

Poplar Street Pump Station construction appropriation request

City Council Finance Committee

Mayor Katjana Ballantyne

Richard E. Raiche, Director of IAM

Demetrios Vidalis, Director of Water & Sewer

Stephen Haynes, W&S Finance Director

Ed Bean, Finance Director

6 December 2022



Outline

- Project goals
 - Historical context
 - Problems created
 - Solutions offered
- Project details
 - Infrastructure included
 - Schedule
 - Relation to ArtFarm
- Financing
 - Rate impacts

Project goals

Poplar Street Pump Station enables flood mitigation in Wards 2&3, supports CSO reduction, and unlocks development potential in 60% of the City

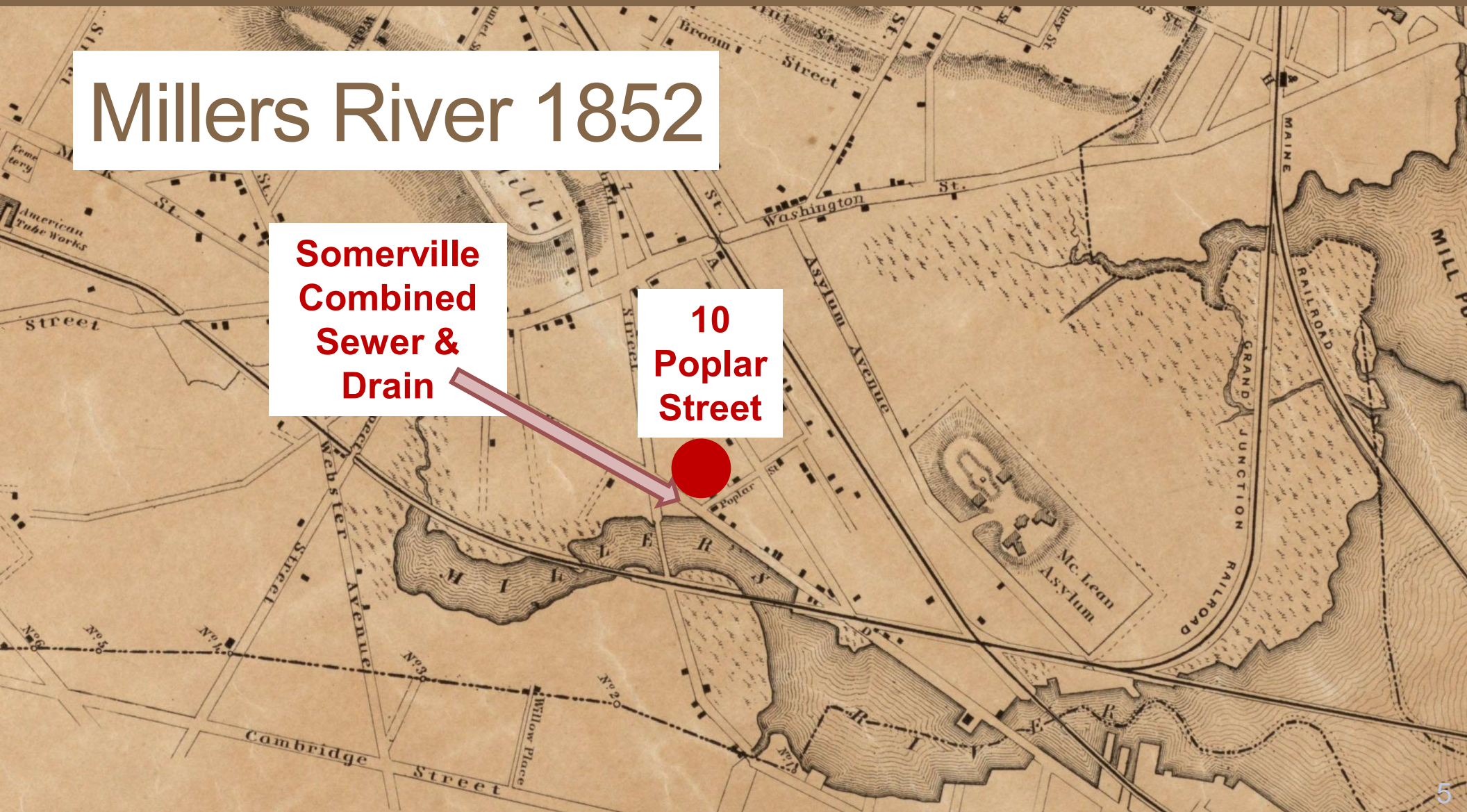
Historical background

Poplar Street Pump Station solves a problem created in 1873

Millers River 1852

**Somerville
Combined
Sewer &
Drain**

**10
Poplar
Street**



Millers River 1873 - 1879

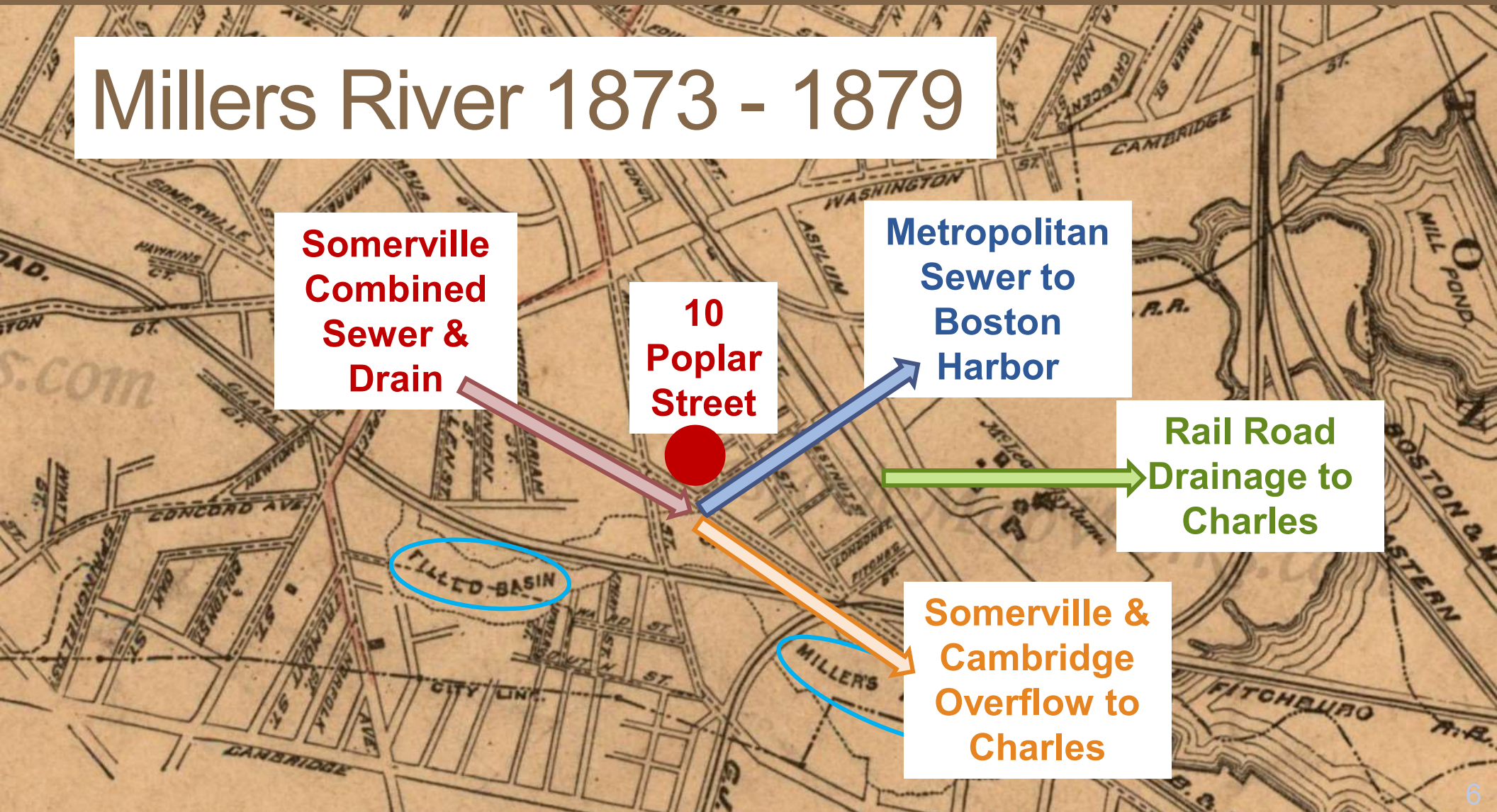
**Somerville
Combined
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Poplar
Street**

