



# NORTHERN WATER INDOOR WATER AUDITS FOR COMMERCIAL AND INSTITUTIONAL CUSTOMERS

Brendle Group Pilot Program Evaluation Report | January 7, 2022

Pilot Program At-A-Glance		
	<b>9</b> audits performed	Average cost of audit <b>\$2,335*</b> <small>*Including cost to distribute fixtures</small> 
	<b>27.2 MG</b>	The audits analyzed buildings that use this much water annually
The audits recommended conservation measures that would save this much water annually	<b>3.1 MG</b>	
	<b>414</b> water-efficient aerators and showerheads were distributed to program participants	
The distributed aerators and showerheads save this much water annually	<b>0.8 MG</b>	

Program Recommendations At-A-Glance	
<b>Program Management</b>	<ul style="list-style-type: none"> <li>Continue offering this program, as it fills a market gap by making CII indoor audits available to commercial entities located within the service boundaries of 46 out of 49 allottees that are public water systems.</li> <li>Continue detailed audit participant tracking through the process, from customer application to audit outcomes.</li> <li>Set up separate time codes for each audit if detailed audit cost is important to track.</li> </ul>

## Program Recommendations At-A-Glance

### Program Design

- Program Eligibility
  - Include restaurants and multi-family buildings as eligible properties using the same tool and audit protocol.
  - Evolve the program to include industrial customers and specialized auditing tools.
- Data Request Form
  - Drop request for building plans.
  - Add a sample water utility bill.
  - Add a check box confirming the customer and/or qualified representative will accompany the auditor during the site visit.
- Audit Delivery Protocol
  - Keep in-person site visits.
  - Consider dropping the remote audit offering.
  - Consider adding in a more thorough assessment of the energy-water nexus.
  - Add in a more thorough assessment of operational and behavioral water use.
  - Interview other water utilities that offer CII indoor audits to compare approach, cost, outputs, and level of implementation support.
- Implementation Support
  - Continue offering free aerators and showerheads, as this offering was popular with school participants who lack funds to purchase equipment but can work with students and staff to install what was provided through the program.
  - Bring free fixtures on site visits and install as the site visit is being conducted.
  - Continue providing information on relevant rebates and incentives to defray project implementation costs.
- CII Water Assessment Tool
  - Continue modifying the tool as needed to represent current market offerings for water efficient equipment that exceed WaterSense standards.
  - Continue analyzing multiple years of water use data in a separate excel workbook, then enter a representative year or average values into the tool.
  - Continue to derate bathroom water use in schools if needed to make the water balance work.
  - Continue to recommend water measures that are feasible to implement.
  - Continue to assess water measures using all quantifiable co-benefits (water savings, electricity savings, natural gas savings, and more)
- Program Follow-Up
  - Consider adding a customer satisfaction survey and developing case studies and soliciting testimonials to help with recruitment.
  - Add a monitoring and verification component to check back with participants to determine which measures were implemented and how actual water savings compared to estimated water savings.

Program Recommendations At-A-Glance	
<b>Recruitment</b>	<ul style="list-style-type: none"> <li>• Continue using Northern Water’s stakeholder meetings to advertise the program offering.</li> <li>• Continue using direct connections between allottees, Northern Water, and the program vendor to recruit participants.</li> <li>• Use the list of “interested parties” in the audit participant tracking workbook to kickstart recruitment.</li> <li>• Revisit the program objective to recruit rural customers, which was not successful during the pilot program.</li> <li>• Use a more concerted and coordinated outreach campaign, working in conjunction with allottees. <ul style="list-style-type: none"> <li>○ Develop strategic recruitment partnerships with public water systems to market the program and recruit participants. Connect with 15 identified allottees who are assessed to have interest in promoting this program.</li> <li>○ Consider recruiting allottees that represent sites or campuses that themselves may be good candidates for program participation. Connect with 7 identified allottees who are assessed to meet these criteria.</li> </ul> </li> </ul>
<b>Sharing Program Outcomes and Successes</b>	<ul style="list-style-type: none"> <li>• Continue using Northern Water’s stakeholder meetings to report on program outcomes.</li> <li>• Include program reports and outcomes in annual reporting to WaterSense and award applications.</li> </ul>

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## INTRODUCTION

Northern Water collects and delivers supplemental water from the West Slope to 1,021,000 residents and 614,000 acres of irrigated farmlands in northeast Colorado within the Colorado-Big Thompson (C-BT) Project, which delivers 223,000 ac-ft/yr on average (S. Smith, personal communication) and 310,000 ac-ft/yr maximum (US Bureau of Reclamation, n.d.). Thirty-three municipalities receive a portion of their water through the C-BT Project, along with 120 ditch, reservoir, and irrigation companies, and six industrial users (Northern Water, 2021). Entities that own shares in the C-BT Project are referred to as “allottees” owning water allotments.

