



Water Reuse in Sewered Areas – March 8, 2019

Presented to: MWRA Wastewater Advisory Committee

Presented by: Bruce Douglas



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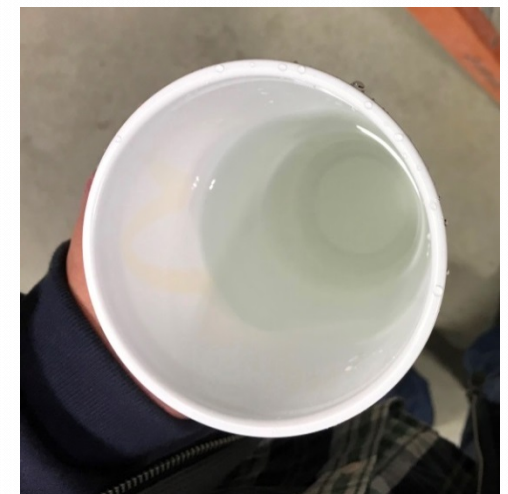
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TERMINOLOGY FOR PRESENTATION :

- **WASTEWATER – MIXED SEWAGE FROM BUILDING SANITARY DRAINS (NON-INDUSTRIAL)**
- **BLACKWATER – SUBSET OF WASTEWATER DERIVED FROM TOILETS, KITCHEN SINK & DISHWASHER**
- **GREYWATER – RESTRICTED TO NON-BLACKWATER SOURCES: BATHROOM SINKS, SHOWERS, BATHTUBS, CLOTHES WASHERS, AND LAUNDRY SINKS**
- **NON-POTABLE – FIT FOR PURPOSE RECLAIMED WATER, SUITABLE FOR USES, SUCH AS: IRRIGATION, COOLING WATER, TOILET FLUSHING, VEHICLE WASHING, COMMERCIAL LAUNDRIES, FIRE SUPPRESSION, SNOW-MAKING, ETC**



MWRA REGULATORY CHANGE REQUEST

MAY 17, 2018

- *“10.023: Specific Prohibitions*
- *No Person shall discharge, or cause or allow to be discharged, directly or indirectly, into the Authority Sewerage System, any of the following:...”*
- *“(13) Any Sludge, except:*
 - a. from a water treatment plant owned and operated by a municipality, or by a water district created by a special or general act of the Massachusetts Legislature, and when specifically permitted by the Authority pursuant to 360 CMR 10.057, or*
 - b. from a water reclamation facility discharging directly to a municipal sewer within the MWRA service area, approved within the Commonwealth of Massachusetts’ Reclaimed Water Permit Program And Standards (314 CMR 20), and when specifically permitted by the Authority pursuant to 360 CMR 10.000.”*

