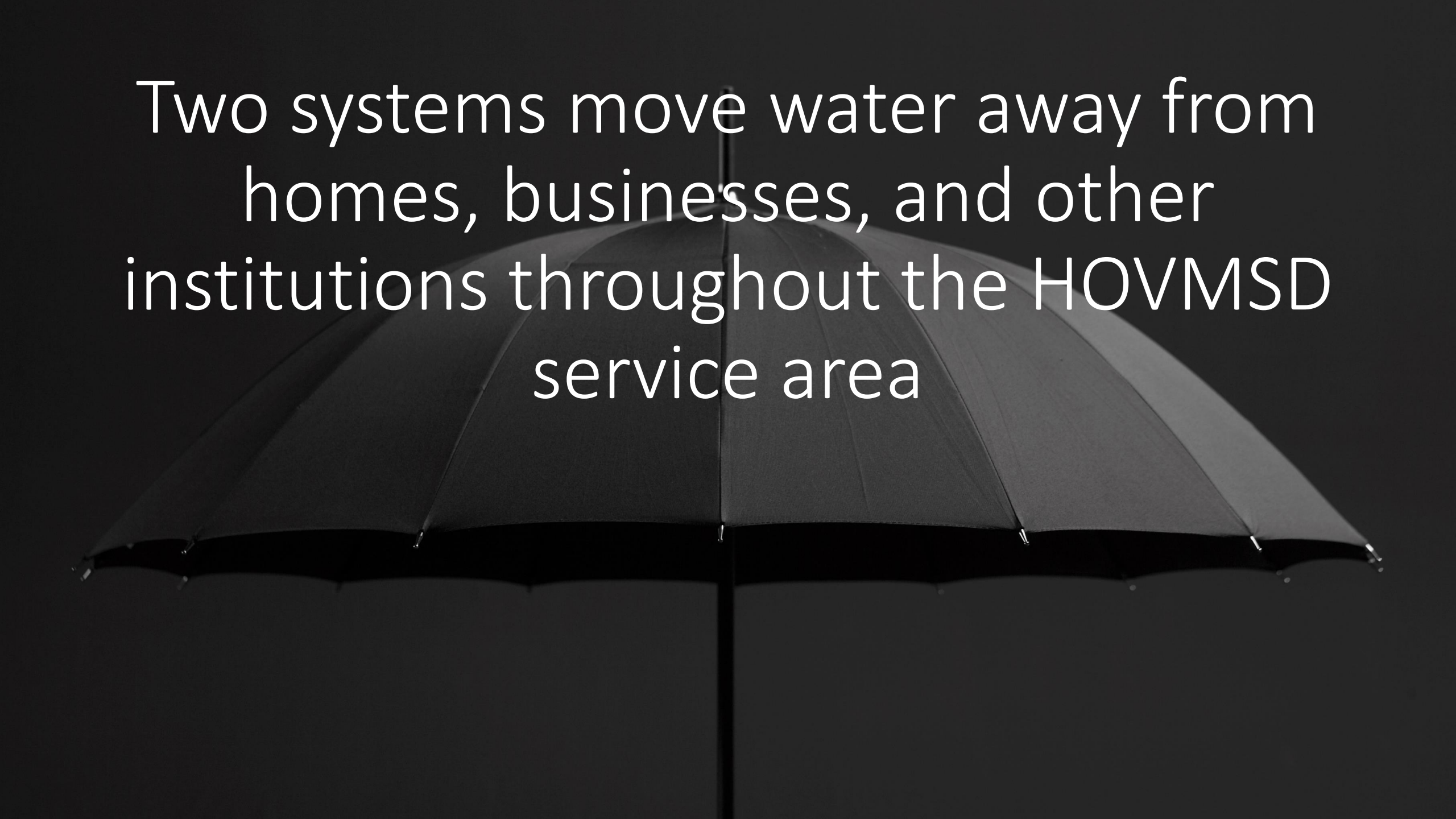
Clearwater Progress Report

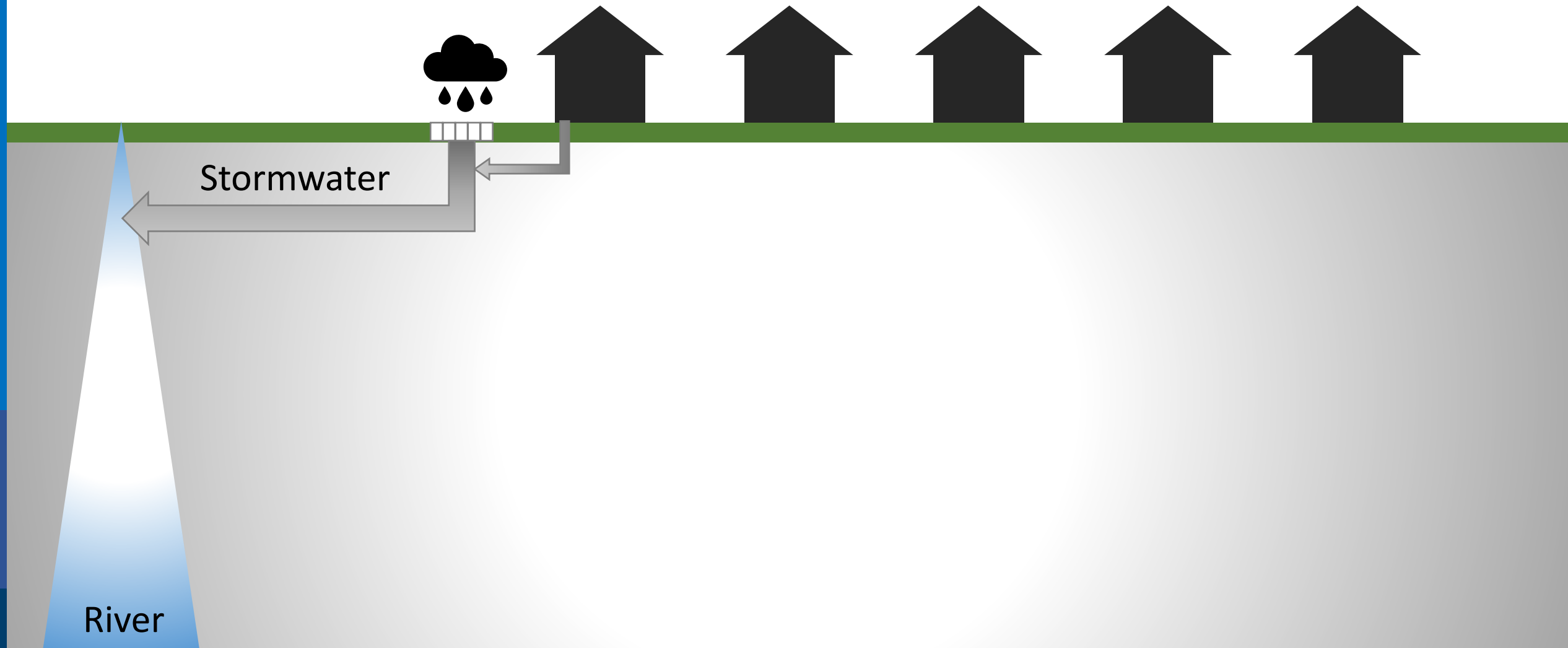
Community Meeting
November 2, 2023

Mike Gerbitz, Donohue

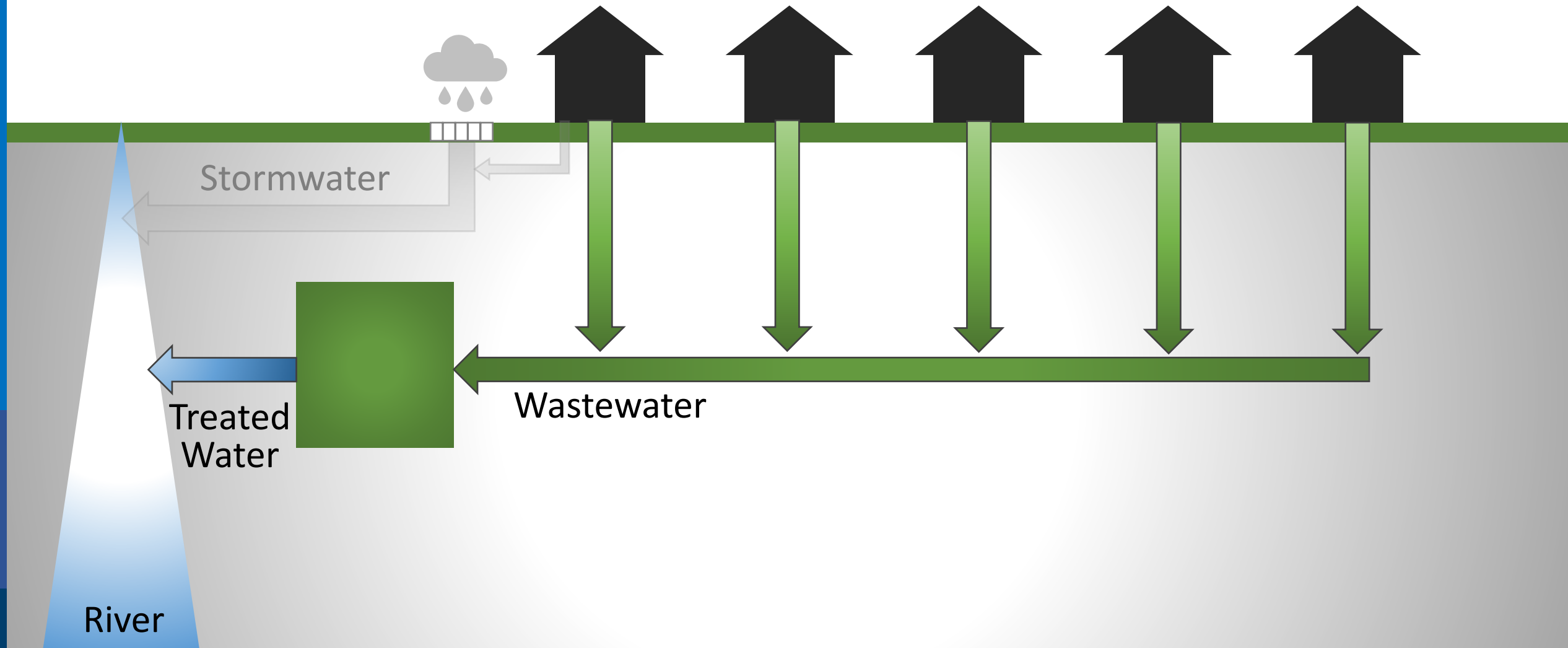


Two systems move water away from homes, businesses, and other institutions throughout the HOVMSD service area