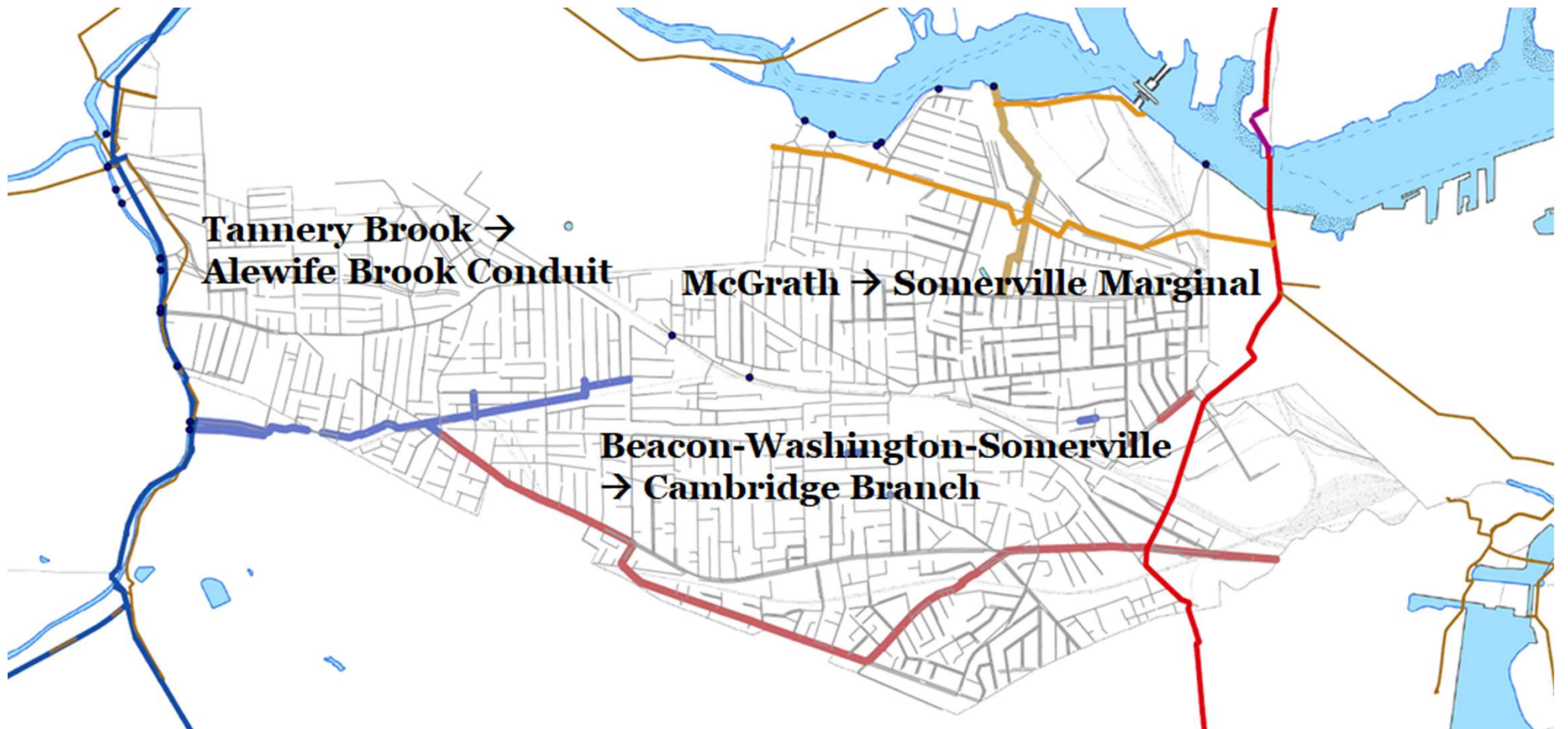
**Metropolitan
Sewer to
Boston
Harbor**

**Rail Road
Drainage to
Charles**

**Somerville &
Cambridge
Overflow to
Charles**



Somerville combined sewer & drain



Combined sewer subsystems

A: Alewife

Western Ward 7
Clarendon Hill

S: Somerville Marginal

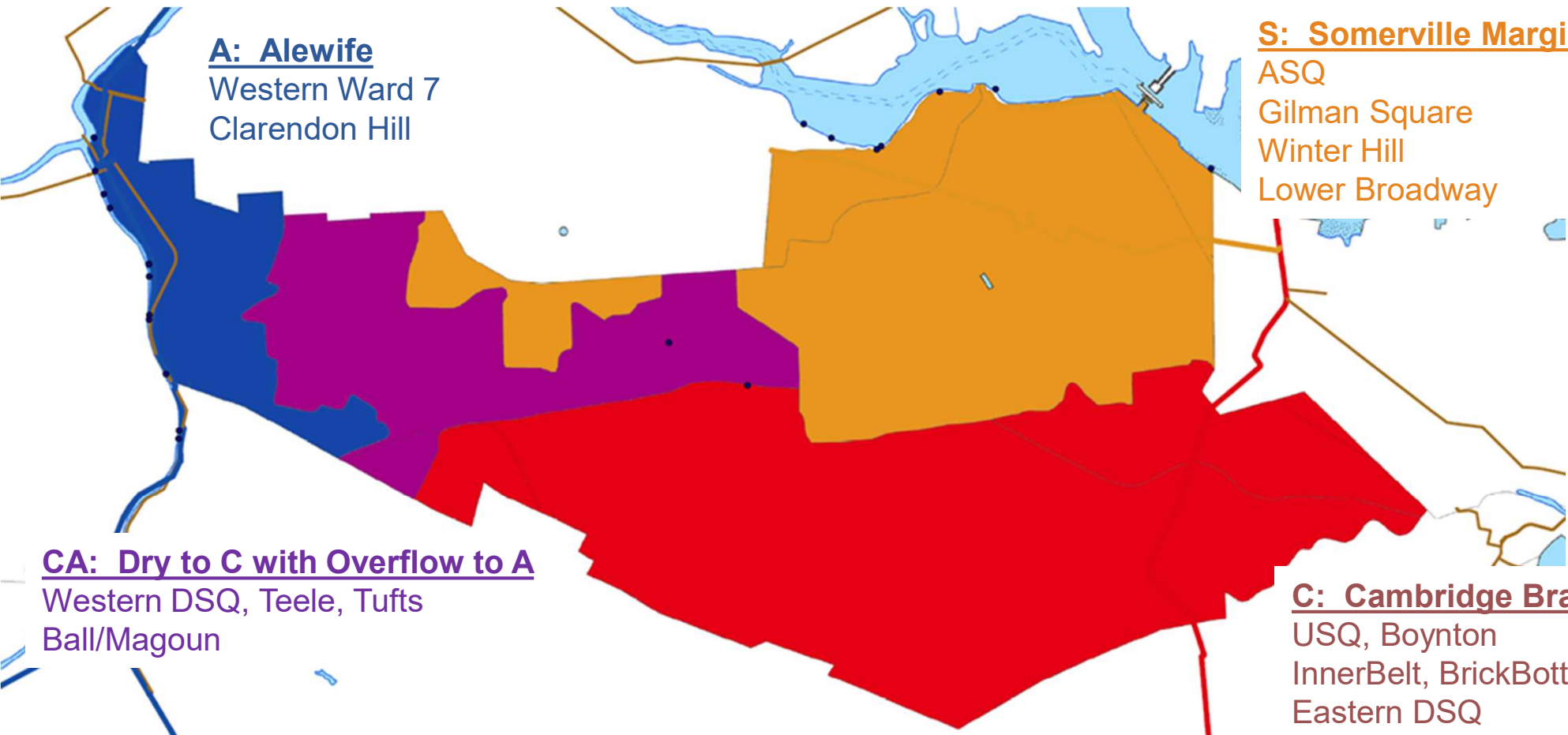
ASQ
Gilman Square
Winter Hill
Lower Broadway

CA: Dry to C with Overflow to A

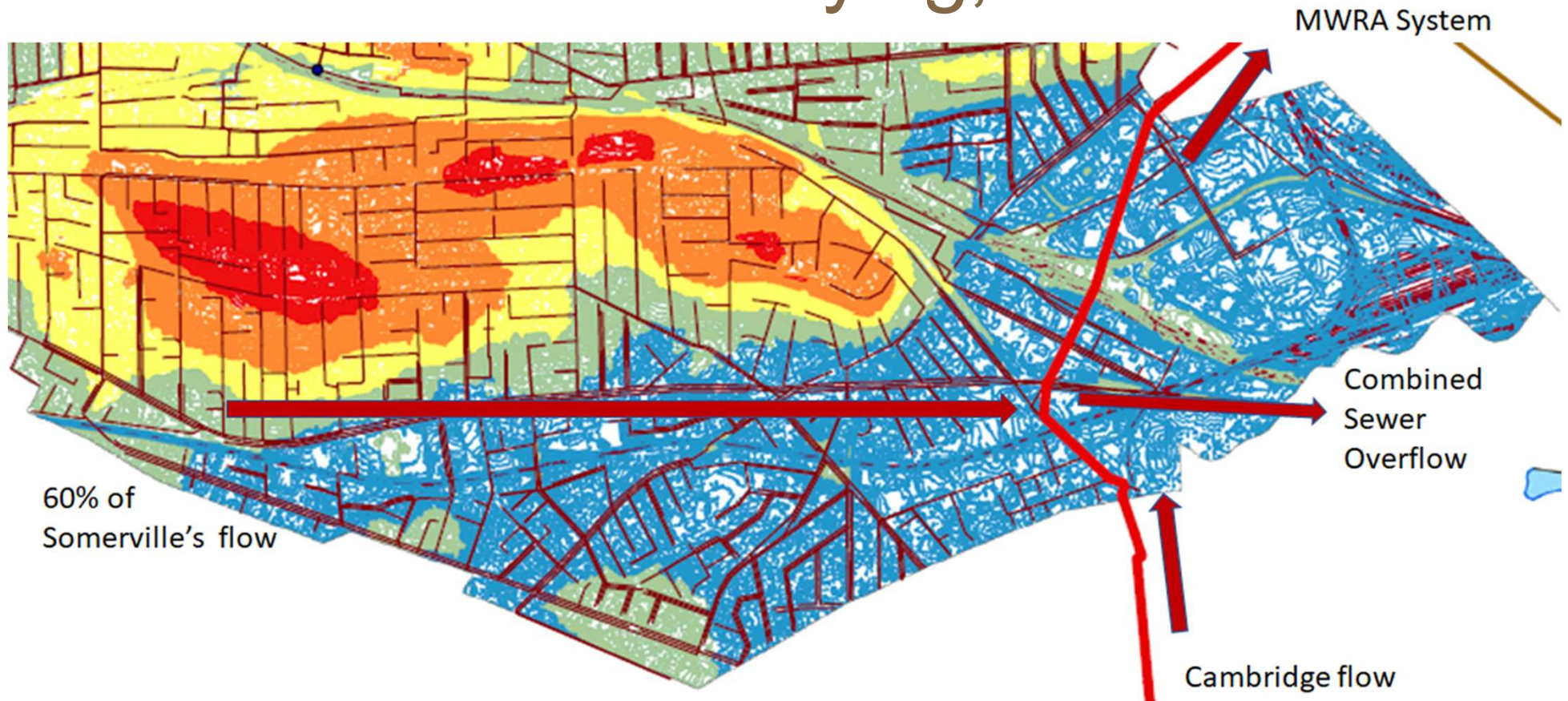
Western DSQ, Teele, Tufts
Ball/Magoun

C: Cambridge Branch

USQ, Boynton
InnerBelt, BrickBottom
Eastern DSQ



Nexus of flows in low-lying, landlocked USQ



- Upstream flows create 3 problems

Problem 1: Flooding

System capacity limitations cause surcharges

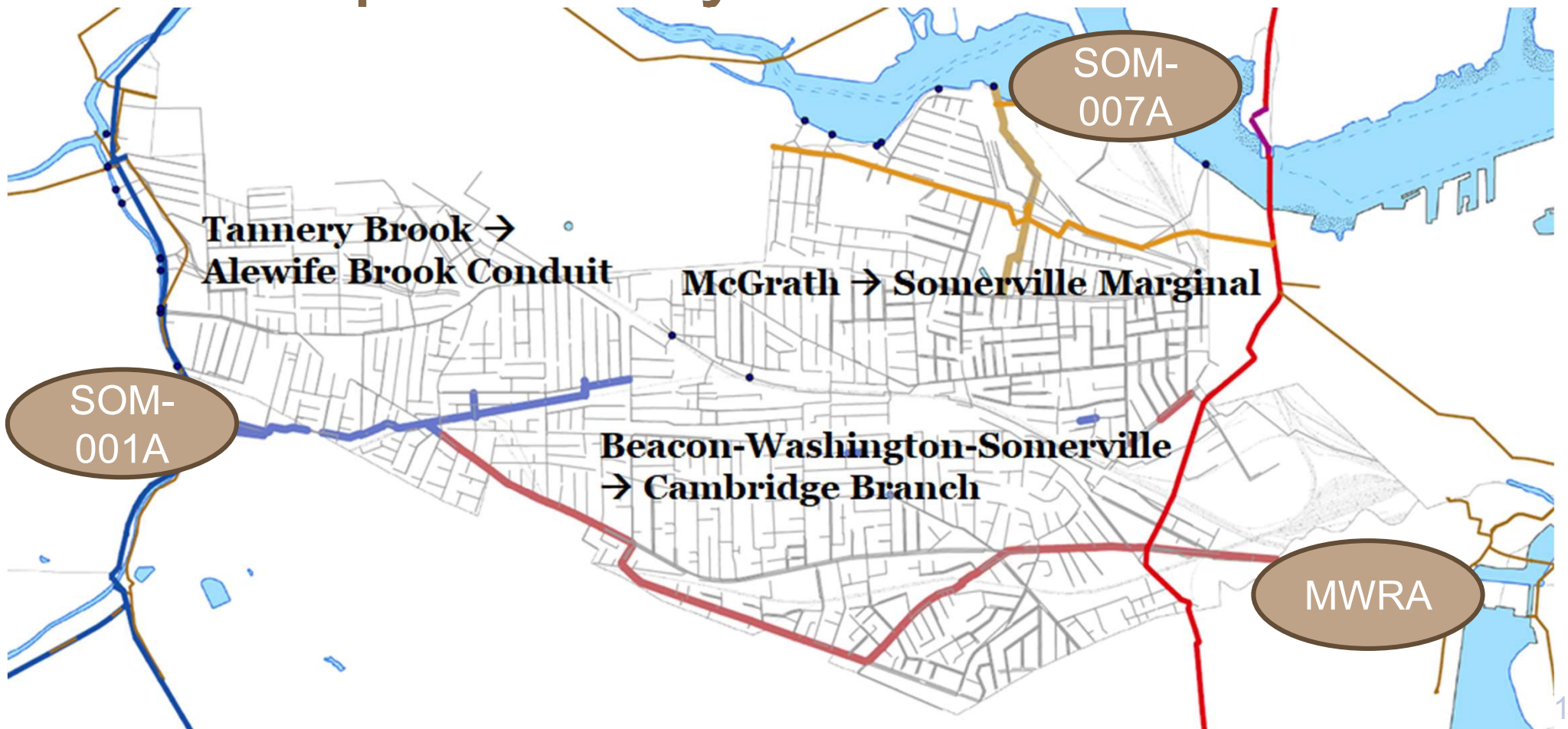
Legacy flooding problems



Problem 2: Combined Sewer Overflows

System capacity limitations cause discharge of sewage to Alewife Brook, Mystic River and Charles River

CSO's provide system relief

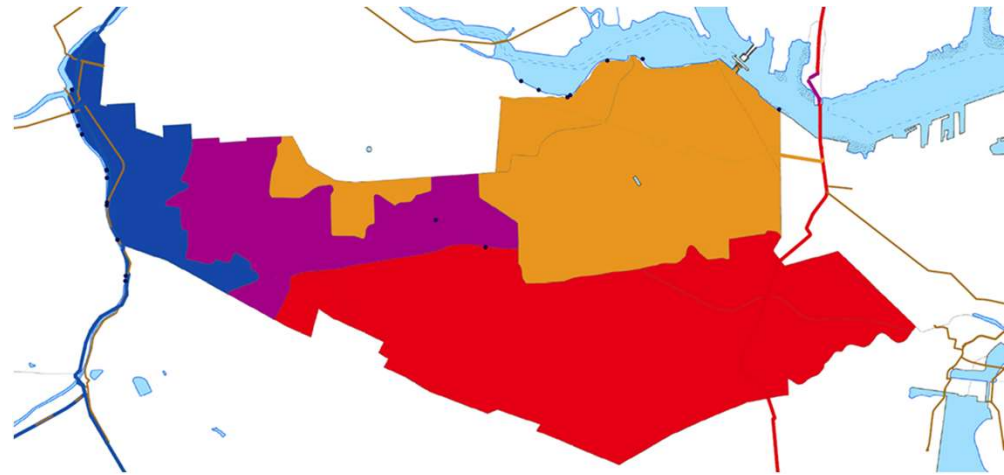


Problem 3: Prohibitions on development

MWRA and DEP require 4:1 stormwater offsets for new sanitary connections

USQ, Boynton, DSQ, InnerBelt & other building permits reliant on stormwater offsets

- 314 CMR 12: Requires 4 gallons of stormwater be removed from sewers for every 1 gallon of new sanitary flow
 - For developers: MEPA permit requirements for large developments (FRIT, US2, DLJ, etc.)
 - For Somerville: Annual reporting to MWRA of new connections and I/I removed
- Must be by system
 - Without stormwater discharge, impossible to offset flows in Cambridge Branch system

