Update on Contract 6963A: Combined Heat and Power Study Deer Island Treatment Plant

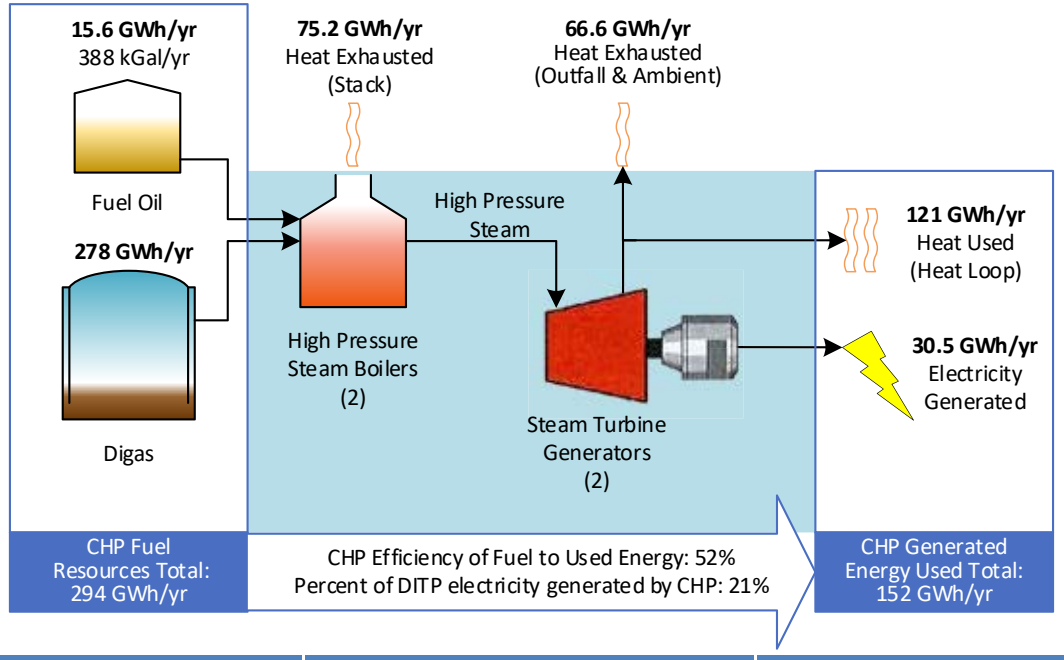
September 14, 2022

Goal of Contract 6963A

Contract 6963A: Part of long term combined heat and power (CHP) system infrastructure planning

- Evaluate Deer Island's existing Combined Heat and Power system
- Develop recommendation to:
  - Reliably and economically meet energy needs
  - Maximize on-site generation
  - Reduce electricity purchases

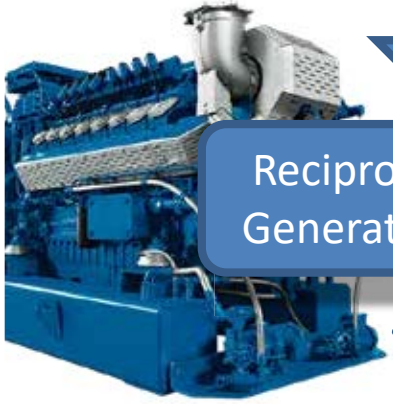
Existing CHP Schematic and Energy Flow



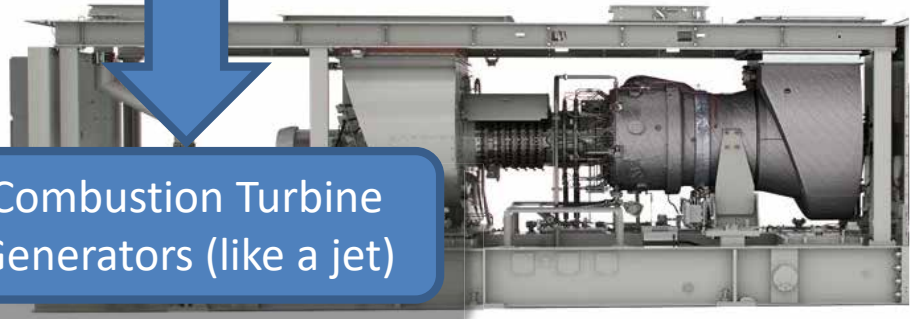
Total Energy Used at DITP (Thermal & Electrical)	Total Energy Generated from On-site Resources	Percent of Energy from On-site Resources
265 GWh/yr	152 GWh/yr	57% by Energy 65% by Cost

