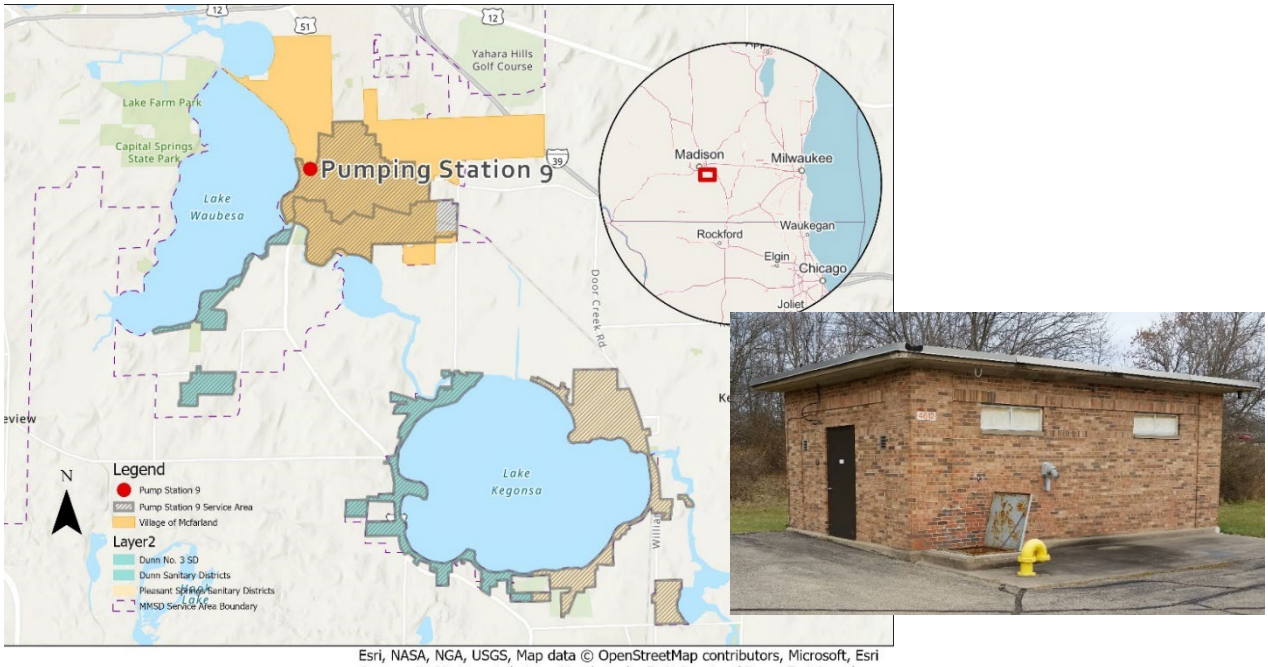
Overview

Given the known possible outcomes as a result of optimizing/replacing softeners, the reported willingness of service-area residents to undertake these actions given a limited financial incentive, institutional leadership interest in an individual household rebate program, and guidance from the DNR suggesting to both "evaluate the potential for a rebate program to install high efficiency water softeners" and "recommend residential softener tune-ups on a voluntary basis" (Wisconsin DNR 2022), the Salt Savers Pilot Program was initiated in 2020 with the primary objective of determining the feasibility of, and costs associated with running a municipally administered water softener optimization & replacement incentive program. Educating residents and encouraging voluntary softener tune-ups is a Tier 1 source reduction measure outlined in Wis. Admin. Code **§** NR 106.90.

Pilot Area - Pumping Station 09 (ps9) Service Area

The pilot project took place in a sub-basin of MMSD's collection system which all goes through pumping station no. 9. This sub-basin includes the Dunn Sanitary Districts, a portion of the Village of McFarland, and the Pleasant Springs Sanitary Districts.

Figure 1: Pumping Station 9 Service Area



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This area presented an ideal pilot area because within MMSD's service area because of its:

- relatively small size.
- geographic isolation (everything goes through ps9) and discreet, fixed sewershed boundaries (the pumps do not re-route as is common elsewhere throughout the collection system).
- mostly residential composition– the target audience for this intervention. There are only about 250 commercial water utility accounts in the Village of McFarland, of which, only 140 are located in McFarland ps9 service area. There are only 19 meters greater than 2" in McFarland, and none in the sanitary districts. The Village reports only 56 multi-family residential water meters. In Dunn & Pleasant Springs, even fewer commercial accounts. Estimated total # of commercial buildings for the whole PS09 Service area is 155.
- housing stock and tenure. The area has older homes that are primarily single family, owner-occupied. In the Village of McFarland, for example 90% of homes were built before 2016, 81% were built before 2005. The older housing stock represents a greater base for potential softener improvement interventions.
- existing wastewater monitoring data, feasibility for installing additional monitoring due to the station's construction, frequent visit as part of maintenance crew routes, and its inclusion as part of the regular quarterly sampling associated with the district's User Charge (billing) Program.

- Relatively high median household income. In the 53558 Zip code (Primarily McFarland) is $93,506 (ESRI, U.S. Census Bureau, 2021), compared to the median household income in the county - $75,179, and state - $63,293 (for 2016-2020, in 2020 dollars) (U.S. Census Bureau, 2021).
- Historical outreach in the area – efforts in 2005, 2009 and 2015 on this topic in the area may have primed homeowners to be receptive to current and future outreach.

Perhaps most importantly, there was also municipal leadership and interest from the communities in this area. Members of the Dunn Sanitary districts board and town employees toured NSWTP in early 2019. Upon learning of the geographic isolation (as in there was one control point, PS9), for their area, they initiated a conversation with the district on starting a pilot program. All of the participating communities were able to prioritize this project, get approval from their respective governing bodies, and dedicate staff time to working with MMSD on developing, advertising, and administering the program.

PS 09 service area at a glance:

Distinct customer communities - 3

Residential addresses estimate – 4,020

Estimated daily flows – (from the period 7/9/20-5/9/21), ranges .648 MGD to 1.21 MGD, with an average daily flow of .82 MGD

Estimated PS 9 service area businesses – 155

PAST PS 9 AREA WORK

This pilot project isn't the first effort to look at PS 9's service area. A previous look at chloride concentration at the District's billing monitoring (User Charge) points in 2003 helped determine residential softening was a main direct source of chloride to address (un published study). In 2005, the district undertook its first public outreach campaign and monitoring efforts related to chloride in this area. The 2005 outreach was comprised of sending a brochure (see Appendix A: Historical Outreach & Studies in Ps9 Service Area) in the community newsletters for McFarland, Dunn/Kegonsa and Pleasant Springs Sanitary Districts. To study the impact (if any), weekly composite samples were taken March-October that year. Unsurprisingly, a memo summarizing this work (included in Appendix A: Historical Outreach & Studies in Ps9 Service Area), reported no observable change resulting from this one-time outreach effort.

Sampling during this effort in 2005 showed a daily average chloride concentration ranging 440 mg/L to 585 mg/L with an average of 502 mg/L per day. Flows during this time period ranged 0.72 MGD to 1.01 MGD, averaging 0.8MGD.

In 2014, 2017 and then 2019-present, chloride analysis has been included periodically in the District's User Charge Monitoring program for UC Point PS09. User Charge Monitoring includes six to seven consecutive daily (24-hour flow composite) samples each for July/August 2014, October 2014, and May 2017 and July 2017. These samples, a total of 23 samples, could be considered a 'baseline' level for expected chloride concentrations and mass at the pumping station. During this time flow ranged .706MGD – 1.19MGD,

averaging .9MGD. Chloride concentration ranged 402-555 mg/L, averaging 455 mg/L. It must be noted that these samples included summer and fall samples only.

Using the user charge samples collected in 2017 as an average representation of 2017 conditions, (using average flow, and average chloride concentration, average mass, across the 13 samples), an estimated 10% reduction in chloride is needed for the wastewater passing through this pumping station to reliably meet or be under the water quality goal for NSWTP discharge, 395 mg/L.

An estimated 10% Cl- reduction in PS09's service area is needed to meet water quality goals.

Workflow

From the established goals, stakeholder conversations, and analysis of barriers, the District & Municipalities worked together to design a project workflow that would satisfy the need to transparently document and verify interventions, issue incentives, and ultimately support overall reduction in water softener salt discharges to the sewer system.

The basic workflow of the program was designed as follows:

Table 2: Pilot Workflow

1. Service provider training

The district trains service providers, such as plumbers and softener technicians on a standardized process for evaluating water softeners, proper settings programming for salt minimization, and making recommendations about replacements. They are also trained on using a program-specific reporting form via mobile app.

2. Promotion

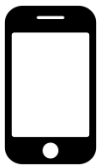
MMSD and municipal partners promote the program (**Error! Reference source not found.**, page **Error! Bookmark not defined.**) Main messaging of the advertsements centered on the themes, "Check your water softener", most of which had a QR code leading to the self-screen diagnostic.

3. Softener Evaluation

Homeowners can self-assess softener using online tool, or call a service provider to assess their softener. Either way, they will get a diagnostic report with recommendations for next steps to minimize salt use, and whether or not they would qualify for a rebate from their community.

Service providers were coached during training, to also offer homeowners in the pilot area free insprections while on call for other services, for example, while already on-site to fix a leaking faucet, they could offer to evaluate the softener.

4. Softener improvements (inspection, optimization and/or replacement)
Service providers perform evaluations, optimizations or replacements in accordance with specified guidelines about set-up, efficiency and sizing.



5. Reporting
Service providers document the inspection, ptimization and/or replacement and their time and location. Reporting done primarily electronically (via the Survey123 mobile app, later described in GIS , page 20)

6. Review
Municipal staff review provider-submitted reports (using the ESRI Solution "Citizen Problem Manager" dashboard, later discussed in GIS , page 20 below) to verify accuracy and completeness.

7. Incentive Reimbursement
Incentives are issued to either the homeowner or the service provider (see inventive model discussion above).

Design

The design of the Salt Savers Pilot was meant to find a balance between available resources/staff time, addressing short term barriers (such as cost, service provider knowledge), while simultaneously laying the foundation for longer-term change (such as norms, awareness, convenience, transparency).

ANTICIPATED BARRIERS

To get the highest participation possible, we took efforts to make it as easy as possible for residents. In designing the program, we started with thinking through all the possible barriers, and made sure to build elements into the program that would address those. Anticipated barriers, and program elements designed to mitigate these issues are detailed in Table 3: Pilot Design, below.

Table 3: Pilot Design

Anticipated challenges	Aspect of the pilot to address challenge
Lack of awareness Commonly, homeowners don't know if they have softeners, or what condition they are in. Knowledge of chloride pollution is also not common knowledge. Also, MMSD brand awareness low	• Marketing push: saturate community with information about softeners & chloride pollution • Leverage municipal partners' namesake, brand and credibility to elevate salt pollution urgency • Dovetail with existing service calls and existing trusted messengers (plumbers)
Softener Maintenance Norms "Set it and forget it" is a common phrase used to tell homeowners what to do with their softener. Furthermore, softeners have a long lifespan, "if it	• Provide service providers with stickers to put on the softener that include inspection date & instruction for future maintenance (as is common with other appliances, such as hot water heaters or furnaces)

ain't broke, don't fix it" mentality conflicts with known softener efficiency decay (due to resin degradation) of ~2% or more per year.	• Provide homeowner some type of documentation for their home appliance files, showing the age of the softener, and recommendations about when to check efficiency • Make a quick softener inspection standard as part of all plumbing house calls.
Salience/prioritization Softeners are a low-priority appliance, Often hidden away in basement utility rooms, they are likely not 'top of mind' among other appliance/ household needs.	• Make checking the softener a default – include quick softener inspection & homeowner education part of all plumbing house calls • Awareness (aforementioned marketing push)
Lack of information Give specific action for residents to take to improve their water softener. That being said, settings are not transparent, hidden within the control head, not user-friendly, homeowners may not be able to figure out settings themselves.	• Develop clear, simple 'ask' for residents to take when interested in reducing their salt use created: • Develop list of trained water softener service providers, list on MMSD Website- people for them to call for more info. • Increase availability of web-based, google-searchable home softener specific information. • Develop 'clunker list' of softeners that just need to be replaced. • Provide test kits for homeowners to DIY
Cost New, high-efficiency softeners can cost >$1,000, a large expense for many household budgets. The efficiency gains/savings available by upgrading are very small, there is almost never a return on investment for upgrading a softener efficiency. Optimization can also be pricey, costing up to $120.	• Incentive programs (rebates) lessen the financial cost
Inconvenient Although most softeners can be improved, no resource currently exists to confirm this for homeowners – who to call?	• Dovetail with existing service calls so homeowners don't even have to think about it. • Develop self-check tool (web-md style) for home owners to diagnose softener without having to take the less convenient step of scheduling a service call.
Technical skills No standardized process for service providers to follow to evaluate and optimized a water softener exists. Very few technicians in our service area know how to program softeners for salt efficiency.	• Cultivate a wider base of partners who can get the message to our target audience • Develop standard optimization guidance • Develop training program • Train and provide decision assistance tools for WQ Professionals, including plumbers, so that (in the short term), the pool of available providers is large enough to meet demand for services, and (long-term), both standardize optimization and shift business norms to include softener optimizations.

	• Train service provides on giving standardized recommendations so homeowners get consistent guidance.
Administrative & capital capacity Limited staff at MMSD to administer grant program for residential softeners. Municipalities have limited funding to offer program themselves.	• Engage municipal partners to lead through innovation grant model. • Develop tools that facilitate communication and program administration
Evaluation How to measure the success of the intervention when there is no existing pattern, instruction manual or method for measuring this kind of intervention, as this project has not previously been done anywhere else.	• Install continuous monitoring at pumping station • Require reporting forms to estimate reductions, track costs and effort. Knowing what actions are happening and where will help answer questions such as: Is this project scalable? Was it successful? Is it worth repeating? What's worth doing more of? Less of?

FUNDING

Pilot area participating municipalities were supported in their involvement with this project through Chloride Innovation Grants from MMSD. Innovation grants were established in 2017 to support projects that facilitate permanent reductions of chloride (salt) to the district's sewer system through changes to business practices, behaviors, and norms (Madison Metropolitan Sewerage District, 2022). The Village of McFarland, the Town of Dunn and Pleasant Springs Sanitary Districts all individually applied for innovation grants to support their administration of the Salt Savers Pilot. Their grants covered direct incentive expenses, as well as administrative time to run the program.

INCENTIVES

Stakeholder Interview- Plumbers

As barriers and possible mitigation strategies were considered and the format for the program began to come into focus, the need to gain early-buy in from plumbers became glaringly apparent. We sought feedback early-on from plumbing shops, the plumber's union, Local 75, and water quality industry professionals (as is later discussed in Softener Evaluation & Optimization Process Development, page 18), and local plumbing shops. In early conversations with plumbing companies, they cited 1) service plumber lack of knowledge (about optimization, softeners generally), and, 2) the cost for getting someone on-site as the biggest barriers to plumbers carrying out softener inspections. Knowing this, providing some sort of incentive to compensate providers' time to encourage a transition to a business model in which routine softener inspections become the norm, and developing a training program to teach a standard inspection & optimization checklist decision support tools and standardized methods for documentation were essential to providing quality, reliable optimization services.

Incentive Models

The participating municipalities lead on choosing a model they wanted to offer for their community. Each individually opted to use different system. The Town of Dunn opted to use a service provider reimbursement model in which:

- Certified service provider performs an optimization or installs new softener for which the homeowner is billed with a discount at the point of sale (optimization = free, *up to $75; installation = discounted $200)
- Service provider records and tracks every discount provided.
- Municipality reimburses the service provider for services performed/discounts offered in the reporting time frame.

The Village of McFarland and Pleasant Springs Sanitary District chose to use a rebate model in which:

- Certified service provider performs an optimization or installation of new unit and charges full price; provides the customer with a voucher for the corresponding service.
- Homeowner submits the voucher to the municipality.
- Municipality issues a sewer bill credit for the amount of the voucher.