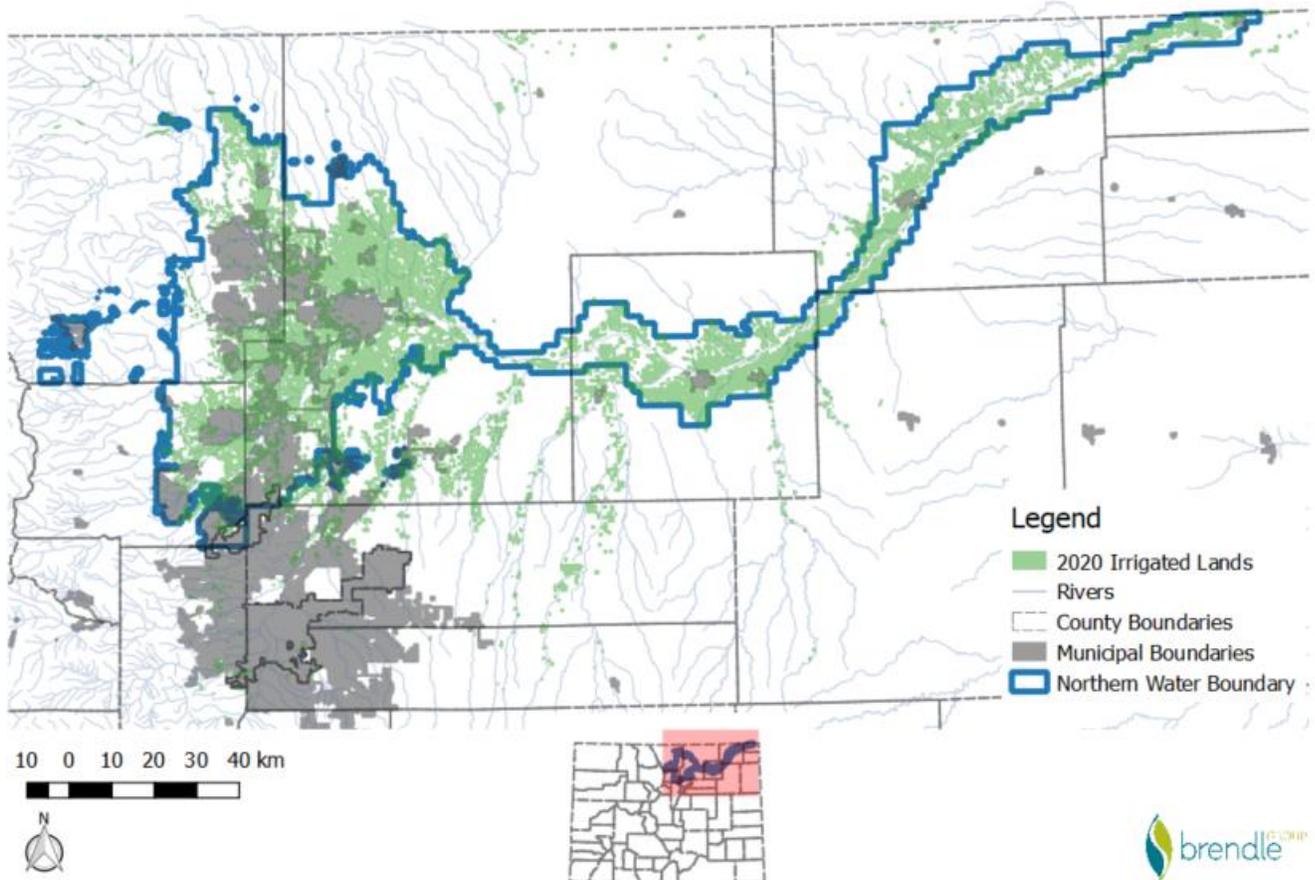


Figure 1. Northern Water Service Area

In 2018, Northern Water initiated a regional water efficiency program. The program delivers water conservation programs to commercial properties and homeowner’s associations whose water utilities own shares in the C-BT Project (i.e., municipal and rural domestic water allottees). Initial conservation programs offered by Northern Water emphasized efficient outdoor water use through irrigation system audits, landscape transformations, and training.

In 2021, Northern Water contracted with Brendle Group to pilot a conservation program delivering indoor water audits to commercial and institutional customers.

This report contains an evaluation of the 2021 pilot program, market research, and recommendations for future iterations of the program, if offered again by Northern Water.

## 2021 PILOT PROGRAM EVALUATION

The following sections provide a brief description of the scope of the 2021 pilot program by task; outcomes that demonstrate the program reach and impact, or that can be reused by Northern Water in future program offerings; and lessons learned to inform future program offerings.

**Appendix A: Scope of 2021 Pilot Program** contains the full pilot scope.

### TASK 1 - PROJECT MANAGEMENT

The project management task included:

- Project setup, kickoff meetings, and monthly invoicing
- Internal team coordination meetings (within Brendle Group)
- External team coordination meetings (with Northern Water)
- Audit status tracking to support Brendle Group’s workflows and Northern Water’s management reporting requirements

### OUTCOMES

The audit tracking workbook was used to track audit status information and outcomes for audits that were delivered (**Table 1**).

*Table 1. Audit Tracking Fields*

Tracking Field	Tracking Entries
Customer Name	Name of customer
Facilities Being Audited	Name of facility being audited
Notes	Important notes and reminders
Audit Lead	Brendle Group’s lead auditor
Dates	<ul style="list-style-type: none"> <li>• Application Received</li> <li>• Signed Waiver Received</li> <li>• Application Approved</li> <li>• Initial Contact Made</li> <li>• Data Request Sent</li> <li>• Data Received</li> <li>• Follow Up Interview Scheduled</li> <li>• Follow Up Interview Completed</li> <li>• Site Visit Scheduled</li> <li>• Site Visit Completed</li> <li>• Water Use Analysis Completed and Tool Populated</li> <li>• Draft Report Sent</li> <li>• Audit Results Meeting Scheduled</li> <li>• Final Report Sent</li> </ul>
Audit Cost	Estimated audit cost
Annual Water Use (gal/yr)	Based on customer-provided utility data
Identified Water Savings (gal/yr)	All identified water savings, regardless of implementation feasibility
Recommended Water Savings (gal/yr and % of annual water use)	Recommended water savings, based on payback period and implementation feasibility
Estimated Annual Cost Savings (\$/yr)	Includes water, electricity, and natural gas savings
Name of Audit Report	<ul style="list-style-type: none"> <li>• Draft Report Name</li> <li>• Final Report Name</li> </ul>
Water Provider	Potable water provider
Other Water Sources	Raw water or other sources used on-site
Implementation Support	<ul style="list-style-type: none"> <li>• # of 0.5 gpm aerators that could be easily replaced</li> <li>• # of 1.5 gpm aerators that could be easily replaced</li> <li>• # of 1.5 gpm showerheads that could be easily replaced</li> <li>• Water savings equivalent (kgal/yr)</li> </ul>

The tracking workbook also contains a list of applications that were not eligible under current criteria (due to industrial water use), entities that expressed interest but did not complete the application process, and entities that expressed interest, but the audit could not be completed within the project period. Northern Water can use this information to kickstart the program if offered again.

The final audit tracking workbook is contained in **Appendix B: Audit Tracking Workbook**.

### **LESSONS LEARNED & RECOMMENDATIONS**

For future program years, Brendle Group recommends setting up separate time codes for each audit, if audit cost is important to track. We used one time code for all audits, and therefore had to estimate costs per audit based on which ones were active each month.

