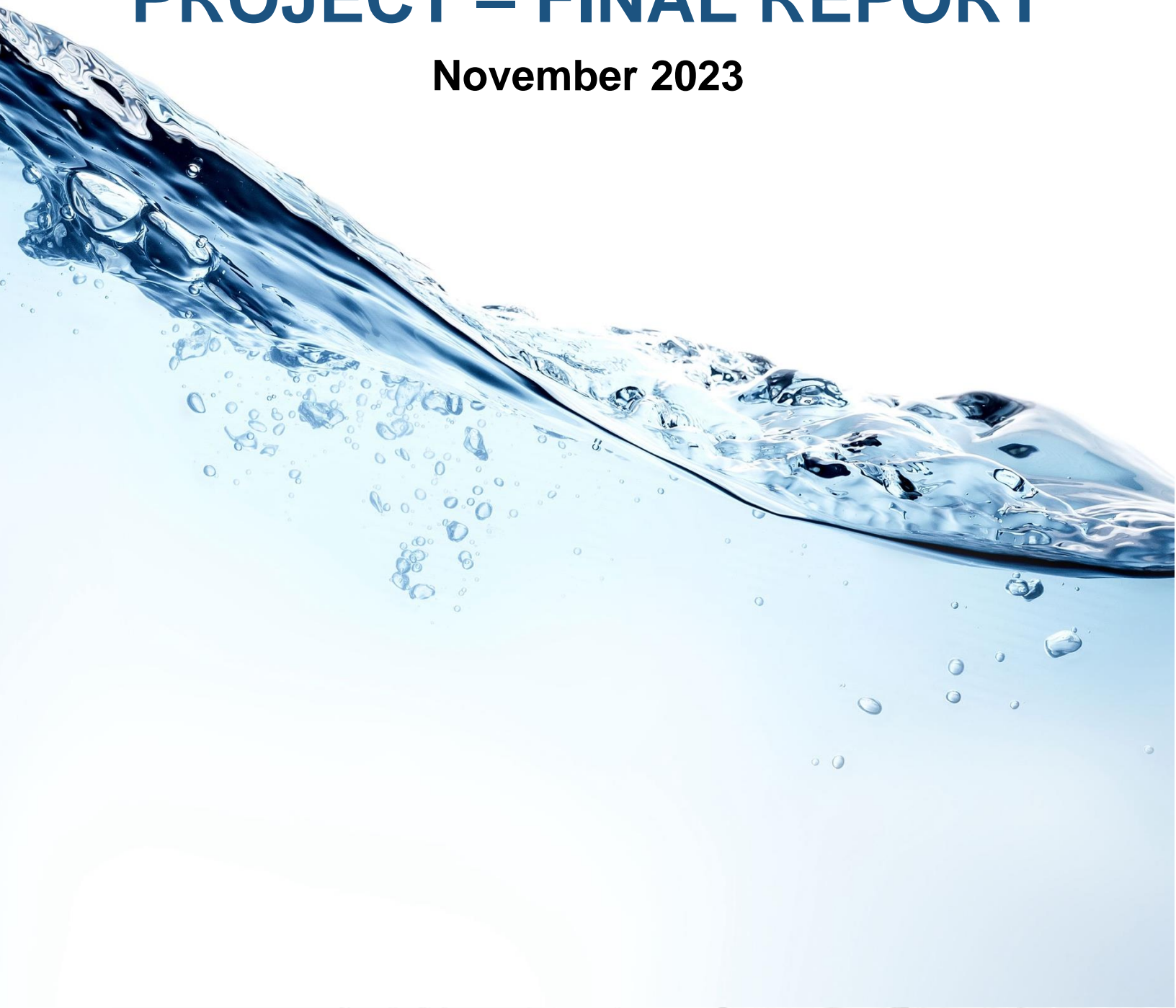




2023 SPRAY PAD PILOT PROJECT – FINAL REPORT

November 2023





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Introduction

Spray Pads are community playground installations that are a collection of water features. These are not only a fun and safe way for kids to enjoy water play, but they are also a great way to promote active play and healthy lifestyles while promoting sustainability in a community.

Many flow-through spray parks are designed for a flow rate of about 265 to 568 liters per minute (lpm) when operating. This results in an average use of 37,854 to 94,635 liters of water on daily basis and between \$25,000-\$60,000 per year in water costs, depending on the flow rate, number of spray features, and overall size of the pad.

Saskatoon has the largest number of spray pads per '000 capita in Canada (**Figure 1**). Also, water use at these spray pads has been steadily increasing over the years, but notably increased in 2021. The 2021 summer operating condition was prolonged hot weather, which increased the demand and community need for spray pads and led to increased water use, thereby exceeding the budget. In 2022, spray pad facilities became part of the City's Extreme Heat Response, and their hours of operations were extended to help the community stay cool during the heatwave.

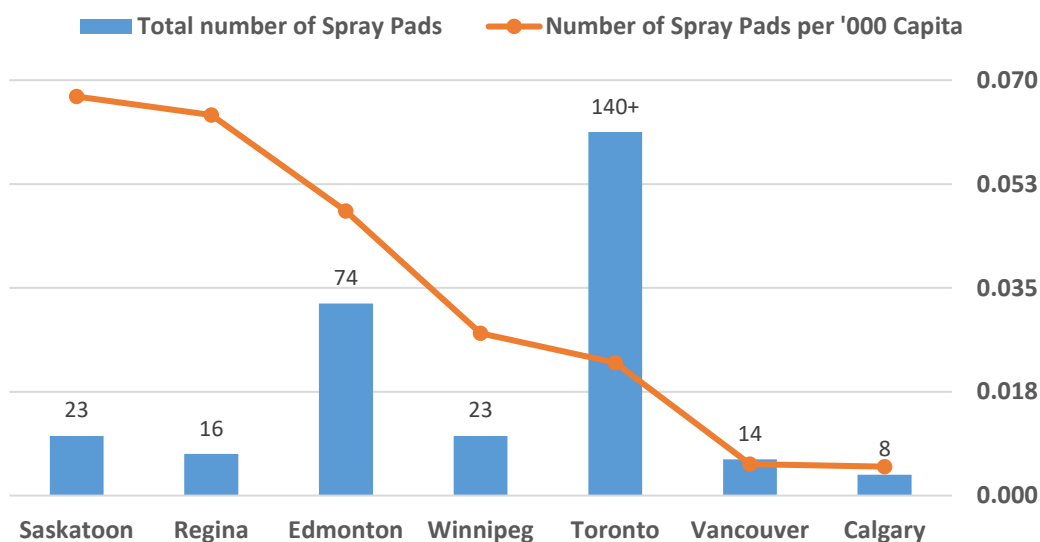


Figure 1. Total and Per '000 Capita Number of Spray Pads in 2023 in Some Major Canadian Cities.

Climate change projections show the increasing likelihood that we will experience prolonged hot weather conditions more often. Continued city growth and more frequent hot weather is expected to increase demand on these facilities. This increase in water use can also stress our municipal water system capacity because water-demand peaks in the summer, and this has been identified as a high risk in the City's [Local Actions for Adaptation Plan](#).