One idea that was also discussed, but ultimately not used was an event-based model, in which:

- Municipality schedules and publicizes softener tune-up dates/times and has residents sign up.
- Trained service providers sign up for event slots.
- During the events, service providers systematically evaluate/optimize softeners for residents that have signed up.
- In the event that service providers are finding clunkers, they provide a rebate for replacement.
- Service providers are reimbursed by the municipality

Amount

There were two tiers of incentive offered as part of this pilot program:

- $200 for replacement of an identified clunker. A replacement is defined as: removing a softener that meets at least one of the following criteria 1) 15 years old or older 2) on an identified clunker list 3) is an analog days-regenerating (timeclock), and replacing it with a new, demand-initiated softener that is set-up and sized to meet a minimum efficiency of 4,000 grains/lb.
- $75 for an evaluation or optimization. Evaluation is defined as: a documented water softener inspection (in-person or virtual) which uses a standardized questionnaire for determining softener status to provide recommendations for salt-efficiency improvements. An optimization is defined as: documenting actions taken to increase water softener salt efficiency. This could include (but isn't limited to) readjusting hardness setting to better match influent water, adjusting reserve capacity or salt dose, cleaning resin, or changing injector size.

Results from the previously mentioned 2019 Community Values Survey, Paired Sewershed Study (Lake, Erickson & Cantor, 2015), and pilots in the Tenney-Lapham Neighborhood led to these incentive amounts.

Conversations with plumbing shops affirmed this as something that would work. Plumbing shops quoted $120 as the general going rate for a service call (trip fee) plus $60/hour after that. For home softeners, the plumbers estimated 15 minutes was all that was needed for an inspection, so if compensated, inspecting a softener as an add-on (dovetailing with an existing call) could be easily covered with a nominal incentive. That being said, questions about how to proceed past a simple inspection, for example if an optimization takes place (which might take longer), or how to compensate for calls that are stand-alone softener inspections (not dovetailing with existing service calls), affirmed that a $15 incentive was not enough to make service providers whole in all scenarios. $75 was a compromise by all parties as a universal reimbursement for a documented 'inspection', (whether it was an add-on or a stand alone) and, and for an 'optimization' (again, whether it was stand-alone or an add-on to an existing service). This amount was agreed upon by water quality technicians too.

Service Provider Training

SOFTENER EVALUATION & OPTIMIZATION PROCESS DEVELOPMENT

A natural prerequisite to developing a training program, standardized procedures for softener evaluation and inspection were needed. Through previous studies, like the Paired Sewershed study (Lake, Erickson & Cantor, 2015), and conversations, it was discovered that optimizing a softener through settings changes is possible, however, there was no standard methodology for, setting-up (including plumbing configuration), and programming a water softener for salt efficiency among plumbers and water quality providers. The Region of Waterloo offers a salt-efficient softener sizing tool, "Softener Buyers Guide" on their website, WaterSoftenerFacts.ca, and various DIY guides for softener set-up are available online, however, none of these fully operationalize a total salt-optimization inspection, overview, assessment. Even a basic step, such as setting the hardness for influent water varied greatly from service provider to provider, yielding greatly different results for softener efficiency. Technical guidance for optimization process began by working with water softener manufacturers, installers, and wholesalers in 2018. The District had first convened this group of local water quality industry leaders to develop a Best Management Practices Guide, or BMPs, in 2015 (Madison Metropolitan Sewerage District, 2015) to set general standards for water softeners. These BMPs set recommended efficiency performance, but did not explain how to get there or calculate efficiency. This initial group of experts, plus additional reviewers (see blue box, Figure 2: Optimization Process Technical Experts Consulted) were asked to weigh in on things like: determining plumbing configuration and softener age, criteria for a softener to be 'optimizable', criteria for replacement, resin atrophy & efficacy of resin cleaning, sizing considerations, recommendation for idle softeners in seasonal homes, salt settings, and reserve capacity considerations, ultimately yielded a standard checklist (Appendix C: Softener Training Materials) for a water softener inspection/optimization, and, by and large formed the basis for training program content. The review process also included compiling lists of current

Figure 2: Optimization Process Technical Experts Consulted

Optimization Process Technical Guidance Provided by:
AJ Jameson, Technician at Culligan Total Water
Don Vaughan, Engineer at Clack Corporation
Jeff Hellenbrand, Owner of Hellenbrand Water
Joel Wick, Capital Water Softeners
Ray Mayne, Owner of Fox Water
Paul Lippitt, Engineering Specialist for WI Dpt. of Admin.

and obsolete models (those which are still optimizable and those which are deemed 'clunkers'). This step-by-step diagnosis and treatment process for optimization was translated into the first iteration of the Survey123 app for plumbers (later discussed in GIS Tools, p. 20), and was tested during a 2019 training with Madison College Apprentices. As the Survey123 app was coming together, district staff were in touch with the Waukesha Wastewater Treatment plant and their consultants working to develop a softener optimization program for their Pollutant Minimization Plan. Although both programs (MMSD & Waukesha) both had apps, the underlying purpose and therefore the design/roll-out and target audience differed greatly.

TRAINING CONTENT

The technical training class for water quality professionals, plumbers, and other related trades, titled, 'Salt Wise Soft Water' was first rolled out in its current form in 2019, as an extension of a similarly titled class originating in 2016, that covered softener-salt reducing actions in generalities. Class training booklets and content was reviewed by the same group of professionals who reviewed technical softener optimization guidance. All class content is summarized in the materials provided in Appendix C: Softener Training Materials, including class workbook, annotated training slides, and associated resources.

The full training consisted of three distinct segments that could either be taught independently as stand-alone, taught together concurrently, or sequentially dependent on audience and available time. The primer class focuses on basics of softener evaluation, inspection and an overview of salt efficiency improvement opportunities. The second segment, goes more in-depth into how to program softener settings for efficiency. The third part of the class (added to classes after 2019, for service providers interested in participating in the pilot program) goes over the logistics of downloading and using the Survey123 mobile app for documenting and submitting inspections.

In the State of Wisconsin, professional licensure for plumbing and other trades requires a certain amount of continuing education classes annually. The Salt Wise Soft Water class was submitted and approved (course id 18920) by the WI Department of Safety and Professional Services, as of April 14, 2017 as 3.0 hours of credit for the licenses listed in Figure 3: SaltWise Soft Water Class CEU's Professional Licensure, meaning that professionals who attend the class, holding one of the listed licenses could use this class to satisfy their continuing education requirements.

Figure 3: SaltWise Soft Water Class CEU's Professional Licensure

HOURS OF CREDIT	CREDENTIAL TYPE
3.0	Commercial Plumbing Inspector Certification
3.0	Dwelling Contractor Qualifier Certification
3.0	Journeyman Plumber License
3.0	Journeyman Plumber-Restricted Appliance License
3.0	Journeyman Plumber-Restricted Service License
3.0	Master Plumber License
3.0	Master Plumber-Restricted Appliance License
3.0	Master Plumber-Restricted Service License
3.0	UDC-Construction Inspector Certification
3.0	UDC-Plumbing Inspector Certification

TRAINING ATTENDANCE & CERTIFICATION

The Salt Wise Soft Water course was taught at least eight times formally with large groups 2019-2021, as well as an additional handful of times informally with smaller groups such as plumbing shops or water quality

companies for their employees on request. See Table 4 below for listing of class date, group in attendance, and number of people estimated in attendance. Parts of the class are meant to be conversational; a dialogue between service providers and the District, so the content has continued to evolve as more is learned.

At the outset of the pilot in PS 9 service area, personal invites were extended to all service providers operating in the participating municipalities, based off of municipal records listing which companies pulled permits in their jurisdiction within the last year.

~200 Providers Trained 2019-2021

In order for a person or company to be listed at on the District's website and considered a certified provider (eligible to provide an incentive qualified service for the pilot program) they have to complete either part or the whole Salt Wise Soft Water training class. In the spirit of growing skills, learning together and evolving the pilot program as this new knowledge is being built, no test or knowledge check was required to be considered certified. Instead, provider reports are monitored for accuracy and completeness. Any further education or course correction is dealt with on an individual basis with that provider directly as things occur. Full list of certified providers participating in the pilot program is included in Appendix C: Softener Training Materials.

Table 4: SaltWise Soft Water Training Class List

Date	# Attendees	Note
3/19/19	20	Trial run with MATC Plumbing Apprentices
9/25/19	7	Training class
10/15/19	29	Training class
10/30/19	22*	Hosted by City of Madison Building Inspectors *# that took it for credit. Don't have full record of total attendees.
3/19/20	22	Canceled due to Stay at Home Order (Covid19)
8/12/20	9	Virtual provider training
10/4/21	50	Local 75 Apprentices Class
10/19/21	25	Local 75 Fall Info Meeting
Ad hoc	~10	Trainings upon request

GIS Tools

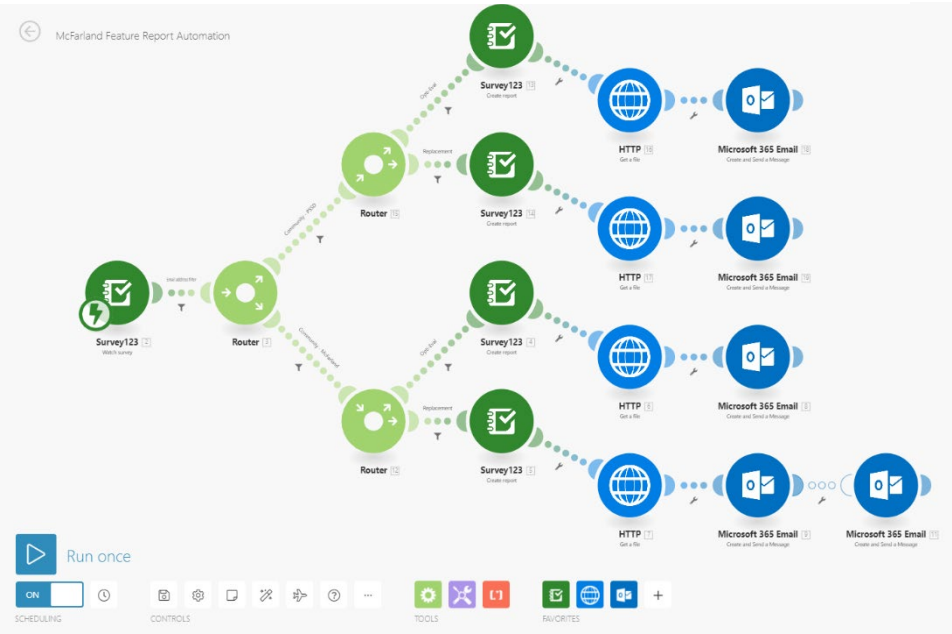
ESRI's GIS tools are the glue holding the pilot program together. Playing multiple roles from documentation and review to education and evaluation, these highly-customizable tools bring program participants/partners together in an organized, efficient and low-cost way. These tools were employed for this project simply due to the availability and accessibility of them – at the time of the project inception, the District already had accounts to ArcGIS Online and all associated apps. Using ESRI's tools in novel ways garnered recognition from the company, and was featured in one of their publications as a Case Study (ESRI, n.d.). As flexible and customizable as the tools are, there were still however limitations, discussed in Appendix E: Notes on Use of GIS.

REPORTING

Use of GIS tools essentially started with a need for a platform that facilitated capture of inspection information, while providing decision support and feedback for the end-user. Survey 123 served these functions. Providers use a Survey123 form (via mobile app) to document inspections, optimizations, and replacements. Homeowners can use a different Survey123 form (browser version) to 'self-screen' their home softener. Both questionnaires were built with an XLS form in Survey123 Connect, and hosted through ArcGIS Online. The questionnaire serves a dual purpose as both a way to document softener status and services rendered for purposes of verification and incentive allocation, but also importantly, as a tool to help the provider follow the standard optimization procedure. Extensive conditional logic, the ability to pull data, and answer validation based on the XLSForm, along with an ArcGIS Online map of expected water hardness are built in. These features help providers use more accurate settings for a given address, making this decision support functionality possible. Screenshots of the questionnaire are included in Level 2, Part 2 of the training slides, beginning on page 16 (full training slides linked in Appendix C: Softener Training Materials).

The Self-Screen, a tool for homeowners who want to assess their own softener before calling a professional is also built off of a Survey123 form. This publicly viewable, browser-based Survey123 form has embedded videos and pictures, to make it easier for homeowners to go through a step-by-step process to identify their softener and determine opportunities for improving it. The survey also has an eligibility map built in to determine if they qualify for a rebate from their municipality.

Figure 4: Report Automation with Integromat



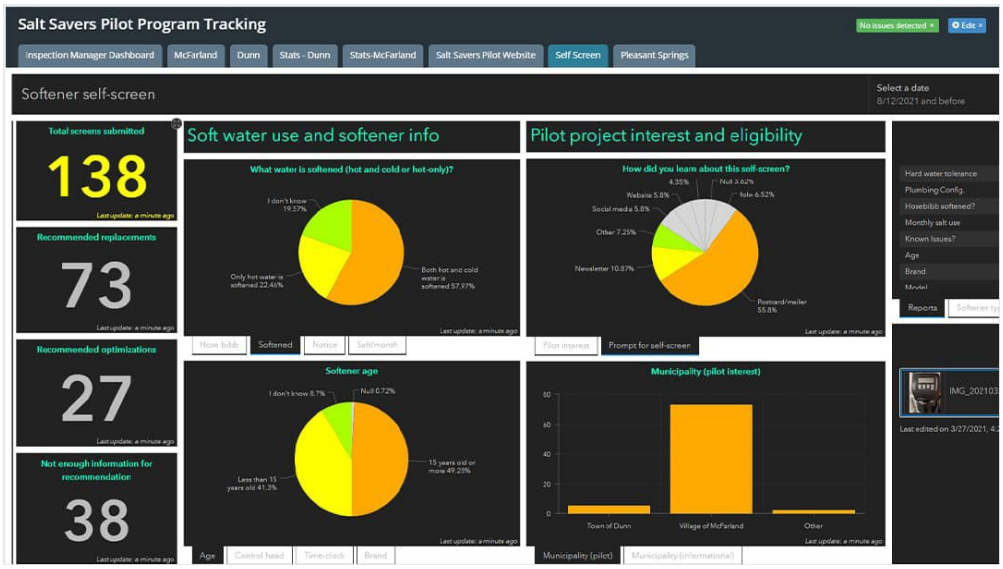
Both the inspection records and the self-screens submitted through Survey 123 utilize a particularly useful feature of Survey 123 for follow up and confirmation: feature reports (example feature report included in Appendix E:). Feature reports allow complex answer piping (from the survey) into a custom template. The program Integromat (Figure 4) is used to automate emailing feature report PDFs to the homeowner for their records (and in the case of provider services, to the provider and program admin for review and rebate issuance). This documentation, including current softener condition and advice for future ongoing maintenance, is a positive step in changing the long-standing "set-it-and-forget-it" attitude toward softeners, and it helps with one of the long-term goals for the project.

DASHBOARDS FOR PROGRAM MANAGEMENT

Survey123 seamlessly integrates with other ESRI apps, such as dashboard, the ESRI Solution, “Citizen Problem Manager” dashboard, and feature report templates, allowing real-time collaboration across organizations; multiple parties can easily view, edit and analyze the ‘live’ inspection information.

The information from the surveys feeds (live) into a number of dashboards (example below) designed for program tracking and evaluation. All the dashboards associated with this project were collated in one place with the ESRI Storymap Map Series Builder, to make for easy centralized access for program administrators.

Figure 5: Integration of Dashboards, Citizen Problem Reporter Solution and websites using Storymap Template



Program Promotion Messaging

At the outset of the program, the goal was to fully saturate the area with information so that residents couldn’t say that they would have participated if only they had known. To stretch the limited staff time and advertising resources, most messaging focused on a universal ask for residents to take the self screen. Water softener optimization/upgrade couldn’t be marketed a potential money savings, because, in most scenarios an softener optimization or replacement cost more than the saving recouped by the intervention (estimated to only save about $19/year in salt and $18/year in water (Household water bill= about $70/month (about 3000 gal/month @ .00798/gal for water+sewer - Est. 38 regens per year, 60gal/regen = 2,280 gal/year savings, $18.19 annual water bill savings, $19 salt savings). Environmental reasons were frequently cited as a reason to check a water softener.

Evaluation

QUALITATIVE

Program assessment includes,

- Mid-pilot self-screen poll: Halfway through the pilot program, on 8/10/21, an email survey was sent to early Pilot-eligible Self Screen takers (in McFarland) who had not yet taken any recommended action on their softener by participating in the rebate program (n=48), to determine possible reasons for not ‘converting’ their eligibility and recommendation into action. The email contained a single

question – 'do you still plan on following the recommendations', and 2 possible buttons to click (yes and no). Depending on which button is clicked, the respondent would be taken to a separate screen to identify why they had not or would not take the recommended action.