### **TASK 2 – PILOT DESIGN AND PREPARATION**

The pilot design and preparation task included:

- **Finalizing pilot design and scope:** The 2021 pilot program was open to any office, institution, municipal facility, church, hotel, or school whose water provider is a Northern Water municipal or rural domestic allottee. Industrial customers and irrigation use were not eligible for the program. Northern Water was particularly interested to promote participation in rural counties. The pilot program offered in-person site assessments as well as virtual site assessments due to the COVID-19 pandemic and associated public health guidelines.
- **Recruiting and marketing the program:** Northern Water led program marketing and recruitment efforts. Brendle Group introduced the program at the April 30, 2021 Northern Water stakeholder meeting where the new season of efficiency programs was officially launched. Brendle Group also did direct outreach to allottees where we had direct contact with a water provider through another project.
- **Developing the audit and reporting tools and protocol:** Brendle Group started with version 1.5 of the [CII Water Assessment Tool](#) developed by the City of Boulder, Colorado WaterWise, and Brendle Group. However, Brendle Group made minor tool modifications (represented as version 1.6) and developed a separate report template to address requests from Northern Water, specifically to include efficiency benchmarking and rebates available to defray water measure implementation costs.

## OUTCOMES

Materials were developed during the Pilot Design and Preparation task that can be updated and repurposed if the program is offered again:

- Northern Water developed a program flyer<sup>1</sup>, informational website<sup>2</sup>, and application website<sup>3</sup> (not included in this report).
- The stakeholder presentation developed by Brendle Group is included in **Appendix C: Stakeholder Meeting Presentation**.
- The CII Water Assessment Tool version 1.6 is included as **Appendix D: Audit Tool**.
- **Appendix E: Audit Materials** contains:
  - Site Packing List
  - On-Site Safety Plan
  - Data Release and Waiver of Liability
  - Data Request
  - Audit Report Template

## LESSONS LEARNED & RECOMMENDATIONS

- **Pilot design and scope**
  - The pilot program was most successful with schools and municipal facilities. No hotels applied to the program. Restaurants and multi-family buildings (where classified as commercial) could be added to the program in future years.
  - One industrial applicant was interested in an audit but was ineligible under the current program. Industrial users could be added to the eligibility list in future years, but specialized knowledge and tools are needed to conduct industrial audits, so the audits would be more expensive.
  - The pilot program was not successful in recruiting participants from rural areas, as all audit participants were in the Front Range. This proximity helped keep travel costs down but did not achieve an expressed objective of the pilot program.
  - All audits except the Northern Water test audit included an in-person site visit. The remote site assessments were not a popular offering based on customer preferences, and most sites lacked up-to-date, accurate building plans necessary to facilitate virtual audits.
  - The original pilot program scope did not include implementation support in the form of providing free fixtures to participating customers. The pilot was modified to include giveaways of 0.5 gpm aerators, 1.5 gpm aerators, and 1.5 gpm showerheads. This offering was popular with the school participants who lack funds to purchase equipment but can work with students and staff to install what was provided through the program.

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<sup>1</sup> [https://www.northernwater.org/getattachment/ac170ca6-ffb3-4246-9a14-8e8146536da4/Audit\\_Services.pdf](https://www.northernwater.org/getattachment/ac170ca6-ffb3-4246-9a14-8e8146536da4/Audit_Services.pdf)

<sup>2</sup> <https://www.northernwater.org/what-we-do/protect-the-environment/efficient-water-use/consultations-and-audits>

<sup>3</sup> <https://www.northernwater.org/auditapplication>

- **Recruiting and marketing the program**
  - Recruitment to the program was tricky, as Northern Water and Brendle Group have the most direct contact with allottees, rather than eligible customers. While personal connections were adequate this year to fill the pilot program, future years may need a more concerted and coordinated outreach campaign, working in conjunction with allottees.
- **Audit tools and supporting materials**
  - The most frequent gap in completing the audit report was needing to get meter size from the customer. The data request form should be modified to request a water utility bill which includes this information.
  - The CII Water Assessment Tool uses WaterSense standards for equipment and appliance upgrades; however, current market offerings can exceed WaterSense standards (e.g., showerheads, toilets). Brendle Group modified the CII Water Assessment Tool to recommend 1.5 gpm showerheads and 1.28 gpf toilets.
  - The CII Water Assessment Tool only allows one year of utility data to be entered. Brendle Group used a separate Excel workbook to analyze the full period of record provided by the customer to identify periods of apparent leaks and unusual water use, and to calculate average water use values that were entered into the tool. Periods with obvious leaks and periods with unusually low water use due to COVID-related closures were excluded from analysis of typical water use.
  - Within the CII Water Assessment Tool, it was common to have to “derate” bathroom use in schools for the end use water balance. Brendle Group found the same need when delivering water audits under the Energy Savings in School program for the Colorado Energy Office.
  - The CII Water Assessment Tool focuses on consumptive end uses and does not explicitly look at water-using heating and cooling systems such as water heaters, boilers, and cooling towers, unless a system leak is apparent in the water use data. The tool does not examine in detail water use that is determined by human behavior, such as defrosting foods using running water. Future program offerings could look to better address these “operational” water use topics as part of the site visit and customer interviews.

### TASK 3 – PILOT EXECUTION

The Pilot Execution task included scope for ten audits. The first audit was conducted at Northern Water’s administration building to develop the audit protocol, tool, and report. This test audit may not be needed in future program years. During contracting, audit costs were estimated based on a standard audit that was assumed to take 12 hours, equivalent to a unit cost of \$2,000 per audit.

## OUTCOMES

**Table 2** contains a summary of metrics that describe the reach and impact of the pilot program.

*Table 2. Pilot Program Evaluation Metrics*

Characteristic	Results
Number of Audits	9
Average Audit Cost	\$2,335 (includes cost to purchase and distribute fixtures)
Days from Application to Completion	76-185
Customer Type	1 office building 1 police department 6 schools 1 combined school/church
Customer Location	Berthoud - 1 Greeley - 1 Loveland - 6 Longmont - 1
Annual Water Use (gal/yr)	Range: 429,000 – 13,188,000 Total: 27,165,000 Average: 2,909,444
Identified Water Savings (gal/yr)	Range: 73,900 – 1,371,000 Total: 3,979,900 Average: 442,211
Recommended Water Savings (gal/yr)	Range: 73,900 – 1,052,000 Total: 3,107,900 Average: 345,322
Recommended Water Savings (%)	Range: 5-27% Total: 11% (sum of water savings / sum of water use) Average: 16% (average of percent savings values)
Estimated Annual Cost Savings (\$/yr)	Range: \$200 - \$14,560 Total: \$35,830 Average: \$3,981
0.5 gpm aerators distributed	283
1.5 gpm aerators distributed	65
1.5 gpm showerheads distributed	66
Water savings equivalent of distributed fixtures (kgal/yr)	845

Nine (9) of the ten (10) planned audits were delivered during the 2021 pilot program. Though two applicants were identified for the tenth audit, neither could be completed during the program period; both applicants were added to the 2022 waitlist.