The Stormwater System



The Wastewater System



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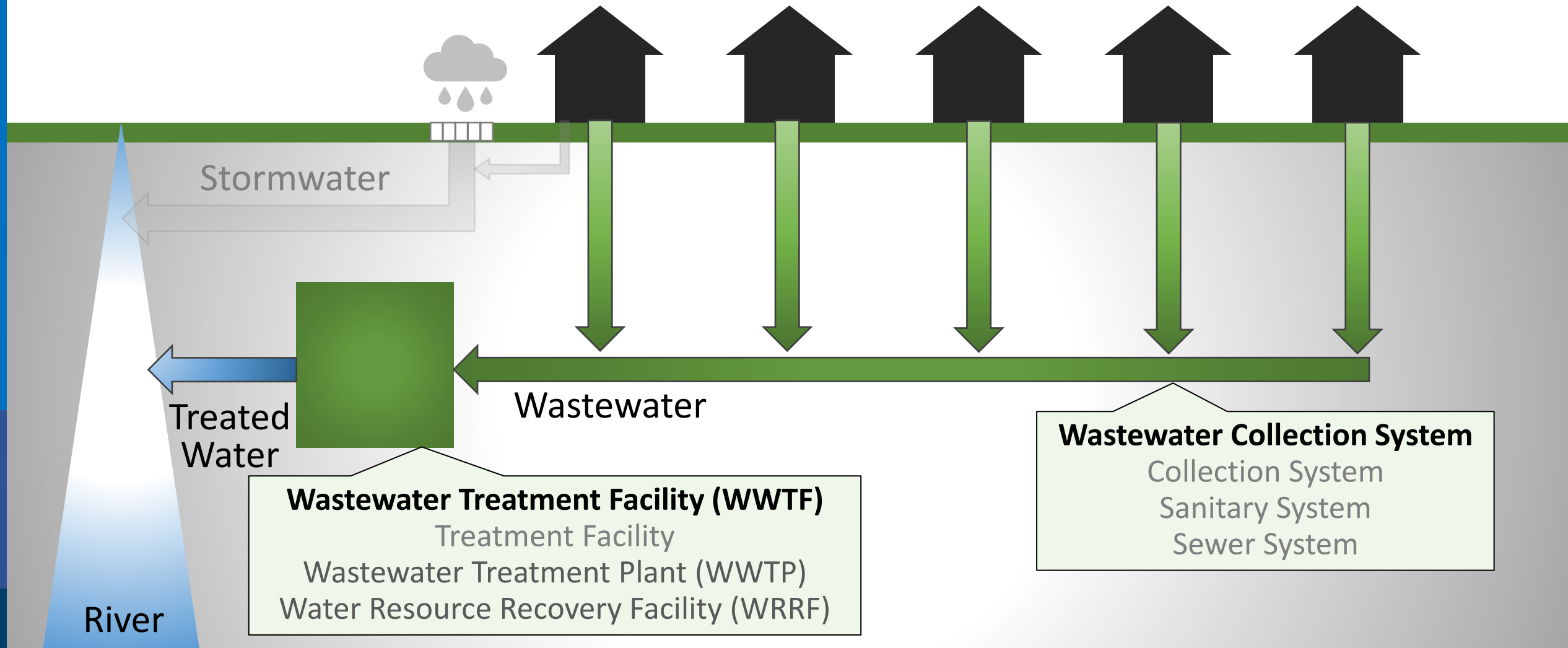
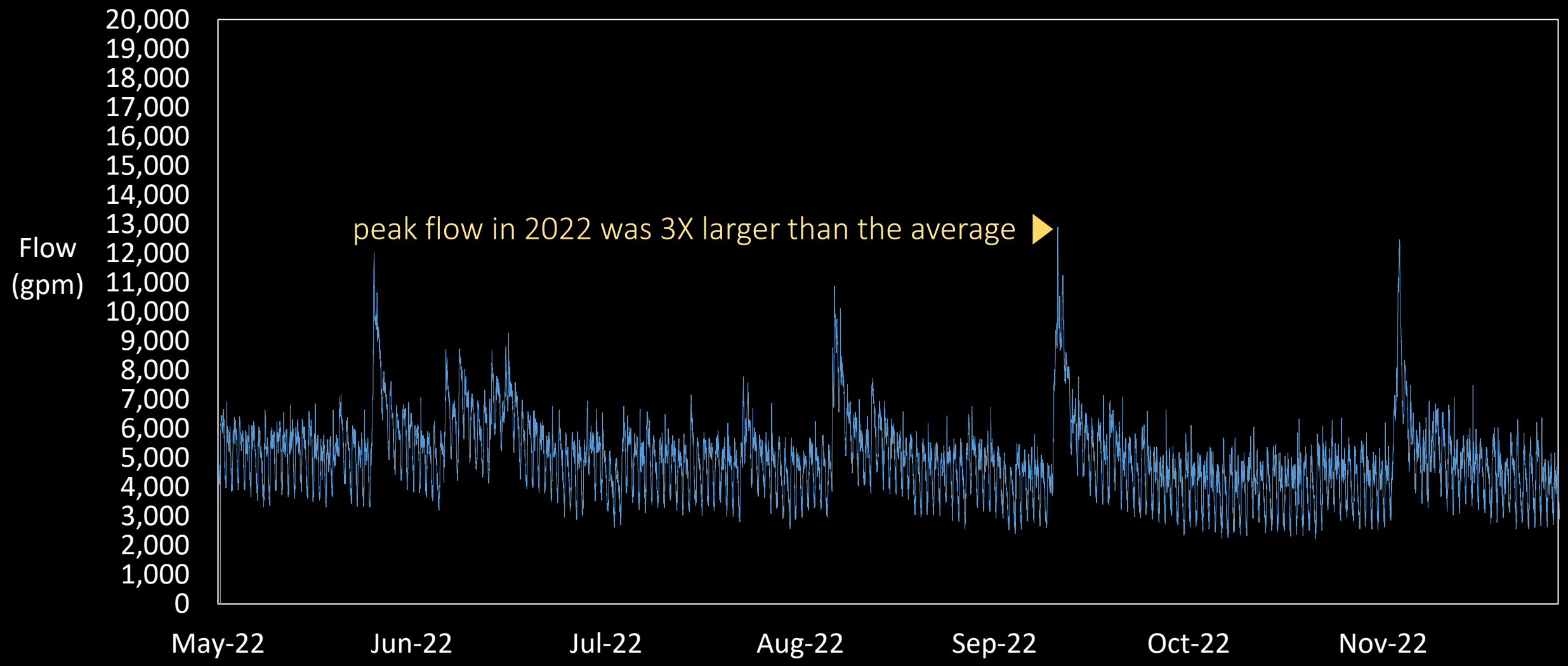