- Intercept interviews: Designed to assess reception of the program generally, and saturation of advertisements in the community. These were conducted after the conclusion of the program (August 2022) by two District staff who asked questions to random passersby in public places in McFarland. The goal was to find out if they've heard of the program, what their opinion of it is, and if they saw advertisements. By talking to a random sample of residents, we were also able to hear from area residents if there was something major that we didn't anticipate or hear about otherwise (as far as reasons for not participating, messaging missteps, for example).
- Exit interviews: To hear about the logistics of how the program worked, semi-structured exit interviews were conducted with municipal partners' program admin and with each of the participating providers after the program ended.
- Participant Survey: Rebate recipients were given an opportunity for providing feedback after the program ended by way of a questionnaire that was mailed to the address where rebates were issued (n=210).
- Content analysis: An open-records-request was put in to the McFarland Assessor's Office, to obtain records of building permits before during and after the pilot. This data was examined to determine additionality.

MONITORING

A desire to measure actual chloride levels at the pumping station was present since the origin of the pilot, to verify reported changes resulting from actions stimulated by the incentive program. To accomplish this, data was collected in two ways: 1) User Charge- as a dovetail with existing samples used for standard District billing purposes, and 2) Probe Data- with a novel use of a freshwater conductivity probe.

Quarterly Sampling

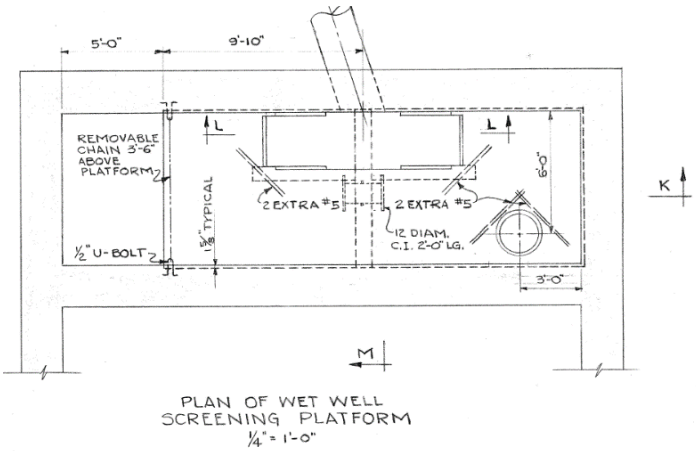
Chloride concentration is the main measure of chloride typically used at the WWTP, for permit purposes and research projects alike. Concentration is measured at the MMSD Lab, which is a State Lab of Hygiene and WI DNR certified lab, using Ion Chromatography, per EPA 600/R-93-100 Method 300.0, and Chromeleon software, filtering samples and diluting them as necessary to fall within a given analytical curve.

Daily 24-hour composite samples are regularly taken through the collection system (at fixed points) on a quarterly basis as part of district rate setting through a program called 'user charge sampling'. Pumping station 09 (the pilot area) is a user charge sampling point, so every quarter, five days of 24-hour composite samples are already being returned to the lab for existing purposes. During the pilot period, chloride concentration was measured in all user charge samples from PS09, a total of about 60 samples.

Continuous Conductivity

To gain additional coverage beyond the existing quarterly chloride samples collected as part of 'user charge', an Onset HOBO U24 Freshwater Conductivity Data Logger (U24-00x) logger was installed in PS09, on 7/9/20 to measure continuous conductivity in the pumping station wet well. A wall-anchored cable, is used to lower the logger into the wet well within protective pvc pipe fixed to the side of the wet well wall. Pump station engineering schematics were consulted to ensure the cable reached to below the 'low water mark' for the station, so that the logger would remain continuously submerged. The install of this housing required a temporary shut down of the station and partial drain of the wet well. The logger started collecting data (temperature and conductivity) at five minute intervals on 7/9/2020 and remained in the pumping station well until after the pilot concluded.

Figure 6: Hobo Freshwater Conductivity Logger & Wet Well Schematic



Retrieving the logger requires staff with specialized training and equipment (confined entry). Data is retrieved biweekly, at which time the logger is cleaned and checked. Instructions and procedure for field collection of data is included in Appendix B: Conductivity Logger, Data Procedure.

RESULTS

Participation

SELF SCREEN

In total, 334 self screens were submitted (March 27, 2021-July 2022). Three times out of four the Self Screen tool was able to make a recommendation to the taker; only about a quarter of self-screens did not provide enough information to make a diagnosis (including those due to user error, non-completion, and those which were not included in the self screen metadata).

About half of all self-screens elected to determine their eligibility for the pilot; total, 183 self-screen takers voluntarily disclosed their address to check their eligibility for pilot. From those, 37 addressed matched addresses that participated in the rebate program. Assuming the self-screening came before participating in the rebate program, the messaging focused on having people try the self-screen to determine eligibility did somewhat work to make conversions.

Table 5: Self Screen Recommendations

Recommendation	# of Self-Screens
Replacement	163
Optimization	76
Not enough information provided	95
	334

REBATE

A total of 229 home water softener interventions were completed as part of this pilot program, by twelve providers from five different companies. Across all communities, replacement was the most participated in intervention.

Table 6: Rebate Participation by Community

		# Replacements	#Optimizations	Inspection only	Total
McFarland	Nov. 15, 2020- May 31, 2022	120	12	12	144
T. Dunn	Oct. 2019- May 31, 2022	30	18	28	76
Pleasant Springs Sanitary Districts	July 2021- May 31, 2022	4	4	1	9
Total		**154**	**34**	**41**	**229**

The 229 services completed overall were completed within 210 addresses (ie. some addresses may have had multiple actions completed, like for example an initial inspection that resulted later in a replacement). As a percent of each area's total number of residential addresses, participation was around 5% in McFarland, 9% in Town of Dunn Sanitary Districts, and 2% in Pleasant Springs Sanitary Districts.

COMMERCIAL SOFTENERS

In the Village of McFarland, a co-branded (District & Village) letter went out to all commercial water meter billing addresses October 2020 (copy of letter in appendix), inviting them to call a service provider for a free water softener evaluation. The mailing included 205 addresses, including:

141 - 5/8 Inch Meters

31 – 1 inch meters

21 - 1.5 inch meters

12 - 2 inch or greater meters

Printing of the co-branded letter was done in-house, and envelopes were provided by the Village. It cost $102.50 in mailing costs ($0.50 per piece postage). The district reimbursed providers directly for their inspections, $75 per documented inspection, captured in a Survey123 questionnaire made for this portion of the project specifically.

27 commercial facilities had softeners evaluated as part of the pilot program also, accounting for at least 7,675 lb. of salt use annually, direct reimbursement costs totaling $1,425

Outreach

At the outset, the goal was to spread as much awareness of the program as possible. Table 7: Outreach Efforts, and Appendix D: Outreach Materials chronicle the advertising and outreach efforts throughout the pilot in each of the participating communities.

Table 7: Outreach Efforts

McFarland	
Direct Mail	
Postcard	Send to 3,000 addresses 3/25/21, using utility mailing list (including non-owner occupied residential water meters) Second post card delivered week of 3/16/2022, using same mailing list (but with addresses that already participated removed)
Newsletter	"the Outlook" is a print newsletter that goes out three times a year to all addresses in the 53558 zip code (including addresses outside of McFarland) via the McFarland Thistle, about 5,800 copies. Salt Savers was featured in this newsletter October 2019, and in the Spring/Summer 2021 edition.
Flyer	One plumbing provider did their own mailing in January 2021 (details on number and distribution list unknown)
Press	
Press Release	August 13, 2020 – electronic version
Newspaper	August 2, 2021 – McFarland Thistle Local Paper, electronic version
Electronic	
Newsletter	"the Lookout" – a bi-weekly E-newsletter (opt-in), with 686 Salt Savers program featured at least three times 2020-2021.
Social media	The Village posted on their Facebook page 4x during the pilot program
Website	Village of McFarland Website: https://www.mcfarland.wi.us/400/Salt-Saver-Pilot-Project
Website	McFarland Chamber of Commerce: https://www.mcfarlandchamber.com/
Event Based/Site Specific	
Flyers	Flyers stapled to takeout bags at McFarland House Café 6/24/21-until they ran out (approximately 200)
Signage	Ace Hardware McFarland Signage Posted 6/24/21 sign posted at McFarland Library date- summer 2021 sign at Farmer's Market 7/29, 8/5, 8/12 & 9/16.
Event	Public Works Day (5/22/21 8am-12pm), Drive-through event at the public works building. Estimated total traffic (including children) = 200 people
Event	Food Cart Frenzy 5-7pm, 9/15/21
Event	McFarland High School Football Game (Eco-Club) + Raffle, loudspeaker announcement 10/15/21, with help from volunteers in McFarland HS Eco-Club

Event	McFarland PTO Trunk or Treat 1-3pm, 10/30/21
Gov./Public Meeting	
Commission	The District's Summer 2021 Commission Meeting featured speakers on the Salt Savers Pilot
Public Works Committee	Presentation September 21, 2021.
Dunn	
Direct Mail	Co-branded letter sent 3/14/20 – used utility mailing list, 828 addresses total
Postcard	Sent to same utility mailing list September 2020 when program restarted after local public health guidelines allowed (following COVID-19 "Stay At Home" orders)
Newsletter	Community newsletter included article – sent out October 2019 Community newsletter included article – Late March/April 2022 Sent to 2,256 residents (including those who are not part of the Sanitary Districts, who are on septic)
Presentation	Webinar with UW Extension - Cities (fall 2020)
Website	https://www.townofdunnwi.gov/sanitary-sewer-districts
Pleasant Springs	
Direct Mail	Letter & brochure sent Oct. 12, 2021 to about 500 addresses
Website	http://mobile.pssd-wi.org/pleasant-springs-salt-savers-pilot-project.shtml

Local water-affinity groups were also invited to share information about the Salt Savers Program. The Yahara Lakes Association included an article in their March 2020 newsletter, and program managers were in touch with the Friends of Lake Kegonsa and Waubesa Beach Neighborhood Association. District staff made a presentation to the Lake Waubesa Conservation Association in September 2020.

In addition to promotion & advertisement specific to the Salt Savers program, before, during and after the Pilot, various area organizations, including all of the founding members of and the WI Salt Wise Partnership, have been actively promoting responsible salt use in the region, including numerous annual trainings, webinars, equipment open houses, billboards, etc. Along those lines of salt-related but non-pilot specific advertising, the District has also long maintained public outreach such as plant tours and events, where salt-reduction is always a topic, and resources like offering a mail-order Hose Bibb Test Kit for free to residents of the MMSD service area.

In intercept interviews conducted August 2022, when asked if they had heard about the "Salt Savers (water softener rebate) Program", three out of four (about 76%) of random passerby interviewed said they had not heard about the program. Although it was a small sample size (30 interviews overall), it indicates that despite the advertisements and outreach, there were still a sizeable segment of the population who were not aware of the program.

Figure 7: Self-Screen Referral

Among those who were aware of the program, (ie. intercept interviewees, elf-screen takers, participants), postcard/mailer and newsletter were the most frequent ways they heard about the program.

These was confirmed in intercept interviews and in a survey of rebate program participants. Of the 210 addresses that were contacted to provide feedback (in the form of a survey), 101 (48%) responded. Among respondents, postcard/mailer and newsletter were the most frequently cited ways in which they had heard about the program.

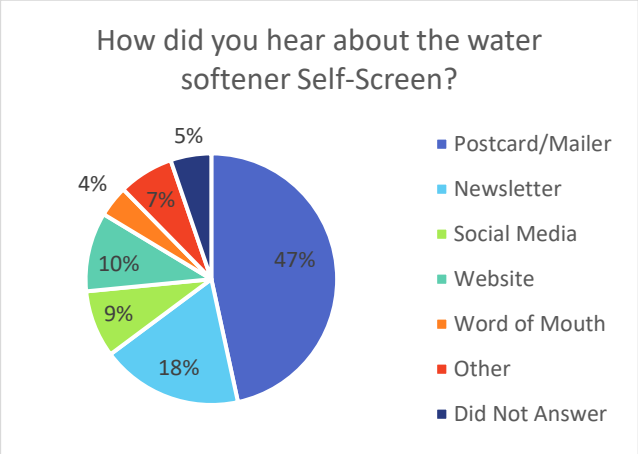
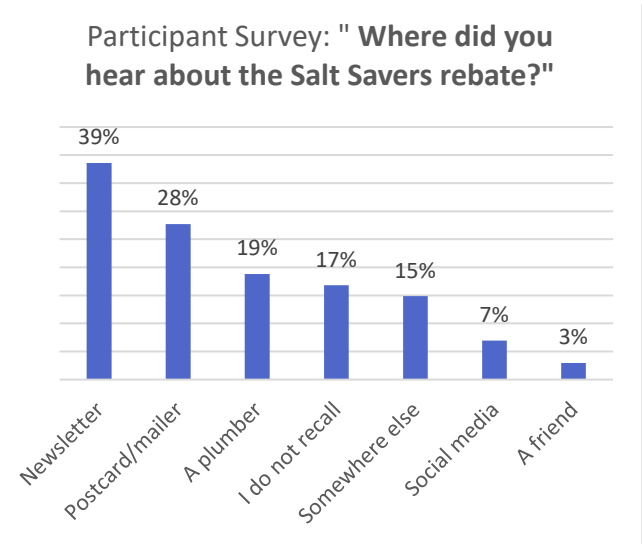


Figure 8: Rebate Program Referral



Timing of self-screens and jobs for the rebate program support this finding as well. Following the first mailing, there was a large wave of interest (as indicated by increases in self screens and rebates issued), however, with subsequent mailings and interventions, only marginal gains were seen.

Evaluating the various forms of in-person/event and site-specific advertising was somewhat limited mainly due to website set up which did not allow tracking or analytics for unique QR codes or links that referred people to the self screen or other resources.

Overall, doing outreach ended up being one of the more time intensive aspects of the pilot, as the district led and paid for most of the outreach efforts, with the partnering municipalities often taking a facilitator role. Staff time needed for coordination was usually the limiting factor in ability to promote the program.

SPECIAL PROMOTIONS

Three separate advertising efforts tried messaging related to an additional prize or incentive. The first, as part of end of the Friends of Lake Wingra's Chloride Innovation Grant, attempted to encourage people to take the self screen in order to be entered into a drawing for a $50 Monroe Street Business gift card. Monroe Street is in Madison, a different city than the pilot projects, however it is a popular shopping area. This was part of an initial push to advertise the self screen, and as open to anyone as a general push to get more self-screen takers – it was not specific to the PS 9 Pilot Area. Attempts were made to have the businesses where the gift card could be redeemed promote the drawing, to reach a wider group. Whether they ended up posting anything (at their retail locations or online) is unknown. The Monroe St. Business Association posted at least once, however the advertisements did not cite how many $50 drawings, when they would be happening or when the deadline for entry is. When asking where they heard about the self-screen, thirteen people specifically cited the Friends of Lake Wingra as how they heard about it. As an add-on to this campaign, self-screen takers who provided an email address (n=103) were sent a follow-up email after submitting their self-screen, which asked them to refer someone. They were offered to get two additional entries in the drawing by referring someone. This appeal did not encourage significant additional self-screens; about five people claimed they were referred by someone else during this phase of the drawing.

