Staff Report

SPLASH/SPRAY PADS – WATER MANAGEMENT OPTIONS

November 24, 2020

BACKGROUND:

There is currently a wading pool in Brookside Park that opens in early June and closes mid-August. This pool has been in operation since 1990 and requires staff to fill it daily to an eighteen-inch depth, monitor chlorine levels, and collect admission fees ($1 per youth). For safety reasons associated with standing water, this facility is staffed. Hours of operation are 11:00 AM – 4:00 PM. It is located in the floodway, so it is unusable when the park is flooded and requires extra maintenance after a flood event.

The FY 2020/21 CIP has funds allocated to construct a splash pad somewhere in the City that is out of the flood plain. In addition, City Council is wishing to develop a downtown plaza which could have a splash pad included. Splash pads (picture below) do not have standing water, do not require a staff person to be present, can be open longer hours, have a longer season, and do not require an admission fee.

Although there are many decisions to be made (features, surfacing, location, etc.), staff is looking for direction regarding whether Council has a preference as to what Water Management System (WMS) is incorporated into the design. There are three WMS to consider; 1) Recirculation System, 2) Flow-Through System, and 3) Repurpose System. Each system has different requirements and the following information is provided to further explain each system and the pros and cons associated with each.

OPERATIONAL STANDARDS FOR SPLASH/SPRAY PADS:

The Iowa Department of Public Health (IDPH) governs the code requirements related to pools in Iowa. IDPH views a splash pad with a recirculation system as a pool and

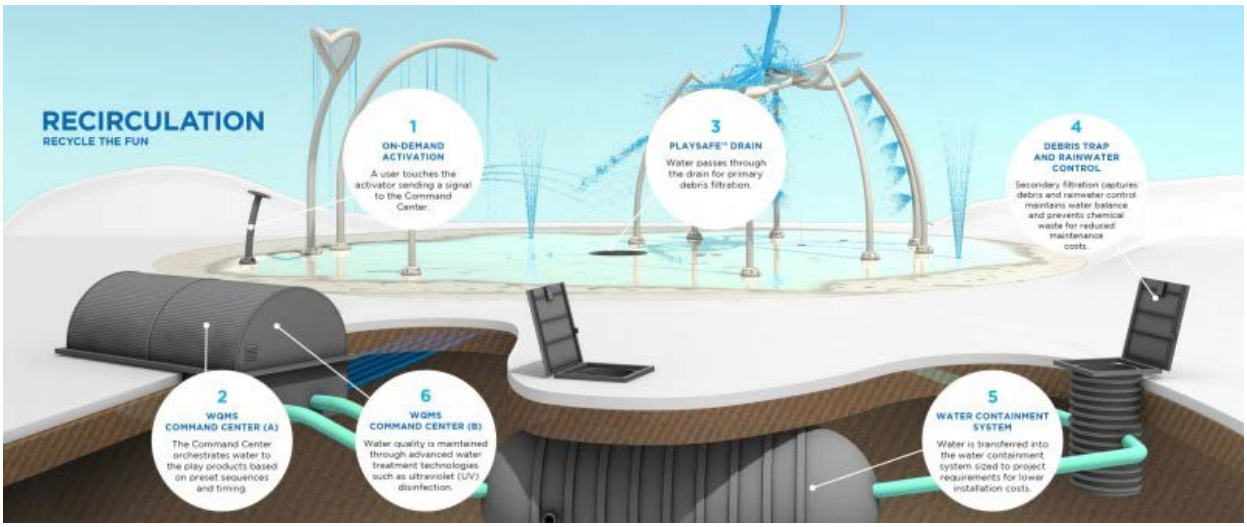
requires agencies to adhere to IDPH Pool Code. Flow-through and repurpose systems are not governed by IDPH.

The Model Aquatic Health Code (MAHC) is a voluntary guidance document based on science and best practices that can help local and state authorities and the aquatics sector make swimming and other water activities healthier and safer. It is a collaborative effort between the CDC and 140 volunteers across the U.S. with expertise in public health or aquatics. At the current time, compliance with the MAHC is voluntary. At the same time it is regarded as the best practices and a way to standardize the industry. Several states, including Iowa, are considering adoption of the MAHC into code. Some of the MAHC is more restrictive than Iowa code and some less restrictive. Parks and Recreation has been following the most restrictive code of the two when improvements have been made within our aquatic programs and facilities. MAHC also regulates recirculation systems but not flow through.

WATER MANAGEMENT SYSTEMS:

Recirculation System

Recirculation is a closed-circuit system that recycles and disinfects the water to and from the play area. This is the system currently used at Brookside Wading Pool, Municipal Pool and the Furman Aquatic Center. The diagram below shows how this system works.