Wastewater Flows Increase During Wet Weather



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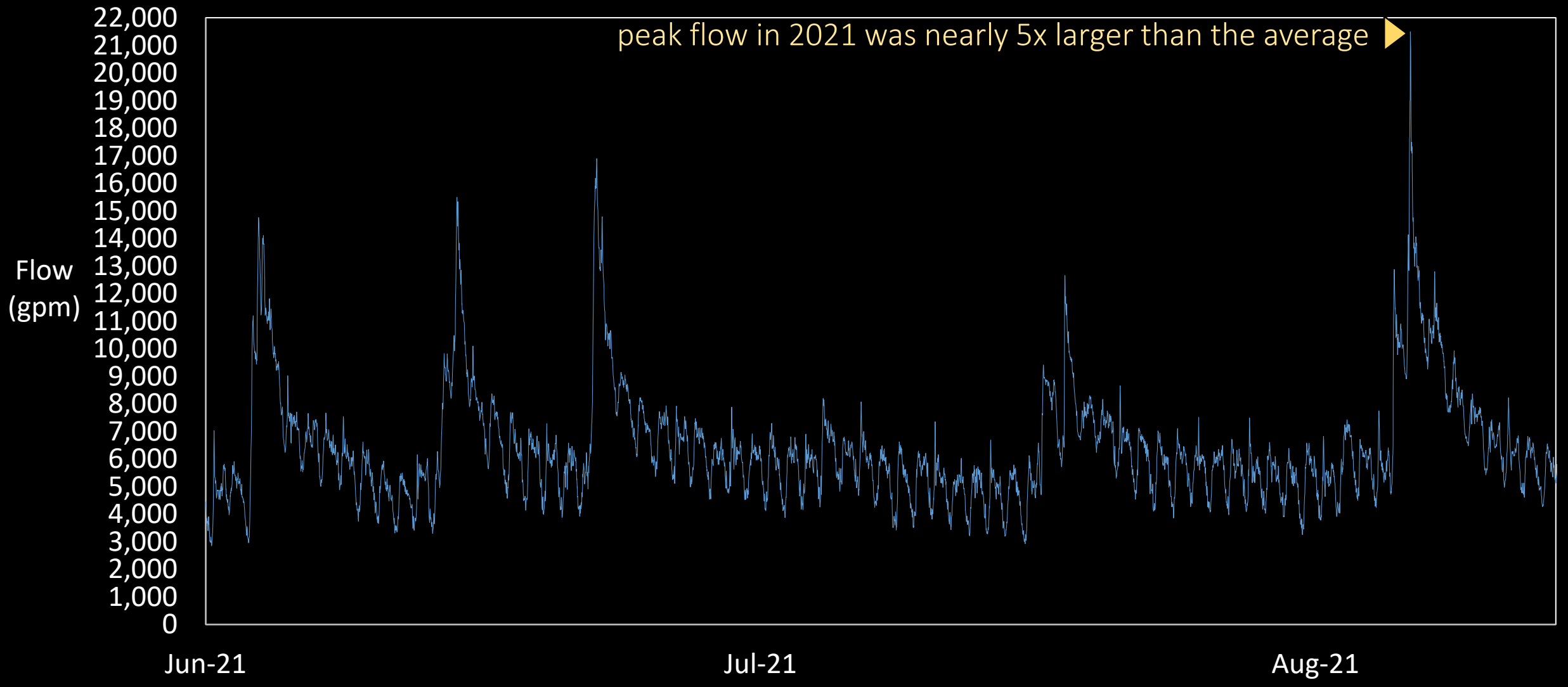
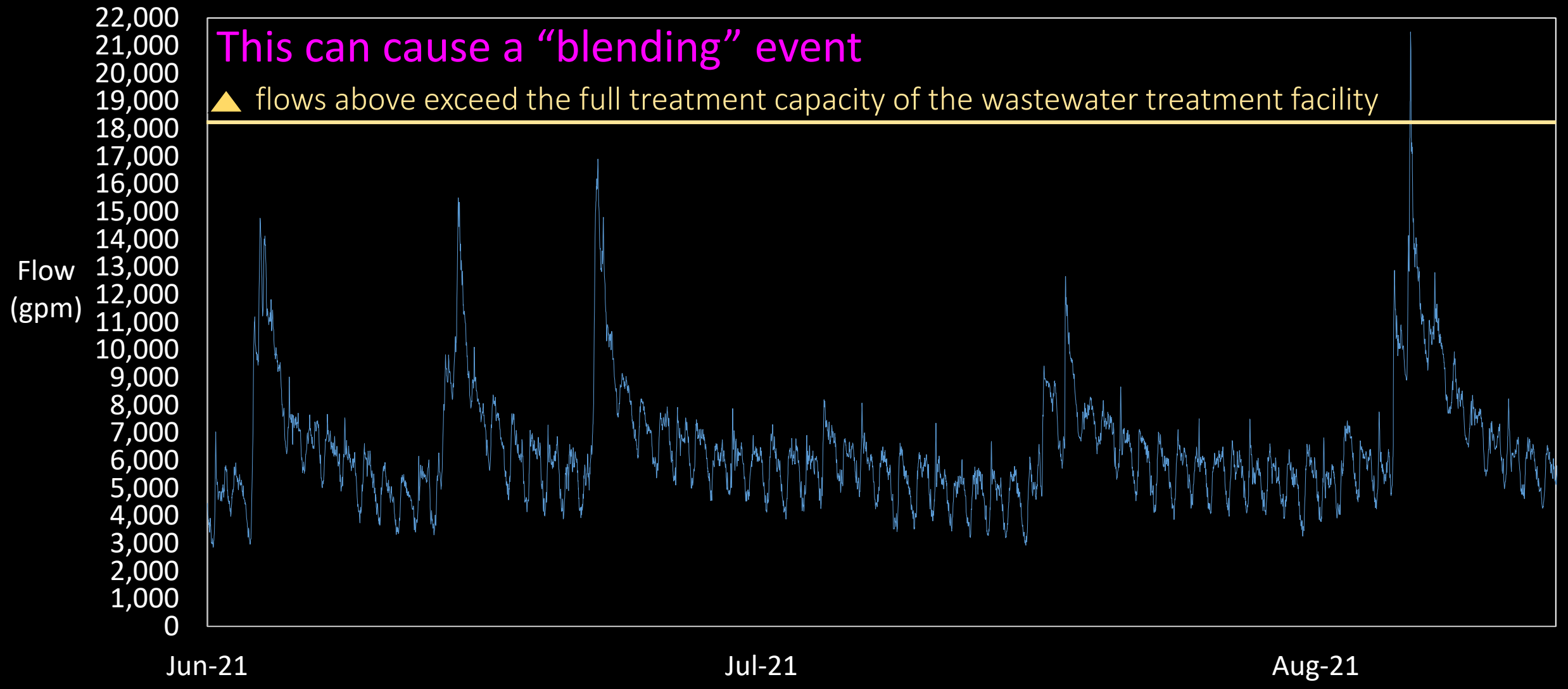


Wastewater Flows Increase During Wet Weather



Year	Plant Flow (mgal)	Annual Precipitation (in)	# of Blending Events	Volume of Blended Flow (mgy)
2010	2391	32.25	3	16.618
2011	2359	30.08	1	3.998
2012	1845	17.89	0	0
2013	2014	27.14	1	0.562
2014	2079	29.34	2	3.549
2015	1888	29.93	3	2.185
2016	2021	27.71	0	0
2017	2094	26.89	0	0
2018	2128	30.01	5	2.062
2019	2446	40.14	4	1.115
2020	2170	28.11	1	0.686
2021	2546	23.28	0*	0
2022	2594	28.35	0	0

*Flow exceeded 18,000 gpm on Aug 28 for one hour. No diversion.