Keeping this in mind, a pilot project was initiated in 2023 to test nozzle upgrade options that are relatively inexpensive and easy to do without disrupting regular operations or reducing service levels, viz., (a) lower-flow nozzles, (b) misting nozzles (commonly called 'mist'ers'), and (c) winter blank nozzles, either in combination or individually, with the aim of reducing water consumption.

The goals of this project were to:

- Help the City achieve its overall water use reduction by 5% by 2026 target – [LEC Plan \(Action 25\)](#)
- Help the City achieve its outdoor water use reduction by 20% by 2050 target – [LEC Plan \(Action 26\)](#)
- Help contribute to the City's greenhouse gas reduction targets – LEC Plan
- Help inform future business cases to maximize water efficiency in Spray Pad operations across the City

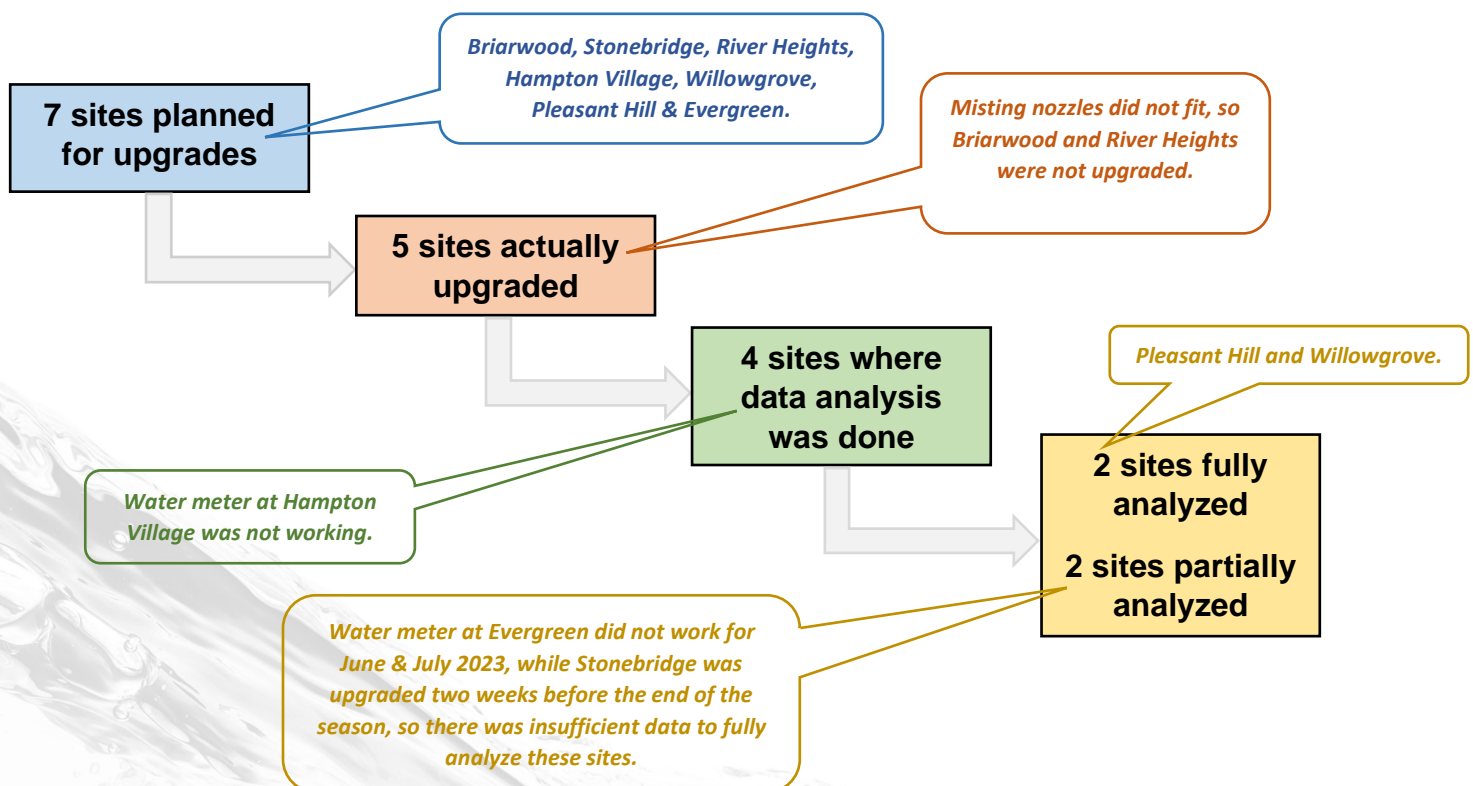
The project involved:

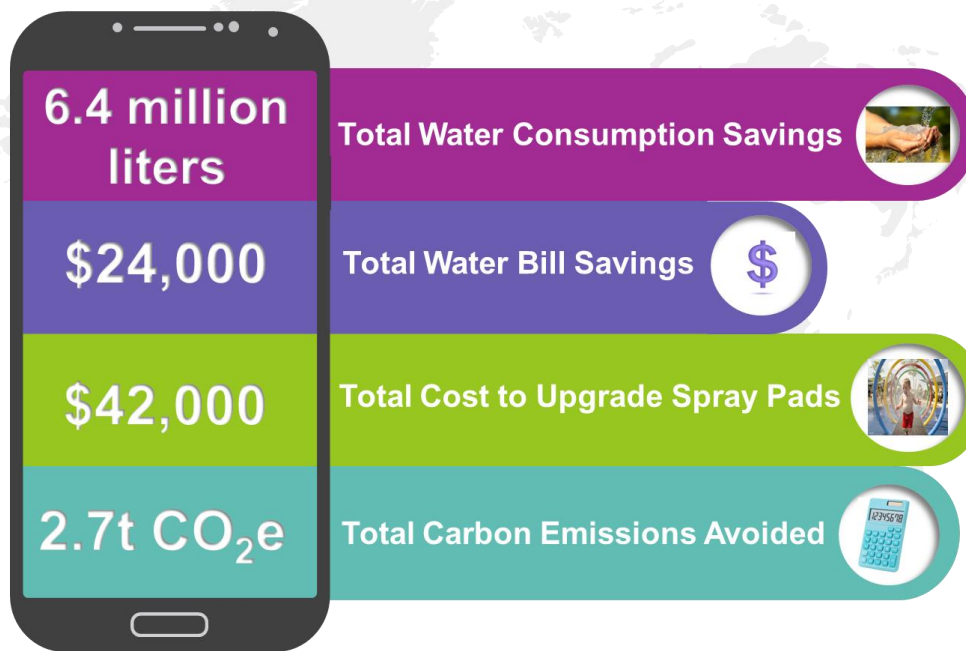
- Researching feasible improvements (timers, nozzles, cycling buttons, temperature sensors).
- Selecting pilot and control sites to test improvements.
- Setting up spray pad accounts in utility management software.
- Completing an economic analysis of spray pads vs paddling pools.
- Installing technology improvements identified in the research including:
 - Replacing existing nozzles with lower-flow nozzles to reduce total flow rate without affecting the user experience.
 - Replacing existing nozzles with misting nozzles to reduce total flow rate and provide unique user experience.
 - Replacing existing nozzles with strategic placement of winter blanks to reduce flow rates without affecting the user experience.
- Minimal disruptions to regular spray pad operations or reduction in service levels.
- Completing an analysis of costs and overall water savings from the improvements.
- Recommending next steps.

