



City of Plymouth



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City Background

Plymouth is a suburb about twelve miles northwest of Minneapolis. With a population of 78,000, Plymouth is the seventh largest city in Minnesota. Additionally, Plymouth is known for its natural amenities, including 8 lakes and an extensive array of parks and trails. Plymouth provides water to its residents and businesses from groundwater sources: Prairie du Chien-Jordan, Prairie du Chien Group, and Jordan aquifers. The City of Plymouth supports water conservation and encourages practices to reduce the demand for municipal water.



"The MnTAP internship was a great opportunity for me to learn and practice skills not taught in my engineering curriculum, such as communication, project management, and economic reasoning. I am super thankful for this experience." ~ SM

Project Background

In the summer, the City of Plymouth can consume more than 430 million gallons of water monthly; more than double the monthly water consumption compared to the rest of the year. Irrigation of public and private green spaces accounts for a significant portion of increased water usage during the summer months. Steps should be taken to reduce peak water demand in the summer and conserve water year-round to ensure the existing system will continue to deliver reliable and affordable water for years to come.

Incentives To Change

Peak water consumption in the summer may strain Plymouth's groundwater sources, prompting the need for more efficient practices and equipment. The Minnesota Department of Natural Resources (DNR) manages water across the state, and has conservation goals and

"Partnering with MnTAP has helped us better understand where cost effective practices can be implemented in our community. The project was complex and challenging. The guidance and information provided by MnTAP is beneficial and will help the City implement improvements going forward."

*-Ben Scharenbroich
Interim Water Resources Manager, City of Plymouth*

SOLUTIONS

regulations regarding water losses and data collection. Reduction of water losses and improved tracking of water use can both be achieved through water auditing.

Conduct Water Audit Annually

The results from the audit of Plymouth's 2018 water consumption using American Water Works Association (AWWA) auditing tool indicate that improved data is needed before any major actions regarding leakage control are taken. The Overall Water Audit Validity Score was 72 out of 100, indicating there is room for improvement in the collection and handling of metering and billing data. Continual water auditing in the future will increase the overall data validity.

Calibrate and Volumetrically Test All Source Meters Annually

Two meters on wells at the central treatment plant had known inaccuracies. During meter calibration, a registered flow was greater than what the influent Rosemont meters would read. By calibrating all 19 source meters, the total volume supply and the total losses can be better estimated.

Solutions

Test a Sample of Customer Meters Annually

Testing customer meters regularly allows for validation of metering data. Testing a sample would also provide a gauge of the overall accuracy of the customer meter population, and determine when meter replacements or maintenance are needed.

Install Moisture Sensors at All Playfields

Soil moisture sensors allow irrigation systems to water only when needed to achieve the optimal soil moisture content. A one-month test of soil moisture sensors at Zachary Field found that water consumption was reduced by 44% compared to the original settings. It was recommended that moisture sensors be installed at all playfields irrigated by the city. This would save almost 5 million gallons of water annually.



Optimize Zone Run Times of Non-Playfields with Evapotranspiration Calculator

Evapotranspiration (ET) calculations were used to determine soil-moisture needs for irrigated spaces

with less foot traffic. Water is conserved by adjusting irrigation runtimes to provide the optimal amount of water needed to irrigate non-playfields.

Replace/Repair Flow Diverters in Showers w/Leaks

Maintenance or replacement of leaky diverters would result in water savings and natural gas used to heat lost water.

Install WaterSense Certified Aerators and Showerheads in Assisted Living Properties

Installing WaterSense certified flow aerators and showerheads in all bathrooms in the senior living buildings would reduce fixtured water use without significantly affecting performance.

Replace Common Area Washers with ENERGY STAR Certified Washers

There are nine coin-operated commercial washers in the common area at Plymouth Towne Square. On average, ENERGY STAR certified washers use 40% less water and 25% less energy than standard washers. Replacing the nine standard washers with ENERGY STAR certified washers would result in significant water and energy savings.

Recommendation	Annual Reduction	Annual Savings	Status
Conduct Water Audit Annually	Improved Data	\$0	Recommended
Calibrate and Volumetrically Test All Source Meters	Improved Data	\$0	Recommended
Test a Sample of Customer Meters Annually	Improved Data	\$0	Recommended
Install Moisture Sensors at All Playfields	4,940,000 gallons	\$11,600	Recommended
Optimize Zone Run Times of Non-Playfields with ET Calculator	790,000 gallons	\$2,000	Recommended
Replace Flow Diverters in Showers with Leaks	56,000 gallons 300 therms	\$300	Recommended
Install WaterSense Certified Aerators and Showerheads in Bathroom Faucets	1,300,000 gallons 7,700 therms	\$7,000	Recommended
Replace Common Area Washers with ENERGY STAR Certified Washers in Plymouth Towne Square	318,000 gallons 700 kWh 600 therms	\$1,000	Recommended

MnTAP Advisor: Nathan Landwehr, Waste Reduction Specialist