Pros:

- Uses the least water of the three systems
- Circulated water is typically warmer
- IPDH and MAHC provides standards to follow

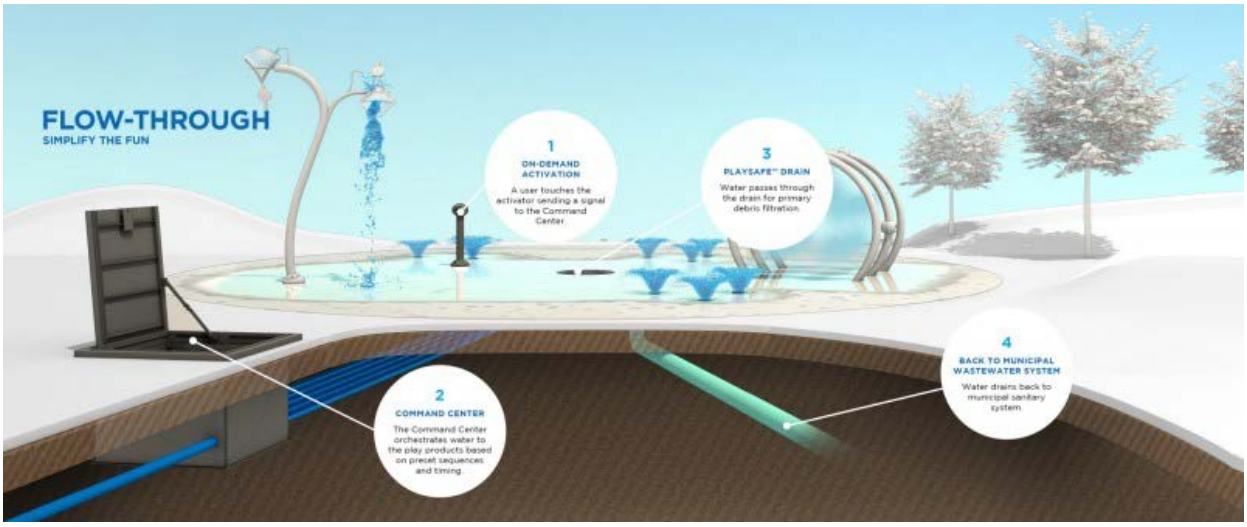
Cons:

- Approximately $150,000 more in capital costs than a flow-through system

- Construction permit required by IDPH (requires permit, plan submission and fee, and notification of completion so it can be inspected prior to opening. Plans must be certified. No deviation from plan without prior approval by IDPH.
- Must adhere to IDPH Pool Code
- Requires annual IDPH registration and inspection
- MAHC requires bathrooms to be within 200 feet walking distance and in clear view from the splash pad
- Showers are required by IDPH and MAHC
- Only one location (Daley Park) currently within the park system may meet the bathroom requirement, none meet the shower requirement
- MAHC requires a primary and secondary disinfection system such as U. V.
- Water testing (start/end of each day, minimum of every four hours)
- Monthly coliform test required
- Chemicals required for disinfection and pH control
- Pumps needed for spray features and circulation
- Higher electric costs than other WMS
- Hours of operation could be limited by available staff
- Staffing
    - Average of 4.5 hours of maintenance per day
    - Water testing at beginning and end of each day
    - Water testing required in intervals not to exceed four hours
    - Backwashing the filter 2-3 times per day
    - Dumping and filling the holding tank 1-2 times per week
- Highest potential of the three systems for small children to contract water borne illness by getting recirculated water on their faces and ingesting pathogens
- Additional deck space (more concrete) is required as the deck needs to be clear of landscape debris by either eight feet of deck area, raised curbs, or raised planters

Flow-Through System

Flow-through systems are easy to operate, low maintenance, and an eco-friendly way to manage water. These systems use potable water that goes through the play area. Effluent water is then returned to the municipal wastewater system or percolated back to the water table.