Indicators for the project:

- Impact on City's overall water use (liters) since 2016 baseline.
- Impact on water system summer daily demand (liters/day) since 2016 baseline.
- Impact on water use per user (liters per visit) since 2016 baseline.
- Maintained user experience based on intercept surveys and summer play program leader feedback.

Project Summary





Results of the 2023 Pilot Project for Pleasant Hill and Willowgrove Spray Pads. (*ROI<2yr; Appendix A*)

Water Use Analysis

A large variation in water use was observed across seven spray pad pilot sites, operating months (June to August), and years (2016 to 2022) (**Figure 2**). This variation can be attributed to different number and types (flow rates) of spray features, number of users, and year to year variation in weather, etc. However, such large variation also suggested that it is difficult to establish a baseline year to compare results.

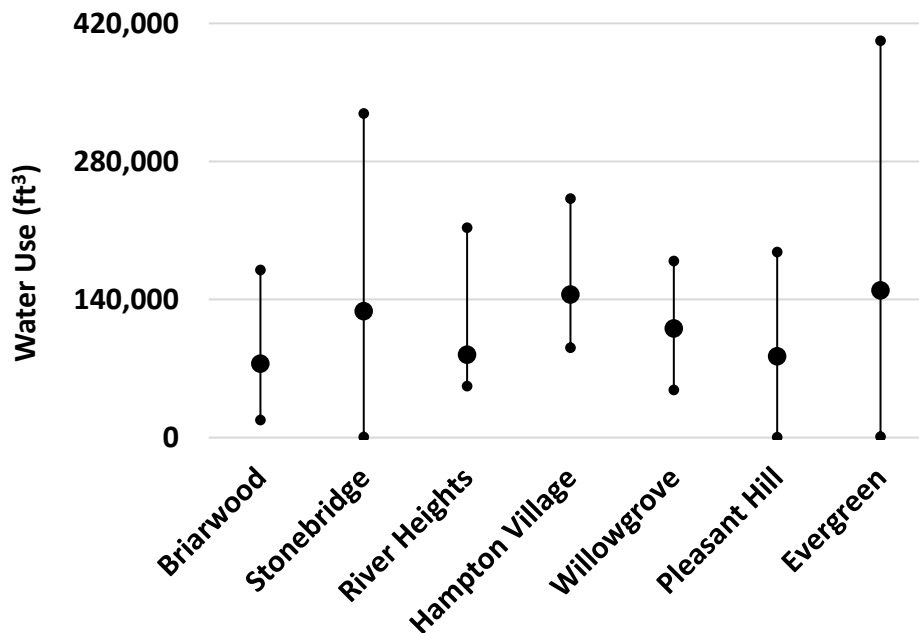


Figure 2: Minimum, Average and Maximum Water Use (ft³) Across 3 Months (Jun-Aug), 7 Spray Pad Pilot Sites, and 7 Years (2016-2022). [1m^3 (cubic meter) = 1000 liters = 35.315ft³ (cubic feet)]

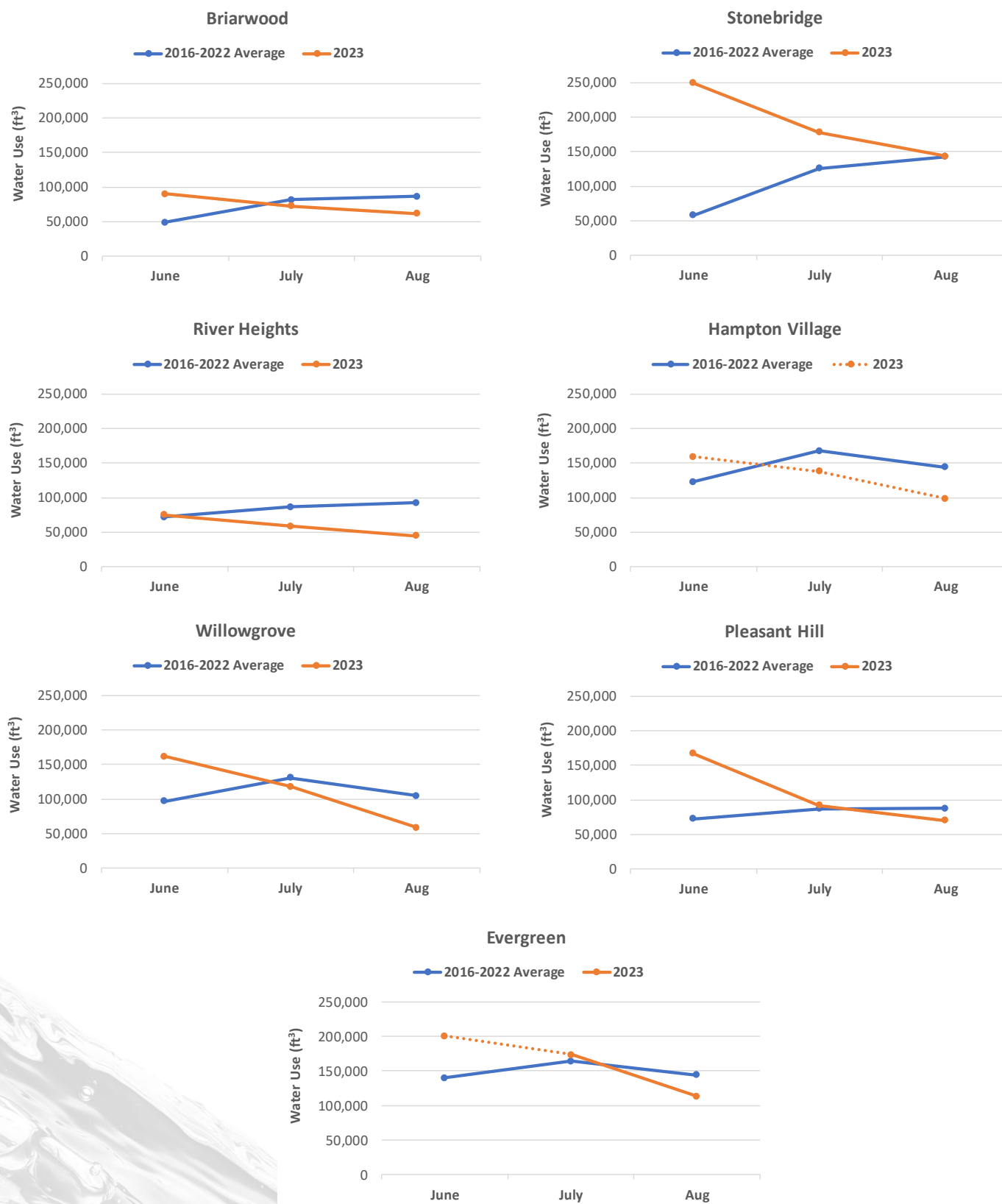


Figure 3: Monthly Water Use (ft³) at Pilot Spray Pad Sites in 2023 versus 2016-2022 Average. *Dotted line indicates estimated (and not actual) water meter readings due to meter reading issues/errors. [1m³ (cubic meter) = 1000 liters = 35.315ft³ (cubic feet)]*

The amount of rainfall did not correlate well with water used at spray pads (**Appendix B**), but temperature did seem to correlate with the amount of water used. For example, water use in June of 2023 was the higher than the 2016-22 average water use in June across all seven pilot sites (**Figure 3**). This seemed to correlate well with the increase in average temperature of 2°C (or 13%) in 2023 vs. 2016-22 average (**Table 1**), while July 2023 average temperature decreased by 1°C (7%) and August 2023 average temperature remained the same as the 2016-2022 average for July and August, respectively.