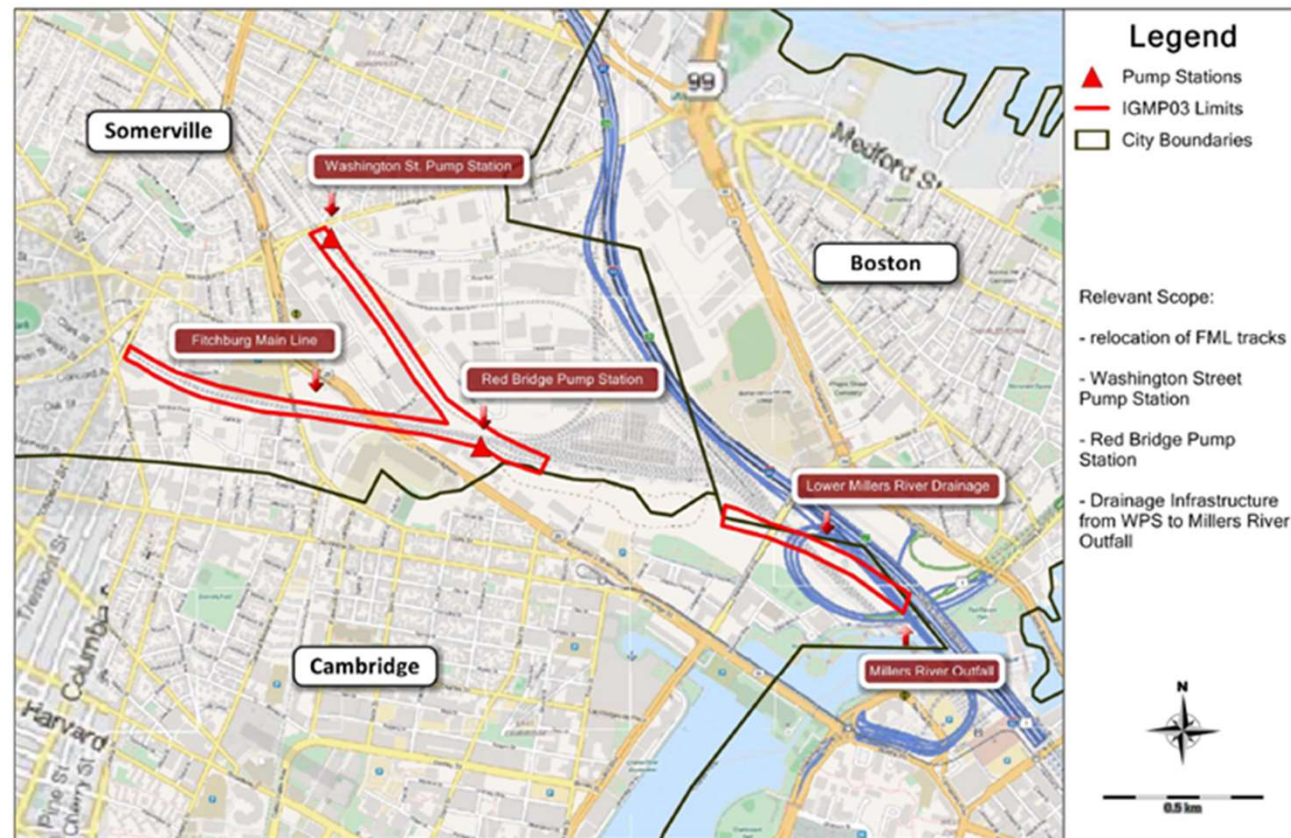


MBTA drainage system provides new capacity

A new solution to a 150-year old challenge

GLX MBTA drainage improvements

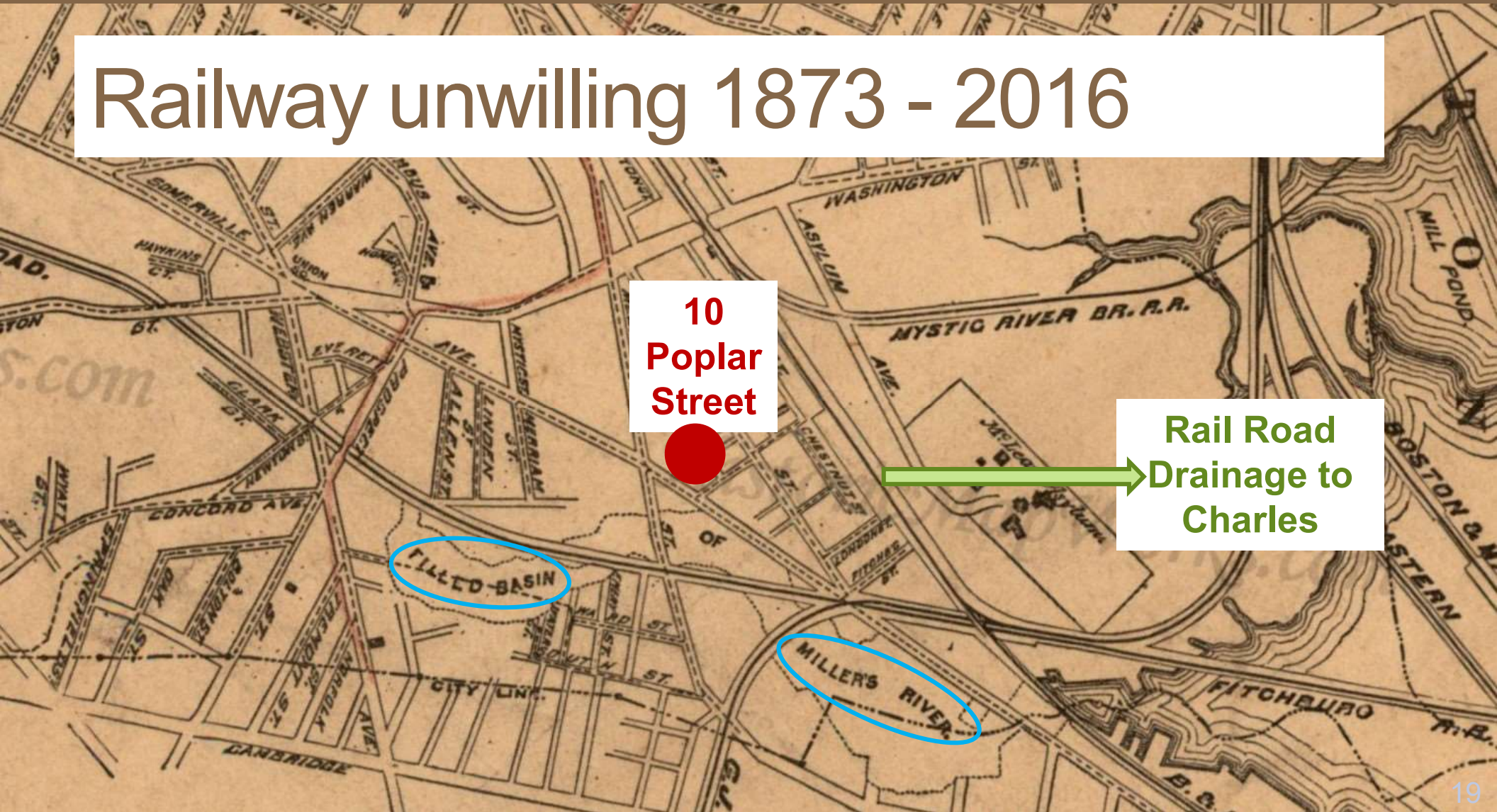
- Designed to keep high-intensity flood elevations below top of rail
- Opportunity!
 - Value in excess capacity during smaller storms



Railway unwilling 1873 - 2016

10
Poplar
Street

Rail Road
Drainage to
Charles



GLX in peril!

- **Delays Will the Green Line Extension Ever Happen?**

The state breaks ground on the project, despite lacking the funds to finish it.

by **PATRICK DOYLE** • 12/12/2012, 2:11 p.m.



- **Cost increases**

- \$600M - \$934M - \$1.3B - \$2.3B - \$4.3B!

The Green Line Extension Is Way Over Budget

The MBTA project to extend the Green Line from East Cambridge through Somerville into Medford is in jeopardy because it is facing huge new cost overruns.

by **GARRETT QUINN** • 8/24/2015, 6:52 p.m.



- **2015 – 2017 redesign**



Somerville helped save GLX

**Somerville mayor: \$50M for Green Line extension
'necessary,' 'frustrating'**

The project's future could be decided Monday.

Politics & Government

Somerville Aldermen Approve \$50M Green Line Extension Funding

Somerville and Cambridge were asked to contribute a combined \$75 million to the project.

By Alex Newman, Patch Staff | Dec 9, 2016 4:55 pm ET

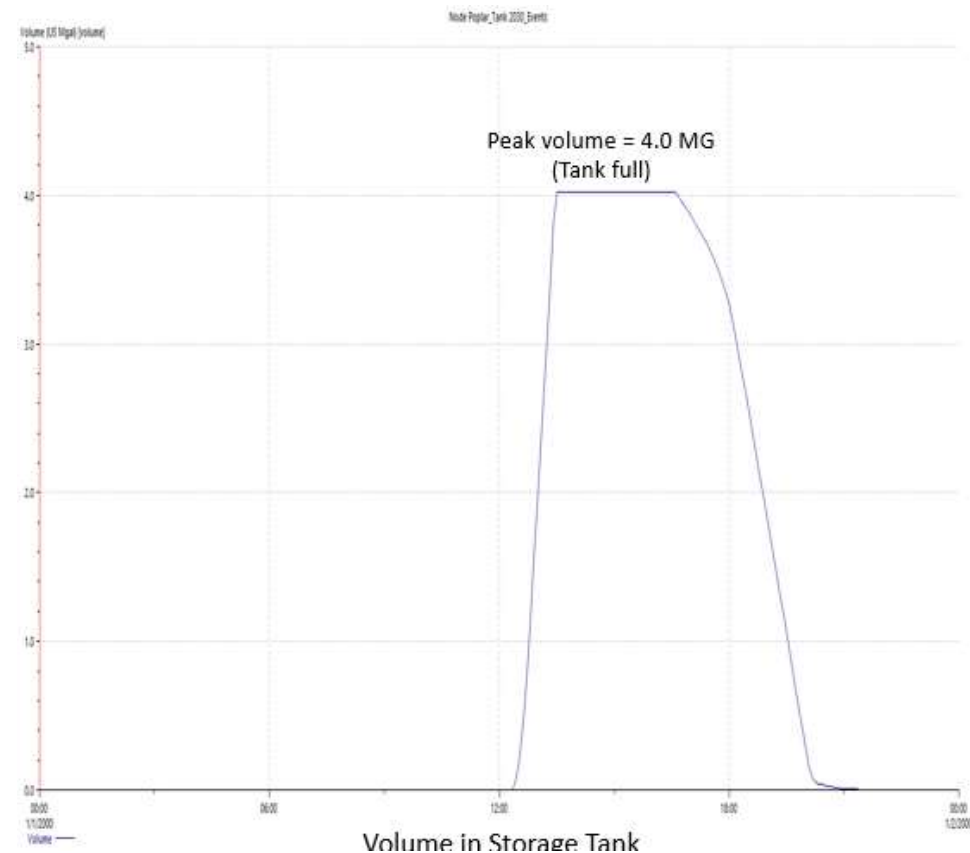
[Like 0](#) [Share](#)

- Somerville negotiated drainage connection



Conditional export of stormwater

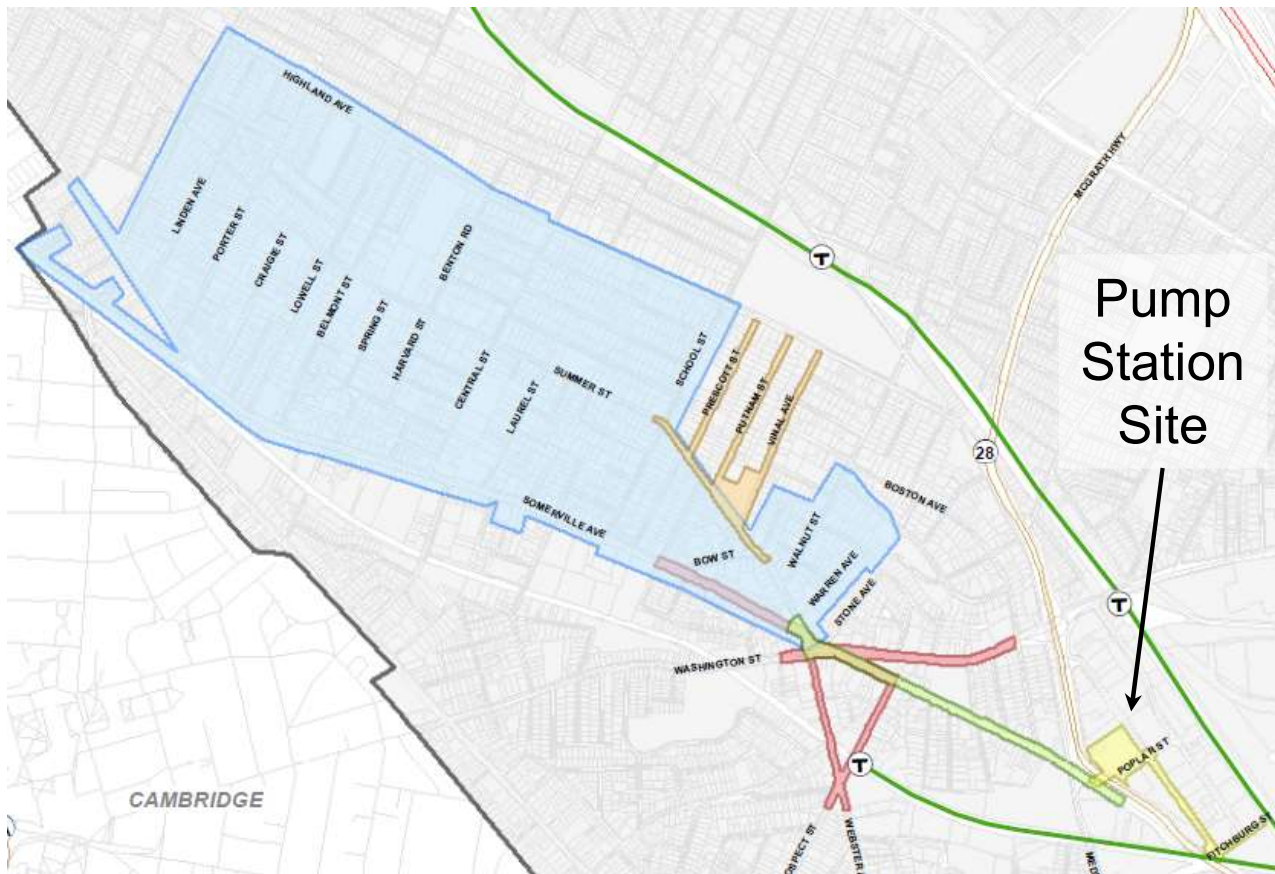
- 50 million gallons per day maximum rate
- Zero discharge when tracks flood
- Poplar Street Pump Station design includes a storage tank to accommodate that condition and maximize benefit