Pros

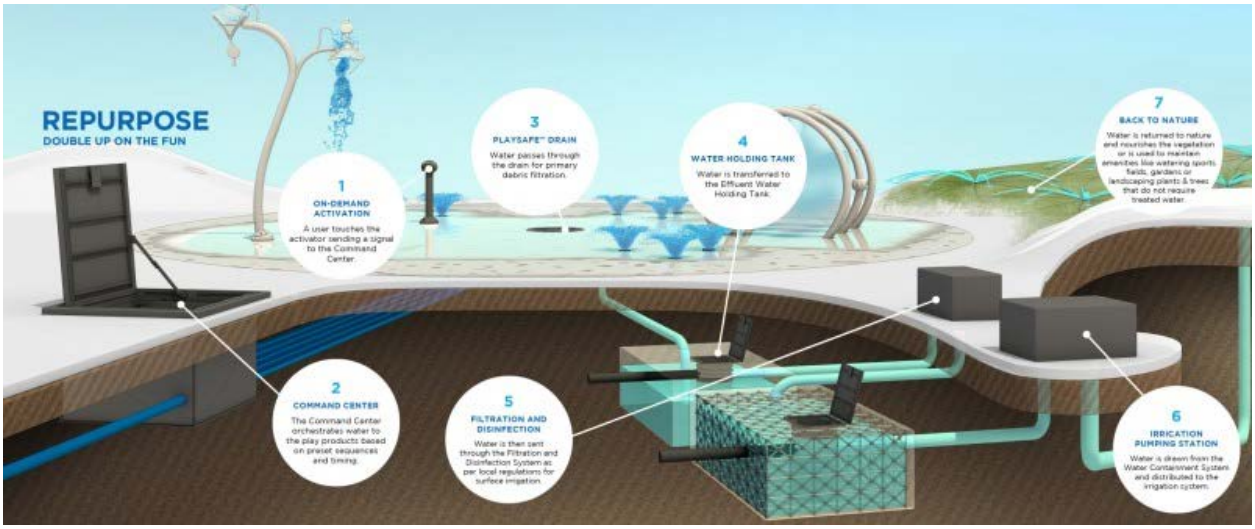
- Minimal staffing required for maintenance
- Lowest capital costs of the three systems
- No IDPH involvement with construction
- Not governed by IDPH or MAHC
- Bathrooms are not required, but recommended to have at least one restroom available in the area
- Locations within park system expanded due to no bathroom requirement
- No showers or UV filter required
- No water testing required
- No chemicals required for disinfection and pH control
- Pumps are only needed for spray features
- Lower electric costs than other WMS
- Hours of operation not limited by available staff
- Minimal staffing required (address maintenance issues as they arise)
- Lower potential for small children to contract water borne illness as water is potable
- Additional deck space perimeter is not needed

Cons

- Uses the most water of the three systems
- Water is typically colder (could install mechanical heat)

Repurpose System

Repurposing systems are sustainable solutions that are designed to reuse the effluent water for surface or sub-surface irrigation. These systems are simple to operate and require minimal maintenance. After use on a splash pad, effluent water is transferred to an effluent water holding tank, then sent through the filtration & disinfection system, treated water is then transferred to a second holding tank. The irrigation pumping station then draws water from the second tank for surface or sub-surface irrigation, the water nourishes vegetation, and returns to nature.



Pros

- Water may be used twice and ultimately returned to the natural ground water source
- Water may be repurposed for other uses, however, overflow will go to sanitary sewer
- Minimal staffing required for maintenance
- Lower capital costs than the recirculation system but more than a flow through system
- Midlevel operational costs of the three systems
- No IDPH involvement with construction
- Not governed by IDPH or MAHC
- Bathrooms are not required but recommended to have at least one restroom available in the area
- Locations within park system expanded due to no bathroom requirement
- No showers or UV filter required
- No water testing required
- No chemicals required for disinfection and pH control
- Lower electric costs than a recirculation system
- Hours of operation not limited by available staff
- Minimal staffing required (address maintenance issues as they arise)
- Lower potential for small children to contract water borne illness as water is potable

Cons

- Uses the same amount of water as the flow-through system but it is repurposed
- Size of tank needed to store all the runoff may be cost prohibitive
- Space needed for large tank or irrigation pond may not be available
- Would not be able to utilize the amount of water generated
- Water is typically colder (could install mechanical heat)
- Pumps needed for spray features and irrigation

SPLASH PAD EXAMPLE:

In the following sections, comparisons will be made between a flow through and a recirculation system. To provide some context, a splash pad design from Looking Glass Park, Bellevue, NE (shown below) is being used to make these comparisons. This splash pad is approximately 4,800 square feet and has approximately 20 spray features and has a maximum flow rate of 271 gallons per minute.

WATER CONSUMPTION COMPARISON:

The main difference between the systems described above is that in a flow through system, the water goes directly to the sewer system (most likely sanitary) after it exits the spray features. The recirculation system reuses the water, however, there is a loss of water through evaporation, backwashing, and periodic water replacement. The two tables below show how much water is used during a 100-day season with the splash pad in operation 7-10 hours per day.