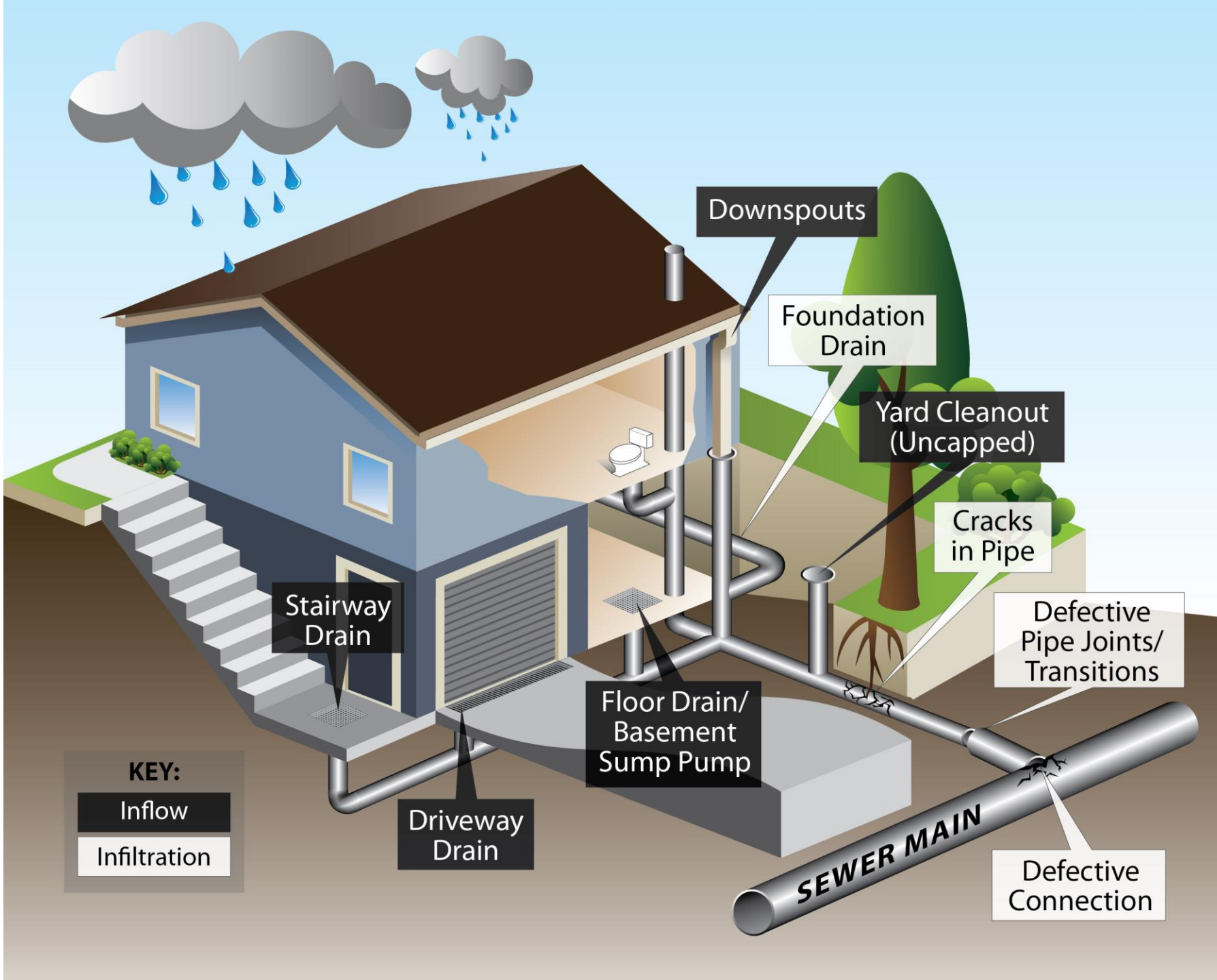
Peak Flows are Caused by Clearwater

Infiltration

Groundwater seeping into sanitary system

Inflow

Stormwater directed into the sanitary system

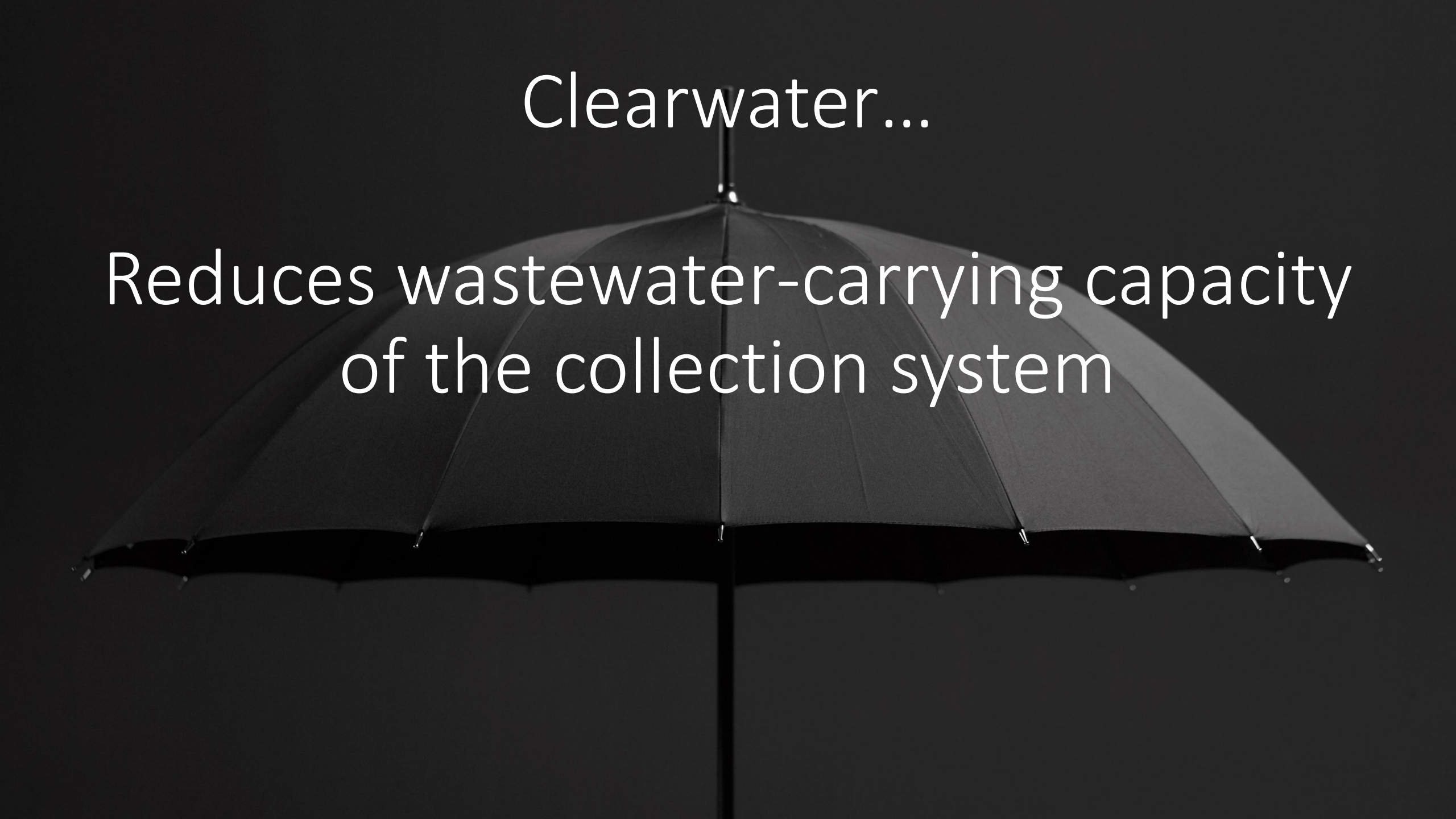


Clearwater…

Wastes money pumping and treating water that doesn’t need treatment

Clearwater…

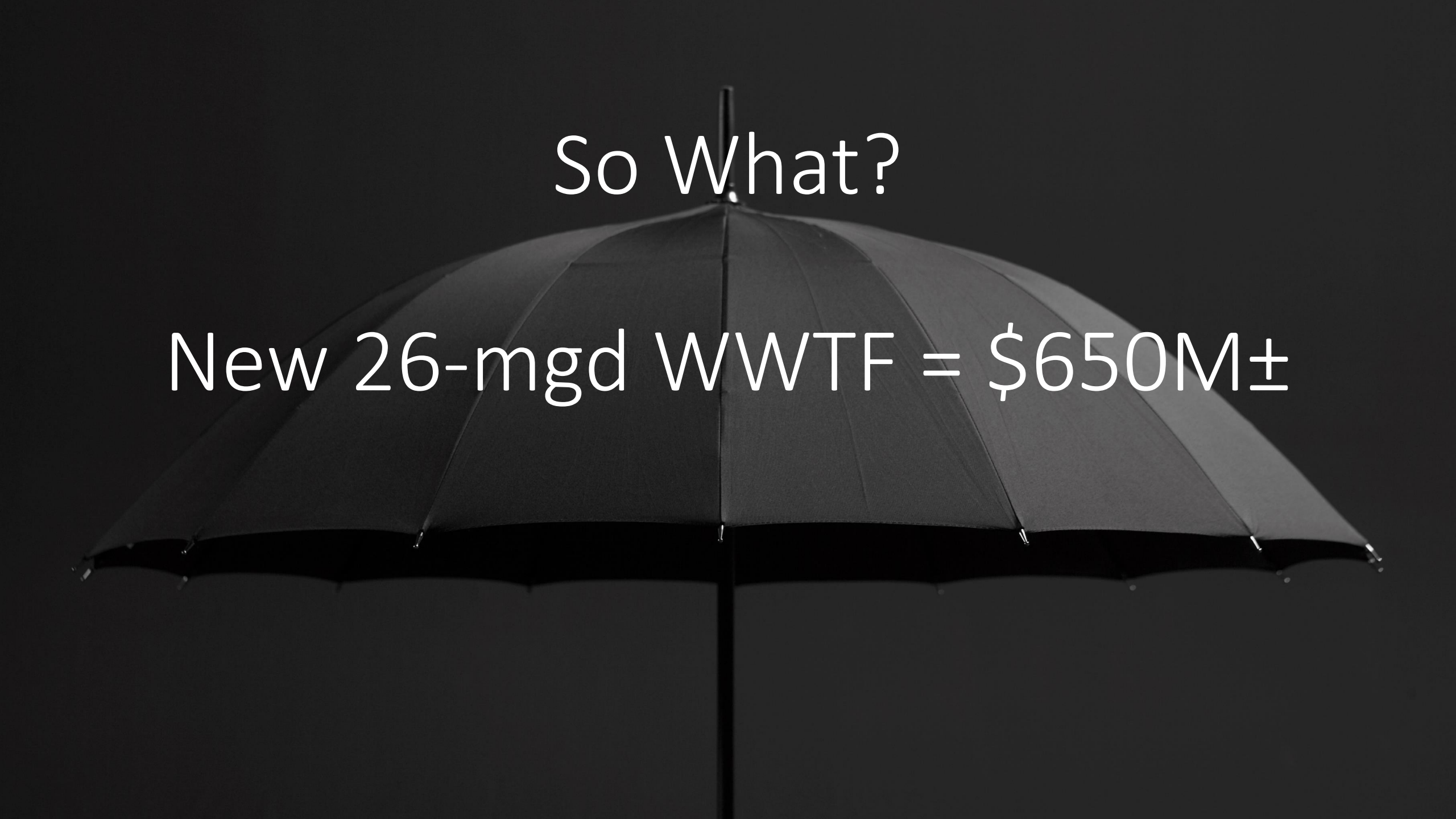
Reduces wastewater-carrying capacity of the collection system



Clearwater…

Reduces wastewater-treatment capacity of the treatment system

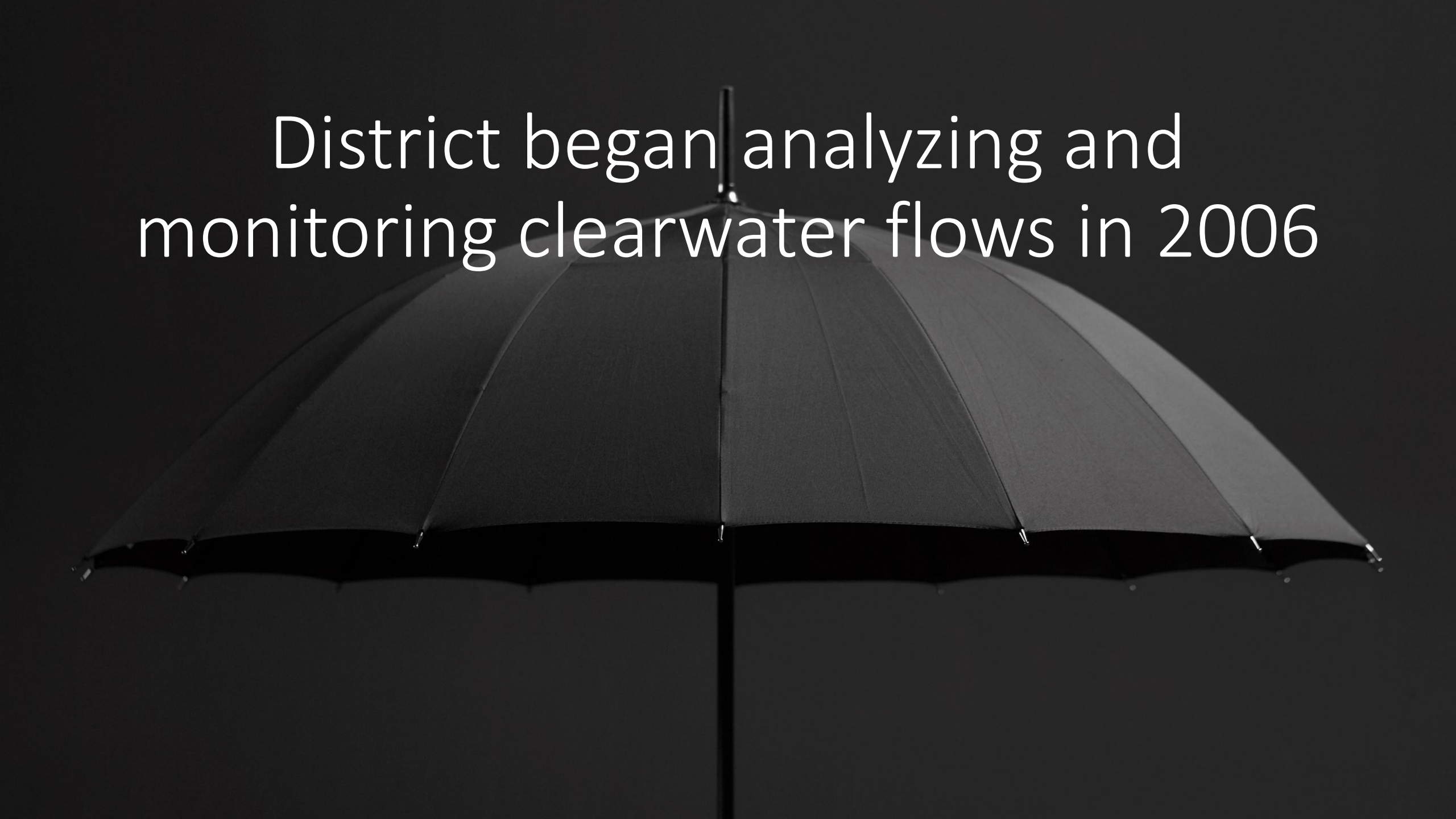
So What?