GILLETTE STADIUM & PATRIOT PLACE 250,000 GPD WATER REUSE SYSTEM



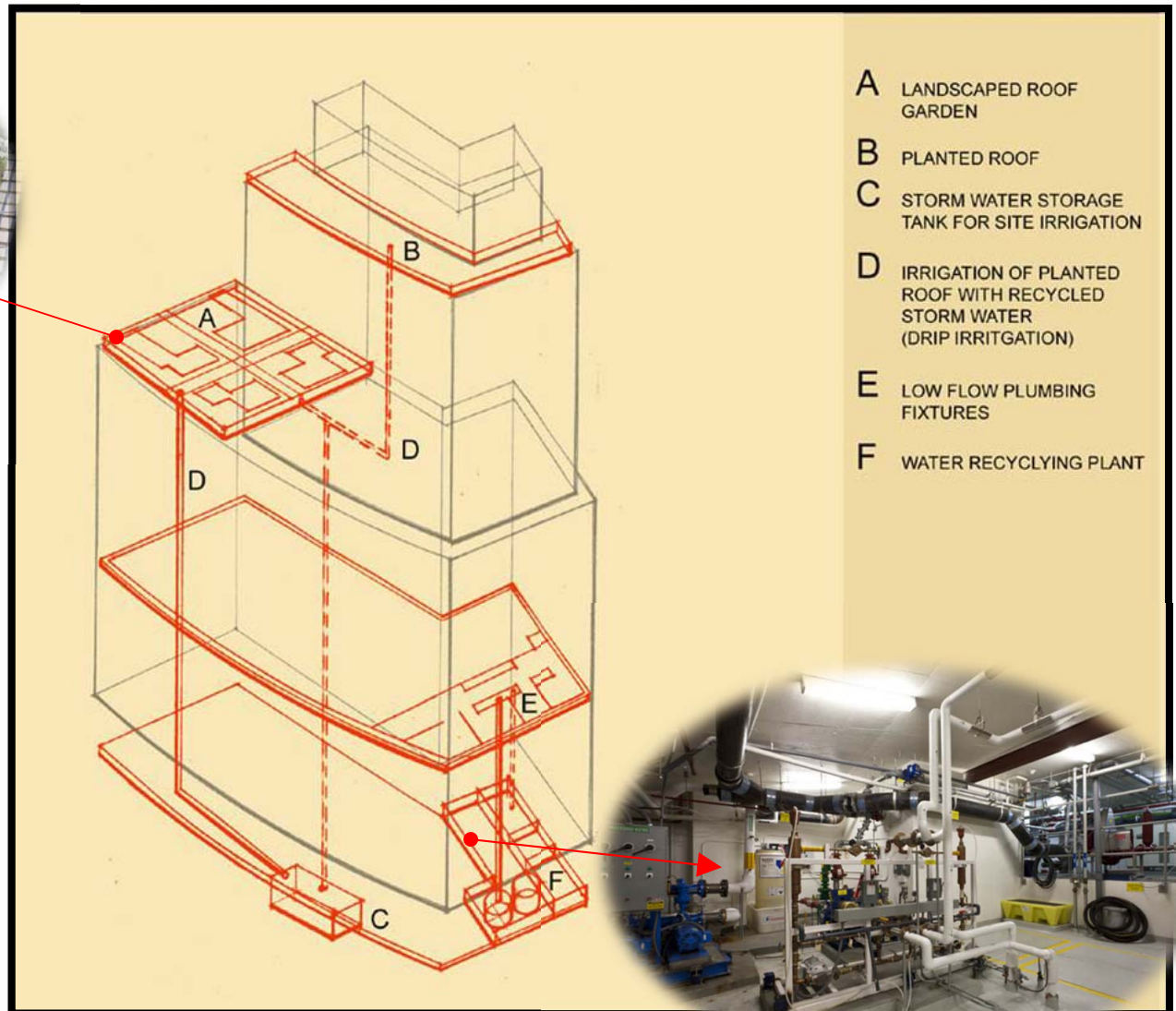
CASE STUDY: BATTERY PARK, NYC

IN BUILDING WATER REUSE & THERMAL ENERGY RECOVERY



Reuse Applications:

- Toilet Flushing
- Cooling Tower Make-Up Water
- Landscape Irrigation
- Laundry



WHY INCLUDE THIS EXEMPTION?

- ENABLE ONSITE WATER REUSE IN THE MWRA SEWER SERVICE AREA FOR THE FOLLOWING APPLICATIONS:
 - ONSITE WATER REUSE
 - SEWER MINING
- PROVIDE NON-POTABLE WATER FOR IRRIGATION, COOLING WATER, TOILET FLUSHING, COMMERCIAL LAUNDRIES, ETC.
- ENABLE SIGNIFICANT WATER CONSERVATION
- NET ZERO ENERGY WATER REUSE ASSOCIATED WITH THERMAL ENERGY RECOVERY
- PROVIDE FOR INCREASED RESILIENCY TO DROUGHT