Flow Through Water Usage

Maximum Flow Rate (gpm)	160
Average Sequence Flow Rate (gpm)	136
Maximum Flow Per Hour (Gallons)	8,160
Hours Per Season	786
Consumption Per Season (Gallons)	6,413,760
Average Daily Consumption (gpd)	64,138
Average Daily Consumption (cf)	8,575
Average Annual Consumption (cfps)	857,455
Average Annual Consumption (ccf)	8,575

Recirculation Water Usage

Maximum Flow Rate	271
Average Sequence Flow Rate	230
Maximum Flow Per Hour (gal)	13,821
Hours Per Season	786
Spray Volume Per Season (gal)	10,863,306

Water to Fill Tank (gal)	3,000
Dump & Fill Every 3 Days (gps)	100,000
Water Used Per Backwash (gal)	1,000
Backwash 2 Times Per Day (gal)	2,000
Backwash Consumption Per Season (gps)	200,000
Evaporation & Overspray Loss @ 4% (gps)	434,532
Consumption Per Season (Gallons)	737,532
Average Daily Consumption (gpd)	7,375
Average Daily Consumption (cf)	986
Average Annual Consumption (cfps)	98,601
Average Annual Consumption (ccf)	986

As you can see, a flow through system uses 6,413,760 gallons per season compared to 737,532 gallons for a recirculation system.

POTENTIAL LOCATIONS:

Since a recirculation system requires a restroom within 200 feet of the splash pad with clear sight lines, the number of locations are limited. When you also consider this amenity should not go in the flood plain, the locations dwindle even further. Also, there are no locations in the park system other than the Furman Aquatic Center that meets the shower requirement for recirculation systems.

Possible Locations – Recirculation System

- Daley Park
- Emma McCarthy Lee Park

A flow through system has less requirements (e.g. restroom, shower) so the number of locations increases. The one downside of most of the locations suitable to accommodate a flow through system is that most of the parking is on-street parking.

Possible Locations – Flow Through System

- Brookside Park (east of Squaw Creek)
- Carr Park
- Christofferson Park
- Daley Park
- Emma McCarthy Lee Park
- Franklin Park
- Greenbriar Park
- Lloyd Kurtz Park
- Northridge Heights Park
- Tahira and Labh Hira Park

CAPITAL AND OPERATIONAL COSTS:

A comparison of the capital and operational costs between the two systems is shown below. Please note the cost of a restroom and/or shower is not included in these cost estimates. Depending on system and location, these would need to be added in.

ESTIMATED SPLASHPAD CONSTRUCTION COSTS

	FLOW THROUGH 4,800 SQ FT	RECIRCULATION 4,800 SQ FT
Estimated Total Project Costs	$ 350,000	$ 500,000

ESTIMATED ANNUAL MAINTENANCE AND OPERATING COSTS

Water Costs	$ 27,863	$ 3,731
Sewer Costs*	$ 25,415	$ 2,953
Maintenance Costs	$ 1,500	$ 7,073
Parts & Supplies Costs	$ 100	$ 250
Chemical Costs	$ -	$ 350
Electrical Costs	$ 84	$ 2,224
TOTAL ANNUAL OPERATING COSTS	**$ 54,962**	**$ 16,581**

*If the water could go to the storm sewer, this cost would be zero.

ESTIMATED LIFE CYCLE COSTS - 10 & 15 YEARS

Estimated 10 Year Operating Costs	$ 549,619	$ 165,808
Estimated Total Project Costs	$ 350,000	$ 500,000
TOTAL 10 YEAR COST	**$ 899,619**	**$ 665,808**
Estimated 15 Year Operating Costs	$ 824,429	$ 248,712
Estimated Total Project Costs	$ 350,000	$ 500,000
TOTAL 15 YEAR COST	**$ 1,174,429**	**$ 748,712**

STAFF COMMENTS:

In speaking with colleagues from across the state, nearly all of the new installs around the state are flow through systems. There are also a couple of existing recirculation systems being considered for transitioning to flow through. While many liked the appeal of the recirculation system, they ultimately did not have a viable plan to capitalize on the water savings that would outweigh the additional capital expense to install the system. Flow through systems were also preferred over recirculation systems due to the staffing and state code requirements that added staff time and expense to operate the system. A number of these cities also are not billed for water usage, making the feasibility of a flow through system even greater.

Although the idea of repurposing the water if using a flow through system is intriguing, staff does not feel this is a viable option. The volume of water generated and the inability to use it as it is available will mean most of it will go to the sewer

system. This reality makes this option less intriguing. The only location that could make this option work is if the splash pad were placed in Carr Park and an irrigation pond was constructed in River Valley Park. The water could then be used to irrigate the soccer and softball fields within River Valley Park.

The recirculation system is better environmentally as it will use approximately 11% of the water used in a flow through system. Although a recirculation system involves almost five times the labor for maintenance tasks than a flow through system, the overall annual operating expense is much lower. Including approximately $17,000 of operational expense for a recirculation system into the budget is easier than trying to include almost $55,000 for a flow through. **Currently, $300,000 has been budgeted for the construction of a splash pad, which creates a $200,000 shortfall is a recirculation system selected. Assuming an additional $200,000 can be identified during the upcoming budget amendment process, a recirculation system appears to be the prudent choice.**