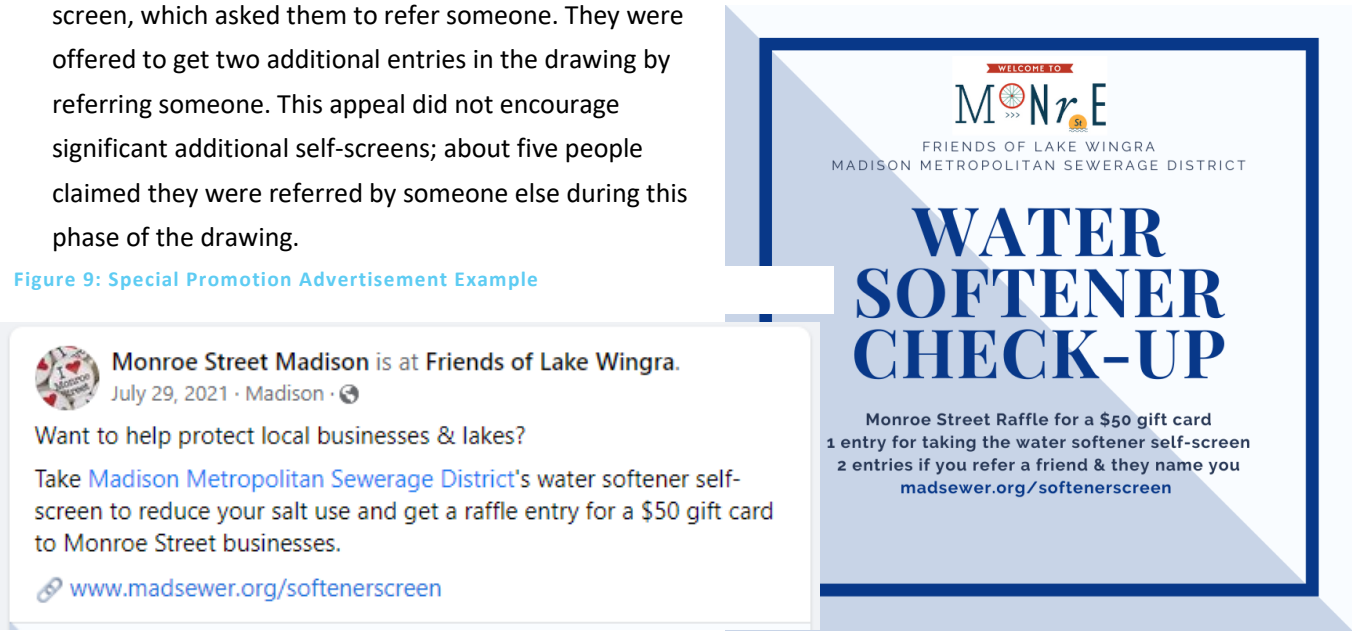


Figure 9: Special Promotion Advertisement Example

Since so much of the first gift-card drawing was in other peoples' hands and uncontrollable to project managers, a second gift card incentive, that guaranteed a result was tested throughout December 2021. The ad promised the first 100 homeowners to take the self-screen were guaranteed a $10 McFarland Business gift card. The ad originated from the District's social media, and was shared out once by the Village of McFarland. Again, whether the businesses where the gift card is redeemable at promoted it or not is unknown. 100 gift cards were not used up by the end of the pilot period, and we heard reports from residents who had gotten the gift card, but were not actually able to use it because of confusion among businesses who were listed as accepting it.

The third raffle-related incentive to take the self-screen happened at a McFarland High School Football game. McFarland High School Eco Club members volunteered to pass out flyers about the self-screen and get the word out to residents. If people scanned the self-screen QR code on their phone, they were made eligible for

a drawing, with the prize being up to $40 of McFarland Athletics Merch/Logowear. Although the volunteers were present for the evening through the first half of the game and gave out many flyers, only a handful (less than 10) people actually entered in the drawing.

SOCIAL MEDIA

The District (Facebook, Linkedin, Twitter, Instagram, and Youtube), and municipal partners, Town of Dunn (Facebook), and Village of McFarland (Facebook, Instagram, Youtube, Next Door, Linkedin) all promoted the Salt Savers Pilot Program Rebate on social media. Through Feb. 2021, the Village of McFarland posted a total of 4 times about the Salt Savers Pilot from the time of the program kick-off (Nov. 2020), three times on Facebook and once on Instagram (same post that was used on Facebook). The Town of Dunn posted 3 times since the start of their pilot program in 2019. The District posted 48 times on salt reduction on Facebook, 21 times on Instagram, 71 times (including retweets) on Twitter, and at least six times on Linkedin, throughout the pilot programs' durations- almost 150 times total. Posts to Facebook about Salt Savers from the district's account generally reached around 150 people, with about a dozen engagements (reactions + comments) per post. A few of the Facebook posts reached around 2,000 people. The District experimented with boosting one post related to the Salt Savers Pilot. The boost lasted 12/16/21 to 12/31/21 with a $10/day budget ($149.99 total), and was targeted to primarily women (about 60%), aged 25-64, within 2-3 mile radii of the center of the PS 9 pilot area. The reach for this boost extended to 541 people, garnering 18 link clicks (during the boost period), for a cost of about $8.33 per click. District social media managers thought that although the reach targeted the right folks geographically, that overall this boosted post did not perform well. Overall they said it cost more to run this ad, reaching fewer people and resulting in fewer link links than ads that are typical for other district boosted posts; for comparison, the Artist in Residence ad that was run in October 2021 cost $30 to reach 1,587 people to yield 68 link clicks at a $0.44 cost per click.

OUTREACH/ADVERTISEMENT IDEAS NOT PURSUED

- Targeted neighborhood outreach (door hangers, signage, event days)
- Signage at houses that participated (peer pressure)
- Targeted online ads (google ads)
- General public signage/billboard in community
- Event/sign-up days
- McFarland TV channel
- Realtor partnerships
- Public meetings

GOVERNMENT BUILDINGS, LEADING BY EXAMPLE

In January 2020, Village staff, District staff and a water quality professional walked through McFarland's Municipal Building and Fire Station to have their water softeners inspected and optimized. During the check-up it was discovered the Firefighters had been experiencing hard water, and that their softener was set up wrong; a good example of why periodic maintenance and check ups on softeners can be useful. This was

meant to messaged out to the community as a case study- to show how the Village is leading by example, however staff capacity and timing with the pandemic led to limited ability to share this story out. Although the intention was there, it just didn't work out for a variety of factors. Still, it is worth noting that oftentimes municipalities (even smaller ones, like the Village of McFarland) have municipal buildings that have softeners operating in them.

Additional Local Salt Reduction Efforts

ONGOING ROAD SALT/WINTER MAINTENANCE SALT REDUCTION

In addition to the efforts put forth as part of the Salt Savers Pilot Program to decrease salt contributions from home water softeners, Municipalities in the Pilot Area also took steps to manage their winter salt use. In 2018, the Town of Dunn sent plow operators to training and added pre-wetting systems to all of their trucks (funded with at 2018 Road Salt Reduction Equipment Grant from MMSD). They discontinued using a salt/sand mix (considered a best practice), and installed computer sensors that calibrate the brine pumps and augers to reach for a target application rate of 300lb/lane mile. With using the new set-up, they are able to make 2-2.5 rounds on their plow routes with a full truck, whereas they used to only just make one round. In McFarland, the Village Public Works has sent nearly all operators to a winter maintenance training class at one point, and have written and adopted a snow and ice program policy. Operators only lay down salt when needed on their second pass, and they have committed to never salt an area that has not yet been plowed. As of the pilot program concluding, they just started using brine as part of a pre-wetting system.

Chloride Reduction

Using existing estimates for average daily discharge per household water softener, and expected reductions that result from optimizing and replacing outdated softeners (Lake, Erickson & Cantor, 2015), we can estimate this pilot resulted in a reduction of 75.5 pounds of salt per day (45 pound of chloride per day) reduction to the sewer system (a 27,550 pound salt per year total reduction).

Table 8: Program Chloride Reduction Estimate

	Total	Avg. pounds/salt/day	Avg. reduction per	Estimated Reduction
Replacements	154	* 0.93	* 47%	= 67 lb salt/ day (40 lb cl-)
Optimizations	34	* 0.93	* 27%	= 8.5 lb salt/ day (5 lb cl-)

Estimates based off of continuous conductivity monitoring in the pumping station are not available to report out in this paper yet as the method and techniques for analysis continue to be developed, however key early takeaways, lessons learned while developing this monitoring methodology include:

- Battery preventative maintenance for the shuttle is required every 3-4 months. (battery for the logger is encased within, and rated to 3 years at 1 minute logging intervals according to the manufacturer, so logger battery life was not an issue during this pilot)
- Regular probe sensor cleaning is essential. Given that the probe's manual cautions against fouling (even in natural aquatic environments), and encourages frequent cleaning of the sensors, we

suspected this would be required very frequently in a wastewater environment. During every other week checks, the logger was pulled out of the water, so data could be transferred to a data shuttle and brought back to the office. At this time, the probe was typically cleaned. During the first few months of cleaning however, it was assumed the end was the probe measurement area, where it was actually a small indentation and metallic sensor on the top.

- Quality calibration readings are essential. Going from conductivity to an estimate of chloride concentration takes many steps (detailed in Appendix B: Conductivity Logger, Data Procedures), and having quality calibration points for adjusting raw conductivity to specific conductance makes a big difference in quality of the data.

Looking at chloride concentration in daily composite samples collected quarterly for billing, before, during and after the program, using a changepoint model with and without assuming autocorrelation, there was no statistically significant decrease in the measured chloride concentration found. The probability of change great enough to observe in actual wastewater samples is not large enough to report a significant change during the pilot.

Expenses

The total cost of the project over four years is estimated to be around $333,900.

Table 9: Pilot Costs

Estimated Project Cost	
Direct Expenses	
Municipal Administrative	3,951.04
Incentives	32,800.00
Monitoring	761.00
Outreach & Advertising	1,596.08
Software	3,880.00
Training	209.27
Evaluation	566.00
Subtotal	**$43,763.39**
Estimated Staff Time	
Program managers	268,723
Supporting services	21,980
Subtotal	**$290,703**
Total	**$333,900**

Major expenses for the program were the rebates (direct incentive), and staff time. Over the course of the whole pilot's four years, 2019-2022, an estimated 4,560 hours were spent on project development, management and evaluation by pollution prevention staff (a manager, two full-time staff people, and two different summer interns). For two full-time employees, this project alone made up 30% of their job duties or more for a solid two years. In addition to project managers, an approximate, 400 hours of time from supporting staff, such as chemists, GIS staff, maintenance/monitoring staff and district communications/business services staff were also spent working on this specific project.

DISCUSSION

This pilot was initiated with the dual purposes of a) determining costs associated with and b) feasibility of running a municipally administered water softener optimization & replacement incentive program. It was successful in determining both.

Cost

Using the estimate of overall chloride reduction described above (using estimates based off of calculated chloride reduction vs. measured reductions)., the Salt Savers Pilot cost an estimated $7,420/pound of chloride per day (or $4,423/pound of salt/day) Against other chloride reduction incentive initiatives the District has been involved in, this particular intervention's overall cost per pound of chloride reduced ($7,420 per pound of chloride reduced per day) is high. Rebates to industrial and commercial facilities and pass-through grants to softener companies from 2015-2019 for example, averaged only $63/day and resulted an overall higher total pound reduction (>1,800 pounds/day reduction vs. 45 pounds/day) (Madison Metropolitan Sewerage District, March 2020).

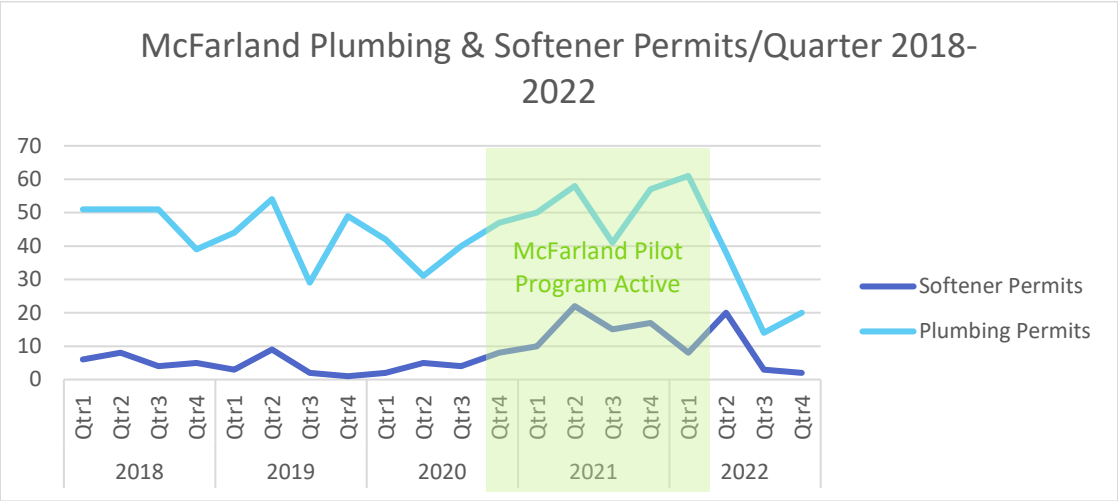
Effectiveness

Overall, offering a municipal water softener optimization & replacement incentive has been feasible, as evidenced by the program launch and the 500-odd residents it reached in some way. Program efficacy however, whether it was able to reduce an amount of chloride sufficient to measure an impact at a pumping station, or at NSWTP, and stimulate increased overall community water softener efficiency, is another measure.

One way to evaluate effectiveness is to measure the additionality, or the extent to which the program accelerated the rate of water softener replacement (Bennear, Lee, and Taylor 2013). The evidence for this program providing additionality is tenuous. 77 out of 100 respondents to a post-program participant survey cited good timing, "To take advantage of the rebate while it was available since my softener was old and had to be replaced anyway", as a motivation for participating in the program. About 60% of respondents overall cited this as their primary motivation for participating in the program.

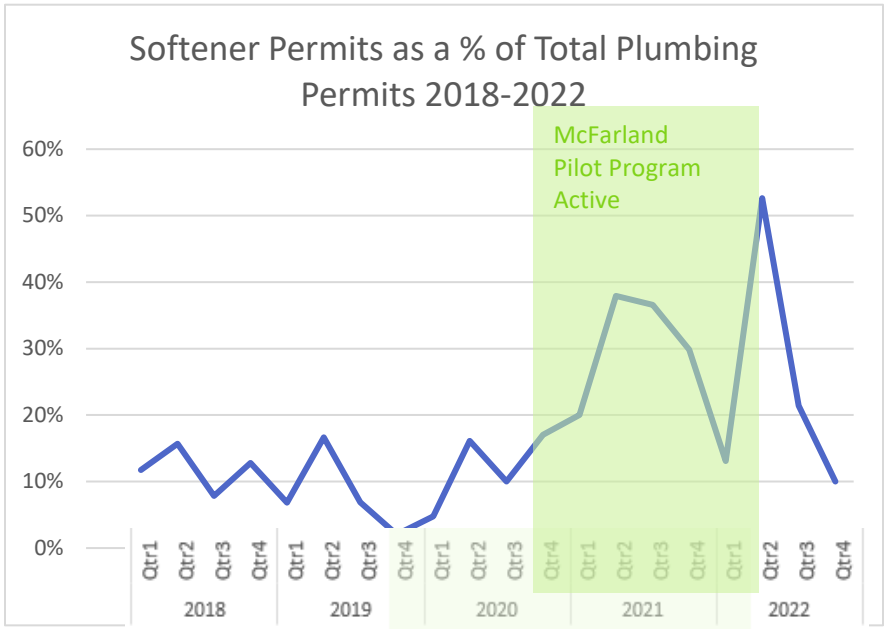
When asked directly, "Would you have optimized or replaced your softener within the last two (2) years if there had not been a rebate program?" in the same post-program follow-up survey, about half of respondents (52%), indicated that **they would not** have optimized/replaced their softener within the last two years had there not been a rebate program. Truthing participants' responses with records of building permits issued in the Village of McFarland before, during and after the pilot, as well subsets of permits, plumbing-specific permits, and a further subset of those, softener-specific permits, is confirmed. The number of plumbing permits and softener permits issued during the pilot period both show a slight overall positive trend (Q4 2019-Q1 2022).

Figure 10: Additionality Evaluation Using Permit Data



Taken in the context of the timing for the pilot however, it's hard to say whether this was due to the pilot program, or just following a national building trend in which, the "the pandemic… helped to fuel continued growth in spending on replacement projects"; "The share of homeowner expenditures devoted to updating older systems, replacing basic exterior elements, and adding outdoor features had risen throughout the 2010s, and firms serving these specialty markets generally reported an increase in workloads in 2020." (*Improving America's Housing 2021*, 2021). Attempting to isolate softener-specific permits from this overall trend, comparing average monthly softener-specific permits to total average monthly plumbing permits in the same time shows that there may have been an increase in rate of pulling softener permits during the pilot, but more time will be required to see if the rate stays high throughout the following years. It may be too soon to tell. Taken together, responses from the participant survey, and evidence seen from analyzing permits, there is slight evidence of additionality.