ZeeWeed 500 Module image courtesy GE Water

FIGURE 1.1 WATER REUSE TREATMENT GENERAL PROCESS FLOW OVERVIEW

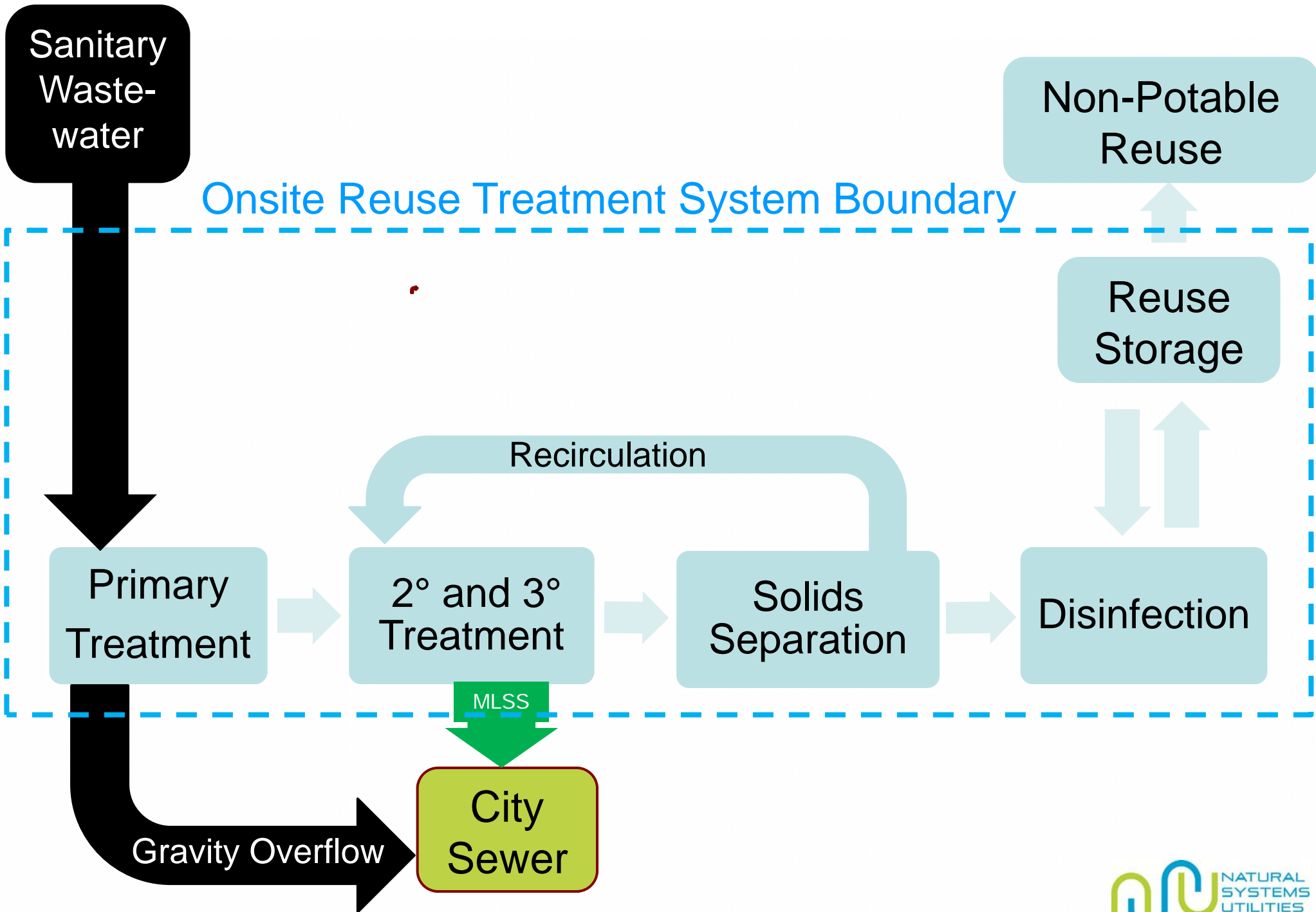


FIGURE 1-2 ONSITE WATER REUSE TREATMENT PROCESS FLOW

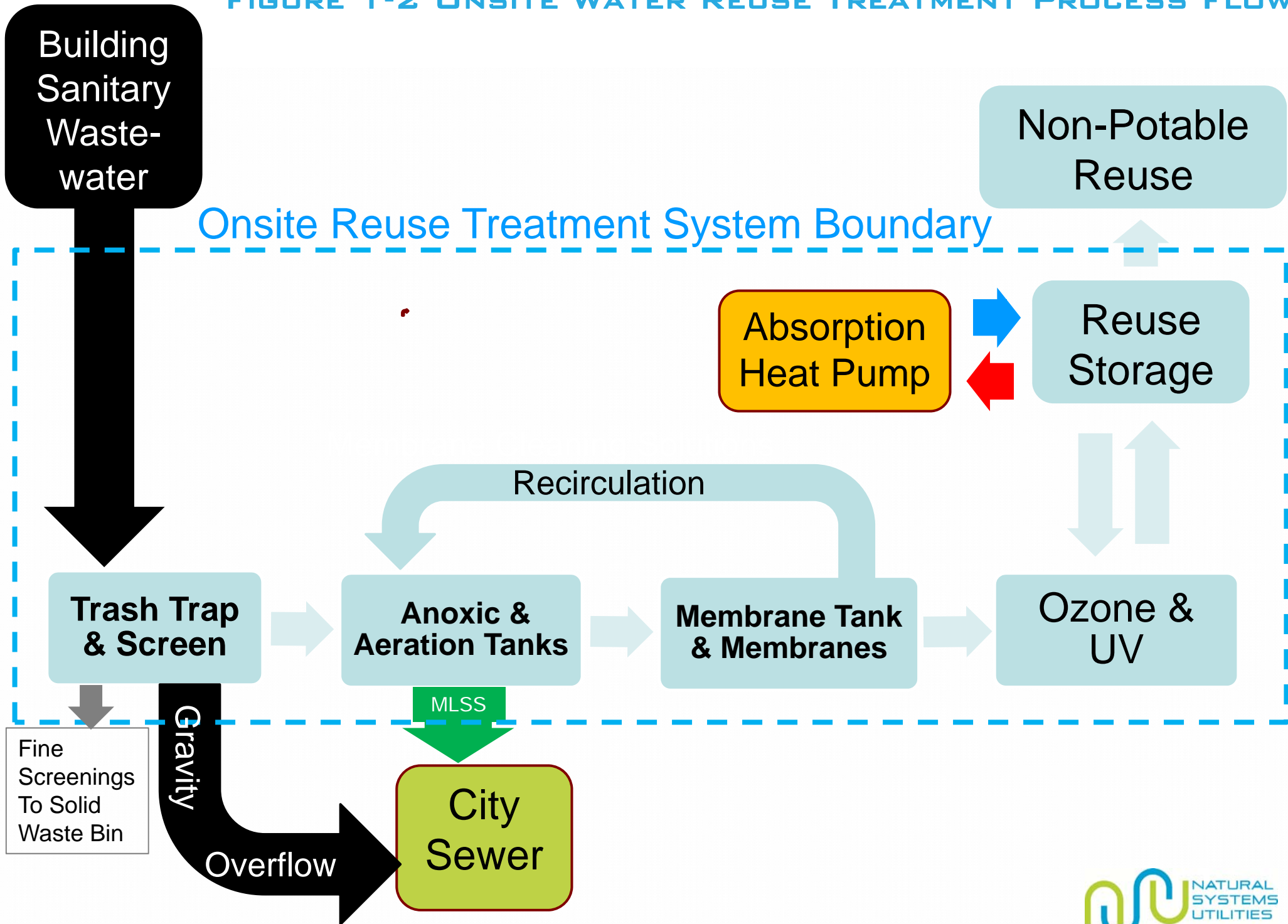