So What?

New 26-mgd WWTF = $650M±

District began analyzing and monitoring clearwater flows in 2006

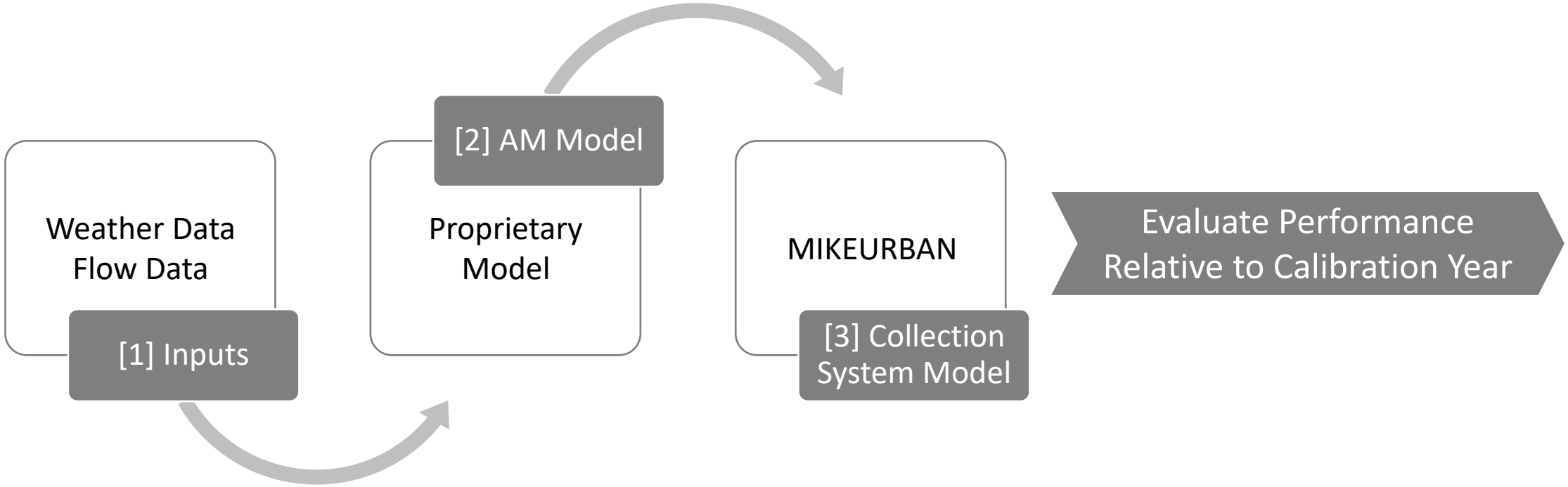


The progressive clearwater approach saved $30M in infrastructure spending ($50M+ today)

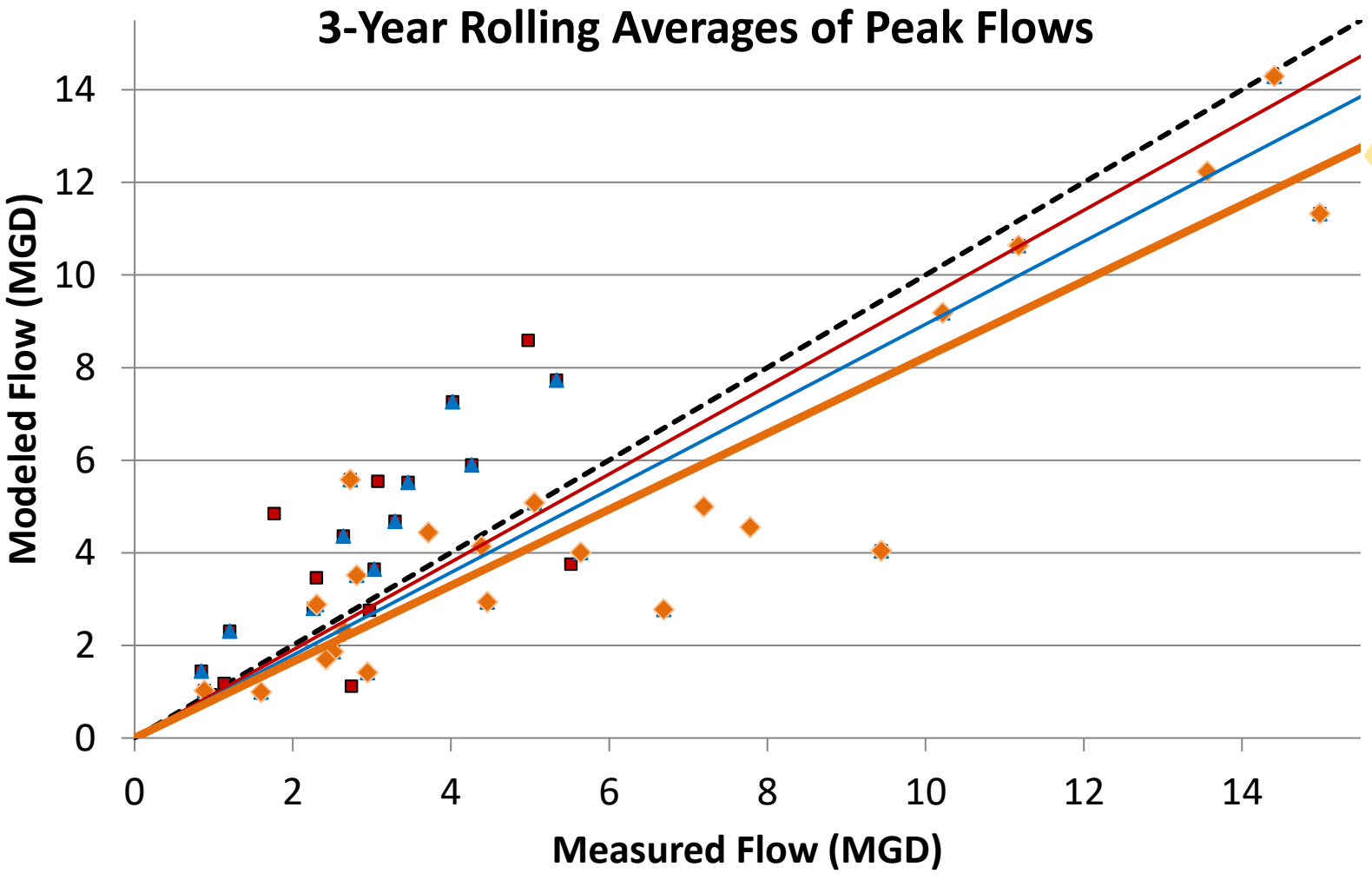
Employed best available technologies (BATs)

The Original Method and BATs (2006)