The audit delivery costs averaged \$2,335 and represented labor expenses to conduct the full audit, from customer application to purchase and distribution of fixtures. These costs did not include hard costs for travel, as all audit locations were close to Brendle Group's offices.

Recommended water savings were about 80% of identified water savings. Water conservation measures were not recommended in the audit report if they did not result in significant water savings; if they had a long payback period; if there were infrastructure limitations; or if the implementation feasibility was otherwise deemed poor. Customers who implement all recommended measures are estimated to save \$200-14,560 (\$3,981 on average) per year from water, electricity, and natural gas savings combined.

The audits took 76-185 days to complete from the date of application to the date the final audit report was sent. The two steps in the process that seemed to take the longest were the customer fulfilling the data request and scheduling the site visit. Site visit scheduling delays originated from the customer (e.g., Thompson School District had bond improvements occurring in schools that delayed site visits).

Brendle Group distributed 414 water-saving devices through the pilot program to customers that will save 845 kgal/yr once installed.

### *LESSONS LEARNED & RECOMMENDATIONS*

Since fulfilling the data request appears to be a barrier, the data request form should be simplified in future years. For example, the request for building plans can be dropped for audits with an in-person site assessment and replaced with a check box confirming the customer or qualified representative will accompany the auditor through the site visit.

With the pilot program evaluation metrics presented in **Table 2**, Northern Water could interview other water utilities that offer CII indoor audits to compare the approach, cost, outputs, and level of implementation support.

Aerators and showerheads should be installed during the site visit to simplify delivery of water-efficient fixtures and to ensure they are installed.

## MARKET RESEARCH

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The following sections describe market research that was conducted during the pilot. **Appendix F: Market Research** contains all data that were collected.

### ABOUT NORTHERN WATER'S ALLOTTEES

Northern Water's Regional Water Efficiency Programs have at least two benefits. First, the regional programs help fill market gaps where allottees are not offering their own conservation programs to customers in their services areas. Second, regional programs offer positive economies of scale in delivering consistent programs across larger geographic areas (rather than each allottee administering and delivering their own programs).

Brendle Group researched Northern Water's municipal and rural domestic allottees. The outcomes of this research were:

- Determining which allottees are public water systems that serve potable water to commercial and institutional customers that are eligible for the CII indoor audit program.
- Identifying allottees who may themselves be good candidates for program participation, based on their business function.
- Clarifying where Northern Water's CII indoor audit program fills a market gap in conservation program offerings.
- Identifying allottees who may be interested to form strategic partnerships with Northern Water to jointly market the program and recruit program participants. This strategic marketing and recruitment effort is recommended in addition to the marketing and outreach done during the 2021 pilot via Northern Water's stakeholder meeting (an annual event open to all allottees) and *ad hoc* outreach with allottees.
- Compiling a list of service providers that deliver CII indoor water audits.

### FILLING MARKET GAPS IN CONSERVATION PROGRAMMING

Forty-nine (49) of the 64 municipal and rural domestic allottees were found to be public water systems. Very few of these allottees currently appear to offer CII indoor audit programs:

- Boulder
- Fort Collins
- Greeley (based on their conservation website, though personal communications indicate the program has been dormant, and Greeley is looking to revive it in 2022)

Based on this research, Northern Water's program is indeed filling a market gap by making CII indoor audits available to commercial entities located within the service boundaries of 46 out of the 49 allottees that are public water systems.

## FORMING STRATEGIC PARTNERSHIPS FOR PROGRAM MARKETING AND RECRUITMENT

Allottees were categorized based on potential interest in supporting Northern Water’s CII indoor audit program. This interest was subjectively assessed based on three factors: (1) how significant commercial water use is within the allottee’s service area, (2) whether the allottee’s water efficiency plan recommends CII indoor audits be offered as a future program, and (3) whether the allottee offers their own audit program already. Based on these factors, 15 allottees were identified that are recommended for approach by Northern Water to gauge interest in developing a strategic partnership to promote the program (**Table 3**). The summary table does not include allottees who were assessed to have low potential interest in the program; full information is contained in **Appendix F: Market Research**.

*Table 3. Allottees Prioritized for Strategic Program Marketing and Recruitment*

Allottee	Allottee Type	Commercial Water Use	Interest Assessment	Other Notes
Broomfield	Municipal	1,476 ac-ft/yr (13%)	Medium	Water efficiency plan expresses interest
Dacono	Municipal	850 ac-ft/yr (14%)	Medium	Water efficiency plan expresses interest
Estes Park	Municipal	574 ac-ft/yr (35%)	High	Water efficiency plan highlights that top water users are almost all hotels and indoor audits are of interest. Other top users include schools and the medical center.
Evans	Municipal	788 ac-ft/yr (15%)	Medium	Evans is launching their water conservation program now, has decent CII use, and has expressed interest in a CII audit program.
Fort Morgan	Municipal	592 ac-ft/yr (15%)	Medium	Water efficiency plan expresses interest
Greeley	Municipal	8,409 ac-ft/yr (43%)	High	Participated in 2021 pilot; Looking to restart commercial audit program; has good rebates for implementation support
Longmont	Municipal	2,533 ac-ft/yr (18%)	Medium/ High	Supported 2021 pilot. Not sure of status of audit program with PACE in Boulder County. Has good rebates available through Efficiency Works.
Louisville	Municipal	670 ac-ft/yr (20%)	Medium	Water efficiency plan expresses interest
Loveland	Municipal	2,004 ac-ft/yr (14%)	Medium	Water efficiency plan expresses interest for largest commercial users. Has good rebates available through Efficiency Works.
Lyons	Municipal	Unknown	Low/ Medium	Sustainability Action Plan calls for development of an audit program to better understand commercial water use.
Superior	Municipal	274 ac-ft/yr (8%)	Low/ Medium	Relatively low CII use but interest expressed in water efficiency plan for audits for large water users. They are listed by name and there are only a few, so outreach could be very targeted.