Table 1. June to August Temperatures (°C) since 2016.

YEAR	June Temperatures (°C)	July Temperatures (°C)	August Temperatures (°C)
2016	18	19	17
2017	16	20	18
2018	18	19	17
2019	16	18	16
2020	15	19	18
2021	19	21	17
2022	16	19	20
Average 2016-22	17	19	18
2023	19	18	18
% Change 2023 vs. 2016-2022 Average	13%	-7%	0%

Source: <https://www.timeanddate.com/weather/canada/saskatoon/historic>.

Total water use for each hour and month was graphed on a heat map showing water used in 2022 and 2023 at the four pilot sites where upgrades were done (Pleasant Hill, Willowgrove, Evergreen, and Stonebridge). The maps showed that these spray pads were well used throughout their operational hours (i.e., 10am to 8pm) with maximum water use occurring during evening hours (i.e., 3 to 8pm) (**Appendix C**). The % change in hourly water use between 2022 and 2023 at Pleasant Hill Spray Pad also showed that June 2023 had higher water use versus June 2022, while the opposite was true for July and August (**Table 2**).

Table 2. Percent Change in Hourly Water Use Between 2022 and 2023 at Pleasant Hill Spray Pad.

	11: 00	12: 00	13: 00	14: 00	15: 00	16: 00	17: 00	18: 00	19: 00	20: 00
Jun	-125%	-37%	8%	-67%	-71%	-48%	-14%	-18%	-21%	-18%
Jul	34%	42%	47%	53%	40%	44%	36%	42%	34%	38%
Aug	49%	45%	28%	47%	50%	47%	43%	31%	31%	36%

There were 18 days (4 in June and 14 in July) in 2023 when spray pad hours were extended by 2 hours to 10pm during Saskatoon's emergency heat response. The total water consumption during these extended hours was 2,032 m³ (or 71,773 ft³) across 15 spray pads in Saskatoon for which data was available.

Weekly change in water consumption in 2022 and 2023 at the four upgraded pilot sites where water use data was available (Pleasant Hill, Willowgrove, Evergreen and Stonebridge) showed that water consumption at all these sites decreased after the upgrades were done (**Figure 4**).

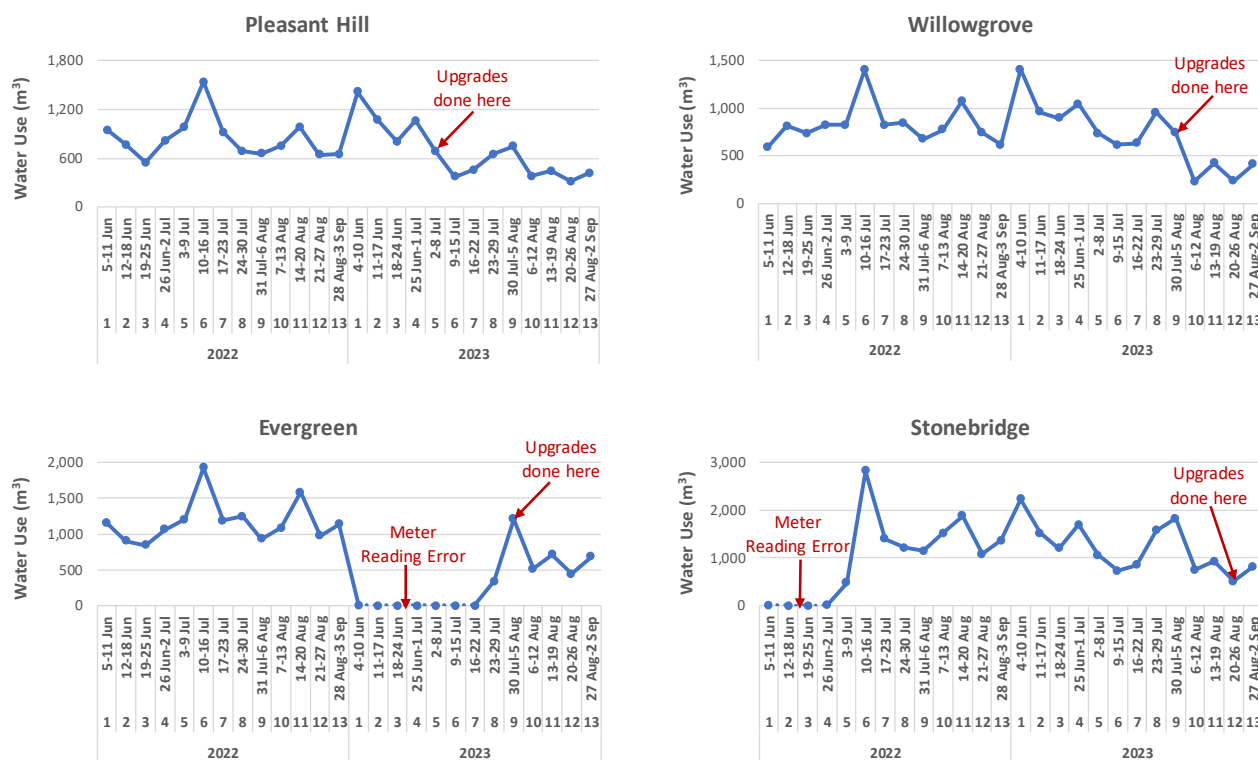


Figure 4: Weekly Change in Water Consumption in 2022 and 2023 at Four Spray Pad Pilot Sites where Upgrades were Done and Water Use Data Was Available. Figure also shows when the upgrades were done, while dotted line indicates meter reading issues/errors.

Methodology

Site-Selection

The 2023 pilot was planned to be conducted at seven spray pad sites across different neighborhoods of Saskatoon, viz., Pleasant Hill, Willowgrove, Hampton Village, Evergreen, Briarwood, River Heights, and Stonebridge (**Table 3**). These pilot sites were selected based on water use/flow rate (**Figure 5**), age, number of spray features, area of city (west/east), whether there is summer play program on site or not etc.

Table 3. Seven Spray Pad Sites Selected for the Pilot Study in 2023.

Spray Pad Site	Average Water Use (2021-2022, m³)*	Year Built or Rebuilt	Number of Spray Features	Water Use per Feature	Total number of nozzles	Water Use per Nozzle
Briarwood	18,778	2005	21	894	21	894
Stonebridge	14,694	2015	14	1,050	29	507
Hampton Village	13,895	2012	10	1,390	18	772
Evergreen	12,739	2017	28	455	43	296
Pleasant Hill	11,706	2016	26	450	29	404
Willowgrove	10,111	2010	19	532	19	532
River Heights	9,092	2000	18	505	18	505

*1m³ (cubic meter) = 1000 liters = 35.315ft³ (cubic feet).