1. Ultrasonic Flow Meters
2. Antecedent Moisture (AM) Model [Extremely Innovative]
3. Collection System Model



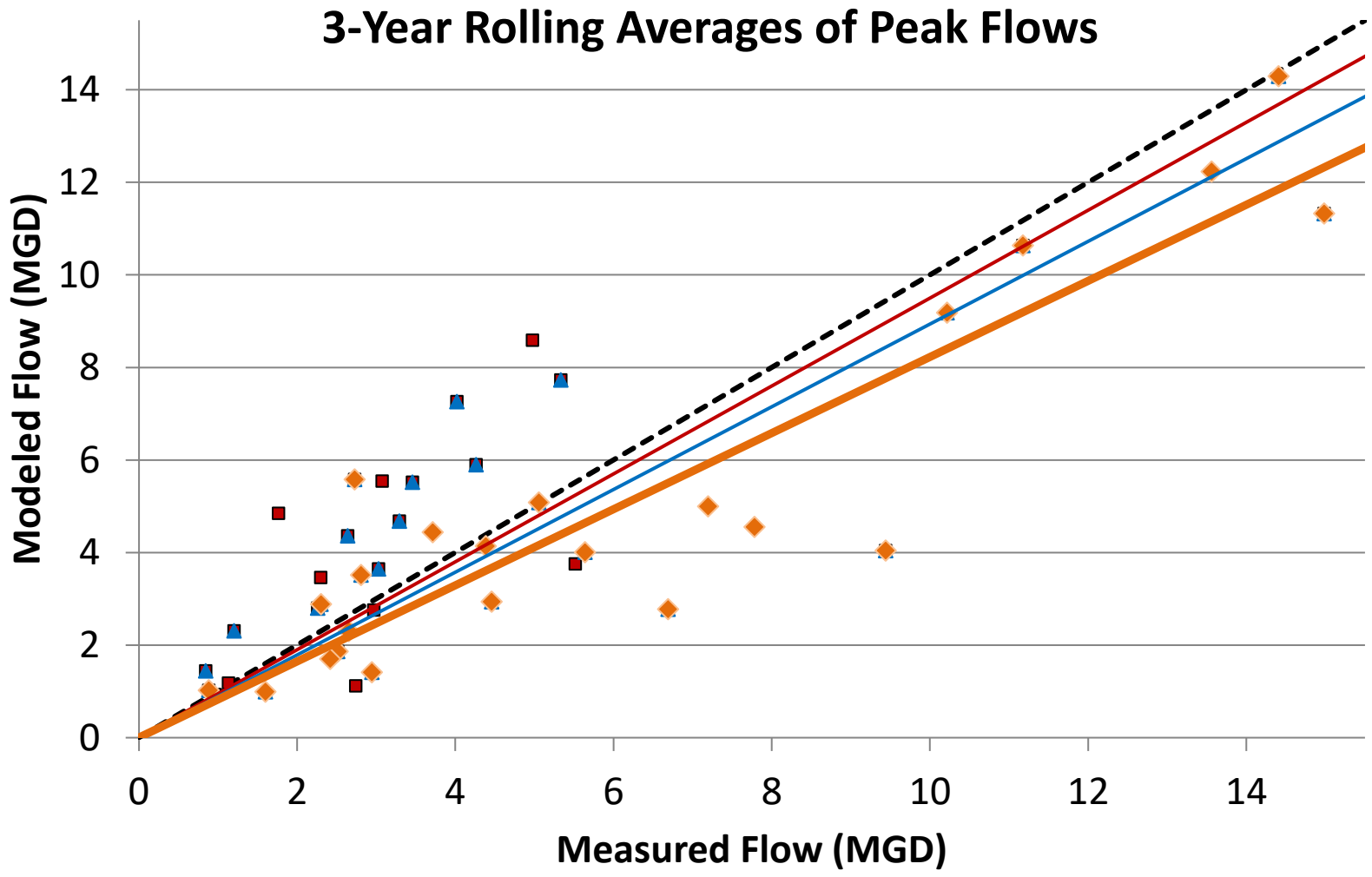
Example Results from Previous Method



Consistently below the "success line" and getting progressively worse

- Qp (2016, 2017, 2018)
- Qp (2017, 2018, 2019)
- Qp (2018, 2019, 2020)
- Program Reference Line
- Qp (2016, 2017, 2018) Trendline
- Qp (2017, 2018, 2019) Trendline
- Qp (2018, 2019, 2020) Trendline

Example Results from Previous Method



Performing progressively worse but…

- How much worse?
- How much clearwater?
- How does this community compare to industry expectations or requirements?
- What is the cost of clearwater?
- What are the risks associated with this performance?

- Qp (2016, 2017, 2018)
- Qp (2017, 2018, 2019)
- Qp (2018, 2019, 2020)
- Program Reference Line
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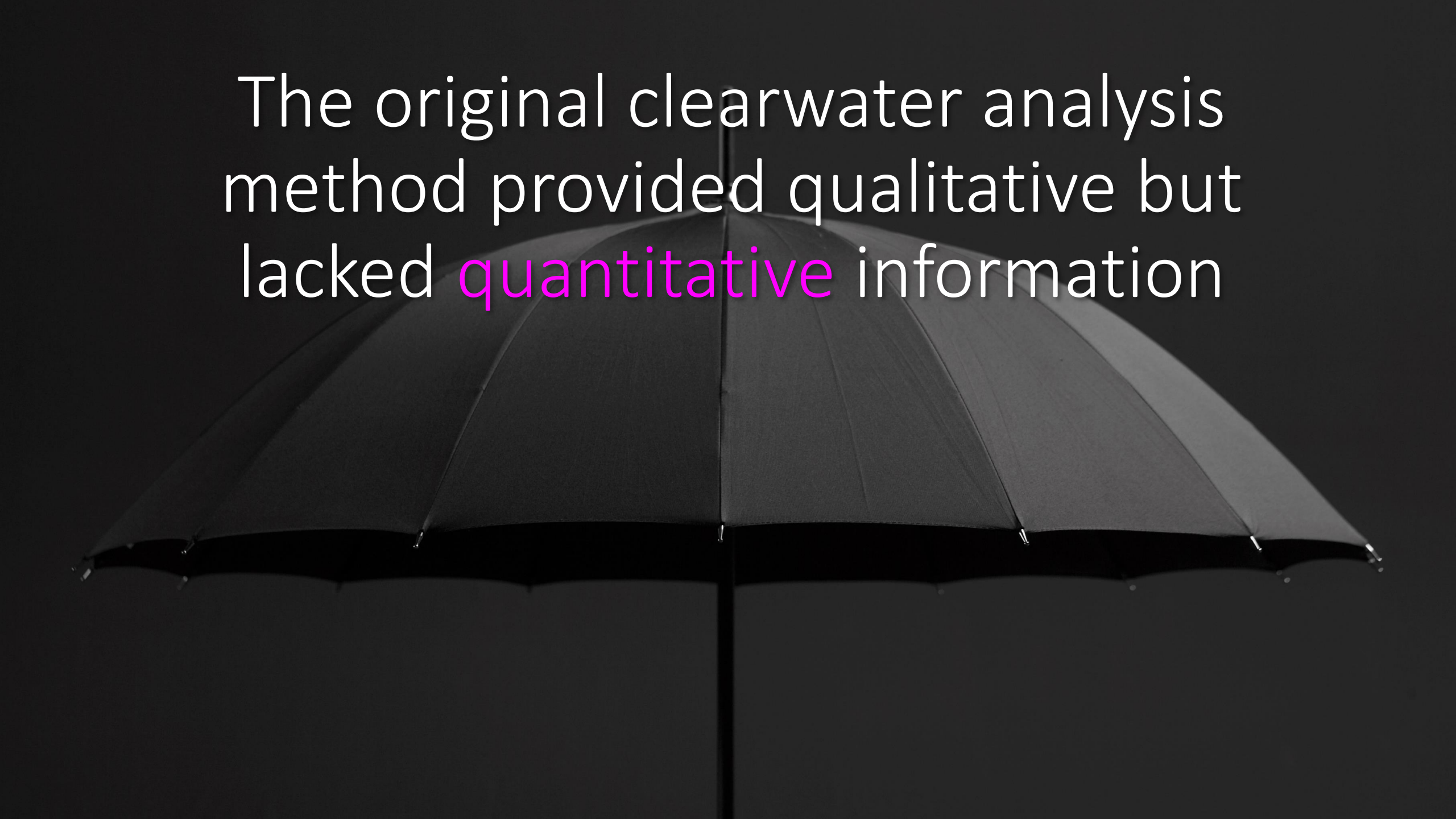
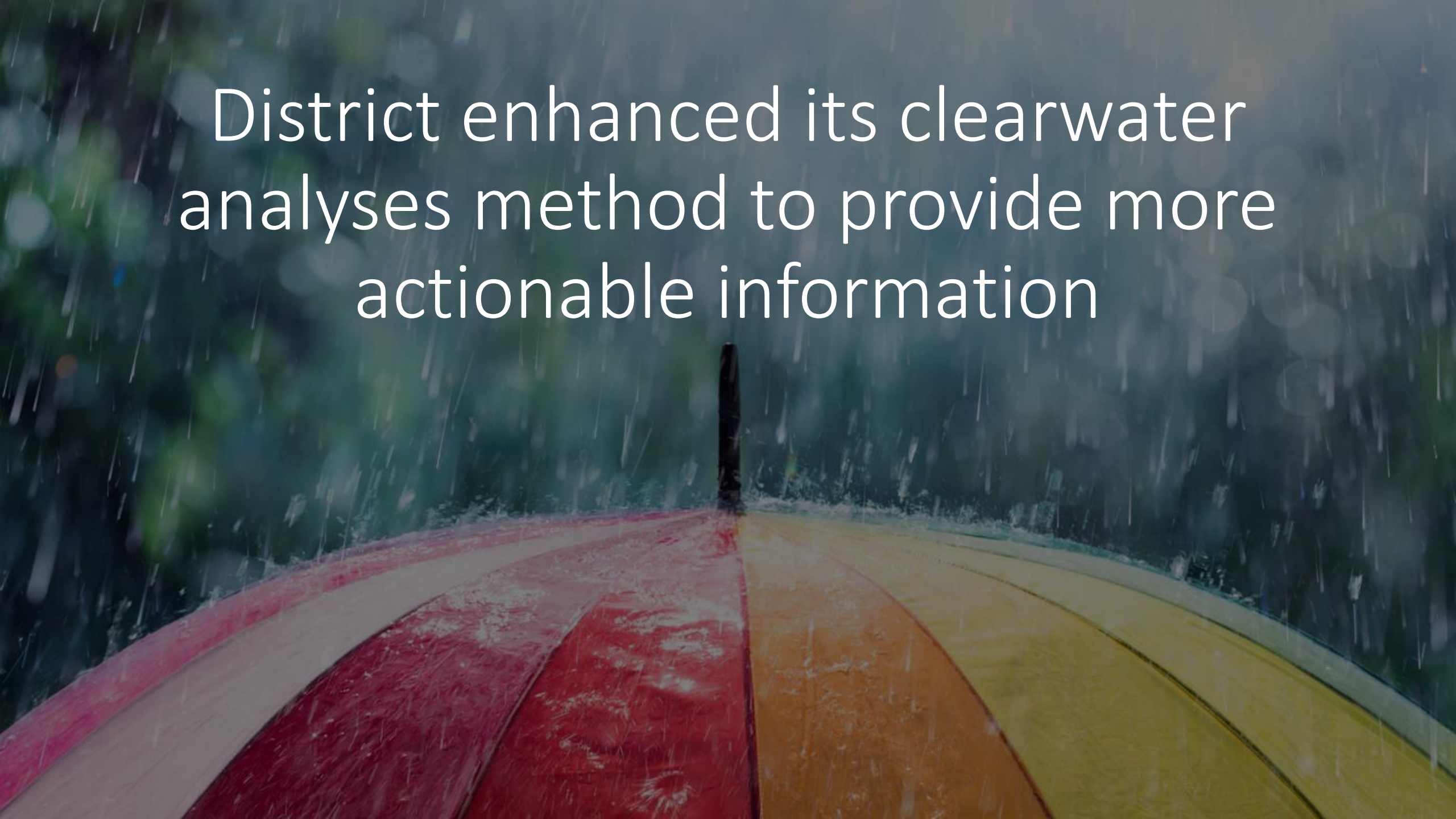
The original clearwater analysis method provided qualitative but lacked quantitative information