Allottee	Allottee Type	Commercial Water Use	Interest Assessment	Other Notes
Fort Collins-Loveland Water District	Rural Domestic	264 ac-ft/yr (6%)	Low/Medium	Relatively low non-residential water use but some interest in the program is expressed in the water efficiency plan, though partnership with Fort Collins may be a feasible program delivery pathway.
Left Hand Water District	Rural Domestic	427 ac-ft/yr (11%)	Low/Medium	Offered a CII indoor audit program previously with Great Western Institute but discontinued due to low participation; water savings were judged successful.
Little Thompson Water District	Rural Domestic	1,148 ac-ft/yr (17%)	Low/Medium	Decent CII water use coupled with some interest in the program. water efficiency plan lists office buildings and schools as key commercial sectors.
Morgan County Quality Water District	Rural Domestic	1,148 ac-ft/yr (48%)	Low/ Medium	Confused interest expressed. Seemingly high non-residential use. Water efficiency plan states that commercial customers have financial incentive to reduce their water use and this program is deemed unnecessary, but then calls for the District to perform 5 per year.

### RECRUITING ALLOTTEES TO PARTICIPATE

Some of the rural and domestic allottees represent sites or campuses that themselves may be good candidates for program participation. Seven (7) allottees were identified for recruitment to the program based on the nature of their businesses (**Table 4**).

*Table 4. Allottees Prioritized for Direct Program Participation*

Allottee	Business Description
Eden Valley Water Company	Wellness campus
Emissaries of Divine Light	Spiritual retreat campus
Latter Day Saints, Corp of the Presiding Bishop of the Church of Jesus Christ	Church/administrative offices
Ptarmigan Acquisition, LLC	Country club/restaurant
Resthaven Colorado LLC	If the allottee represents the funeral home, not the cemetery.
Woodward Governor	Offices/manufacturing
YMCA of the Rockies	Restaurants/church/lodging

### IDENTIFYING VENDORS THAT PROVIDE CII INDOOR AUDIT SERVICES

Few service providers that provide CII indoor audit services were identified:

- [Partners for a Clean Environment \(PACE\)](#) – serves Boulder County, indoor water assessments seem to be bundled within sustainability assessments.
- Great Western Institute – could not find a website, may no longer be active

## ABOUT CUSTOMER SEGMENTS

Ultimately, Northern Water must recruit commercial customers (e.g., hotels, schools, office buildings, municipal buildings, restaurants, and retail stores, based on program eligibility) to participate in the CII indoor audit program. Brendle Group estimated the number of businesses located within the service boundaries of the municipal allottees, using publicly available websites (**Table 5**).

*Table 5. Estimated Business Count by Customer Type*

Business Type	Estimated Number	Data Source & Notes
Hotels	176	<a href="#">Kayak Hotel Search</a> <ul style="list-style-type: none"> <li>• Search by City, State</li> <li>• Click check box for “&lt;City Name&gt; Properties Only”</li> <li>• Unselect rental properties</li> <li>• Use property count in hotels dialog box</li> </ul>
Schools	827	<a href="#">GreatSchools.org Search</a> <ul style="list-style-type: none"> <li>• Search by City, State</li> <li>• Select “Schools in &lt;City Name&gt;, CO” in search dropdown</li> <li>• Use school count in results dialog box</li> </ul>
Restaurants	2,211	<a href="#">Yelp search</a> <ul style="list-style-type: none"> <li>• Enter “Restaurants” into the Find dialog box</li> <li>• Enter City, State into the Near dialog box</li> <li>• Check the mapped extent of search results – adjust distance criteria if needed to better align with City boundaries</li> <li>• Navigate to the last page of results and use the number of returned results</li> <li>• Note: It appears that Yelp will return a maximum of 240 results, so results for Fort Collins, Greeley, and Longmont are reported as 240+ in <b>Appendix F: Market Research</b>.</li> </ul>

Reliable, publicly available, free databases were not identified for office buildings, municipal buildings, and retail shops. It may be possible to extract this information from County assessor databases, but that effort was beyond the scope of this effort.

**Appendix F: Market Research** contains the business counts for each allottee, as well as more detailed information extracted from water efficiency plans where available.

## CONCLUSIONS AND ADDITIONAL RECOMMENDATIONS FOR FUTURE YEARS

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The 2021 pilot program was successful in demonstrating that meaningful water savings potential exists in the commercial indoor sector. If Northern Water continues to offer this program in future years, the program could be expanded to add new elements, including:

- **Monitoring & Verification:** Checking back with program participants to determine which water measures were implemented and to gather water use data to assess how actual water savings compare to estimated water savings.
- **Customer Satisfaction Survey:** A customer satisfaction survey could be useful to help hone the program offering and to solicit testimonials and content that could be used to develop case studies and help recruitment.

### REFERENCES

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Northern Water. (2021). *Colorado-Big Thompson Project*. Retrieved Nov 12, 2021, from <https://www.northernwater.org/Home/Page/ce5e78af-35f1-40fb-b4b7-8334a1c394fb>

US Bureau of Reclamation. (n.d.). *Colorado-Big Thompson Project*. Retrieved Nov 12, 2021, from Projects and Facilities: <https://www.usbr.gov/projects/index.php?id=432>

## APPENDIX A: SCOPE OF 2021 PILOT PROGRAM

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### TASK 1. PROJECT KICKOFF AND MANAGEMENT

Under Task 1, Brendle Group will kick off the project with Northern Water, hold monthly coordination calls for the duration of the project (assumed to be six months), and submit monthly invoices.