Figure 11: Softener Permits as % of Total Plumbing Permits

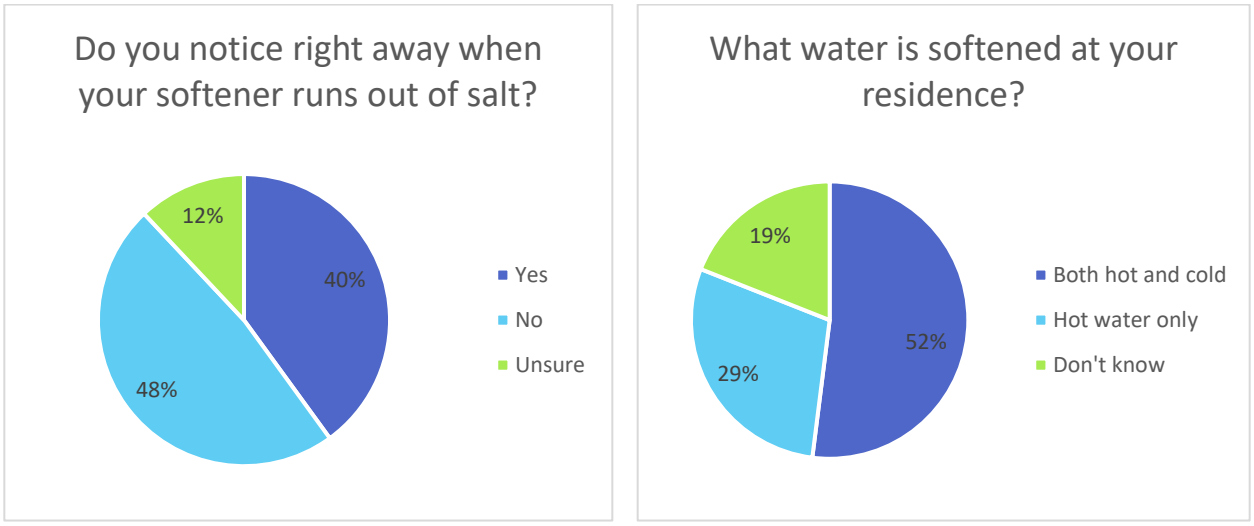


Through the course of this pilot, new information emerged, which, taken with previously known facts about softener aging-related efficiency losses, challenges an assumption embodied in the original inception of this project: that all residents require a softener, and that they prefer all water in a house to be softened to zero grains, constantly. Calling the need, and importantly, assumed consumer desire, for

constant, zero-hardness, full-line softening into question proves an enormous opportunity for a pivot away from status-quo preserving tactics that gain only marginal, temporary chloride reductions (Appendix F: Full-Line vs. Hot Only Cl- Reduction Potential, p.70).

Softener inspection reports showed an opportunity for larger change uncovered as part of the softener data collected by provider-submitted reports. In the town of Dunn, 95% of homes inspected had all water throughout the house (often less the kitchen sink) running through the softener, and 82% in Mcfarland. Having such a high percentage of housing with a huge opportunity to reduce soft water use would likely account for a greater overall reduction in chloride than incremental gains that could be achieved with optimizing softeners (full example calculated in Appendix F: Full-Line vs. Hot Only Cl- Reduction Potential, p.70). More than just opportunity as identified by provider-submitted reports, data collected through the Self Screen lends support to residents' willingness to consider less soft water. Of Self Screen respondents, only about 52% of takers claimed to have both hot and cold water softened, while almost 30% actively stated that they had only hot water softened. Whether these self-reported numbers are accurate, is not certain, but it might perhaps speak to homeowners' willingness to have only the hot water be softened by showing their perceived thoughts about how their plumbing is configured.

Figure 12: Hard Water Tolerance



Residents' willingness to tolerate some hard water, demonstrated in (Figure 12), confirm and strengthen a finding of the District's 2019 Community Values Survey; in which about a quarter of respondents indicated that their softener re-filling habits are accommodating of (they are willing to tolerate) some hard water.

This finding, the abundant opportunity, and partial willingness from residents, to reducing soft water use overall, opens the door to exploring chloride reduction interventions, such as hot-only conversions, blending valves for example, that could be both greater pounds reduction potential (see Appendix F: Full-Line vs. Hot Only Cl- Reduction Potential), and more permanent than seeking incremental gains in the status quo softening paradigm. Previous reports (Lake, Erickson and Cantor, 2015), have documented the temporary nature of softener efficiency gains, due to an estimated resin degradation of 2%/year. Efforts to upgrade and

optimize softeners now (unless paired with a change in norms & attitudes regarding softeners is achieved) would have to be repeated in a number of years or on an ongoing basis. Although an incentive program to upgrade softeners has proven to be feasible, the sustainability of reproducing this program every 10-15 years, with expectation of maintaining or increasing participation is not likely for a utility.

Pilot Program Context

The timing of this pilot project, must be noted. The very first mailings inviting residents of the Dunn Sanitary Districts went out the last week of March 2020, when, within days, life around the world was completely upended due to the COVID-19 Pandemic. On March 13, 2020, President Trump proclaimed a National Emergency concerning COVID-19. By March 17, 2020, The State of Wisconsin and Dane County/Madison Public health issued Emergency Order #12, "Safer at Home", which limited Wisconsin Residents from leaving their homes except for essential activities, government functions and business operations (Department of Health Services, Evers, Palm, 2020). All "non-essential" businesses were ordered to close (Radcliffe, Caughey, and Seyler, 2021). Although guidelines spelled out what was considered essential, including a provision for *"Critical trades. Building and Construction Tradesmen and Tradeswomen"* it was not always clear whether voluntary appliance check-ups for non-emergency situations were allowed. Regardless of whether service calls would have technically been allowed or not, many people would have been nervous to have a service provider in their home due to social distancing. The District decided to briefly put the program on pause April-June 2020.

The pilot kickoff timing in McFarland could have also played a role in the program launch. Opening the program in McFarland coincided with a hot topic election.

It is hard to estimate the overall impact that the COVID-19 Pandemic had on participation. On one hand, there was major job loss/loss of income, supply chain issues, increases in cost of building materials, labor shortages, but on the other hand, there was also a dramatic change in how homes were/are used, and unprecedented home improvement projects (*Improving America's Housing 2021,* 2021). In multiple providers' exit interview, they cited the impact of labor shortages on their ability to maximize the amount of softener check-ups and replacements. One company said they ultimately did not end up advertising the Salt Savers program because they already have too much work and can't keep up as it is.

Considerations for Future Implementation

Should this program be replicated, the following points should be considered:

SCALE OF IMPLEMENTATION

In cases where a municipality only needs to stimulate a small reduction among household sources and has limited opportunity for source reduction among commercial and industrial, this program may be replicable and advantageous. Implementing the pilot program on a larger scale however, should be approached cautiously. University of Chicago economist John List distills evaluating for successful scaling into five vital elements: 1) false positives 2) misjudging representativeness of initial population 3) unscalable ingredients 4) spillovers/unintended consequences 5) economics (Rosalsky, 2022). This particular pilot area would likely not

be representative of a replication in another area, and may have presented a false positive due to the nature of this small, relatively affluent, single-family home dominated community. Unscalable ingredients abound; municipal administration capacity, budget, and primarily, the supply of capable, interested providers willing to incorporate these services into their business model, to name a few. As will be later discussed (in Provider Accountability, p.38), while the program admin worked to stimulate an increased demand in softener jobs, it was later uncovered that there was not will to build capacity among participating provider businesses to meet the increase in demand. Throughout the program, municipal officials heard complaints from residents that they couldn't get appointments or that service providers did not call them back to make appointments, and providers were aware of this, did not deny it. During exit interviews, multiple providers indicated that they occasionally chose not to take optimization jobs because they weren't (according to the provider's business model) worth the time/effort, and that the program didn't make a difference to them because they already had enough work to keep them busy. Providers indicated that they didn't have any interest in adding capacity to their business to meet what could have been a stimulated demand.

From the outset, this program did not consider what kind of "implicit endorsement or recommendation" that this program may have signaled to residents (Krijnen, 2018). In "Choice Architecture 2.0 Behavioral Policy as An Implicit Social Interaction", Krijnen, Tannenbaum, and Fox, lay out a framework that may explain some unintended consequences that this program messaging could have implied (Krijnen, Tannenbaum, and Fox, 2018). By promoting this incentive (rebate), a voluntary program which essentially pays homeowners to do something they should just be doing anyways, the program may have unintentionally signaled that that this action is not urgent, and is a sort of 'above-and-beyond' that people can pat themselves on the back for vs. an essential urgent action required of all to protect water quality. Introducing this incentive it may have also unintentionally influenced residents' perceptions of attractiveness of the behavior (made them perceive it as undesirable). For example, seeing the government offer money in exchange for softener optimization, some residents may have interpreted optimization as a tradeoff wherein their water quality is diminished in exchange for the payment. And finally the last element for evaluating scalability, economics, may be as a contrast to the other elements favorable for scaling. Economies of scale could kick-in if expanded more broadly, and, considering about 15% of the total pilot project went into start-up expenses, replication would likely be cheaper.

CLARIFY MUNICIPAL COMMITEMENT

This pilot project was conceived as a partnership effort; with the District providing the overall vision/guidance, funds, and technical training/tools/logistics, and the Municipalities providing administrative labor, brand recognition/credibility and local knowledge/connections, put towards the common goal of reducing water softener salt tributary to the pumping station and treatment plant. Partnering with a municipality offered direct benefits, like for example, name recognition (offering credibility), more people working on the program, and being able to cut checks and reimburse both providers and residents with less paperwork than would have been required for district accounting systems. Overall, both District and municipal administrators were happy with the partnership system established.

An assumption that was challenged early on, was the assumed connections each of the municipalities hold. Although the municipal governments did have brand recognition that paid off with outreach, we learned that not all of the partner municipalities had ways of contacting residents, and did not have readily available lists or contacts for getting in touch with commercial/non-residential establishments (didn't know building manager at the high school, the largest water meter in the whole Village, or didn't have mailing list for customers, for example). In addition to salt savings, hopefully seeking these lists and testing means of communications proved a useful capacity building exercise for work beyond the pilot.

The importance of maintaining open, timely communication was learned early-on, when a misunderstanding led to an advertisement misrepresenting the incentive. This type of issue could have been easily remedied by having more up front coordination to make expectations explicit in the original contract/agreement. From then on, regular check-ins with the District and municipal admins were set up, and messaging remained in alignment. Although all of the pilot program managers (both District and Municipal staff) found ways to maintain communication and efficiently coordinate, one point of improvement could have been getting the word out at the municipality beyond the directly involved staff – for example, in McFarland, district staff presented to the Village Public Works Committee, however were not able to make a presentation to the Village Board or other municipal bodies. It was not clear how much municipalities promoted the program internally among committees and municipal government to build awareness and ambassadors for the program.

Another point of possible improvement should this model be used in the future, is to clarify municipal commitment, especially as it relates to plumbing permits. A call from a resident mid-way through the program exposed an unforeseen incongruency – although the municipality was offering a $75 reimbursement for water softener check up and a $200 reimbursement for softener upgrade, they were still charging a $57 fee for having the permit to have the work completed. Future municipal rebate programs should consider waiving the fee or significantly lowering it.

PROVIDER ACCOUNTABILITY

In the spirit of this being a pilot program, the overall approach to working with providers (or some of whom optimization and working with softeners might have been completely new), was to be lenient, amenable, and flexible. To be a provider listed on Madsewer.org, all that was required was to attend a training and then say 'yes, list me on the website'. Providers were then given access to documentation app – they did not have them sign any formal agreement to participate or abide by terms or protocols.

As a result, inconsistencies in provider buy-in emerged through the course of the program. For example, one resident commented, the "company I worked with seemed to not understand how the program worked… more education might be needed there", in a program-participant follow up survey. Only one of the participating provider companies proactively reached out to their existing customers. Among the other participating companies that did exit interviews, although all cited having customer databases containing information about existing customers' softener models, including rebate-eligible determined 'clunkers', none reached out or advertised the program to those existing customers. Information about being a provider for

this program, and even the optimization service itself were not added to company websites, and it was not clear if all intake/scheduling/receptionists staff at companies were aware of the program.

In the future, having a written agreement with providers that outlines the expectations of working in the program, which provides accountability and dispute resolution would be beneficial. During exit interviews, multiple participating service providers, despite extensive up-front coordination and communications about the program details and logistics, brought up questions that could have been resolved with an increased organizational-level commitment and early communication efforts. At a minimum, expectations concerning: the point of contact for the entire company, timing for submitting reports, customer service/ messaging, whole staff communication (including scheduling agents/front office staff), service area/eligibility, quality standards for reports, and certification of adherence to standard optimization protocols, should be specified in the agreement.

Having a document that holds providers accountable to quality standards, training required to achieve those standards, and which confirms company-wide buy-in would be beneficial for program consistency and image among consumers. Utilizing a written agreement could also prove to be a useful tool for negotiating compensation for provider time, and confirming company buy-in. All participating providers at some point throughout the program, that optimizations were not prioritized because they were not making money on them, despite having verbally (or by email) agreeing to participate in the program at this rate from the start. Given discrepancy in early advertisements and confusion in the town of Dunn ('free optimization' vs. 'free optimization *up to $75), the providers' frustration with the rate makes partial sense, however, it doesn't when considered in the context of the McFarland model, where providers were able to charge customers their full amount for an optimization, and the residents would recoup their $75 rebate later through the Village.

INCENTIVE STRUCTURE & AMOUNT

Between the two concurrently tested rebate structures (previously discussed in, Incentive Models, page 17 above), there wasn't one that was obviously better than the other. No comments or complaints were heard from residents about wanting the other community's rebate system. In the rebate participant follow-up survey, people who participated in the rebate program overwhelmingly said that the program was easy (only 2/100 respondents said the program was difficult. Non response bias was not conducted on the participant survey since the overall response rate was about 50%). Participants appreciated that they did not have to send anything in, that it was all handled automatically by the providers and the municipality. Both models proved to be about the same amount of administrative work. Overall, providers felt that it was confusing to have two different types of programs running at the same time, but didn't have a strong preference for one over the other. Both municipal program administrators and providers felt that the McFarland model (reimbursements) was more straight forward and transparent.

One of the main confusions (previously alluded to) in the Dunn (discount) model, was surrounding the discount for inspections. District and municipal staff had thought that providers agreed to a service call fee of $75 for an inspection, and were therefore advertising 'free' inspections/optimizations, however, the cost for

some service providers to inspect and guide a homeowner through optimization exceeded $75, so the homeowner ended up getting a bill for the remainder of their service call fee, not a free service as advertised. Although it's hard to attribute this model as a causation, there was a correlation with a higher percentage of jobs overall being inspections/optimizations (60%, vs 14% in McFarland) vs. replacements.

While the McFarland (reimbursement) model was perhaps more straight forward overall than the discount model used in Dunn, the drawback was that homeowners had to pay the full cost up-front then wait to receive their reimbursement – a wait that was dependent on service providers completing their report and on municipal administrators approving it and processing it for payment. Questions about the delay in payment (usually due to providers not having submitted reports yet), were the most frequent reason municipal program admin. heard from residents. This should be considered when weighing which model to use going forward. Having to wait on receiving up to $275 back could be an issue (cashflow) in some circumstances, going against the goal of making it easier for residents to participate.

In a poll of self-screen takers mid-pilot (to find out why self-screen takers might not follow-through on their recommendation), one attributed their lack of follow-through to cost, which indicates that cost might still be a barrier for some people (rebate was not enough). The cost of a new softener or softener upgrade, even with the rebate, being too great a cost for the household was echoed in a handful of intercept interviews and also confirmed in national data, which shows that "fully 51 percent of owners in the lowest-income quintile spent less than $500 on improvements and repairs to their homes in 2019." (*Improving America's Housing 2021*, 2021). Future water softener rebate programs should consider, if they desire to expand access to softener upgrades for lower income households, that a reimbursement model may pose an additional barrier, the discount (or free service) model may prove more effective.

SCOPE OF INCENTIVE – INCLUDED EQUIPMENT

The rebate incentive was designed specifically for single-family home water softeners because commercial water utility accounts vs. residential have different drivers and barriers to action, and chains of command for decision-making. Commercial accounts in the pilot area were offered a free check-up during the pilot as a side part/separate program from the primary Salt Savers Rebate (see p.25). Water quality providers who participated in the program worked on this specific initiative reported feeling like providing this service wasn't worth their time, since often they were not dealing with the decision-maker directly as is the case oftentimes, with homeowners. They indicated a preference to stick to residential market vs. what they called 'lite commercial', or in other words, softeners that are identical in size and model to residential units but owned by a company instead of an individual homeowner. They also indicated that having two programs with different incentive amounts was confusing. Turns out that having two programs between commercial and residential, when they are essentially the same equipment ended up creating confusion. Going forward, it is recommended to dig more into what would incentivize 'lite commercial' to adopt water softener upgrades, and/or to include these 'lite commercial' with any existing homeowner program due to equipment similarity.