Solution 1: Flooding

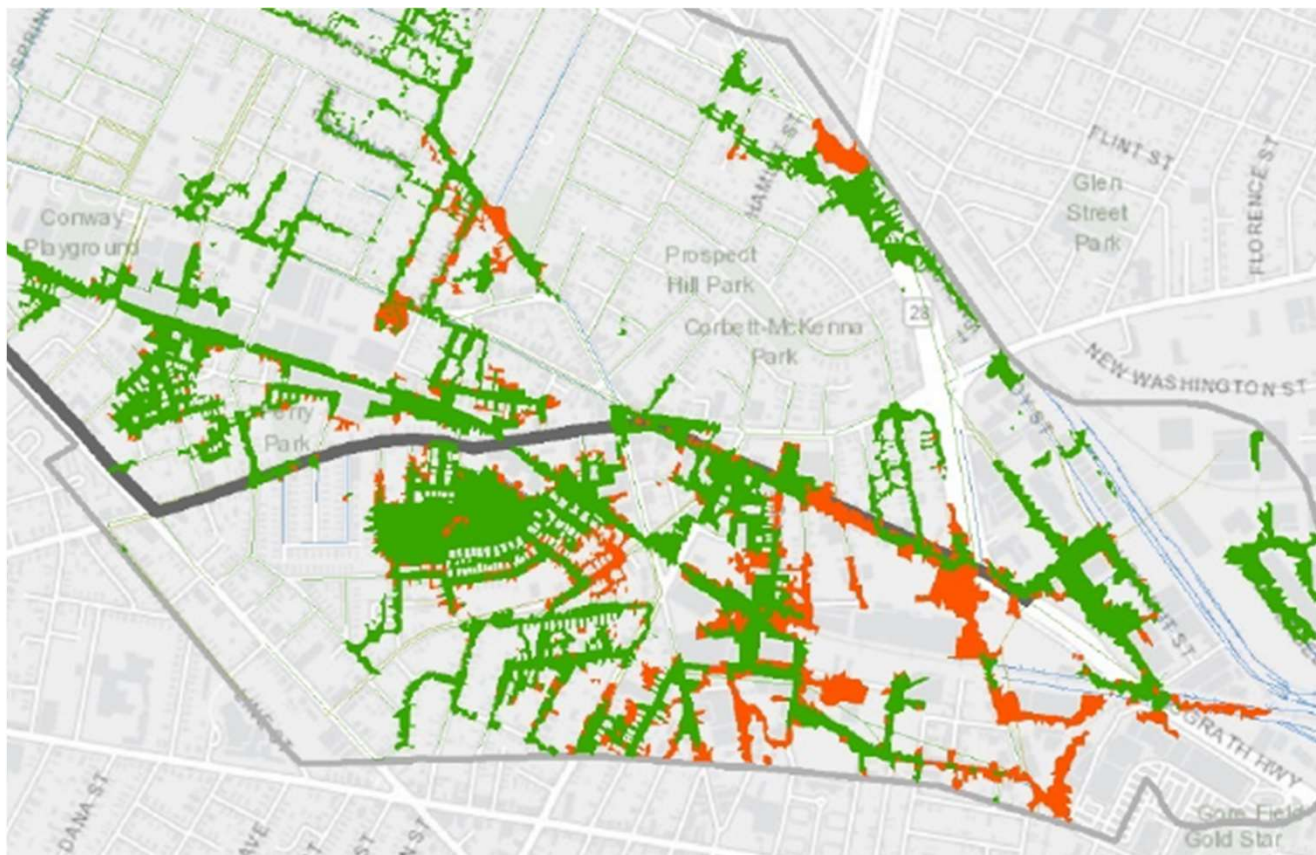
Solves the root cause downstream constraint and facilitates all future flood mitigation projects

USQ projects in design and construction



-  Somerville Ave Utility & Streetscape Improvements (SAUSI)
-  Nunziato Stormwater Storage
-  Poplar Street Pump Station (Stormwater)
-  Spring Hill Sewer Separation Union
-  Square Streetscape & Plaza

Importance of Poplar Street Pump Station and the new drainage connection



Legend

- Flood w/o DS Restriction
- Flood Existing Conditions
- Trunk Sewer
- Conduit
 - combined
 - sanitary
 - storm
- Sewershed C2

- Flooding in orange areas dependent upon new connection

Citywide Drainage & Water Quality Master Plan

- Project summary
- Presentation materials
- Contact info
- Detailed technical reports
- Summary report

The screenshot shows the City of Somerville website page for the Citywide Drainage and Water Quality Master Plan. The page features a navigation bar with links to SomerVoice Home, City Website, City Calendar, SomervilleByDesign, and SomerVision2040. The main content area includes a title, social media icons, a map of the Sewershed Areas, and a text block describing the project. On the right side, there are sections for 'Who's Listening' (Lucia Hiller) and 'Community Meetings' (March 16 2022).

City of **Somerville**

SomerVoice Home City Website City Calendar SomervilleByDesign SomerVision2040 Sign In | Register

Home - Citywide Drainage and Water Quality Master Plan

Citywide Drainage and Water Quality Master Plan

f t in e

Sewershed Areas
City of Somerville, Massachusetts

Dewberry

The City is developing a Citywide Drainage and Water Quality Master Plan, a collection of infrastructure projects that will reduce flooding, improve water quality, and mitigate combined sewer overflows. After years of modeling and evaluation, the Engineering Division and its consultants have developed 30 projects that would address the root causes of flooding and prepare Somerville for climate change. Now, the City is ready to present these ideas and get feedback from the public. Community input will help identify preferred alternatives and determine which of those 30 projects are included in the final Drainage and Water Quality Master Plan.

Who's Listening

Lucia Hiller
Stormwater Program Manager
IAM, Engineering Division

Phone 6174463716
Email lhiller@somervillema.gov

Project Map

Community Meetings

Community Meeting #1 - Wards 5, 6, and 7 (Davis Square and West Somerville area)
March 16 2022

<https://voice.somervillema.gov/citywide-drainage-and-water-quality-master-plan>

Sewershed C2 - Existing Conditions Flooding



Sewershed C2 - Flooding After Project Implementation

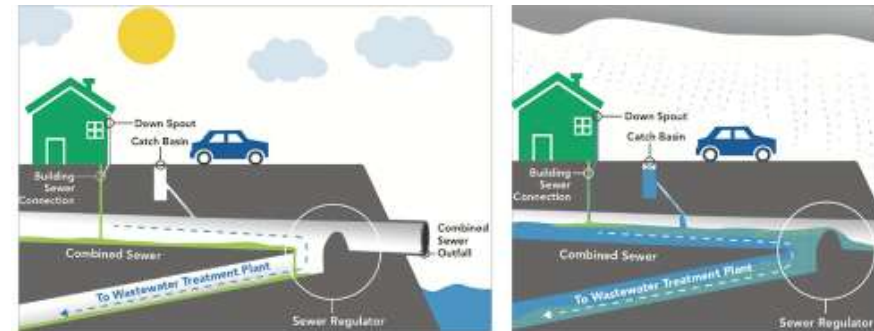


Solution 2: Combined Sewer Overflows

Relieves capacity limitations that cause discharge of sewage to Alewife Brook, Mystic River and Charles River

Long Term Control Plan

- Somerville, Cambridge & MWRA developing plan
- DEP & EPA reviewing and approving plan
- <https://voice.somervillema.gov/cso-plan>
- <https://www.somervillema.gov/cso>
- **2nd community meeting: Dec 15th**
 - <https://tinyurl.com/CSOmeeting2>



November 29, 2022

Combined Sewer Overflow (CSO) Control Plan

About the project

[View Project](#)