### TASK 2. PILOT DESIGN AND PREPARATION

Under Task 2, Brendle Group will work with Northern Water's Water Efficiency Department to confirm the pilot design, including the elements and assumptions described below:

- **Scope of program services:** This pilot program is intended to provide indoor water audit services to commercial and institutional customers. Industrial customers and outdoor irrigation use are assumed not to be included in this program.
- **Geographic locations being served:** Any CII customer served by one of Northern Water's allottees will be eligible for the pilot program. Northern Water is particularly interested to expand services to some of the northeastern counties such as Morgan and Sedgwick.
- **Types of customers being served:** Any CII customer served by one of Northern Water's allottees could be eligible for the program. Previous research has identified CII customer types that tend to be common across service areas (auto/auto service, eating/drinking places, health care facilities, lodging, office buildings, religious buildings, retail outlets, retirement/nursing homes, schools, and warehouses). To demonstrate success, the pilot program should focus on one customer segment with high water use and facilities that include a large number of fixtures and appliances, large water features like pools, and kitchen and laundry facilities. Brendle Group therefore proposes to focus the pilot program on hotels.
- **Audit delivery method and protocol:** Given the uncertainty and limitations that come with the COVID-19 pandemic, Brendle Group proposes to deliver the audits remotely to demonstrate the cost-effectiveness of delivering services to CII customers and to take advantage of technology (videoconferencing) and data (smart meter) capabilities and innovations. The remote audit is proposed to include: 1) a customer data request, 2) analysis and draft recommendations, 3) a virtual meeting/walk through of the facility with the customer, and 4) a recommendations report and meeting with the customer. Brendle Group will develop an audit protocol that covers each of these steps in more detail.
- **Marketing and outreach materials and recruitment plan:** Given the size of the proposed pilot, developing marketing and outreach materials may not be necessary at this time. Marketing and outreach may instead be more effectively delivered through a presentation at Northern Water's water efficiency workshop proposed for Jan 2021 or through e-mailed outreach to allottees. Whatever the approach, Brendle Group has scoped a supporting role to aid Northern Water in these efforts.
- **Tool selection and preparation:** Brendle Group intends to use the CII Water Assessment Tool developed by Brendle Group, Boulder, and Colorado WaterWise. Brendle Group has included minimal scope to make minor changes to the tool, such as changing WaterSense standards if needed. Brendle Group may consider using other freely available tools where available if better suited to a particular customer segment.

### TASK 3. PILOT EXECUTION

Under Task 3, Brendle Group anticipates delivering seven water audits, one of which will take place at Northern Water's administrative building in Berthoud to test the audit protocols and tools. The audits will be billed based on actuals hours worked and actual expenses incurred (if applicable), but for cost estimation purposes, a standard audit was assumed to include the following:

- **Step 1: Data request:** 1 hour of technical time to request and receive data.
- **Step 2: Data analysis and draft recommendations:** 6 hours to analyze data and develop draft recommendations.
- **Step 3: Virtual meeting/walk through with the customer:** 1 hour of administrative time to schedule plus 4 hours to conduct the walk through.
- **Step 4: Final recommendations report and customer follow-up:** 4 hours of technical time to prepare the report, have a follow-up consultation with the customer including a feedback survey, and aggregate the audit reports into the reporting needed by Northern Water.

### TASK 4. PILOT EVALUATION REPORT

Under Task 4, Brendle Group will prepare a technical memorandum that includes recommendations for program continuation and/or expansion. The technical memo will attempt to quantify by customer type the potential number of customers and water savings in Northern Water's service area, as well as recommendations for improving program delivery and outcomes based on the pilot. The audit tool, protocol, and summary of audits delivered through the pilot program will be delivered as attachments to the memo.

## APPENDIX B: AUDIT TRACKING WORKBOOK

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*The audit tracking workbook is included in a separate Excel workbook.*

## APPENDIX C: STAKEHOLDER MEETING PRESENTATION

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*The stakeholder meeting presentation is included in a separate PowerPoint file.*

## APPENDIX D: AUDIT TOOL

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*The audit tool is included in a separate Excel workbook.*

## APPENDIX E: AUDIT MATERIALS

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### SITE PACKING LIST

- Clip board with fixture inventory/water audit template and pen
- Site floorplan, if available
- List of outstanding data questions, including historical water use graph for review
- Audit application materials for reference
- Flow bag
- Flashlight
- Camera
- Multi-purpose tool (not used regularly, just in case)
- COVID-related safety items
  - Hand sanitizer
  - Thermometer
  - Face masks

### ON-SITE CHECKLIST

1. Read & sign COVID safety page including that we have taken temps and the onsite safety rules we agree to adhere to
2. Sit down discussion
  - a. Laptop to fill out any missing data
  - b. Discuss what we want to look at on site
  - c. Get a site map if applicable (fire egress maps work well) to mark location of equipment
3. Go look at equipment and fixtures and take measurements
4. Review logged building automation system (BAS) data if applicable

### ON-SITE SAFETY PLAN

Brendle Group is committed to meeting our contractual commitments while serving our customers safely and with the protection of our employees and customers as top priorities. We acknowledge that safety requirements vary when serving commercial end users, based on local municipal requirements, business functions, number of employees, public interface, facility conditions, and leadership enforcement of safety requirements. We also acknowledge it may be easier for some employees than others to perform site-based services depending on their health history, risk profiles, and other personal circumstances. This safety plan provides flexibility in assisting the employee and Brendle Group in determining whether a site visit can be performed safely and how to perform services safely before, during and after the site visit. We assume if a site-based service is requested, all participants in that site-based service accept these terms and will abide by the requirements described herein. These safety measures described below will be in effect until further notice.

**SYSTEM OF SAFETY PROTOCOLS**

Multiple levels of government result in a system of safety protocols. The following image illustrates the elements to be considered by audit personnel when deciding if an audit can safely be delivered in person and what rules apply.



**PROPOSED SAFETY PLAN FOR ON-SITE VISITS**

In preparation for potential on-site verifications of work performed in coordination with current contractual agreements with Northern Water, Brendle Group has compiled recommendations to remain safe while conducting fieldwork.

Brendle Group employees will not perform a site visit if they, or individuals they meet with on site:

- 1. Have traveled within the past 7 days via airplane or cruise ship. This restriction is waived for people who are fully vaccinated, defined as at least 2 weeks have elapsed since the final vaccine dose has been administered; or
- 2. Have tested positive for COVID-19 (or have had close contact with someone who has) within the past 14 days, where close contact is defined as within 6 feet for more than 15 min; or
- 3. Are exhibiting one or more COVID-19 symptoms (or have had close contact with someone who is) within the past 14 days. Symptoms include fever, cough, shortness of breath, fatigue, muscle aches, headache, loss of taste or smell, sore throat, congestion, nausea, and/or diarrhea.