Another challenge in scope of the program, was with which equipment was funded. Water softener interventions were the only appliance included the focus for simplicity, however this approach proved to be

overly deductive, not looking at water quality holistically. The pilot area was somewhat challenging to make recommendations in because some of the homes in the area had private wells (vs. a municipal drinking water distribution system), and therefore had inconsistent water quality. Some of the wells in the area had high iron to the point where some of the providers recommended to install an iron filter ahead of the softener, to keep the softener efficient longer. In a few cases, the homeowners were upset that their iron problem could theoretically be solved by running an inefficient softener, but that the 'right' thing to do as far as minimizing salt use was to install this additional device which was not covered by any incentive/program funding. In these instances, purchasing a $1,700-$1,800 iron filter to preserve softener efficiency, when the softener (running at a lower efficiency) could accomplish the same job didn't make sense for the homeowners. In this pilot area, the number of these instances were small, but should be considered seriously if designing and rolling out a replica of this pilot elsewhere, since the efficiency losses could really add up; one provided quoted a maximum efficiency only about 2,800 grains/lb (vs. an efficiency goal of 4,000 grains/lb) for softeners being relied on for iron removal.

FOCUSING MESSAGING

Community based social marketing suggests having 'asks' be non-divisible, end-state behaviors (McKenzie-Mohr, and Schultz, 2014). In developing and implementing this program, it was not possible to meet all parties' expectations for the program and focus in on single end-state, non-divisible behavior. Ultimately, messaging used for suggesting optimizations did not meet these two criteria, but messaging related to replacing softeners did. This may have contributed to a higher number of overall replacements (even though it is the more costly and labor-intensive action). The messaging for optimizations, ('take the softener self-screen') which was non-divisible, but not end-state and the messaging ('get it checked') was end-state, but divisible.

For future programs, we would recommend clarifying messaging. Throughout post-program evaluation (including, intercept interviews notably), a reoccurring theme was that homeowners believed the program didn't apply to them because of the age of their house ("but my house is only 8 years old, it was just built) or age of softener ("my softener is still new- we just got it 5 years ago). Overall, people really didn't think it was an issue unless their softener was old. This was perhaps reflected in the bias towards replacement participations in both the self screen and the rebate program.

For this program, offering the largest incentive getting old softeners out made sense on paper because of their potential for larger salt discharge reduction, however this may have altered perception, subsequently resulting in confounding the 'check it' messaging.

In the mid-pilot email poll of self-screen takers who had not yet converted their self-screen into action, among respondents for whom replacement was recommended (n=33), and those for optimization was recommended (n=15), open rates on the email were similar, about %60, and rate of clicking within the email were very similar, a little less than half of people who opened the email.

Table 10: Mid-Pilot Conversion Inquiry

	Yes	No	No response (did not open email)	No response (opened, but did not click)	Total
Replacement Rec.	6	3	13	11	33
Optimization Rec.	1	5	6	3	15

It's a small population size, so hard to say for sure, but it appears that people who got a recommendation replacement were typically more likely to follow through on their recommendation than people who had optimizable units. This is in direct contrast to the early research done ahead of the pilot, the District's 2019 Community Values Survey in which a random sample of adult respondents in MMSD's service area generally said they would be more willing to have their softener optimized than to have it replaced. It is possible that the original question in this survey could have been flawed because it forced a binary, and didn't provide an alternative option that might better reflect reality: *if it needs to be.

Bottom line, any future reproductions of this pilot should focus on increase urgency in messaging and clarifying that all softeners need to be looked at.

Unanswered Questions - Directions for Future Research

Beyond considering the known learnings detailed above, unanswered questions including the following, should be evaluated before considering repeating or scaling another home water softener efficiency incentive program:

What are the real barriers to softener optimization and upgrade? Knowing more about the extent to which money is primary barrier for softener maintenance (and for who) is not known, but would be helpful in designing a more effective program. Community Based Social Marketing recommends a five step process in which identifying barriers precedes development of strategies so that the program (strategy) actually addresses the main thing prevention the desired action (McKenzie-Mohr, and Schultz, 2014). In formation of this pilot project, the strategy was prescribed without true insight into whether (and how) cost was a barrier (or for who). There was data to support willingness to participate in an incentive program, however research to truly investigate reasons for/or not maintaining softeners were not thoroughly interrogated. As a result, previously discussed in 'Incentive Structure & Amount' p. 39, experience in this study shows the inventive amount offered may not have been enough to nudge people for whom cost was a true barrier, and at the same time, for many residents, proved to be a useful bonus for something they already planned on doing, discussed in 'Effectiveness', p. 33. Designing a study that gathers information to the barriers to the specific actions directly, would likely increase program effectiveness.

What alternatives exist to meet home water quality needs beyond ion-exchange water softeners? During intercept interviews, nearly all respondents, intrigued about options to do their part on salt reduction asked about alternatives. The program website included vague wording about alternatives: "Other approved water treatment devices", "approved by the State of Wisconsin for use in home plumbing applications", leaving space for options that emerged to be considered eligible, but ultimately putting the research onus on

individual residents. Having more proactive information available would help residents make informed choices and possibly a greater salt reduction than through optimization or upgrade alone.

What are the costs and benefits/tradeoffs in soft water quantity reduction strategies, such as plumbing conversion to hot-only softening, or blending valves? Provider reports and Self screen questionnaires uncovered a high potential for chloride source reductions using these strategies, however, relatively little is currently known about the costs associated with these conversions and feasibility of them. It appears that equipment and skillset among professionals already exists, but are not widely used perhaps due to entrenched norms. Being able to clearly communicate to homeowners who risks (if any) and costs to expect would go a long way to advance these strategies.

One last area that could benefit from continued research and development is in monitoring chloride in wastewater. Continued development/refining of methods for monitoring and analysis techniques would make evaluation easier and cheaper. This pilot tested use of a freshwater conductivity logger in a wastewater environment in an attempt to secure additional data coverage beyond existing sampling points. Use of the logger, and how to handle the data was a huge learning curve. How to interpret this data and understand its viability is still ongoing. Outcomes, although not included in this paper, will nonetheless prove useful to future source reduction initiatives.

CONCLUSION

In this study, the efficacy of offering a limited-time rebate to incentivize home water softener improvement (optimization and upgrade) was evaluated. Over the two-year pilot, 210 different households participated, yielding an estimated reduction of about 45 pounds of chloride per day to the sewer system.

Overall, given the time commitment and cost compared to the estimated chloride reduction, only slight evidence of program additionality, anticipated issues with scalability, and the limitations and perceptions of voluntary-only programs, repeating a water softener incentive program should be approached cautiously, considering lessons learned through the pilot. Scaling this pilot to offer rebates more widely should be expected to yield sustainable (long-term) chloride reduction sufficient to impact influent chloride to the Nine Springs Wastewater Treatment Plant, however might prove useful in other areas where the conditions (public opinion demanding a rebate, opportunity for non-residential chloride reductions are limited, and small, short-term gains in water quality are the goal) are warranted. Overall, further research that helps evaluate approaches that incentivize longer-term, more sustainable reductions should be prioritized over investing more in additional voluntary optimization/reduction incentives.

APPENDICES

Appendix A: Historical Outreach & Studies in Ps9 Service Area

Brochure sent out in 2003

Our Mission Statement

To protect public health and the environment, the Madison Metropolitan Sewerage District provides exceptional wastewater collection, treatment and related services to the metropolitan

What's the Message?

The Madison Metropolitan Sewerage District is asking for your help in reducing the amount of chloride released to the environment.

Chloride ions do not break down in the wastewater treatment process, but rather pass through the treatment plant to the environment. High concentrations of chloride can be harmful to the plants and animals that live in streams and rivers.

You can help by controlling the amount of salt (sodium chloride) used in your water softener. In this way, the advantages of softened water, such as the need for less soap and detergent for cleaning, and less energy for heating, can be achieved while minimizing the negative effects of salt in the environment.

What Can You Do?

Each time your softener regenerates, its resin tank is flushed with a salt solution that is discharged to the sewer system. Several options are available to reduce the amount of salt used to regenerate your softener.

1. If your softener regenerates on a timer, consider switching to a high efficiency softener that regenerates with a meter. Metered water softeners track the amount of water you use and regenerate only when needed.

2. Increase the time between regeneration cycles. If your softener uses a timer, increase the settings gradually, a day at a time, until you notice hardness effects, such as less sudsing, for two cycles. Then set the timer back one day. If your softener uses a meter, increase the settings 100 gallons at a time until you notice hardness effects after two weeks, then set the meter 100 gallons lower.

3. Consult with an expert. Have your softener tuned up by a qualified water softener representative.

What Are The Benefits?

1. Reducing salt use helps the environment. High chloride concentrations can be harmful to aquatic plants and animals. Minimizing the amount of chloride released to the environment allows our streams and rivers to remain healthy, and their beauty and recreational benefits can continue to be enjoyed by everyone.

2. You save money. An efficiently running water softener uses less salt and less water, plain and simple. You can realize savings of 30% to 50% or more without noticing a difference in your water quality.

Thanks for Your Help!

Our goal is to reduce the amount of chloride entering the environment by reducing the rate of salt used by water softeners. Your efforts, although perhaps seemingly small, will aid in collectively reducing the release of chloride to our local streams and rivers. Call us with your questions at 222-1201 or visit us on the web at madsewer.org.

Make a Difference!

Important Message

NaCl

For Wastewater Utility Customers

SALT

MMSD

Madison Metropolitan Sewerage District

Protecting public health and the environment.

Kegonsa Sanitary District Bill Stuffer – sent 2017

Salt from many sources—including home water softeners—passes through your local wastewater treatment plant into area streams every day. Join Madison Metropolitan Sewerage District in taking action now to prevent this pollution and keep sewer bills low. *Your actions make a difference.*

LEARN MORE AT:
www.madsewer.org/Programs-Initiatives/Chloride-Reduction

HOW TO BE 'SALT WISE' AT HOME

- Water softeners only have a life of about 10-12 years before they lose efficiency. If you have an older water softener, invest in a new, more efficient model to reduce salt waste and protect fresh water resources.
- Water softeners, even newer ones, should be periodically checked. Call your technician for a softener check-up, and ask them to adjust settings to reduce salt use. Tune ups have been shown to reduce salt use by a quarter or more.
- Encourage friends, relatives and community businesses to be Salt Wise!

Appendix B: Conductivity Logger, Data Procedures & Analysis

DATA COLLECTION (LOGGER OPERATING INSTRUCTIONS)

At: https://madsewer.org/logger-procedure

SPECIAL SAMPLING PROJECTS

Conductivity – Chloride Model Development Data Collection

To interpret the conductivity data, significant process and procedure, including developing a model to predict concentration based off conductivity in the wastewater environment, had to be developed. To build the model, a special sampling project was initiated in February 2021. Hourly grab samples were taken from wastewater at PS 9 over a period of six days using an ISCO multi-plex portable sampler (one 500ml sample per hour, each in a separate bottle) connected to the pumping station control monitors. After 24 hours, when the tray was full, the bottles were taken from the pumping station to the MMSD laboratory and a new tray of empty bottles was put in its place to begin the collection process for the current day. This was done every day except for Sunday, for six days starting February 2, 2021. The MMSD laboratory analyzed chloride concentration in these samples (n=116) using the same equipment and method as outlined above in Quarterly Sampling. A regression was completed using R Studio with the resulting data, yielding a piece-wise log-scale regression model with a breaking point. The regression had a very small bias (<1%) with very small residuals, so was therefore considered good. The slight bias that occurs due to the log transformation was handled through the "smearing coefficient" function.

Probe Validation Data Collection

In early Spring 2022, when initial analysis of the probe data began, there were only 6 points where quarterly billing samples, a known, trustworthy approximation of daily chloride (based on a flow-proportionate composite sample), and chloride data from the logger matched up. To build up a more robust pool of matching points, a special sampling project was initiated from 6/27/2022 – 7/27/2022, to collect additional daily composite samples. The procedure used was as similar as possible to the method used for quarterly billing samples. This effort yielded 13 additional samples to use for evaluating probe data.

DATA CLEANING & PROCESSING OVERVIEW

Full RMarkdown documenting analysis steps is available as an .Html file upon request. Requests should be made to catherineh@madsewer.org . General summaries of analysis steps included in plain language below.

Summary of procedure for estimating concentration having collected conductivity data :

1) After collecting data from the logger to the data shuttle, 'offload' to HoboWare software
2) Use HOBOWare Conductivity Assistant to enter field calibration measurements to translate raw conductivity into specific conductance data.
3) Merge all specific conductance files using HOBOWare
4) Export full timeline of specific conductance data from HOBOWare file (.hproj) to .csv.
5) Manually remove data gaps from data collection problems from specific conductance dataset

6) Read .csv files (full specific conductance, flow data, quarterly sampling points) into R Studio.
7) Use RDA Files: m_log_high.rda & m_log_low.rda from regression to estimate chloride concentration from conductivity

Summary of procedure for evaluating conductivity logger data validity, analyzing data and conclusions/recommendations for future use will be forthcoming in later publication.

Appendix C: Softener Training Materials

Example Class Advertisement

Madison Metropolitan Sewerage District

YOU'RE INVITED TO

Salt Reduction Through Efficient Water Softening

LEVEL 1 TRAINING

What: A foundation for recognizing opportunities to reduce water softener salt. This training includes:

- Overview of chloride sources and impact on the environment
- Water softener basics
- Fundamentals of water softener efficiency
- Tips for evaluating softeners for efficiency and making recommendations to customers on ways they can reduce salt use.

For: Professionals who inspect, install or service water softeners in the course of their work, such as plumbing inspectors, home inspectors, plumbers, softener installers and service technicians, and property or facility managers.

LEVEL 2 TRAINING

What: Intermediate training to equip service providers with the skills necessary to determine softener efficiency and make changes to softener settings. This training includes:

- Overview of water softener settings that affect efficiency and how to find them on various types of softeners
- Calculating softener salt efficiency
- Optimizing water softeners
- Practice using MMSD softener app to perform optimizations

For: Professionals who install or service water softeners in the course of their work, such as plumbers, softener installers, and softener service technicians.

Thursday, March 19, 2020

Village of McFarland Municipal Center
5915 Milwaukee St., McFarland, WI 53558

Level 1 training: 8-9:30 a.m.
Level 2 training: 10-noon

Gain the knowledge and skills you need to help your customers reduce their water softener salt use in this **free** training. This training is now offered in two levels so attendees can choose the amount of training relevant to their work, so you can register for one or both levels.

Attendees who complete either level will have the option of being designated as trained service providers for participation in the District's pilot softener improvement programs (see www.madsewer.org/SaltSavers for more information).

CONTINUING EDUCATION AVAILABLE

Attendees who complete **both** Level 1 and Level 2 training will qualify for 3.0 continuing education hours through the Wisconsin DSPS for the following certifications and licenses: Commercial Plumbing Inspector; Dwelling Contractor Qualifier; UDC-Construction Inspector; UDC-Plumbing Inspector; Journeyman Plumber; Journeyman Plumber-Restricted Appliance; Journeyman Plumber-Restricted Service; Master Plumber; Master Plumber-Restricted Appliance; Master Plumber-Restricted Service.

FREE REGISTRATION HERE:

www.madsewer.org/SaltSavers

For additional information, contact Emily Jones, EmilyJ@madsewer.org or 608-709-1857.