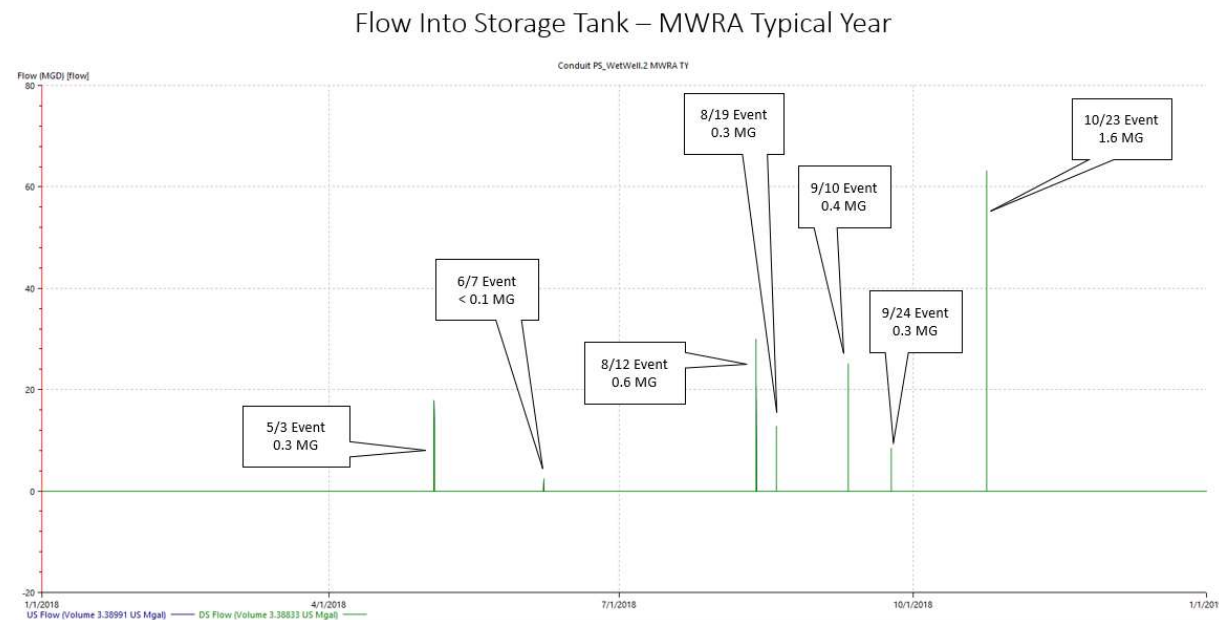


Solution 3: Offsets for new development

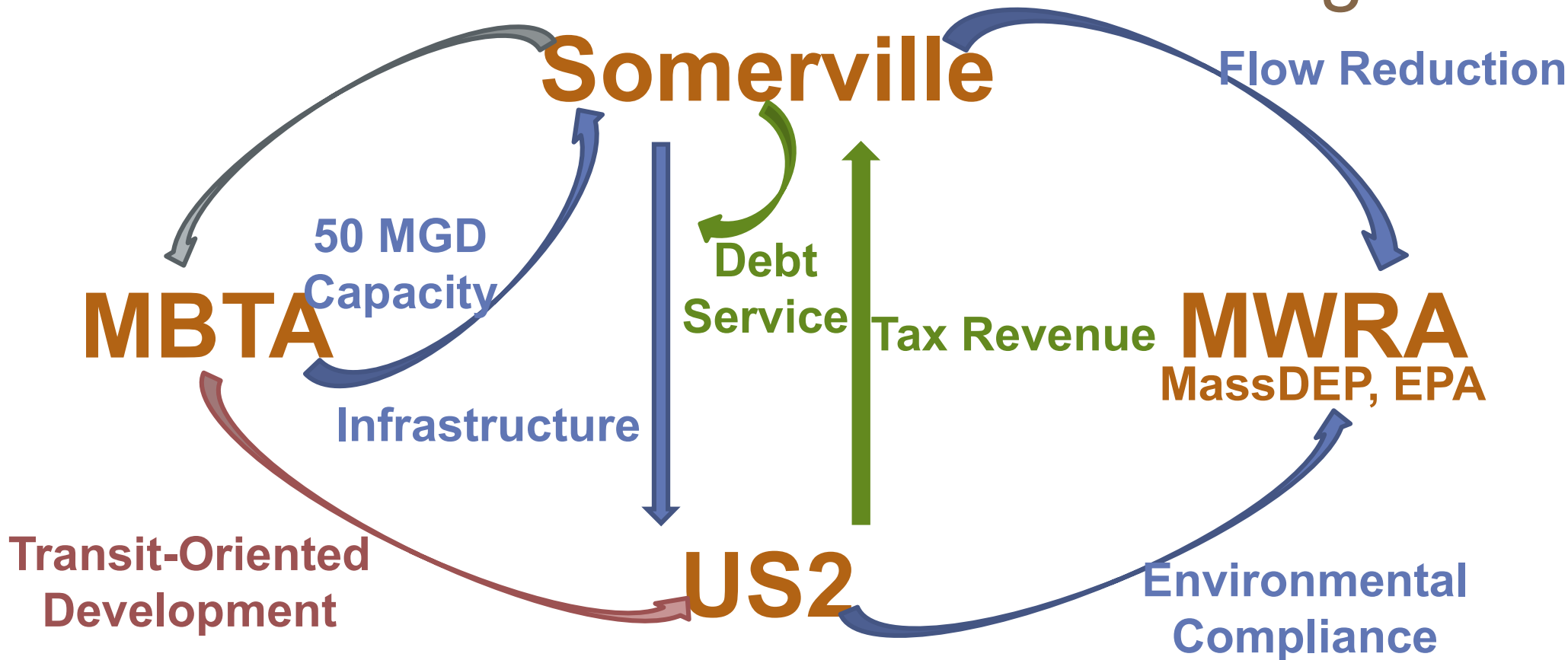
MWRA and DEP require 4:1 stormwater offsets for new sanitary connections

Hydraulic modeling results

- Diverts 2.2 Billion gallons of stormwater from MWRA system to MBTA system in a typical year
- 6 mgd average day
- Provides offsets for development scenarios



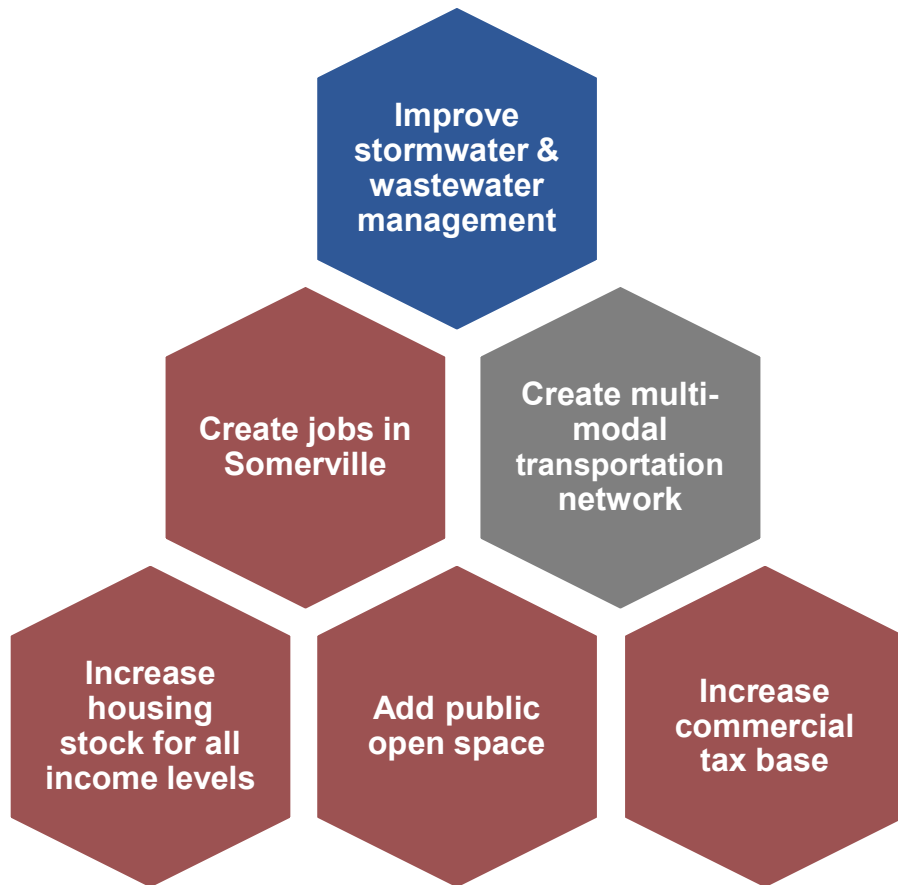
Infrastructure enables development - tax base enables debt service & future budgets



Transformation of USQ vital component of SomerVision

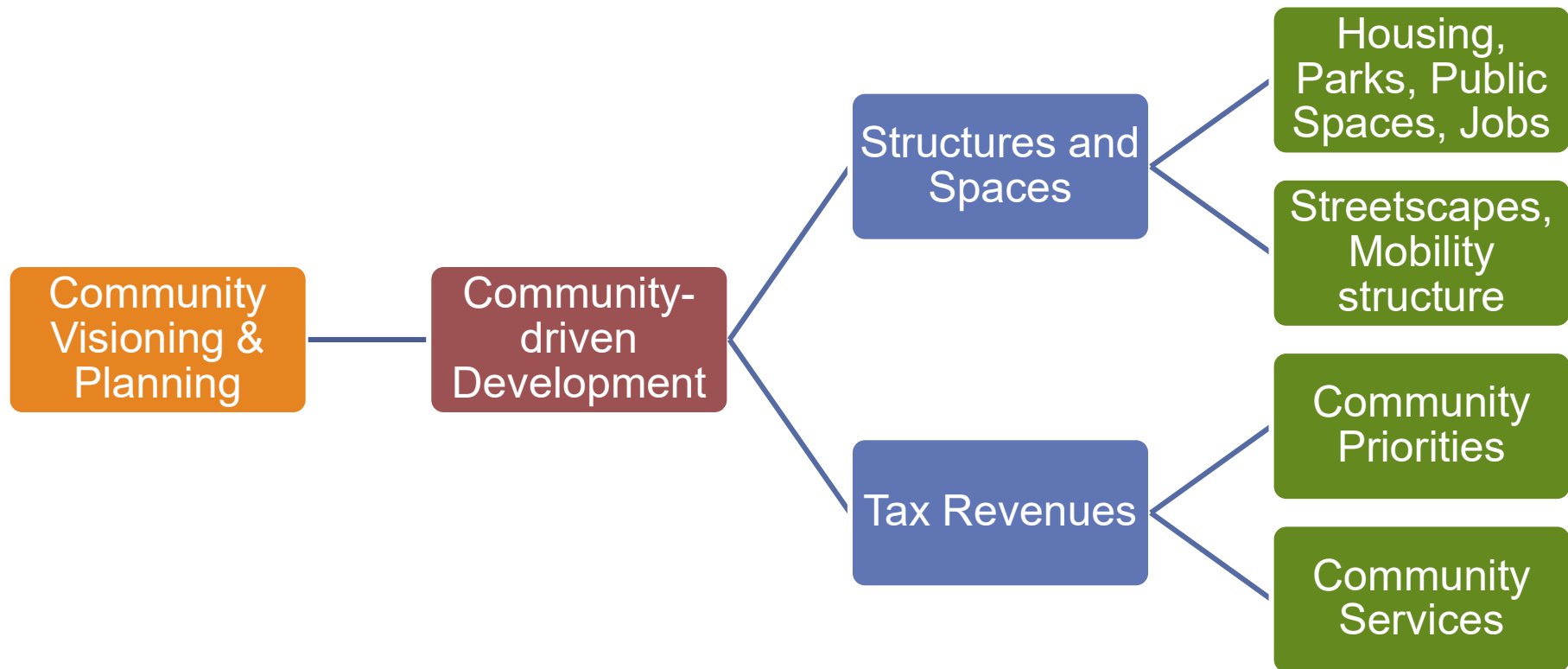
A quick aside on the benefits of development

SomerVision & USQ Plan



- Advance sustainable mobility goals
- Address legacy flooding issues
- Add new public open space
- Address housing crisis
- Create local jobs
 - Reduce commutes out of and through Somerville
- Expand commercial tax base to fund community priorities and create financial stability