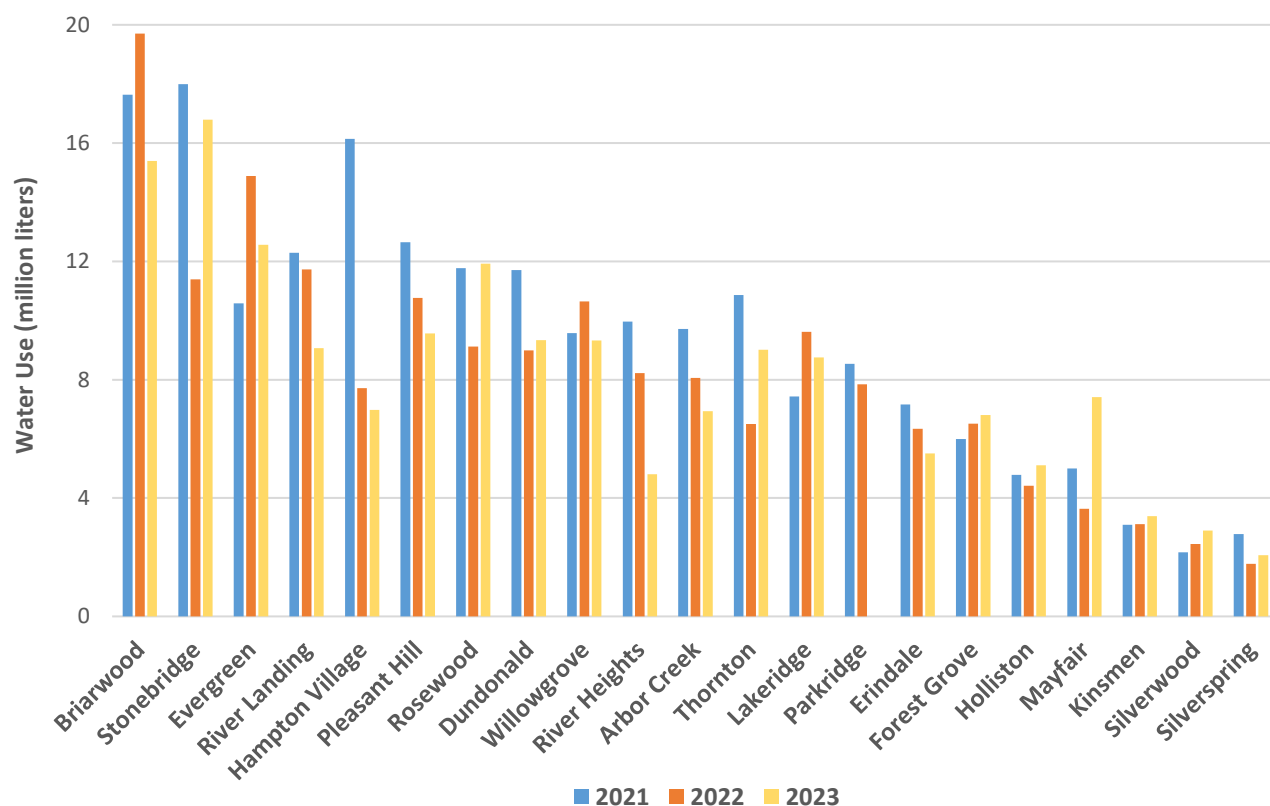


Figure 5. Water Used at Spray Pads Across Saskatoon in 2021, 2022, and 2023. *Parkridge spray pad was closed for 2023 for improvements, so no data is available. [1m³ (cubic meter) = 1000 liters = 35.315ft³ (cubic feet)]*

Control Spray Pads

Due to the large variation observed in water consumption across years and spray pad sites, three control spray pad sites (Mayfair, Silverwood, and River Heights) were selected on the Westside of Saskatoon to compare the average weekly water consumption at these control sites with the average weekly water consumption at the Pleasant Hill pilot site before and after upgrading the pilot site in 2023. Similarly, three control spray pad sites (Briarwood, Erindale and Arbor Creek) were selected on the East side of Saskatoon for Willowgrove, Evergreen, and Stonebridge pilot sites before and after upgrading the pilot sites in 2023.

The % change in weekly average water used at control sites before and after the upgrades were done at pilot sites was subtracted from the % change in weekly average water used at respective pilot sites to normalize the results (**Appendix D**) with regards to controls sites (control sites show overall city trends). Weekly water consumption data (**Appendix E**) at the pilot sites was normalized by considering weekly values starting from Sunday and ending on Saturday of the week in both 2022 and 2023.

Calculating Nozzle Efficiencies

To test the efficiency of upgraded nozzles, all spray pads were run at full flow rate (a) before upgrading with new nozzles for 15 minutes and (b) after upgrading with new nozzles for 15 minutes, and the actual water meter readings were noted. Difference between these water meter readings were then used to calculate the efficiency of the new nozzles in terms of water consumption and bill savings by extrapolating the differences for total operational hours (10 hr; 10am to 8pm) of spray pads and over the season (Jun 1-Sep 4; 96 days).

Detailed Results

Depending on nozzle selection, the spray pad efficiencies improved by 11-40% (**Table 4**). The efficiency was three to four times higher at sites where misting nozzles were installed (River Heights & Briarwood) compared to sites where lower-flow nozzles were installed (Pleasant Hill, Willowgrove, & Evergreen).

Table 4. Nozzle Efficiency Savings.

Spray Pad Site	Calculated Water Cost Savings (\$)	Water Consumption Savings (m ³)	% Savings
Pleasant Hill	\$13,996	3,720	12.50%
Willowgrove	\$13,997	3,720	12.50%
Evergreen	\$13,995	3,720	11.11%
Stonebridge	\$31,310	8,296	20.11%
River Heights	\$27,990	7,440	33.33%
Briarwood	\$27,992	7,440	40.00%

Pleasant Hill pilot site showed an average reduction in water consumption of 32.3% or \$15,933 after the upgrades were done (**Table 5**). The 2023 water bill at this site was \$38,573, which would have been \$54,506.02 if no upgrades were done. The cost of nozzle upgrades at this site was \$472, not including labor costs.

Willowgrove pilot site showed an average reduction in water consumption of 16.2% or \$8,088 after the upgrades were done (**Table 5**). The 2023 water bill at this site was \$36,987, which would have been \$45,075.27 if no upgrades were done. The cost of nozzle upgrades at this site was \$581, not including labor costs.

Table 5: 2023 Spray Pad Pilot Savings.