Agenda

Agenda – Level 2 Salt Reduction Through Efficient Softening Training

Tuesday, Mar. 10, 10:30-noon | Madison Metropolitan Sewerage District Maintenance Facility

Instructor: Emily Jones, Pollution Prevention Specialist, MMSD

Handouts:

- Hardness test strip kit
- Evaluation flow chart with clunker list; time-clock ID pictures as attached resources
- Worksheet for notes on softener evaluations
- Customer information handout

Level 2 Training

10:00 – 10:20 Overview of water softener settings that affect efficiency

- Reiteration of definition of softening efficiency
- Efficiency affected by:
  - The amount of salt used to regenerate the softener (salt dosage) (gallon of gas)
  - The amount of hardness particles that the softener can remove between regeneration (grain capacity) (miles)
  - The buffer programmed into the softener to keep soft water from running out before regeneration (reserve capacity) (low gas light)
- Salt use affected by hardness setting (4-wheel drive)

10:20 – 10:35 Calculating water softener efficiency based on softener settings

- **Why you might want to do this:** Calculating efficiency can help you make recommendations for customers in a question of whether to replace the softener. It can also show the actual impact of

Service Provider Resources

Process overview: https://www.madsewer.org/wp-content/uploads/2021/10/Salt-Savers-Process-Providers.pdf

Billing instructions: https://www.madsewer.org/wp-content/uploads/2021/10/P2-2021-Salt-Savers-Reimbursement-Cheat-Sheet.pdf

Hardness lookup map:

Example of a paper (alt.) reporting form: https://www.madsewer.org/wp-content/uploads/2021/10/P2-Salt-Savers-Reporting-Form-McFarland.pdf

Optimization process checklist: https://www.madsewer.org/wp-content/uploads/2021/10/P2-General-Softener-Efficiency-Evaluation-Checklist.pdf

Training Workbook

(most current version): https://www.madsewer.org/wp-content/uploads/2021/10/2020-Softener-Training-Workbook.pdf

Training Slides

most current versions available at: https://www.madsewer.org/do-business-with-us/for-water-softener-professionals/salt-savers-training/

List of Certified Providers

https://www.madsewer.org/pollution-prevention/chloride/for-residents/find-a-trained-softener-professional/

Appendix D: Outreach Materials

Letter to Commercial Water Meters - McFarland

VILLAGE OF McFarland

www.mcfarland.wi.us | 5115 Terminal Drive, McFarland, WI 53558 | 608.838.7287

September 21, 2020

CAPITAL WATER SOFTENER INC
4909 TRIANGLE ST
MCFARLAND, WI 53558

Dear CAPITAL WATER SOFTENER INC,

The Village of McFarland is dedicated to protecting fresh water and keeping sewer bills low. That's why we are partnering with the Madison Metropolitan Sewerage District and local water treatment experts to offer FREE water softener check-ups for all commercial buildings in the Village.

We're asking you to schedule a water softener assessment for the property(ies) you own or manage, in the Village of McFarland. Getting your softener assessed only takes about 30 minutes, but it can go a long way in saving you time and money when it comes to refilling your softener. Oftentimes, a few simple settings adjustments can increase your softener's efficiency.

It's important to act now. Local lakes, streams and drinking water are experiencing rising levels of chloride, which comes from road salt and water softener salts. Tuning-up water softeners, even new ones, makes a difference in preventing future sewer bill increases, and protecting the environment.

Contact one of the following directly to schedule your free water softener assessment:

Hellenbrand Water	Total Water	Capital Water Softener, Inc.
Dave Zuhde	A.J. Jameson	Joel Wick
608-849-0928	608-221-2236	608-241-1511
dzuhde@hellenbrand.com	www.culligantotalwater.com	j.wick@capwater.com

We are encouraging residents and business owners to take advantage of this program before the end of the year. More information available at: https://www.madsewer.org/Business-salt-reduction

Sincerely,

Aimee Irwin

Aimee Irwin, Assistant Public Works Director

McFarland Public Works

Catherine Harris

Catherine Harris, Pollution Prevention Spec.

Madison Metropolitan Sewerage District

McFarland Thistle Article – July 2021

https://www.hngnews.com/mcfarland_thistle/article_51a06df4-9741-50e1-8267-f5d22f75a619.html

73° Fair

The Herald-Independent and McFarland Thistle

No One Delivers Local Like We Do

Friday, August 13, 2021

SUBSCRIBE NOW

CONGRATULATIONS Graduate Click here to view photos CLASS of 2021

STATE CHAMPS: Spartans dominate Notre Dame to cap off undefeated season

Backyard birds see a popularity surge during COVID-19 pandemic

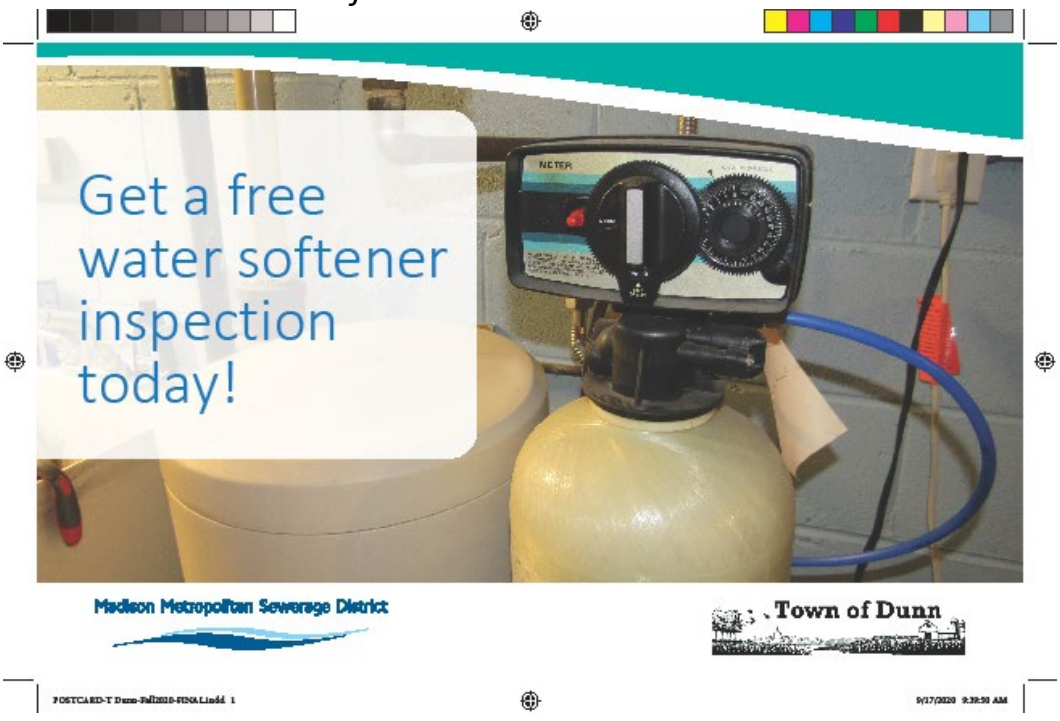
95-year-old Cottage Grove resident reflects on polio fears as she receives COVID-

Rime ice and hoarfrost make the hidden visible

New program could save McFarland residents money while reducing pollution to local waterways

By Lucy Ripp lripp@hngnews.com Aug 2, 2021 3 min to read

Postcard to the Town of Dunn – March 2020



Postcard to McFarland

Madison Metropolitan Sewerage District

Village of McFarland

SAVE SALT, PROTECT FRESH WATER

McFarland residents whose homes are connected to the sewer system are now eligible for rebates for water softener evaluations, optimizations and replacements of inefficient softeners. These rebates are being offered as part of the **Salt Savers** program, a pilot program offered by the Village of McFarland and Madison Metropolitan Sewerage District to reduce salt pollution in freshwater streams from softeners.

HOW IT WORKS

If your home is connected to the sewer system (that is, you do not have a septic tank), take the steps below to get started in the program:

1. Take the water softener self-screen at this link: **www.madsewer.org/SoftenerScreen.**
2. Contact a service provider at the Salt Savers link below to carry out recommended improvements to your softener. Some services may be performed virtually.

After the service, McFarland will issue you a rebate of $75 for a softener evaluation or optimization, or $200 for the replacement of a softener determined to be inefficient.

Learn more at www.madsewer.org/SaltSavers

PRSRT STD
US POSTAGE
PAID
MADISON, WI
PERMIT 1390

Letter & Flyer to Pleasant Springs

PLEASANT SPRINGS SANITARY DISTRICT

October 13, 2021

Dear Resident,

As a Pleasant Springs Sanitary District customer, you have an opportunity to receive a rebate for improvements made to your home water softener. Improving your water softener will reduce home salt use, protect local fresh water, and help avoid the need for expensive treatment technology to remove salt from wastewater.

Pleasant Springs Sanitary District is partnering with Madison Metropolitan Sewerage District, our local wastewater utility, to offer the **Salt Savers** pilot program. The goal of this program is to reduce the amount of chloride (a component of salt) that ends up down the drain. The wastewater treatment plant currently receives too much chloride **and most of the chloride in the sewer system comes from water softeners.**

In the Salt Savers program, a trained water softener service provider will assess your softener and make improvements based on its condition. The service provider may optimize your softener so it runs on less salt, or if your softener is inefficient, the provider will replace it with a new water softener (with an efficiency of at least 4000 grains per pound) or other water treatment device that reduces salt use. You will receive a rebate for the improvement made to your softener.

You are eligible to participate in this program if you live in the Pleasant Springs Sanitary District. The enclosed flier includes more information about the program and how to participate We have a unique chance to prevent chloride pollution in local freshwater bodies. We encourage you to take part!

Sincerely,

Linda Larsson, Commissioner-President
John Barry, Commissioner-Secretary
Scott Haumersen, Commissioner

2083 Williams Drive, Stoughton WI 53589-3352
Phone (608) 873-3074 info@pssd-wi.org Fax (608) 646-0089

The Lookout McFarland Electronic Newsletter

THE LOOKOUT

Your Digital Spin on the Outlook Newsletter

Opt-in electronic newsletter distributed via email on Thursday every other week.

Fall/Winter 2020
https://www.mcfarland.wi.us/ArchiveCenter/ViewFile/Item/120

Winter 2020/Spring 2021
https://www.mcfarland.wi.us/ArchiveCenter/ViewFile/Item/127

And Spring/Summer 2021 edition
https://www.mcfarland.wi.us/ArchiveCenter/ViewFile/Item/137

PUBLIC WORKS

About

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care of the hydrants immediately. By clearing the snow, it will reduce seconds, and even minutes of fire crews trying to access the hydrant and can save lives.

Coming Soon: Discounted Water Softener Improvement Services

Adding heavy bags of salt to a water softener is nobody's favorite chore. If you find yourself lugging multiple bags of salt to your softener every month, your softener might be inefficient and using more salt than it should. Not only does that mean more trips to refill the softener, it also means that more salt from your softener is ending up in the sewer system.

Madison Metropolitan Sewerage District, the local wastewater treatment utility, receives over 100 tons of salt at the wastewater treatment plant each day, mostly from water softeners. The plant isn't designed to remove chloride (a component of salt) dissolved in water, so it passes through to local freshwater bodies. If chloride levels continue to rise, downstream waters could become too salty for fish and other aquatic life, and the District could face expensive upgrades to remove chloride that would increase your sewer bill.

Increasing the efficiency of your water softener, or reducing your soft water use, can minimize your salt use and keep our freshwaters fresh. Many water softeners are not operating at their peak efficiency, meaning they use more salt than necessary. Even new softeners can be configured incorrectly, below their highest efficiency. If your softener is inefficient, you can significantly save on salt by optimizing your water softener to use less salt or by replacing it if it's at the end of its lifespan.

The Village of McFarland is partnering with the sewerage district to offer the Salt Savers pilot program, which encourages improvements to water softeners that reduce their salt use. This new program, which is already being tested in the Town of Dunn, will be available to McFarland residents later in fall 2020.

SCREEN YOUR WATER SOFTENER; FIND YOUR REBATE ELIGIBILITY

Every bag of salt you put in your water softener ends up in local freshwater bodies. To prevent our freshwater resources from impacts of salt pollution, the Village of McFarland is currently offering rebates to residents to have their softeners optimized or replaced to reduce their salt use.

You can now use an online screening tool to assess your softener and soft water use at home and get recommendations for salt reduction actions. This screening tool was developed by Madison Metropolitan Sewerage District, which is partnering with McFarland on the Salt Savers rebate program. Depending on the information you enter in the screening form, you may get recommendations to have your softener optimized or to replace it if it's inefficient. If you do not have enough information about your softener to get a recommendation, that is okay – the rebate program also provides reimbursement for softener evaluations by a service provider participating in the program.

After you take the screen, you will receive an emailed report that you can use as a basis for contacting a participating service provider in the program to request recommended services to your softener or plumbing. Take the first step to protect freshwater, take the softener screen!

Evaluate your softener at www.madsewer.org/SoftenerScreen

SPRING/SUMMER 2021

The Outlook Newsletter

The Outlook newsletter is a print distribution that is sent out three times a year in February, May, and September through the McFarland Thistle newspaper. Due to the longer distribution cycle, The Outlook focuses on overarching, seasonal, and long-term content.

Text included in August 2020 email (for email body):

Coming soon: Discounted water softener improvement services

Find out if your water softener is wasting salt in a new program coming to McFarland this fall. In an effort to reduce salt pollution the Village is partnering with Madison Metropolitan Sewerage District to offer McFarland residents discounts off of water softener evaluations, optimizations, and the replacement of old, inefficient softeners with higher-efficiency units. Learn more here.

Full newsletter text (linked):

Adding heavy bags of salt to a water softener is nobody's favorite chore. If you find yourself lugging multiple bags of salt to your softener every month, your softener might be inefficient and using more salt than it should. Not only does that mean more trips to refill the softener, it also means that more salt from your softener is ending up in the sewer system.

Madison Metropolitan Sewerage District, the local wastewater treatment utility, receives over 100 tons of salt at the wastewater treatment plant each day, mostly from water softeners. The plant isn't designed to remove chloride (a component of salt) dissolved in water, so it passes through to local freshwater bodies. If chloride levels continue to rise, downstream waters could become too salty for fish and other aquatic life, and the District could face expensive upgrades to remove chloride that would increase your sewer bill. **Increasing the efficiency of your water softener, or reducing your soft water use, can minimize your salt use and keep our freshwaters fresh**. Many water softeners are not operating at their peak efficiency, meaning they use more salt than necessary. Even new softeners can be configured incorrectly, below their highest efficiency. If your softener is inefficient, you can significantly save on salt by optimizing your water softener to use less salt or by replacing it if it's at the end of its lifespan. The Village of McFarland is partnering with the sewerage district to offer the Salt Savers pilot program, which encourages improvements to water softeners that reduce their salt use. This new program, which is already being tested in the Town of Dunn, will be available to McFarland residents later in fall 2020. Steps to take now:

- **Self-screen your home softener**. Is your softener more than 15 years old? Are you using more than one bag of salt per month? There are certain clues that indicate an inefficient softener. For general guidance on the condition of your softener, take a home softener screening found at www.madsewer.org/HomeSaltReduction. Knowing the state of your softener can prepare you to request a visit from a service provider as part of the pilot program.
- **Sign up for more information from the Village**. If you're interested in participating when the program begins later this fall, let Village staff know so they can contact you when the program is launched. Contact Aimee Irwin at the Village of McFarland, Aimee.Irwin@mcfarland.wi.us, to sign up for updates about the program or to ask questions about the program.

Town of Dunn Newsletter

The Town of Dunn

2022 Spring Newsletter

www.townofdunnwi.gov (608) 838-1081

Salt Savers Program Ends May 31st

Many water softeners in the Town of Dunn are outdated or not set to run at peak efficiency. This means more salt than is required to soften our water is entering our water. For residents connected to the sanitary sewer, salt that goes into water softeners ends up at the Madison Metropolitan Sewerage District (MMSD) wastewater treatment plant, which is not equipped to remove salt from water. Eventually, the salt ends up in our watersheds which can threaten freshwater wildlife.

The goal of the Salt Savers pilot program is to reduce chloride, a component of salt, from entering our fresh water resources by improving water softener efficiency. To encourage residents to participate in the program, the MMSD funds discounts on services and equipment reduce salt input into the sewer system. Residents can receive a free assessment of their water softener by a trained professional enrolled in the Salt Savers program. If a water softener is deemed too old or inefficient by the technician, softener replacements are eligible for a $200.00 discount at the time of service.

If you are interested in having your water softener evaluated, visit *www.madsewer.org/pollution-prevention/chloride/for-residents/find-a-trained-softener-professional/ to* find a service technician trained specifically for this pilot program. Waste less salt, protect freshwater – be a Salt Saver!

Hurry, this program is set to end on May 31st, 2022!

Is Your Well, Well?

When your property is on a well, you are your own water utility manager! Clean drinking water is essential to health.

It is recommended that private well owners test annually. Testing is recommended sooner if there has been flooding in the area or if any changes in taste, odor, or appearance of the water are noticed.

Contact Madison and Dane County Public Health at (608) 243-0357 or visit *www.publichealthmdc.com/* and search "Well Testing" for more information. Public Health staff will be able to help discuss the types of tests you need based on your situation and their cost.

Receive a $10 Gift Card For Self Screening Your Water Softener

For a limited time, eligible residents can get a $10 gift card to several McFarland businesses for screening their water softener with an online screening tool. To complete the self screen tool, visit *madsewer.org/pollution-prevention/chloride/for-residents/water-softener-efficiency/* or scan the QR photo below.