Once the 7-day period has passed and all individuals that attend the site visit pass the above criteria, site visits may be held following our safety guidelines below.

## BEFORE THE VISIT

In advance of a site visit, several questions and documentation should be considered in preparation. A site visit should be determined appropriate before taking steps to prepare.

### *Is a site visit appropriate?*

Brendle Group will evaluate each site visit against the following statements. If a site visit does not align with all statements, Brendle Group may, at its complete discretion, postpone or cancel it.

- Individuals attending the site visit must meet the three COVID-19 evaluation criteria above
- Site visit is allowed by current federal, state and local rules
- Site visit is allowed by Northern Water with an approved vendor safety plan and no current restrictions in place
- Site visit is allowed by Brendle Group current safety plans
- Site visit is allowed by business customer safety plans
- Site visit is allowed by safety plans from any other organizations included in the site visit
- Site visit is essential or preferred to meeting customer service needs
- Site visit is time sensitive and cannot be postponed without adverse impacts

### *What steps should be taken to prepare?*

Once a site visit is deemed appropriate, Brendle Group employees should follow these steps to prepare the needed documentation and materials.

- Discuss any required safety documentation from the organizations involved that must be reviewed, filled out and submitted prior to the visit
- Limit site visit to only essential personnel
- Review updated safety guidelines from local, state, and federal agencies
- Gather personal protective equipment (including a face covering), hand sanitizer and documentation needed for the visit
- Plan and discuss how to minimize contact by reviewing equipment locations, access points, and safety protocols with the parties involved.
- Gather contact information from all individuals going on the site visit
- Complete as much preparation work remotely prior to onsite visit

## DURING THE VISIT

During a site visit, the following precautions must be taken throughout the visit. If health and safety become a risk while on site, the site visit may be terminated at any time.

- On the day of the visit, do a screen for symptoms etc. and confirm the list of people at the site visit with contact information for contact tracing if needed later.
- Transportation to and from the site visit must be at 50% vehicle occupancy, must maximize distance between passengers, windows are to remain open, and ventilation increased
- Limit indoor meetings to less than 10 people with social distancing rules and mask enforcement in place
- All individuals (including auditors and customers) involved in the site visit must wear a mask to cover their noses and mouths during transit and during all meetings
- Minimize direct contact with others and maintain a minimum 6-foot social distance wherever possible
- Avoid sharing materials and supplies used in the field such as measurement equipment
- Wash hands when possible, and use hand sanitizer frequently
- Avoid touching your face
- Avoid coming into contact with building exhaust or exhaust vents
- Sanitize on-site equipment
- Stop work immediately if your health or safety is at risk, or if safety protocols are not followed by anyone involved

## AFTER THE VISIT

Take the following action after a site visit.

- Wash hands using CDC guidance as soon as possible after departing the site
- Sanitize all equipment that was taken to the site, including high-contact surfaces in vehicles
- Monitor and report any COVID symptoms experienced within 14 days to Brendle Group leadership and to Northern Water's project manager

## DATA RELEASE AND LIABILITY WAIVER

### Pilot CII Participant:

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(Company Name)

### Participant Address:

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(Full Address)

### Water Provider(s):

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(Water Provider Name(s))

### *WATER RECORDS RELEASE*

Thank you for participating in the Northern Water pilot audit program for commercial, institutional, and industrial (CII) users. Brendle Group, on behalf of Northern Water, will be conducting both remote and on-site water audits. We will be requesting data directly from you, the end user, and may be additionally required to collect data from your water provider(s). In addition, as part of this pilot program, we or Northern Water will be potentially monitoring water usage over the next several years as well. The information will be used to demonstrate trends or benefits from the program and will not be used to identify individual water usage or users directly or with any third parties. All information related to individual customers and specific customer data shall remain confidential by Brendle Group, except to share program results with Northern Water. Brendle Group shall not publicly release the name, address, telephone number or any personal financial information of Pilot Participant as a current or past user of a public utility.

I hereby consent to and authorize Water Provider(s) to release water usage and billing information (DATA) to Brendle Group on my behalf. I further release Water Provider(s) and Brendle Group from any claim, demand, action, or right of action resulting from the sharing of Data by Water Provider(s) with Brendle Group.

### Authorized Participant Representative:

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(Authorized Printed Representative Name)

### Authorized Signature:

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(Authorized Signature)

**Date:** \_\_\_\_\_

**WAIVER OF LIABILITY**

Brendle Group is hereby authorized by Pilot CII Participant to perform water audits, either remotely or onsite, as part of the Northern Water Pilot CII audit program. Brendle Group, may, at Pilot CII request and Brendle Group discretion, install water-saving features such as low-flow devices or other mechanical water-savings tools. Pilot CII Participant waives liability for any malfunctions or damage during or after audits or installations. Pilot CII Participant representatives shall be responsible for checking the condition of all plumbing or other delivery features to ensure current and ongoing health.

Pilot CII Participant hereby agrees to indemnify and hold harmless Brendle Group, Water Provider, and Northern Water (Audit Providers), Audit Providers officers, agents, and employees against all liabilities, judgments, costs, and expenses arising out of, or in consequence of faucet aerator, showerhead, or other water-saving device replacement or installation by Brendle Group as part of this Pilot Project.

By this signature, Pilot CII Participant also acknowledges they have read and will adhere to Brendle Group’s On-Site Safety Plan: COVID-19 Safety Measures for Northern Water CII Audit Services.

**Authorized Participant Representative:**

\_\_\_\_\_

(Authorized Printed Representative Name)

**Authorized Signature:**

\_\_\_\_\_

(Authorized Signature)

**Date:** \_\_\_\_\_

## DATA REQUEST

To help identify water and money saving opportunities for your business, please complete the data request by sending this completed form, available documentation, or any questions to [NorthernWaterAudit@BrendleGroup.com](mailto:NorthernWaterAudit@BrendleGroup.com).