FIGURE 1-3 ONSITE WATER REUSE TREATMENT PROCESS FLOW PLUS CLEANING SOLUTION RECIRCULATION⁵

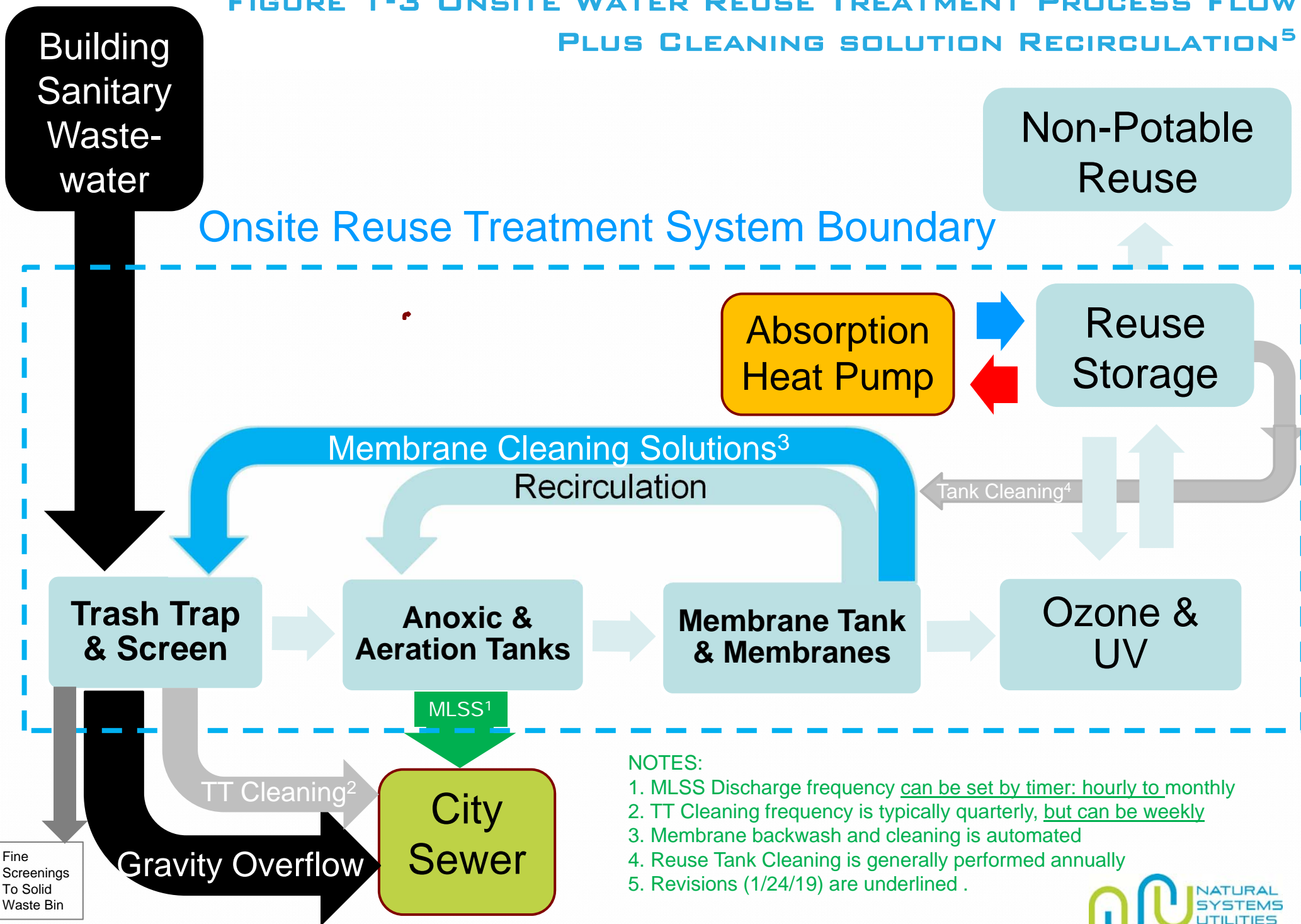


TABLE 1-2 URBAN ONSITE WATER REUSE TYPICAL DISCHARGES TO COLLECTION SYSTEM¹

Routine Sewer Discharge

- Daily frequency (continuous)
- 50% to 10% of Indoor Use
- Typical Sanitary Sewage

Mixed Liquor Suspended Solids²

- Frequency can be set by timer, i.e., hourly
- ~1% of reclaimed water production
- Total Solids = 1% to 1.5%

Trash Trap Solids²

- Quarterly typical frequency, can be reduced
- 5,000 to 10,000 gallons
- Total Solids = 1% – 5%