Table 6: 2023 Spray Pad Pilot Savings				
Spray Pad Site(s)	Decrease in Water Consumption after the Upgrades were Done (%)	Water Savings	Carbon Emissions Avoided (t CO ₂ e)*	Cost of Upgrades at Each Spray Pad Site (not including labor costs)
Westside Control Average	20.85	32.27% (4,235 m ³ or \$15,933)	1.82	\$472
Pleasant Hill Pilot	53.12			
Eastside Control Average (after Jul 31, 2023)	31.15	16.22% (2,129 m ³ or \$8,008)	0.92	\$582
Willowgrove Pilot	47.37			
Average Water Use Savings per Spray Pad				24.24%
Total Savings in Water Bill				\$23,941
Total Carbon Emissions Avoided*				2.7 t CO ₂ e

*Calculated using a factor of 0.00043 t CO₂ e/m³ of water saved; 1m³ (cubic meter) = 1000 liters = 35.315ft³ (cubic feet).

Anomalous Results

- Evergreen pilot site showed an average reduction in water consumption of 4.1% after the upgrades were done (**Table 6**). However, the water meter at this site did not record any data from June to almost the end of July 2023, so these water savings were calculated based on 2022 data and are therefore not reliable because of the large variation in water use across years.
- Stonebridge pilot site showed an average increase in water consumption of 13.4% after the upgrades were done (**Table 6**). The partial upgrades were done at this site less than 2 weeks before the close of the spray pad season. This is not a long enough duration to fully calculate water savings.

Table 6: 2023 Spray Pad Pilot Savings (Anomalous Results).

Spray Pad Site(s)	Decrease in Water Consumption after the Upgrades were Done (%)	Water Savings	Cost of Upgrades at Each Spray Pad Site (not including labor costs)	Reason(s) for Anomalous Results
Eastside Control Average (after August 1, 2023)	38.35	4.11%	\$1,608	<i>Water meter did not record any data from June to almost the end of July 2023 at this site, so these water savings were calculated based on 2022 data and are therefore not reliable.</i>
Evergreen Pilot	42.46			
Eastside Control Average (after August 22, 2023)	48.66	-13.39%	\$0.00 (in-stock item)	<i>The partial upgrades (only winter blanks) were done at this site less than 2 weeks before the close of the spray pad season. This is not a long enough duration to fully calculate water savings.</i>
Stonebridge Pilot	35.27			

Lessons Learned

What Went Well

These comments were received from the Project Team:

- “Project planning was done well through the development of an [Upgrade Plan](#) that showed every type of nozzle to be upgraded for different spray pad features at each pilot site.”
- “Low-cost solutions were implemented.”
- “Project gathered positive media attention.”
- “The changes were well received by Saskatoon residents and there were no public complaints.”
- “Recreation leaders did not receive any negative feedback on the changes made.”
- “Professional photography was done.”
- “Communication with multiple departments to develop engage page and survey questions to gather feedback from Saskatoon residents allowed better use of engagement resources and lowered confusion for the public.”
- “Results showed a sizeable reduction in water consumption.”
- “Nozzle upgrades were identified as a feasible improvement to reduce water use. These upgrades are repeatable and reliable to maintain savings.”

What Did Not Go Well (Challenges)

- **Briarwood and River Heights** spray pads were not upgraded with ground spray misting nozzles due to fit issues. The ground spray misting nozzles that were delivered were installed and water efficiency measurements were taken, but they were a tripping hazard, so were removed immediately after taking meter readings.



Improper Fit of Misting Nozzle

- **Stonebridge** spray pad was upgraded only with winter blanks on August 22, 2023. The ground spray misting nozzles that were ordered for this site never arrived and the 6" nozzles that were delivered for some other features did not meet specifications.



Original Nozzle Diameter



Delivered Nozzle Diameter

- **Hampton Village** spray pad was upgraded with lower-flow nozzles on July 10, 2023. However, the water meter at this site did not work in 2023, so no water consumption data is available before and after the upgrades were done.
- While surveys are an excellent tool to get user feedback, sometimes the project characteristics don't lend well to public surveys. For example, it is unclear if the public would have recognized changes to the spray pads in this case because there weren't large scale changes to the spray pads.

- Project was delayed because we were without a project manager for several months. This resulted in the upgrades being implemented later in the season and with a limited scope of nozzle improvements only.