Community-driven Development



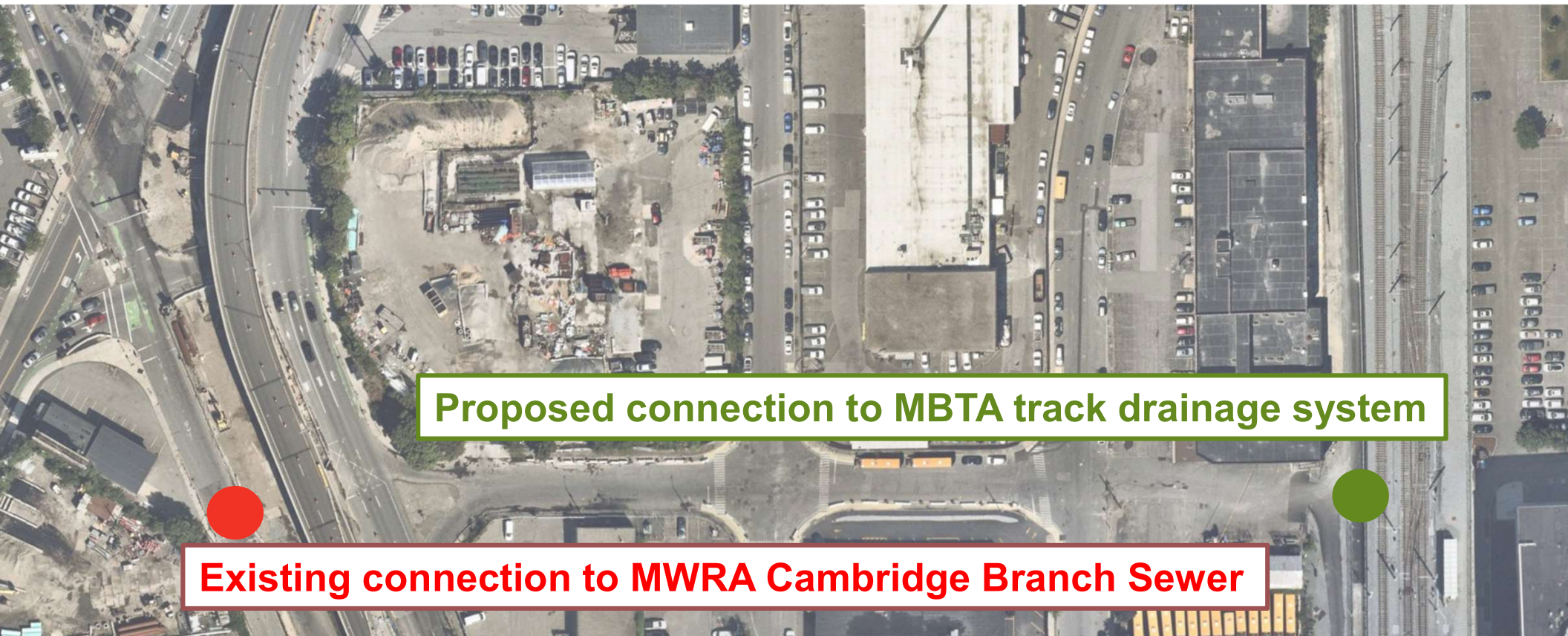
Outline

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Project details

Infrastructure at Poplar Street

Objective: Move stormwater from MWRA to MBTA



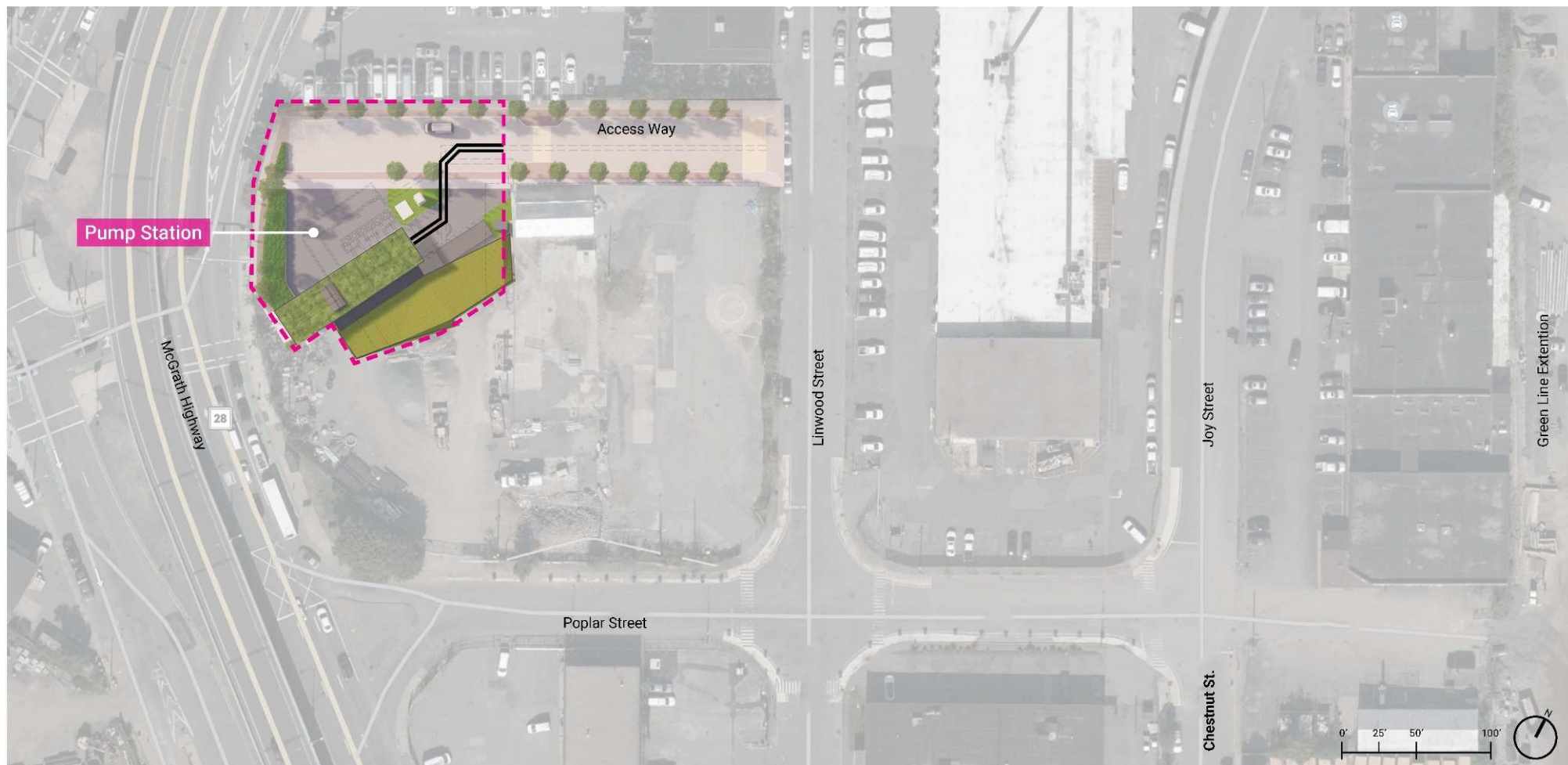
Proposed connection to MBTA track drainage system

Existing connection to MWRA Cambridge Branch Sewer

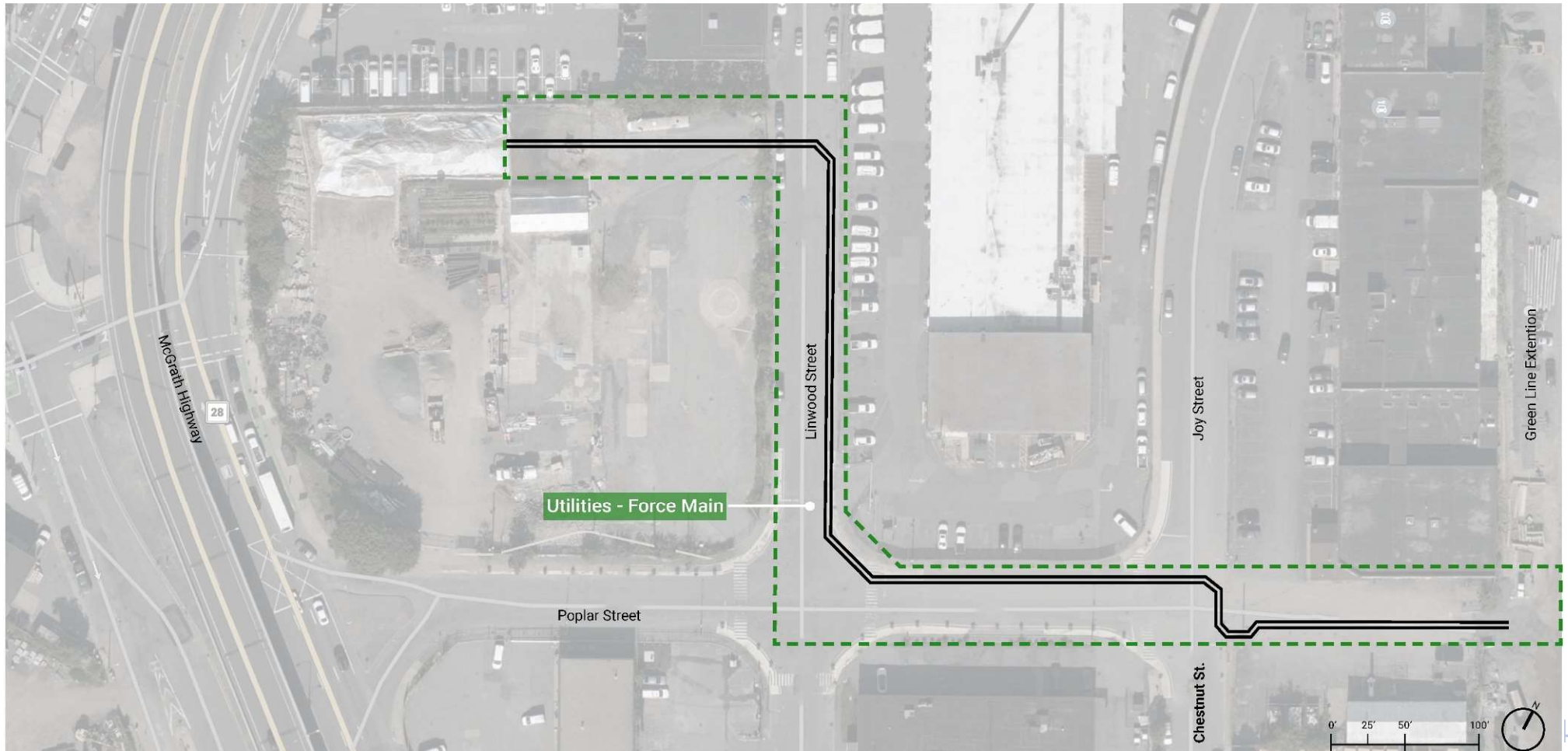
Gravity connection to SAUSI culvert



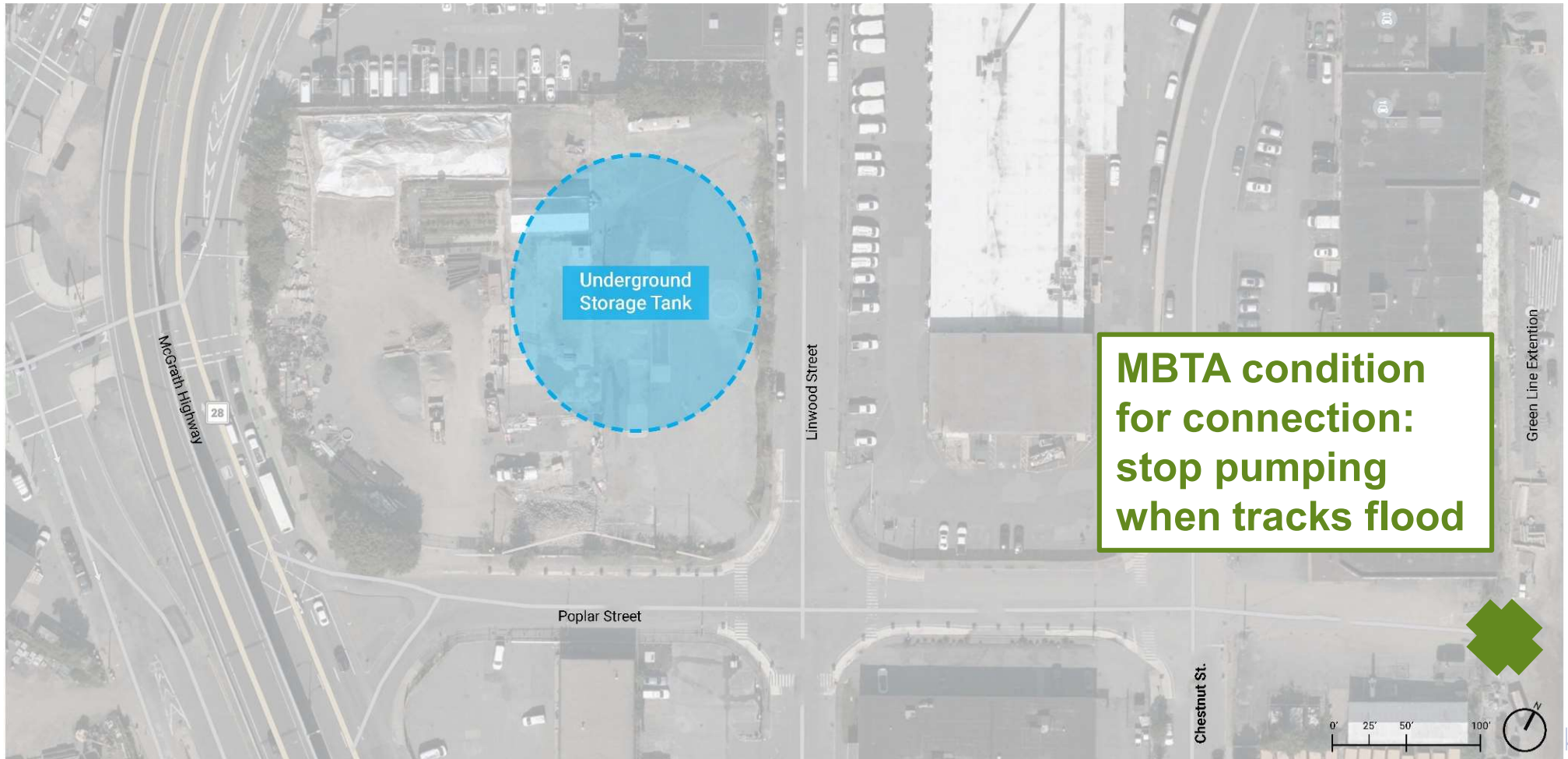
Lift from MWRA to MBTA elevation ~17 feet