District enhanced its clearwater analyses method to provide more actionable information



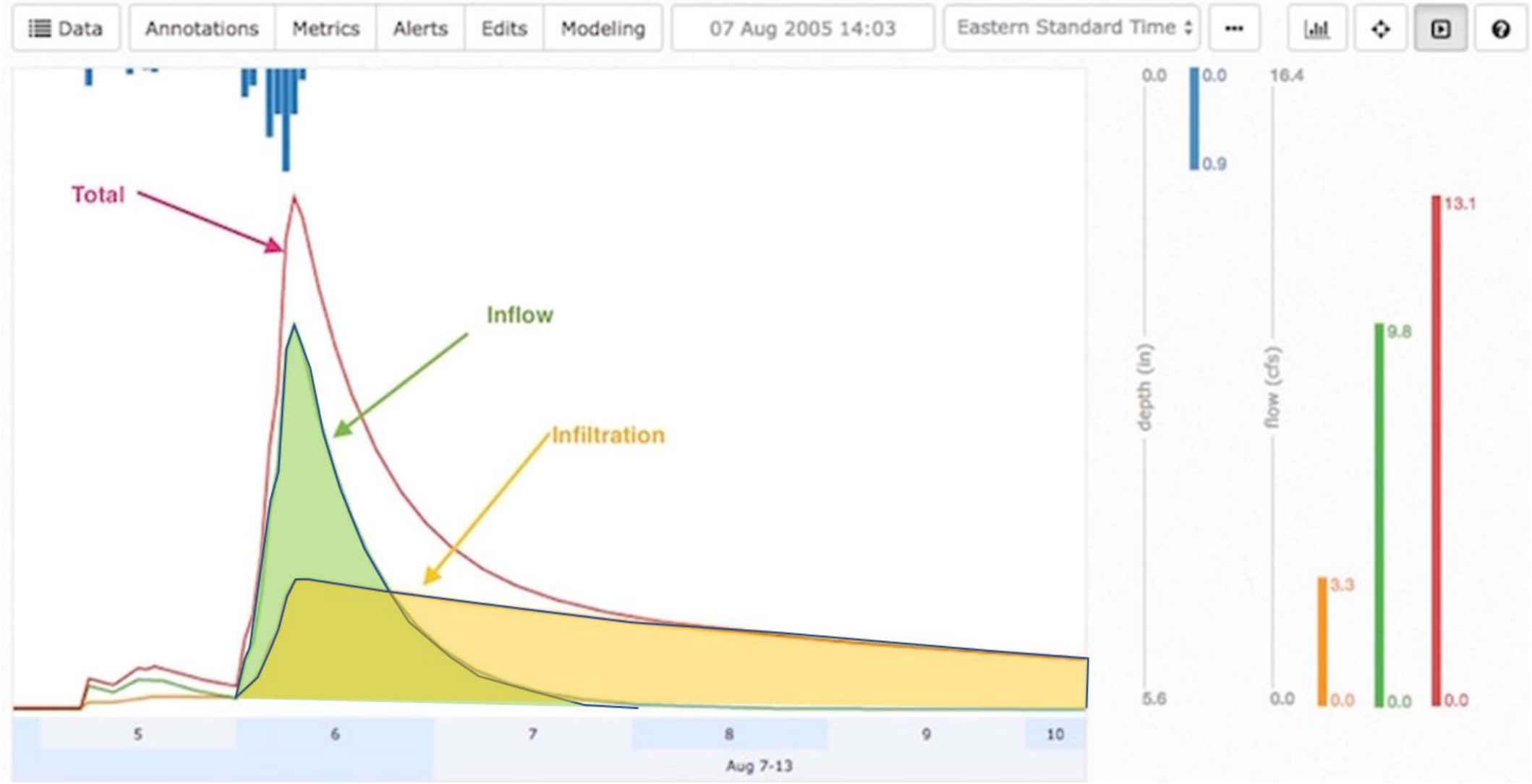
The analysis method has evolved to use the best available technologies (BATs) today

The Enhanced Method and BATs

1. ~~Ultrasonic Flow~~ Meters Laser Flow Meters
2. ~~Antecedent Moisture (AM) Model~~ [Proprietary and Not Supported]
3. Collection System Model with a Robust Antecedent Moisture Model

[1] Collect Data	[2] Calibrate	[3] Simulate	[4] Results
Annual Flow and Rainfall Data	Re-Calibrate Model	Perform Typical Year Simulation	Clearwater Analysis
		Perform Long-Term Simulation (50 Years)	Risk Analysis

Method Provides a Partitioned Clearwater Analysis



USEPA and WDNR Focus on Inflow

Excessive inflow requires further investigation to determine if it can be reduced in the collection system cost effectively.

Deemed excessive if the total daily flow during a storm exceeds a 275 gpcd guideline (EPA/625/6-91/030).

USEPA and WDNR Focus on Infiltration

Excessive infiltration requires further investigation to determine if it can be reduced in the collection system cost effectively.

Deemed excessive if the dry-weather flow exceeds 120 gpcd, (EPA/625/6-91/030 and ASCE/EPA Cooperative Agreement CP-828955-01-0).

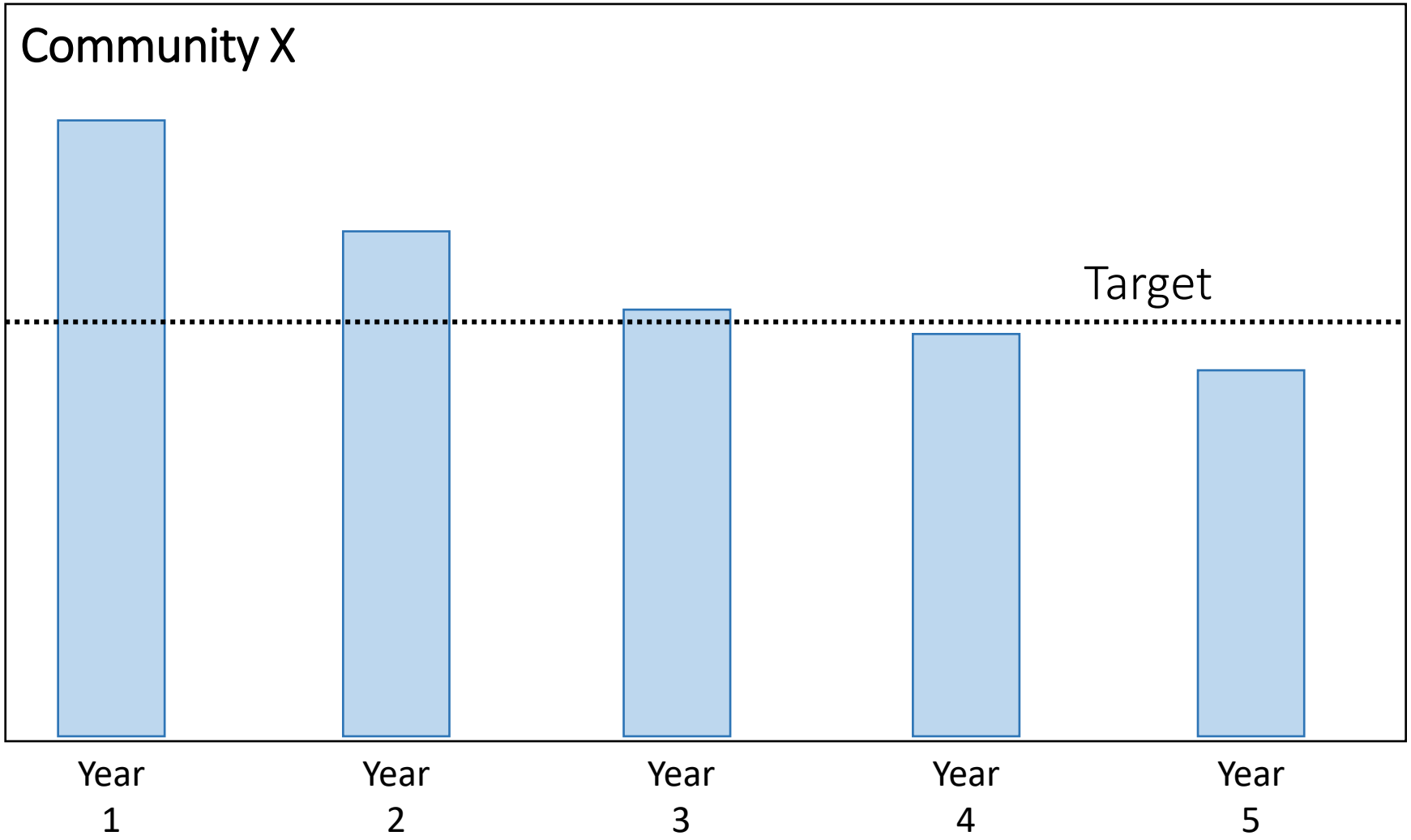
Method Provides Conventional Clearwater Metrics