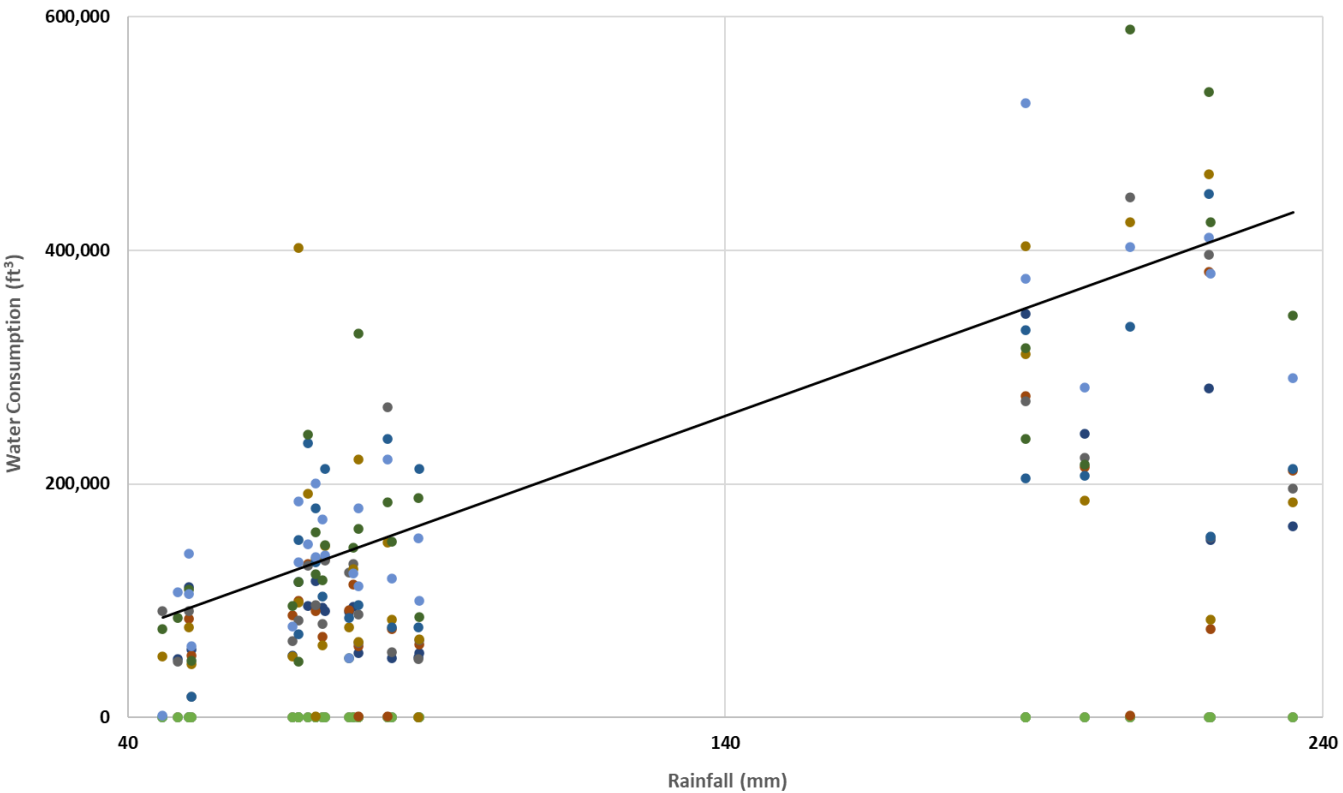
Recommendations

1. Upgrades should be done after testing nozzles and early in the spring before the spray pads open to allow longer run times to estimate savings, which in turn will help produce more accurate records.
2. More information about the project should be displayed at the sites to educate patrons and Recreation Leaders.
3. Need to find reliable suppliers for nozzle upgrades. Original equipment manufacturer parts had a 100% success rate, but nozzles supplied by the other manufacturer did not fit well.
4. There is a good opportunity for public water conservation education and awareness through the Summer Play Programs at spray pad sites.
5. In addition to surveys, any future upgrades to spray pads are also an opportunity to connect with the community associations and local user groups to see if there have been impacts to the experience.
6. Include project tasks that were not complete in 2023 (e.g., technology upgrades like timers, temperature sensors, cycling buttons, remote controllers etc. as well as comparison of economic analysis with paddling pools) in the next phases of spray pad improvement work.
7. Continue monitoring water use at sites where no or anomalous results were obtained in 2023 due to meter reading issues/errors (e.g., at Evergreen, Stonebridge, and Hampton Village spray pad sites).
8. Lastly, edits/additions to the Land Development Standards to cap the total flow rates of future spray pads are recommended.

Appendix A: Project Costs

Labor (Installation) – Facilities	\$2,190.00
Labor (Project Management) – Sustainability	\$38,846.22
Nozzle Procurement Costs including freight/delivery	\$1,054.00
Taxes (GST = 5% & PST = 6%) on Nozzle Procurement	\$115.94
TOTAL	\$42,206.16

Appendix B: Correlation between Water Use and Rainfall ($R^2 = 0.18$)



Appendix C: Heat Maps

PLEASANT HILL SPRAY PAD

METER_ID (All)

Sum of READ_VALUE		Column Labels																							
Row Labels	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00	Grand Total
2022	1.96	1.96	1.96	1.96	0.00	0.00	0.00	5.55	17.85	6.15	381.34	678.91	910.91	1175.62	1290.01	1396.10	1497.16	1407.25	1374.32	1258.81	178.12	62.73	0.00	0.00	11648.68
Jun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	1.35	92.10	155.85	194.85	282.15	335.40	431.40	555.75	493.35	465.60	429.90	36.05	0.00	0.00	0.00	3473.90
Jul	1.96	1.96	1.96	1.96	0.00	0.00	0.00	5.55	13.95	0.00	151.05	280.20	388.50	488.70	482.40	492.16	474.00	503.26	478.23	446.21	107.52	61.08	0.00	0.00	4380.65
Aug	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.75	4.80	125.25	222.15	300.45	357.15	416.25	418.80	411.30	357.00	367.80	319.95	14.10	0.45	0.00	0.00	3319.20
Sep	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.94	20.71	27.11	47.62	55.96	53.74	56.12	53.64	62.70	62.75	20.45	1.20	0.00	0.00	474.93
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.50	0.45	6.60	373.65	511.20	607.80	914.25	1084.05	1149.90	1193.85	1143.15	1164.45	1019.25	203.70	87.75	0.15	0.00	9470.70
Jun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.15	0.00	207.45	214.05	178.65	472.35	573.00	637.80	635.85	582.75	565.65	506.40	102.00	54.75	0.15	0.00	4731.60
Jul	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.90	0.15	6.60	99.30	161.55	205.20	229.05	287.40	277.20	302.55	290.70	317.55	278.10	100.50	33.00	0.00	0.00	2598.75
Aug	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.90	123.15	216.30	188.85	210.00	223.20	234.00	247.05	253.35	205.35	1.05	0.00	0.00	0.00	1966.20
Sep	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	3.00	12.45	7.65	24.00	13.65	11.70	21.45	22.65	27.90	29.40	0.15	0.00	0.00	0.00	174.15
Grand Total	1.96	1.96	1.96	1.96	0.00	0.00	0.00	16.05	18.30	12.75	754.99	1190.11	1518.71	2089.87	2374.06	2546.00	2691.01	2550.40	2538.77	2278.06	381.82	150.48	0.15	0.00	21119.38

WILLOWGROVE SPRAY PAD

METER_ID (All)

Sum of READ_VALUE		Column Labels																								
Row Labels	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00	Grand Total	
2022		3.45	3.45	3.45	3.45	0.00	0.00	0.60	0.00	4.65	0.00	745.50	796.35	854.86	1226.19	1254.00	1448.98	1379.20	1190.88	1246.14	1175.61	131.24	37.56	2.61	2.61	11510.75
Jun		3.44	3.44	3.44	3.44	0.00	0.00	0.60	0.00	4.65	0.00	147.75	144.15	236.40	392.25	288.15	472.65	404.46	376.41	419.46	437.61	7.41	2.61	2.61	2.61	3353.51
Jul		0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	321.75	323.55	297.76	398.49	485.55	529.32	479.83	400.80	412.65	385.02	102.31	31.65	0.00	0.00	4168.70
Aug		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	256.95	308.25	293.25	387.30	413.10	393.15	436.20	365.85	373.50	323.10	9.90	1.20	0.00	0.00	3561.75
Sep		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.05	20.40	27.45	48.15	67.20	53.86	58.72	47.82	40.53	29.89	11.62	2.10	0.00	0.00	426.79
2023		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.90	4.05	526.95	690.75	625.50	908.25	1088.40	1237.50	1060.35	1051.20	1091.85	1095.75	245.70	88.05	0.00	0.00	9727.20
Jun		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	219.45	281.70	243.75	462.60	494.40	670.35	542.40	469.20	537.30	521.85	96.00	42.60	0.00	0.00	4581.60
Jul		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.90	4.05	196.50	264.60	233.40	298.80	379.95	363.90	325.20	358.80	356.85	361.35	145.05	45.45	0.00	0.00	3346.80
Aug		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.90	135.30	145.20	136.65	200.55	191.55	175.80	203.25	172.65	204.45	3.90	0.00	0.00	0.00	1669.20
Sep		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.10	9.15	3.15	10.20	13.50	11.70	16.95	19.95	25.05	8.10	0.75	0.00	0.00	0.00	129.60
Grand Total		3.45	3.45	3.45	3.45	0.00	0.00	0.60	0.00	17.55	4.05	1272.45	1487.10	1480.36	2134.44	2342.40	2686.48	2439.55	2242.08	2337.99	2271.36	376.94	125.61	2.61	2.61	21237.95

EVERGREEN SPRAY PAD

METER_ID (All)