Reuse Storage Tank Cleaning

- Annual or greater typical frequency
- BOD & TSS \lll Typical Sanitary Sewage

11/24/2019 Revisions are underlined

²Will not be released during CSO event

EXAMPLE DAILY LOADS FOR PROJECTS WITHOUT REUSE, WITH 50% ONSITE REUSE AND SEWER MINING

System Type	Component	Flow to City Sewer		Total Suspended Solids Concentration (mg/L) ¹			Resulting Solids Load (lb/day)		
		GPD	MGD	low	med	high	low	med	high
Without reuse	Raw Sewage	50,000	0.05	100	220	350	42	92	146
	Total Solids Load						42	92	146
50% onsite reuse	Raw Sewage	25,000	0.025	100	220	350	21	46	73
	In-building Reuse	250	0.00025	8,000	10,000	12,000	17	21	25
	Total Solids Load						38	67	98
Sewer Mining	Raw Sewage	(100,000)	(0.1)	100	220	350	(83)	(183)	(292)
	MLSS (Total Solids Load)	1,000	0.001	8,000	10,000	12,000	67	83	100
	Net Solids Load Difference						(16)	(100)	(192)

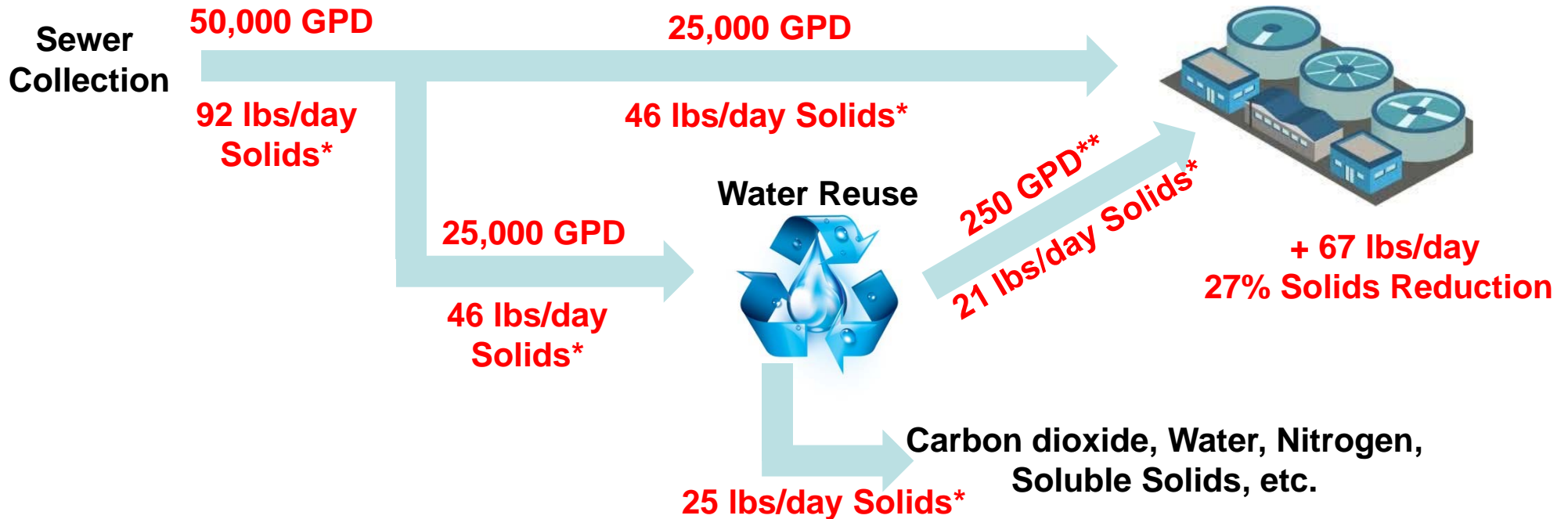
¹Raw sewage Total Suspended Solids (TSS) concentrations from Metcalf & Eddy