Force main connection to MBTA

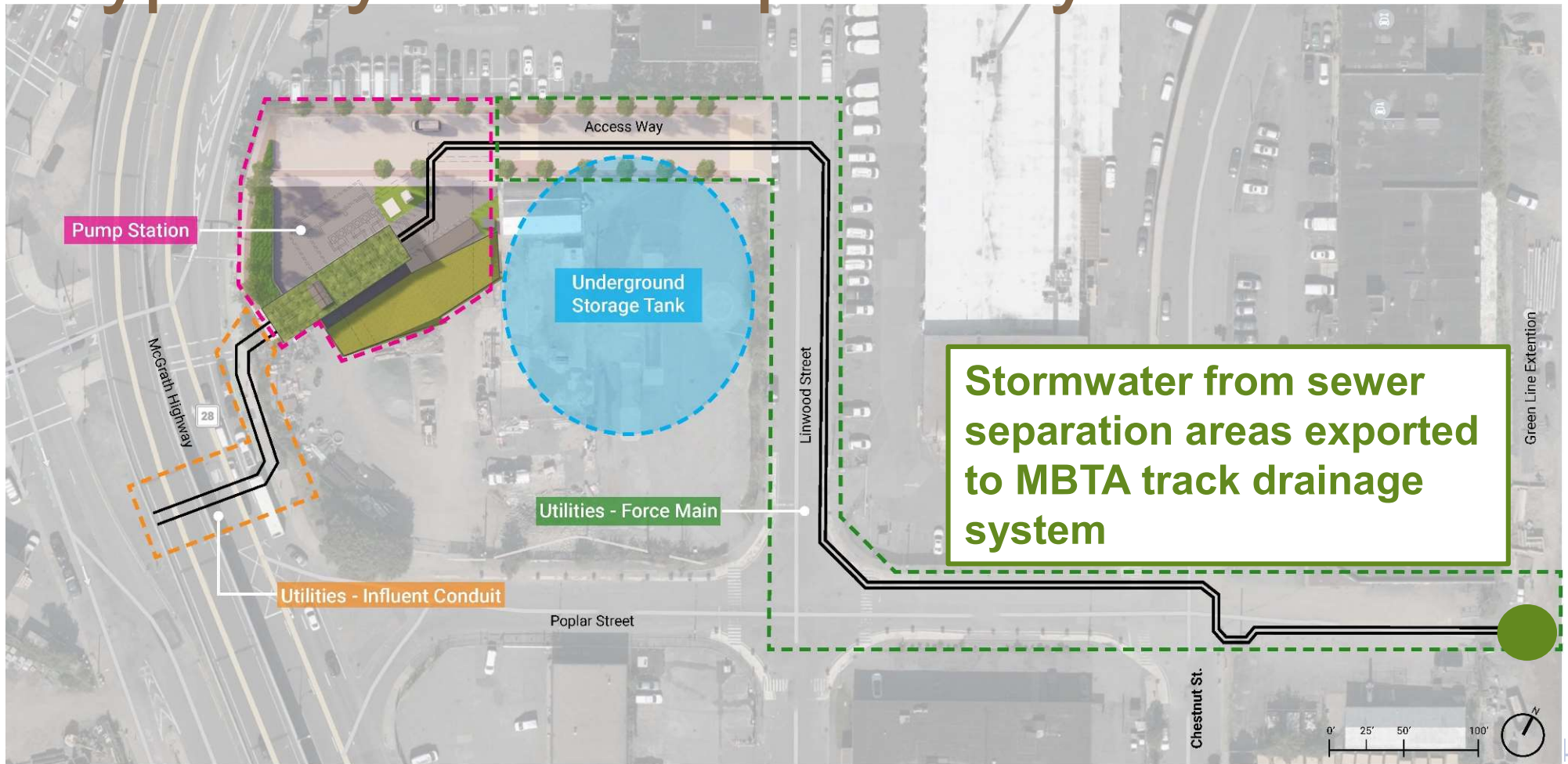


Store stormwater when tracks flood

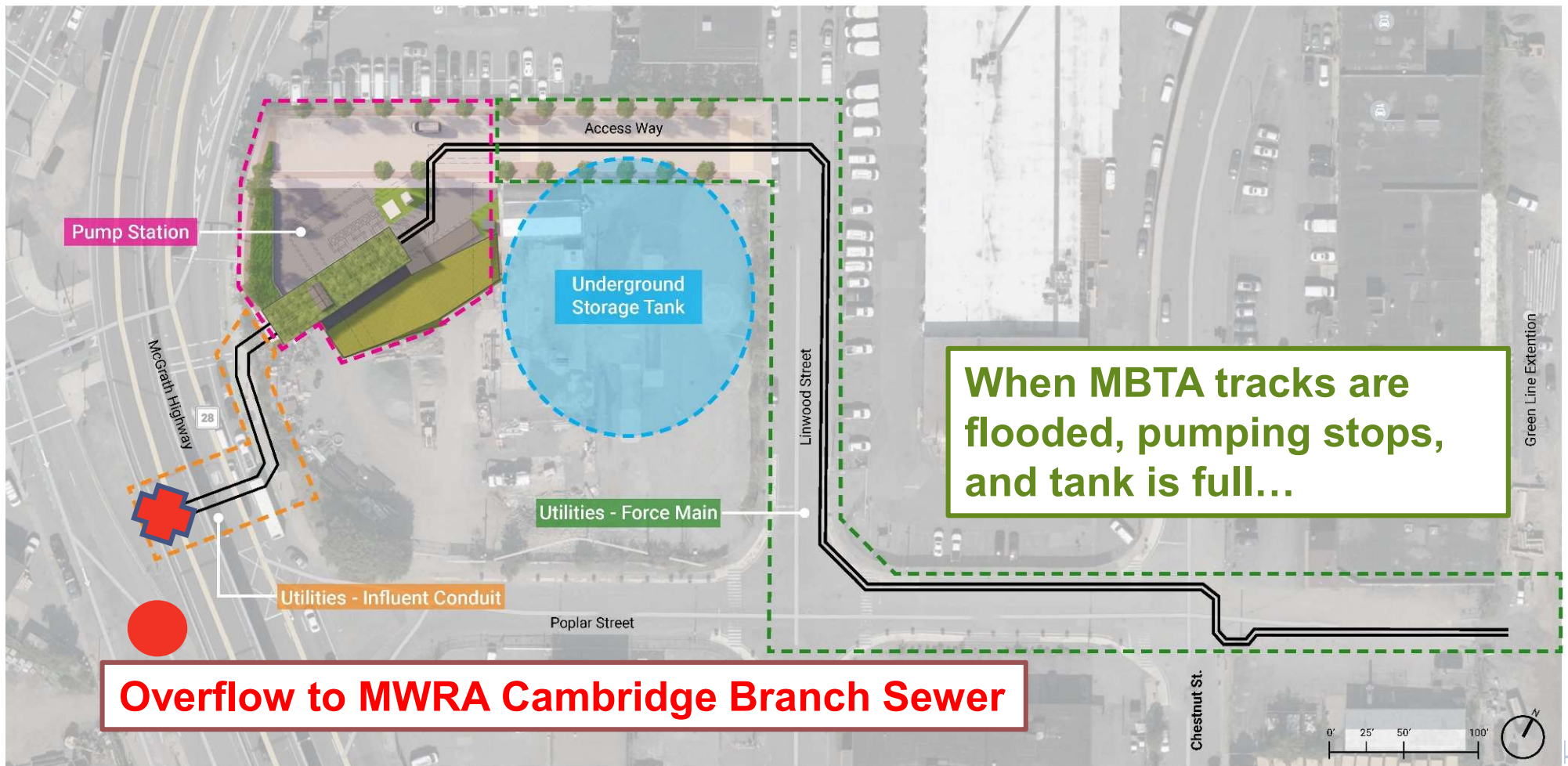


Green Line Extension

Typical year and up to 10-year storm



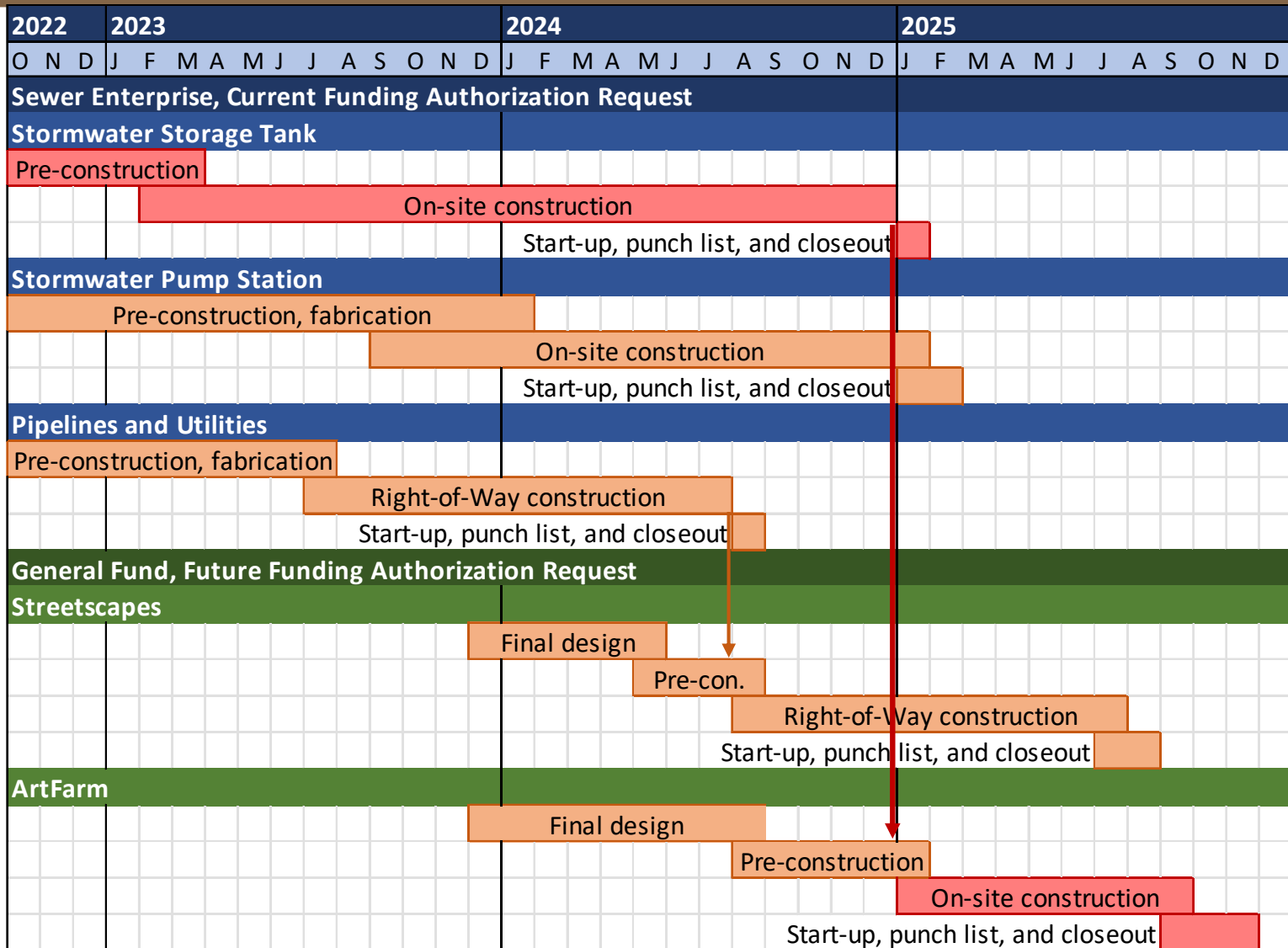
Extreme events



Green Line Extension

Schedule

Construction Manager recommendation for precast concrete tank shortens schedule by 18 months and reduces costs by \$8M



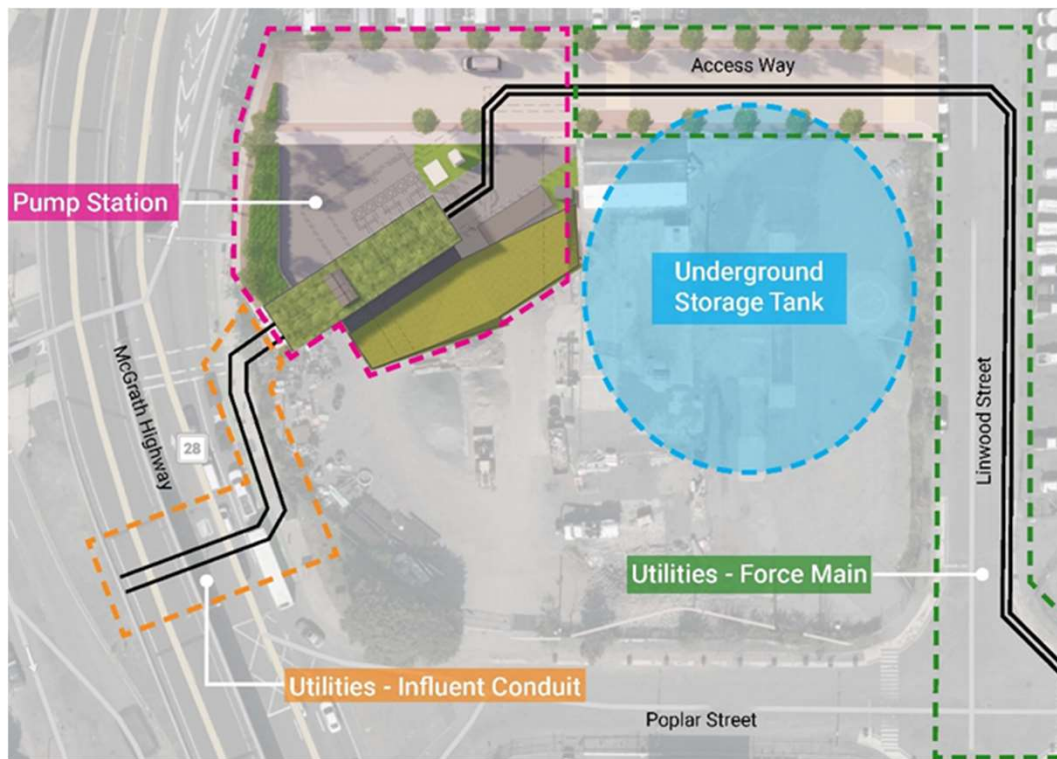
Schedule commentary – Precast tank

- Overall project critical path (illustrated in red):
 - Tank excavation & concrete → surface restoration, ArtFarm activation
 - Schedule: Earliest start for ArtFarm construction winter 2024/25
 - Plan: Initiate ArtFarm final design winter 2024/25
- Alignment of non-critical path components
 - Pump station duration similar to tank, with long lead times for equipment
 - Complete pipeline work early (eliminate unknowns, avoid escalation)
 - Schedule: Earliest start for streetscape construction summer 2024
 - Plan: Initiate streetscapes final design winter 2024/25
- Funding requests
 - All sewer infrastructure – Fall 2022
 - Streetscapes & ArtFarm – Winter 2023/24

Relation to ArtFarm

The final phase of the project

Infrastructure designed to accommodate ArtFarm vision



- Finalize ArtFarm design and integrate infrastructure access

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Financing

Construction cost escalation and interest rate increases necessitate changes to rate increase forecasts presented for FY2023

Poplar Street financing strategy

- Total project cost: \$102 Million
 - Apply \$10M from ARPA
 - Accept up to \$2.5M federal earmark
 - Borrow remainder in tranches through bonding
- Current request:
 - \$89.333 Million bond authorization

Core financial model assumptions

- Utility Funds receive \$2M annually in stabilization contributions
- MWRA cost will escalate at an average rate of 3-4% per annum
- Capital investment plan utilizes debt financing
 - Future project costs escalated to reflect market factors
 - Interest rates on future borrowing are higher than prior year analysis given rising interest rate environment
 - Eligible future projects will leverage SRF program
- Assuming 100% spending of operating and capital expenses