Sum of READ_VALUE		Column Labels																							
Row Labels	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00	Grand Total
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.15	0.15	1229.70	1312.20	1092.15	1504.65	1404.00	1916.85	1861.80	1811.40	1861.35	1950.90	236.10	103.35	0.90	0.00	16286.10
Jun	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.00	208.35	276.30	224.55	462.60	293.25	592.05	549.90	561.00	619.05	647.70	4.65	0.00	0.00	0.00	4439.85
Jul	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	547.65	495.30	439.65	501.30	530.55	638.40	657.75	576.15	651.90	651.30	176.25	99.30	0.90	0.00	5966.40
Aug	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.15	406.05	489.90	363.45	462.90	492.30	586.20	565.65	596.85	530.25	601.50	19.35	0.00	0.00	0.00	5114.70
Sep	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	67.65	50.70	64.50	77.85	87.90	100.20	88.50	77.40	60.15	50.40	35.85	4.05	0.00	0.00	765.15
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.85	7.80	6.60	236.25	285.60	216.30	326.25	433.65	510.90	473.85	442.95	471.00	483.45	52.20	17.55	0.00	0.00	3967.20
Jul	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.95	66.60	33.90	63.60	70.50	74.55	83.10	90.15	87.15	96.30	48.75	17.55	0.00	0.00	773.10
Aug	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.85	7.80	6.60	183.00	205.35	172.20	256.80	350.40	402.75	363.15	309.15	355.65	361.80	3.45	0.00	0.00	0.00	2980.95
Sep	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.30	13.65	10.20	5.85	12.75	33.60	27.60	43.65	28.20	25.35	0.00	0.00	0.00	0.00	213.15
Grand Total	0.00	0.00	0.00	0.00	0.00	0.00	0.45	2.85	7.95	6.75	1465.95	1597.80	1308.45	1830.90	1837.65	2427.75	2335.65	2254.35	2332.35	2434.35	288.30	120.90	0.90	0.00	20253.30

STONEBRIDGE SPRAY PAD

METER_ID (All)

Sum of READ_VALUE		Column Labels																							
Row Labels	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00	Grand Total
2022	3.00	3.00	3.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1022.97	1143.43	1577.21	799.04	1279.48	1442.50	2119.52	769.95	1075.42	1769.06	221.97	154.64	7.91	3.91	13397.00
Jun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	4.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00
Jul	3.00	3.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	394.77	423.62	808.11	366.33	586.78	465.15	1289.49	363.99	403.03	540.31	175.97	151.64	6.91	3.91	5989.00
Aug	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	595.20	560.64	721.10	351.84	631.95	786.06	755.17	261.72	603.61	1188.71	26.00	0.00	0.00	0.00	6482.00
Sep	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	158.17	44.00	79.87	60.74	191.29	74.86	144.24	68.78	40.04	20.00	3.00	1.00	0.00	918.00
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.90	8.85	909.00	1326.90	1261.05	1761.75	1896.30	1826.70	1686.15	1619.55	1752.60	1819.80	343.05	120.15	0.60	0.00	16348.35
Jun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	447.60	614.25	500.10	810.00	886.80	762.00	692.85	644.25	764.85	744.00	137.40	51.30	0.30	0.00	7055.70
Jul	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	0.00	265.20	396.30	450.75	535.35	567.90	553.95	512.55	508.50	435.30	555.15	197.55	68.85	0.30	0.00	5049.15
Aug	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.40	8.85	192.00	301.05	300.15	300.15	429.00	485.55	440.40	439.65	531.75	508.65	8.10	0.00	0.00	0.00	4061.55
Sep	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.20	15.30	10.05	14.40	12.60	25.20	40.35	27.15	20.70	12.00	0.00	0.00	0.00	0.00	181.95
Grand Total	3.00	3.00	3.00	0.00	0.00	0.00	0.00	0.00	16.90	8.85	1931.97	2470.33	2838.26	2560.79	3175.78	3269.20	3805.67	2389.50	2828.02	3588.86	565.02	274.79	8.51	3.91	29745.35

Appendix D: Water Consumption at Control Spray Pad Sites in 2023.

Time Period in 2023	Number of Weeks	WESTSIDE			EASTSIDE		
		Mayfair	Silverwood	River Heights	Briarwood	Erindale	Arbor Creek
		Water Consumption (m ³)					
4-Jun to 6-Jul	5	3,491.55	1,068.53	2,227.00	XXXXX	XXXXX	XXXXX
7-Jul to 2-Sep	8	4,033.95	1,887.67	2,674.00	XXXXX	XXXXX	XXXXX
4-Jun to 30-Jul	8	XXXXX	XXXXX	XXXXX	4,315.00	3928	5052.3
31-Jul to 2-Sep	5	XXXXX	XXXXX	XXXXX	1,970.00	1682	2069.1
4-Jun to 31-Jul	8	XXXXX	XXXXX	XXXXX	4,448.00	4073	5206.05
1-Aug to 2-Sep	5	XXXXX	XXXXX	XXXXX	1,837.00	1537	1915.35
4-Jun to 21-Aug	11	XXXXX	XXXXX	XXXXX	5,714.00	5164	6514.95
22-Aug to 2-Sep	2	XXXXX	XXXXX	XXXXX	571.00	446	606.45

Appendix E: Weekly Water Use Data for 2022 & 2023 at Four Pilot Spray Pad Sites.

Year	Week*		Pleasant Hill	Willowgrove	Evergreen	Stonebridge
			Water Consumption (m ³)			
2022	1	5-11 Jun	951.75	595.65	1,147.20	-
	2	12-18 Jun	767.90	812.36	903.30	-
	3	19-25 Jun	550.50	734.85	843.15	2.00
	4	26 Jun-2 Jul	815.55	826.05	1,066.05	5.00
	5	3-9 Jul	979.65	822.45	1,204.35	471.00
	6	10-16 Jul	1,540.65	1,400.85	1,930.50	2,822.00
	7	17-23 Jul	917.00	822.35	1,190.40	1,397.00
	8	24-30 Jul	693.30	844.20	1,245.15	1,214.00
	9	31 Jul-6 Aug	655.95	673.35	927.75	1,138.00
	10	7-13 Aug	751.50	772.65	1,083.90	1,516.00
	11	14-20 Aug	985.35	1,072.50	1,583.55	1,883.00
	12	21-27 Aug	644.40	745.20	976.05	1,073.00
	13	28 Aug-3 Sep	649.80	617.55	1,132.80	1,361.00
2023	1	4-10 Jun	1,416.90	1,406.40	-	2,234.40
	2	11-17 Jun	1,071.45	963.00	-	1,519.35
	3	18-24 Jun	808.80	896.85	-	1,193.10
	4	25 Jun-1 Jul	1,062.75	1,045.20	-	1,688.10
	5	2-8 Jul	687.90	735.90	-	1,050.15
	6	9-15 Jul	373.65	613.05	-	727.80
	7	16-22 Jul	453.45	633.60	-	851.25
	8	23-29 Jul	649.80	954.00	338.55	1,571.55
	9	30 Jul-5 Aug	746.10	744.15	1,208.70	1,822.50
	10	6-12 Aug	380.10	230.40	511.95	742.20
	11	13-19 Aug	445.65	424.20	712.20	921.00
	12	20-26 Aug	319.20	236.70	440.70	506.40
	13	27 Aug-2 Sep	418.65	414.15	683.85	816.00

*The weekly data was normalized using these periods: (a) For 2022, Sun, Jun 5 to Sat, Sep 3 and (b) For 2023, Sun, Jun 4 to Sat, Sep 2.