Madison Metropolitan Sewerage District is providing these gift cards to encourage residents to assess their home water softener and find opportunities to reduce salt use. By taking the screen, you'll also find out if you qualify for a discounted water softener optimization or replacement as part of the Salt Savers pilot program.

SCAN ME

p. 6 - Sent to all residents early April 2022:
https://www.townofdunnwi.gov/_files/ugd/7ab7a6_56348c710d6d46d7b65c21046fd9e265.pdf

Flier – McFarland

Delivered approx. 200 to McFarland House Café on 6/24 – they offered to staple it to all takeout bags (estimated 500/week). Approx. ___ more delivered on ___. This flier was handed out in all of the goodie bags which were part of public works day (approximately 100 bags made). Flier was also included as part of all hosebibb test kits mailed out to McFarland addressed throughout 2020 and 2021.

Salt Savers Pilot Program

VILLAGE OF McFarland

Madison Metropolitan Sewerage District

www.madsewer.org

Check your water softener, protect fresh water, get a rebate.

To help you boost your water softener's efficiency and reduce your home salt use, the Village of McFarland is partnering with Madison Metropolitan Sewerage District to offer the **Salt Savers** pilot program. Here's how it works:

1. Take the softener self-screen at **www.madsewer.org/softenerscreen**. You'll get recommendations based on your softener condition and salt use, and determine your eligibility for a rebate.
2. Contact a trained service provider (listed on the program home page linked below) to carry out any recommended improvements to your softener.
3. If you're eligible, the Village of McFarland will send you a rebate for the completed service: **$75** for an evaluation/optimization, or **$200** for the replacement of an inefficient softener with a new, more efficient unit.

By cutting salt, you can help protect water and keep sewer bills low. Visit the link below for more information and to set up an appointment.

MORE INFORMATION:
www.madsewer.org/SaltSavers

Flier – Dunn

Salt Savers Pilot Program

Town of Dunn

Madison Metropolitan Sewerage District

www.madsewer.org

Check your water softener, protect our fresh water.

To help you boost your water softener's efficiency and reduce your home salt use, the Town of Dunn is partnering with Madison Metropolitan Sewerage District to offer the **Salt Savers** pilot program. Here's how it works:

1. Call a trained water softener service provider, listed at the web address below, to get a **free** water softener evaluation.
2. Your provider will take action based on your softener's condition:

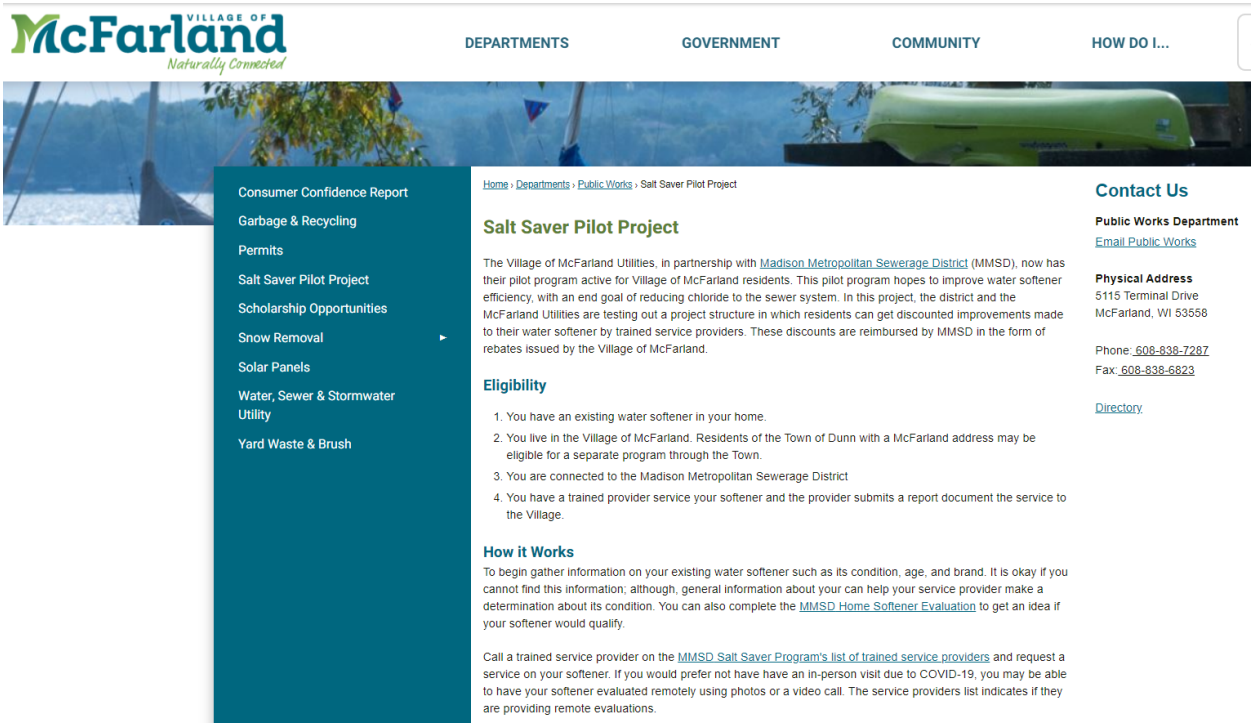
   Optimize: If possible, your provider will optimize your softener to run more efficiently and use less salt. Even some new softeners can be optimized!

   Replace: If your water softener is identified as an inefficient unit, you'll receive $200 off the installation of a new, efficient water softener or other approved water treatment device by a trained provider.

By saving water softener salt, you'll help keep sewer bills low and protect local fresh water. You'll also save trips to the store and to the basement to add more salt to your softener. Visit the link below for more information and to set up an appointment.

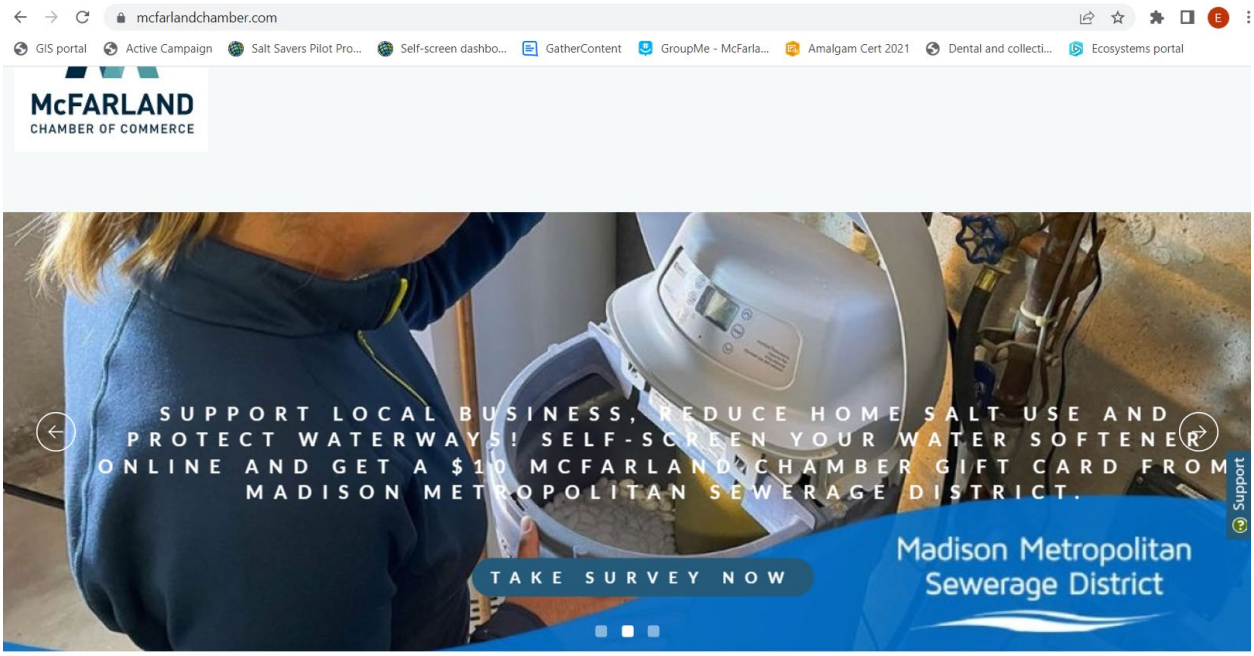
MORE INFORMATION:
www.madsewer.org/SaltSavers
Kelsey Shepperd, Town of Dunn
(608) 838-1081, ext 206
kshepperd@town.dunn.wi.us

McFarland Website



Hose Bibb Test-Kit & Self-Diagnostic Card

McFarland Chamber of Commerce Website



All Comfort Services Ad. January 2021

Event Outreach & Passive Signage

Public Works Day

https://www.hngnews.com/mcfarland_thistle/article_b33cd824-4ee3-51f2-af4c-1b7ccc837dff.html

Public Works Open House was held Saturday, May 22 from 8 a.m. to noon, at the Public Work Department's headquarters at 5115 Terminal Drive. Due to COVID restrictions, the event was drive-thru only. It included: equipment displays, giveaways for all ages (including snacks), informational handouts to increase awareness of the Public Works Department's work.

Food Cart Frenzy – 9/15/2021

This event was put on by the Lions Club. Although it was a well-attended local community-event, it was not a great venue to engage with passerby or attendees.

Library, Ace Hardware, Village Public Works Building, Village Hall?

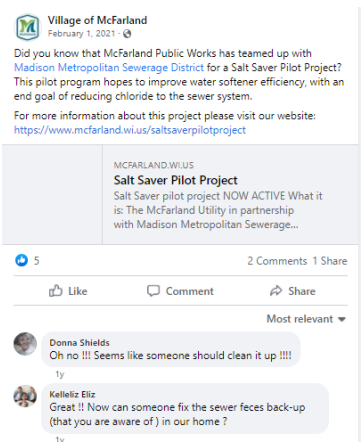
Farmer's Market - (Thursday) from 2-6 p.m throughout the summer 2021.

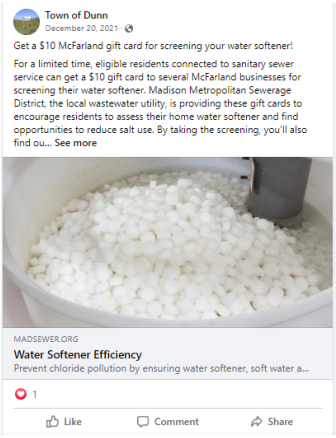
We found that this was a difficult spot to engage with folks at. Towards the end of the summer, we just went to put up a sign, and did not stay to try and talk to folks.

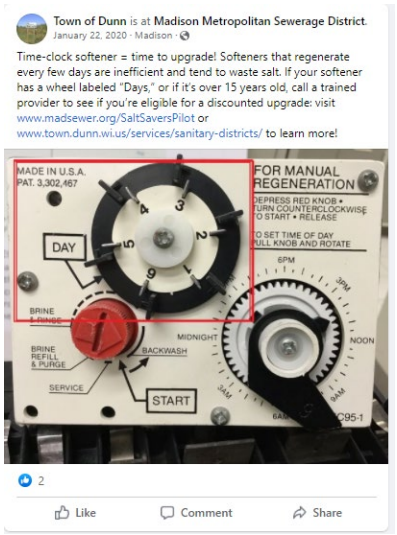
Trunk or Treat – 10/30/21

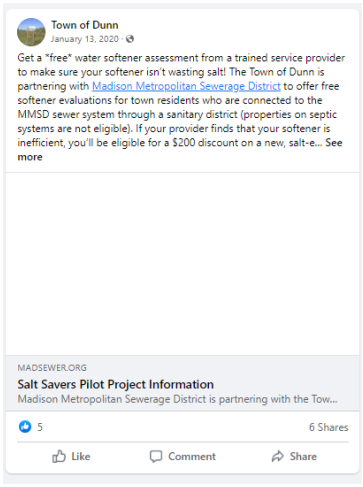
There were literally thousands of people at this event. P2 specialists handed out >400 informational fliers specific to pollution prevention, the rebate program, and logoed items.

Social Media- McFarland & Dunn Accounts









Social Media – District Accounts (excerpts)

Appendix E: Notes on Use of GIS

- working with multiple municipalities, running different format programs, we had to build surveys for each one, meaning the providers had to select a different survey depending on where they're at.
- Reverse geocoding wasn't an option – created an issue.
- Hired Platform Engineer Consultant contract to help us get it off the ground
- Republishing
- Integromat was used as a substitute for Microsoft Azure. We couldn't get Azure because it would be a change through our IT Department to the Microsoft contract, but Integromat was an independent subscription $9/month. Integromat is hosted in Czech Republic, we learned later that all web traffic from any IP in the Czech Republic is blocked on MMSD network, so we could only work on this program when we were outside of the district, WFH – discovered this after already having invested because of the pandemic and working from home
-

Example Self Screen Feature Report

Madison Metropolitan Sewerage District
1610 Moorland Road • Madison, WI 53713-3368 • P: (608) 222-1201 • F: (608) 209-2129

WATER SOFTENER SELF-SCREEN SUMMARY and REBATE INFORMATION

Thank you for completing the online water softener self-screen! By assessing your water softener and your home salt use, you've taken the first step to protecting local streams from salt pollution.

To learn more about reducing salt use in and around your home, visit www.madsewer.org/HomeSaltReduction.

Contact information:

Name:	
Email address:	
Street address:	
Municipality/sanitary district:	Town of Dunn
Connected to sewer system?	Yes
Eligible to participate in pilot?	**Yes**

Discount qualification

Based on your responses to the self-screen, you preliminarily qualify for a **$200 discount** off the installation of a new, efficient softener by a trained service provider. The service provider will confirm that you qualify for this service, and the amount is subject to change if your service provider determines that any of the qualifying criteria in this report is inaccurate.

Your recommendations:

Based on your responses to the softener self-screen, we recommend you take the actions below to ensure that your softener is using as little salt as possible.

Appendix F: Full-Line vs. Hot Only Cl- Reduction Potential

Softening only hot water puts the chloride concentration in the range of compliance with water quality standards, while softening both hot and cold results in a concentration above the current 395 mg/L standard the District is working to achieve.

Pursuing a tactic that encourages softening less water takes pressure off of installing high-efficiency softeners and subsequently maintaining high efficiencies as the softeners inevitably age and loose efficiency. The following comparison illustrations how when less water is softened overall, even lower-efficiency softeners can produce an average concentration in discharge that is within the target range.

Comparison:

	40% of home water softened; 4000 grain per pound softener	**90% of home water softened; 4000 grain per pound softener**
Pounds of salt per gallon of water softened at 25 grains per gallon hardness	160 gallons softened per pound of salt	160 gallons softened per pound of salt
Gallons water softened per month if total water use of home is 3800 gallons per month*	1520	3420
Salt use per month, per home	9.5 pounds per month	21.4 pounds per month
Total salt use per month among 747 new homes/year**	7097 pounds per month	15,986 pounds per month
Chloride contribution to plant per day (avg.)	140 lbs. per day	314 lbs. per day
Difference in chloride mass contribution	-	**174 lbs. per day**
Average chloride concentration	**180 mg/L**	**405 mg/L**

*Assume 3800 gallons of water used per month by these homes (50 gallons pp/day * 2.5 people per home * 30.5 days/month)

** Assumes According to Wisconsin Builders' Association, there were 1245 new single-family housing permits in Dane County in 2019. Assumes 60% of those were in the service area – 747 homes

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GLOSSARY & ABBREVIATION LIST

DNR – Wisconsin Department of Natural Resources

EPA – also known as US EPA, the United States Environmental Protection Agency

GPD – Gallons per day. How wastewater flow was measured for this study.

High Efficiency Softener – A water softener that removes 4,200 grains of hardness per pound of salt or greater is considered a high efficiency softener. Older model softeners usually remove 0-3500 grains per pound of salt.

MMSD – Madison Metropolitan Sewerage District

MWU – Madison Water Utility

Non-parametric statistical technique – a statistical technique that does not depend on the assumption that measurements fall into a "Normal Distribution"

Optimized – in the context of water softener optimization, means that the water softener's operating parameter, pounds of salt used per cubic foot of softener resin, will be set in existing water softeners to an agreed upon amount which will be lower than the typical settings of older water softeners

Service provider/Water quality professional – people who have expertise and licensure in water softener appliances and/or plumbing.

Sewershed – an area where all wastewater drains to a single manhole for the sanitary sewer system

WPDES – Wisconsin Pollutant Discharge Elimination System