Sewer Fund Prior Modeling



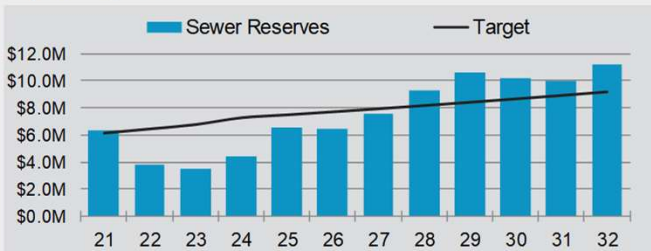
SEWER ENTERPRISE FUND



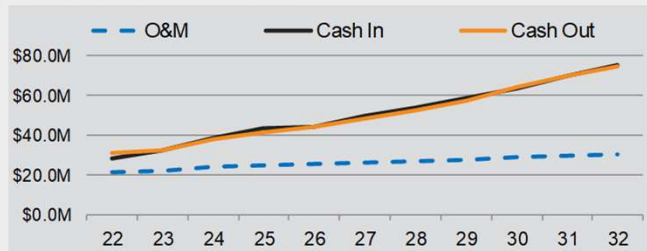
CALC SAVE CTRL LAST OVR

	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	FY 2027	FY 2032
Sewer Usage Rate Plan	0.00%	12.50%	12.50%	12.50%	12.50%	12.50%	9.00%	9.00%	9.00%	9.00%	9.00%	80.27%	177.32%
Debt Service Coverage (1.25 Target)	8.27	3.46	1.97	1.74	1.76	1.71	1.66	1.52	1.35	1.33	1.35	Scenario Manager	
Debt Service / Revenue	2.8%	7.4%	14.5%	19.8%	22.7%	26.2%	28.9%	33.4%	39.5%	42.3%	43.4%	Growth	Normal
Tri-Annual Single-Family Bill @ 18 CCF	\$222.11	\$244.86	\$270.48	\$299.33	\$331.79	\$368.30	\$397.84	\$430.02	\$465.12	\$503.37	\$545.03	Check	-
Net Cash Flow (\$ M)	-\$2.45	-\$0.32	\$0.91	\$2.08	-\$0.06	\$1.12	\$1.73	\$1.29	-\$0.39	-\$0.18	\$1.15		

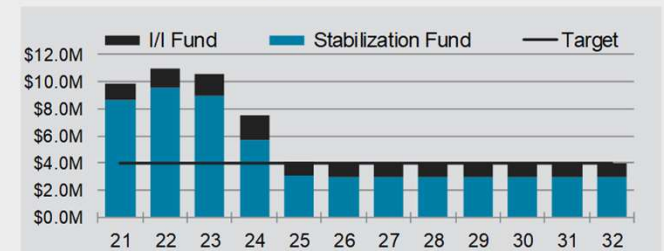
Operating Fund



Revenues vs. Expenses



Stabilization Fund & I/I Fund



Sewer Fund Revised Modeling



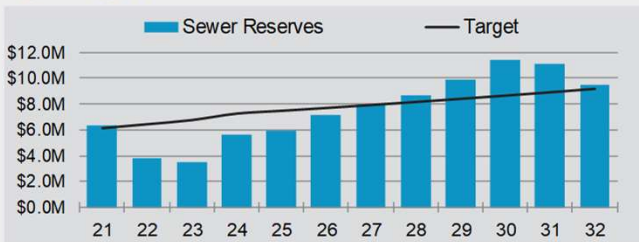
SEWER ENTERPRISE FUND



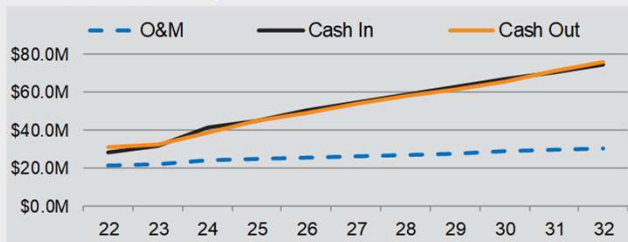
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	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	FY 2027	FY 2032
Sewer Usage Rate Plan	0.00%	12.50%	17.00%	17.00%	20.00%	8.00%	8.00%	7.00%	7.00%	5.00%	5.00%	99.55%	172.00%
Debt Service Coverage (1.25 Target)	8.27	3.92	1.77	1.42	1.59	1.48	1.43	1.42	1.40	1.31	1.25	Scenario Manager	
Debt Service / Revenue	2.8%	6.5%	17.5%	27.4%	29.9%	33.7%	36.6%	38.1%	39.9%	43.5%	46.2%	Growth	Normal
Tri-Annual Single-Family Bill @ 18 CCF	\$222.11	\$244.86	\$279.73	\$320.44	\$376.55	\$403.45	\$432.58	\$460.07	\$489.43	\$511.90	\$535.47	Check	-
Combined Tri-Annual W&S Single-Family Bill	\$339.13	\$372.50	\$419.22	\$473.11	\$543.81	\$581.05	\$621.21	\$660.55	\$698.97	\$730.91	\$764.41		
Annual W&S Bill as % of MHI	0.99%	1.07%	1.18%	1.31%	1.47%	1.54%	1.62%	1.69%	1.75%	1.79%	1.84%		
Net Cash Flow (\$ M)	-\$2.45	-\$0.32	\$2.14	\$0.30	\$1.16	\$0.80	\$0.78	\$1.23	\$1.45	-\$0.28	-\$1.61	Scenario	A

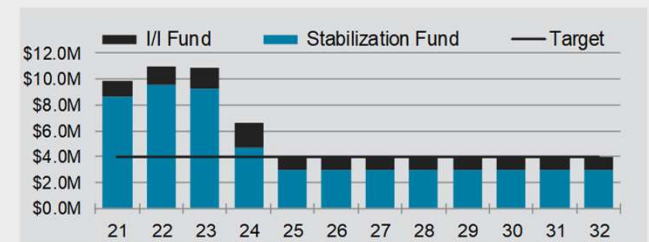
Operating Fund



Revenues vs. Expenses



Stabilization Fund & I/I Fund



Water Fund Prior Modeling



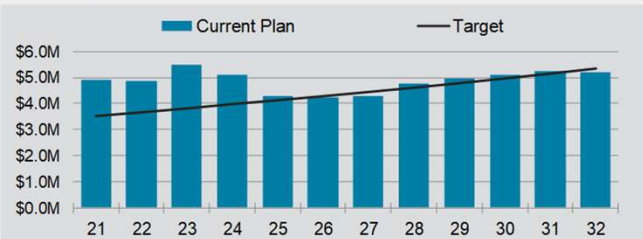
WATER ENTERPRISE FUND



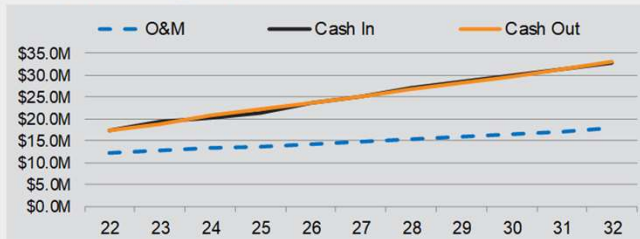
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	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	FY 2026	FY 2031
Water Usage Rate Plan	0.00%	11.00%	11.00%	11.00%	11.00%	7.00%	7.00%	5.00%	5.00%	5.00%	5.00%	62.58%	111.36%
Debt Service Coverage (1.25 Target)	2.58	2.06	1.68	1.68	1.78	1.70	1.73	1.64	1.60	1.58	1.53	Growth	Normal
Debt Service / Revenue	8.8%	12.3%	17.7%	20.3%	21.5%	23.6%	24.2%	26.1%	27.2%	28.1%	29.5%		
Tri-Annual Single-Family Bill @ 18 CCF	\$117.02	\$127.64	\$139.49	\$152.67	\$167.26	\$177.60	\$188.63	\$197.10	\$205.98	\$215.27	\$225.02	Check	-
Net Cash Flow (\$ M)	-\$0.03	\$0.58	-\$0.38	-\$0.81	-\$0.01	\$0.04	\$0.46	\$0.21	\$0.15	\$0.14	-\$0.05		

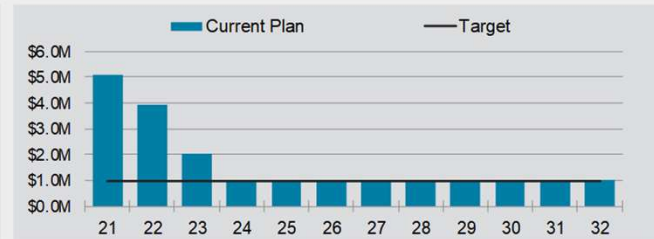
Operating Fund



Revenues vs. Expenses



Stabilization Fund



Water Fund Revised Modeling



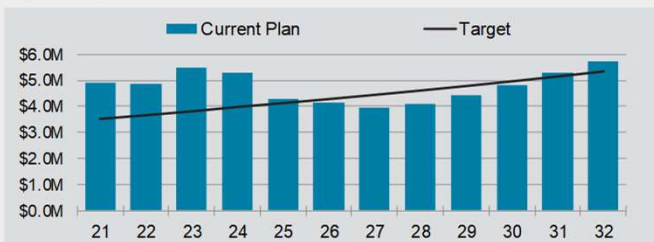
WATER ENTERPRISE FUND



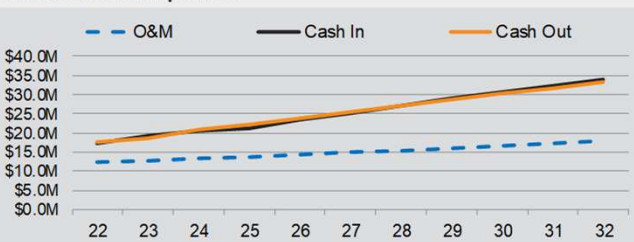
CALC SAVE CTRL LAST OVR

	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	FY 2026	FY 2031
Water Usage Rate Plan	0.00%	11.00%	11.00%	11.00%	11.00%	7.00%	7.00%	7.00%	5.00%	5.00%	5.00%	62.58%	115.59%
Debt Service Coverage (1.25 Target)	2.58	2.39	1.63	1.61	1.73	1.64	1.65	1.62	1.61	1.60	1.57	Growth	Normal
Debt Service / Revenue	8.8%	10.7%	18.2%	21.2%	22.1%	24.5%	25.4%	27.0%	27.7%	28.3%	29.4%		
Tri-Annual Single-Family Bill @ 18 CCF	\$117.02	\$127.64	\$139.49	\$152.67	\$167.26	\$177.60	\$188.63	\$200.48	\$209.54	\$219.01	\$228.94	Check	-
Net Cash Flow (\$ M)	-\$0.03	\$0.58	-\$0.18	-\$1.01	-\$0.16	-\$0.17	\$0.13	\$0.33	\$0.38	\$0.49	\$0.41		

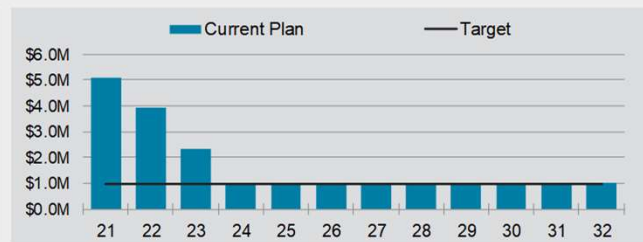
Operating Fund



Revenues vs. Expenses



Stabilization Fund



Kitchen Table Impact Preview *

Total Change in Annual Costs for Various Billing Units (including base & volumetric charges, amended)

	FY 2023	FY 2024	\$ Change	
Total Units per Bill (in CCF)	Annual Total	Annual Total	(FY 2024 - FY 2023)	% Change
15 (average condo unit)	\$919	\$1,029	\$110	12%
18 (average single family home)	\$1,118	\$1,258	\$140	12%
30 (average two-family home)	\$1,912	\$2,170	\$258	13%
42 (average three-family home)	\$2,707	\$3,080	\$373	14%
110 (average 8-unit apartment building)	\$6,583	\$8,409	\$1,826	28%

**Note: Subject to change as team evaluates rate structure changes and FY24 budget*


Assistance Programs

- **Low Income Housing Energy Assistance Program**
 - Administered by the City of Cambridge
 - Federal Program to assist families up to 150% of the Federal Poverty Limit
 - 134+ Families have submitted for the assistance Program
- **41C & 17D (Elderly) Exemptions**
 - Administered by the City of Somerville's Assessing Office
 - 25% off Water & Sewer Bills for all those who qualify
 - 64 of 17D applicants and 37 of 41C applicants (101 total) have qualified for FY22
- *We are exploring additional options for targeted financial assistance and expanding our community outreach teams*

Conclusion



In 2016, we started developing strategies to be proactive and achieve infrastructure-dependent goals



Poplar Street
Pump Station is
critical to that
strategy. Timing
for startup is
urgent.

Challenge: Construction cost escalation and interest rate increases



Call to action:
Continue strategic investment aligned with financial metrics that preserves capacity for other needs and priorities

Poplar Street Pump Station construction appropriation request

Questions