Daily Solids Loads- With/Without Reuse Applications

Scenario 1: No Reuse



Scenario 2: 50% Reuse

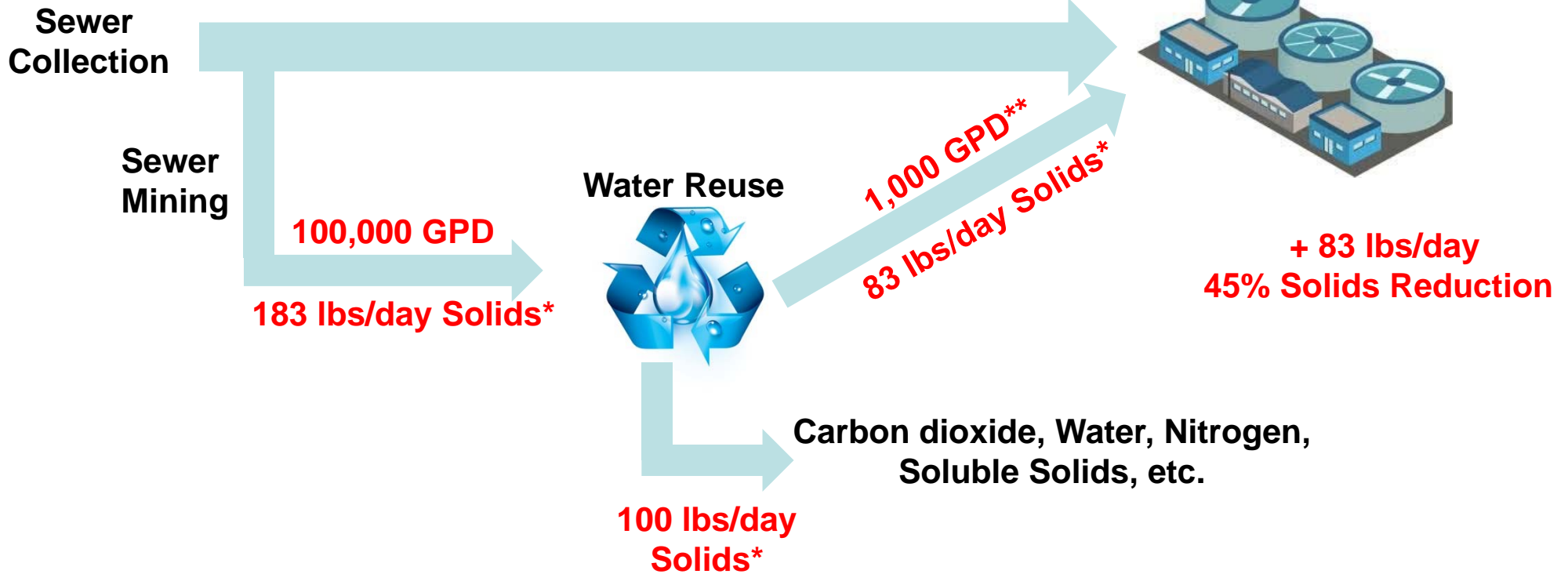


* Solids refer to total suspend solids (TSS)

* Assume TSS of 220 mg/L

** 1% waste sludge

Scenario 3: Sewer Mining



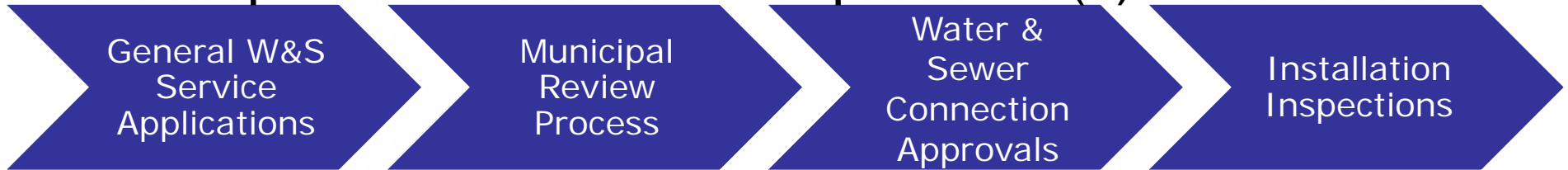
* Solids refer to total suspend solids (TSS)

* Assume TSS of 220 mg/L

** 1% waste sludge

FIGURE 1-4 OVERVIEW OF PARALLEL PERMITTING PROCESSES

Municipal Water & Sewer Department(s)/Commission



Municipal Inspectional Services



MWRA



Massachusetts Department of Environmental Protection





Sustainability & Resiliency

Rising Costs



Competing Demand



Wastewater Capacity





Thank you!

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Q&A



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