### BUILDING & OCCUPANCY INFORMATION

#### Building Identifying Information

**Property Address:** \_\_\_\_\_ **City:** \_\_\_\_\_ **State:** \_\_\_\_\_  
**ZIP:** \_\_\_\_\_

**Year of building construction:** \_\_\_\_\_ **Year of last major renovation (if applicable):** \_\_\_\_\_

**Typical Building operation** (days per year): \_\_\_\_\_

**Typical building schedule** (hours per day): \_\_\_\_\_

#### Building Water End Uses

Water End Use	Check if applicable	Fuel Type (Gas, Electric)	Water End Use	Check if applicable
Laundry	<input type="checkbox"/>	<input type="checkbox"/> Gas <input type="checkbox"/> Electric	Cooling Tower	<input type="checkbox"/>
Water Heating	<input type="checkbox"/>	<input type="checkbox"/> Gas <input type="checkbox"/> Electric	Landscape Irrigation	<input type="checkbox"/>
Space Heating	<input type="checkbox"/>	<input type="checkbox"/> Gas <input type="checkbox"/> Electric	Water Features	<input type="checkbox"/>
Evaporative Cooling	<input type="checkbox"/>	<input type="checkbox"/> Gas <input type="checkbox"/> Electric	Outdoor Cleaning	<input type="checkbox"/>
Food Service	<input type="checkbox"/>	<input type="checkbox"/> Gas <input type="checkbox"/> Electric	Other (please specify) _____	<input type="checkbox"/>

**Does the property use water not provided by water utility provider** (e.g. well water)?  Yes  
 No

If yes, explain:

\_\_\_\_\_  
\_\_\_\_\_

**Is there any non-potable water used indoors?**  Yes  No

If yes, explain:

\_\_\_\_\_  
\_\_\_\_\_

#### Employee Information

**Number of full-time equivalent employees, if available:** \_\_\_\_\_

If data are not available, estimate the average number of employees working in the building on a typical day: \_\_\_\_\_

#### Other Occupancy Information

**School Only:** Number of students enrolled: \_\_\_\_\_ **Hotel Only:** Number of beds: \_\_\_\_\_

### DOCUMENTATION

#### Water Using Fixtures & Equipment

Plumbing fixture/equipment schedule from most recent building plans (electronic format preferred)

Mechanical equipment schedule from most recent building plans (electronic format preferred)

*Water and Wastewater Bill History*

- Water Monthly bill history (minimum of 3 years, and 5 years preferred)
  - Monthly use and cost history in electronic format (Excel spreadsheet preferred)
  - Description of metered area (Indoor area, outdoor area, or both)

*Submeter data (if available)*

- Monthly use history (preferred to cover the same period as water and wastewater bill history)
  - Monthly sub-metered use history in electronic format (Excel spreadsheet preferred)
  - Description of sub-metered area

# AUDIT REPORT TEMPLATE

## FACILITY NAME CII Audit Report

Facility Address

This audit was performed on **date**, by Brendle Group ([northernwateraudit@brendlegroup.com](mailto:northernwateraudit@brendlegroup.com)). Analysis and calculations were performed using the CII Water Assessment Tool, Version 1.6. Audits are provided through Northern Water's [Water Efficiency Program](#).

### BUILDING INFORMATION & PAST EFFORTS

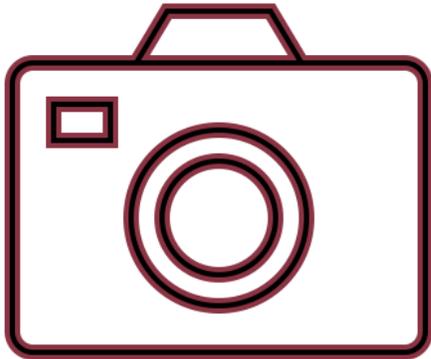


Figure 2. Facility picture

Facility information and history here.

Water use information here.

### UTILITY ANALYSIS

Average Annual Water Use (**Date Range**): **XXX** kgal/year\*

Average Annual Water and Wastewater Costs (**Date Range**): **\$XXX/year\***

\*Analysis notes.

Water use notes here.

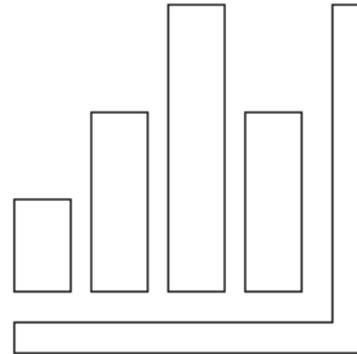


Figure 3. Water use graph

Water utility, meter size, billing rates info here.

Year (Tap Size)	Line Fee	Water Use	Other Applicable Fees	Other Applicable Fees

### WATER USE BENCHMARKING

Based on utility water use and building square footage, indoor and irrigation water use intensities were calculated and compared to benchmarks for similar building types and end uses. Based on this analysis, water use at **facility name** is **efficiency assessment and use type here**.

Water Use	Water Use (3-year average)	Area	Water Use Intensity	Efficiency Ranking	Benchmark

### END USE BREAKOUT

To understand what building systems use the most water, an end use breakout was estimated based on frequency of use and equipment water use rates. Based on this analysis, **end use notes here**.

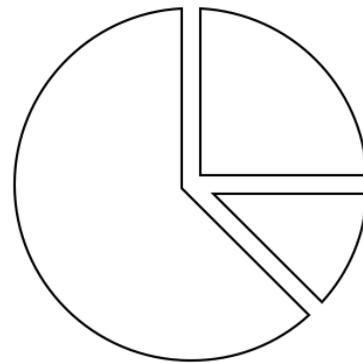


Figure 4. End use breakdown

### RECOMMENDATIONS

While **XXX** kgal (**XX**% of annual water use) of water-saving potential were identified through the audit, measures that would result in **XXX** kgal (**XX**% of annual water use) of water savings are recommended for implementation given their cost saving benefit. **Notes here on measures that are or aren't recommended.**

The section below includes more details about the recommendations on the water conservation assessment report page. The numbering below matches the numbering used in the assessment report.

1. **List of recommended measures here**

### REBATES & OTHER CONSIDERATIONS

**Relevant rebates here**

### FIXTURE INVENTORY (OPTIONAL)

An equipment inventory by room from the site visit is provided below to aid in equipment replacement.

Location	Room#	Fixture Type	Count	Flow	Note

### ASSESSMENT REPORT AND COST-BENEFIT ANALYSIS

**Add from CII Water Assessment Tool here**

## APPENDIX F: MARKET RESEARCH

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*The market research is contained in a separate Excel workbook.*