	Average Dry-Weather Flow (gpcd)		Average Peak Wet-Weather Flow (gpcd)	
	2021	2022	2021	2022
EPA Threshold	125	125	275	275
Combined Locks	88	69	215	246
Darboy	72	59	128	115
Kaukauna	151	141	448	437
Kimberly	109	86	295	230
Little Chute	199	187	461	411

Exceeds EPA threshold

Method Allows Year-to-Year Comparisons of Clearwater Performance

Standard Clearwater Metrics Using a Typical Year

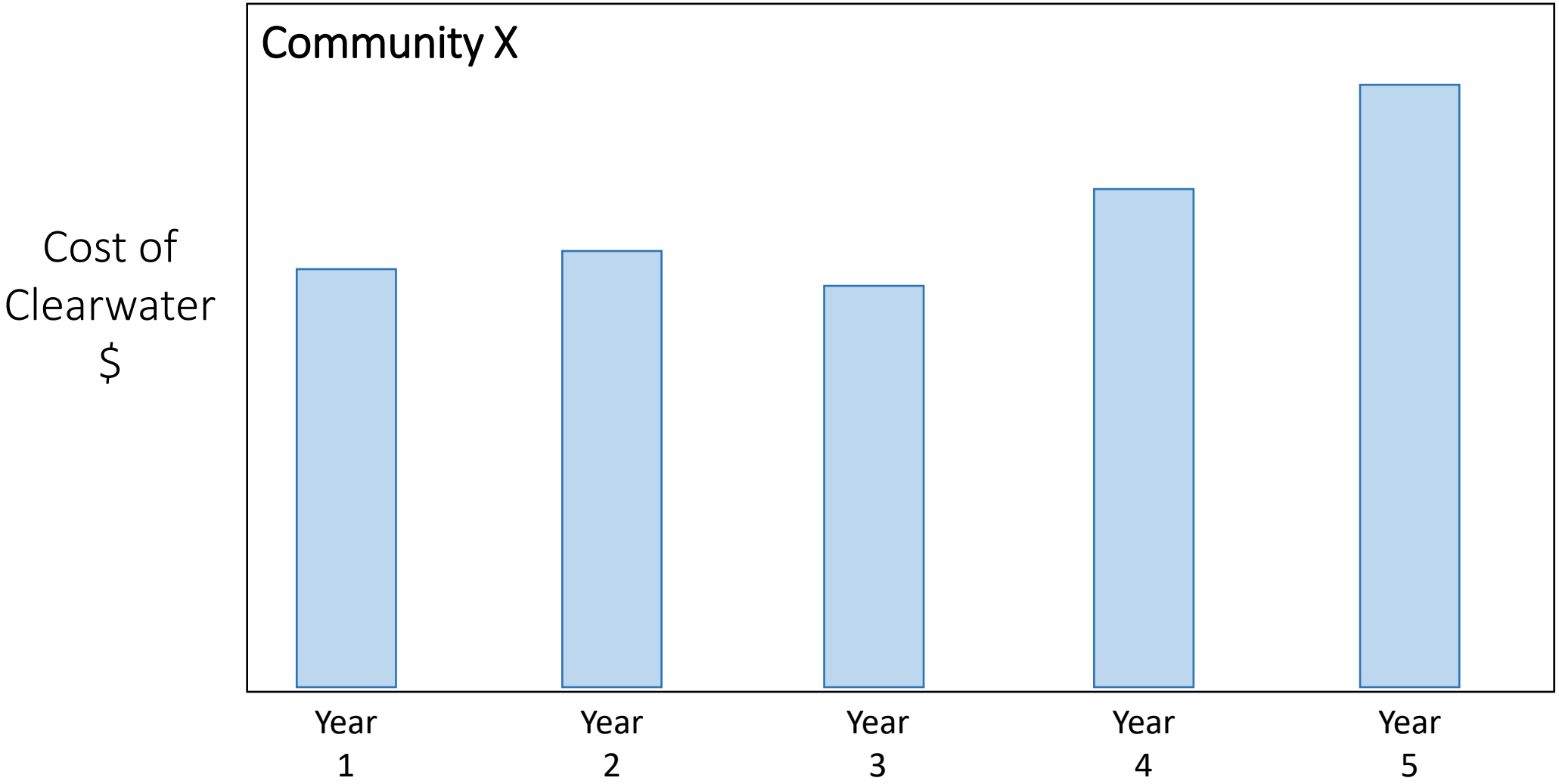


Method Provides Annual Cost Perspective

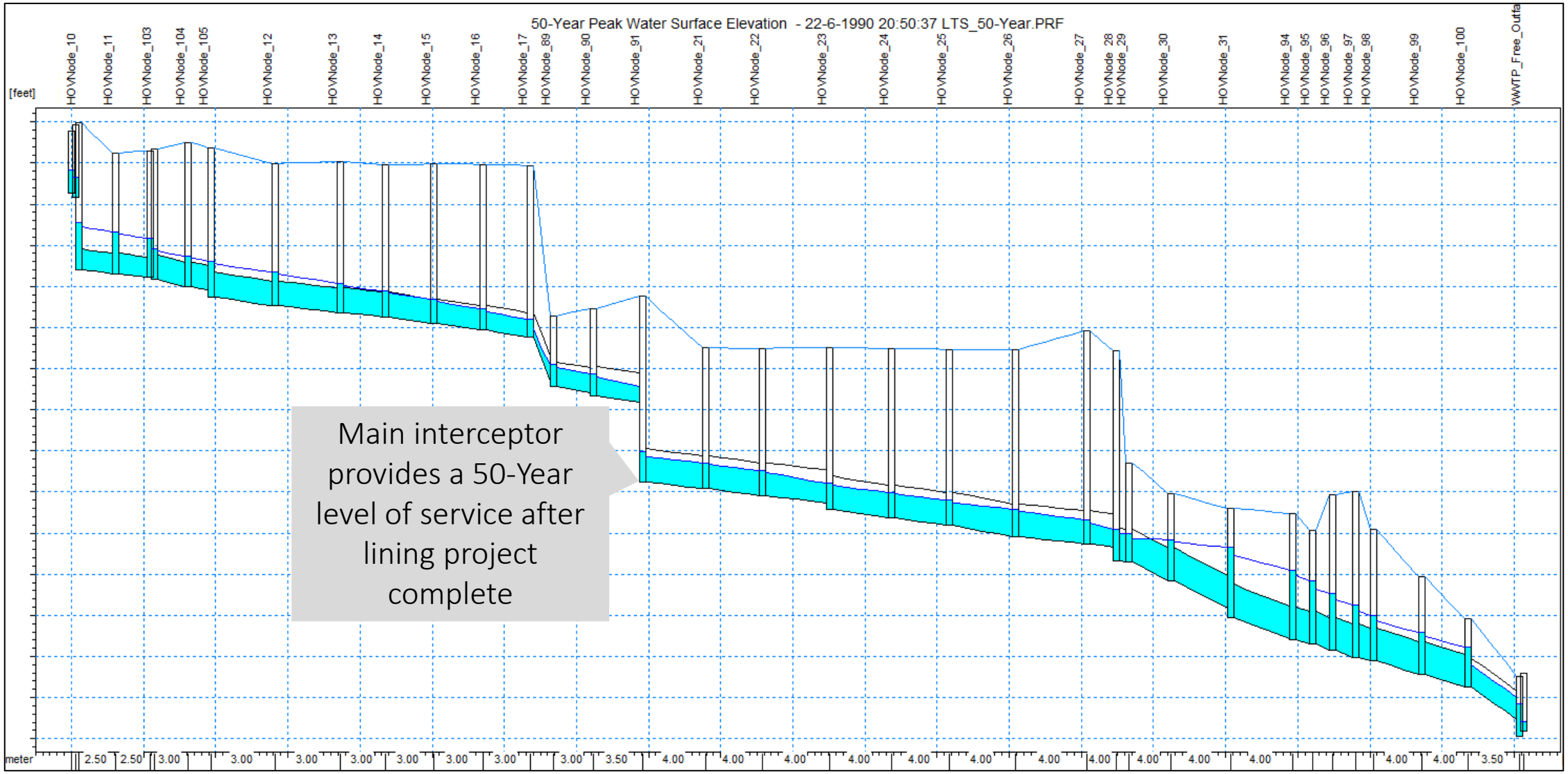
	Clearwater Fraction of Total Flow (%)		Annual Clearwater Cost ($)	
	2021	2022	2021	2022
Combined Locks	50%	43%	$50,288	$38,352
Darboy	39%	30%	$109,158	$71,770
Kaukauna	61%	60%	$401,567	$374,600
Kimberly	54%	42%	$128,593	$78,686
Little Chute	73%	73%	$479,672	$489,298

Corresponds to exceedence of both EPA thresholds

Method Allows Year-to-Year Comparison of $



Method Allows Annual Capacity-Based Risk Analysis



Main interceptor provides a 50-Year level of service after lining project complete

The Enhanced Clearwater Analysis Method Provides More Useful Information…

- Actionable clearwater information using industry-standard metrics than can be compared year-to-year.
  - Infiltration
  - Inflow
- Annual clearwater costs that can be compared year-to-year.
- Capacity-based risk analyses
  - Present-Day Situation
  - What-If Scenarios

Thank you!