CHP Technology Evaluation

Several CHP technologies were evaluated
Two primary contenders



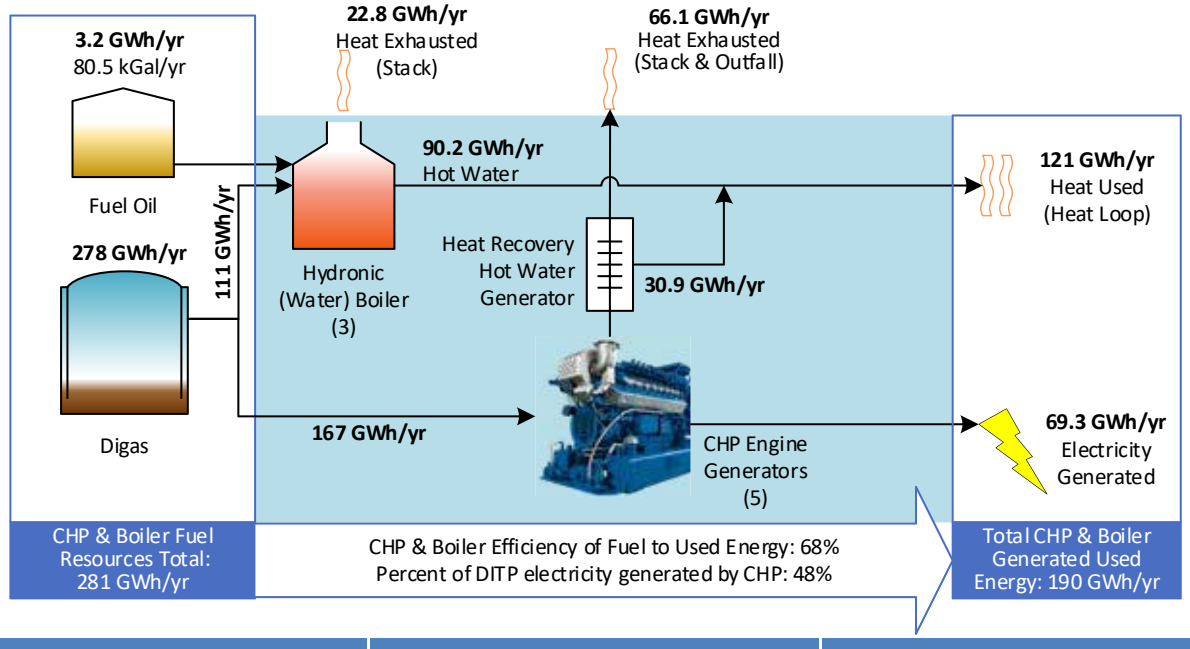
Reciprocating Engine Generators (like a car)



Combustion Turbine Generators (like a jet)

Chosen Technology
Better part load performance = More electricity generated

Best of Several CHP Options - Schematic and Energy Flow*



Total Energy Used at DITP (Thermal & Electrical)	Total Energy Generated from On-site Resources	Percent of Energy from On-site Resources
265 GWh/yr	197 GWh/yr	74% by Energy 78% by Cost

*Based on preliminary sizing and overall design

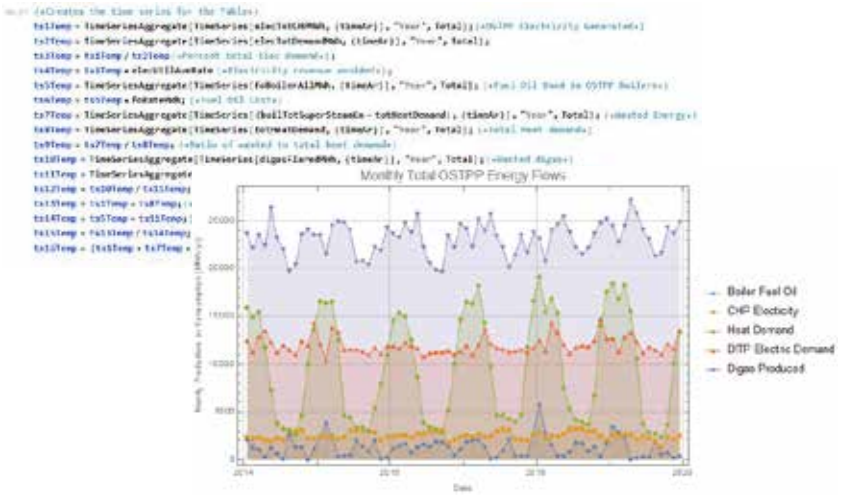
Consultant Results Summary

Consultant NPV Summary Results		
Alternative	NPV	Compare New NPV to Existing (NPV

Additional Analysis by Staff

Staff built upon Consultant's analysis by modifying the following parameters:

- Adjusting the O&M costs
- Lowering the discount rate
- Using a standard boiler life



Results Summary

	Consultant NPV Results	Staff Preliminary NPV Results		
Alternative		**O&M**	**Discount Rate 4%**	**Boiler Replacement**
Existing CHP NPV	$ 214M	$ 233M	$ 290M	$ 328M
New CHP NPV	$ 227M	$ 239M	$ 284M	$ 284M
NPV	**$ +13.1M**	**$ +5.8M** →	**$ -6.5M*** →	**$ -43.1M****

*Includes O&M
**Includes Discount rate and O&M

New CHP outperforms existing CHP

Beyond Net Present Value Considerations: Greenhouse Gas Emissions Reduction

Fuel Oil 300k Gal/yr

3,000 Metric Tons GHG

8M Car miles

+

Electricity 40 GWh/yr*

13,800 Metric Tons GHG**

34M Car Miles

→

16,800 Metric Tons GHG

42M Car Miles

Social Cost of Carbon: $775k/yr

*Does not include Renewable Energy Certificate (REC) Purchases/Sales

** Based on actual GHG profile provided from the electrical supplier

Beyond Net Present Value Considerations

- Increase on-site generation
  - From: 57% by Energy; 65% by Cost
  - To: 74% by Energy; 78% by Cost

- Eliminate 30 fuel oil truck deliveries per year
- Eliminate high pressure steam system hazards

Next Steps

New CHP appears to be economically viable

+

There are significant benefits beyond economics

=

Staff recommend: New CHP should move forward

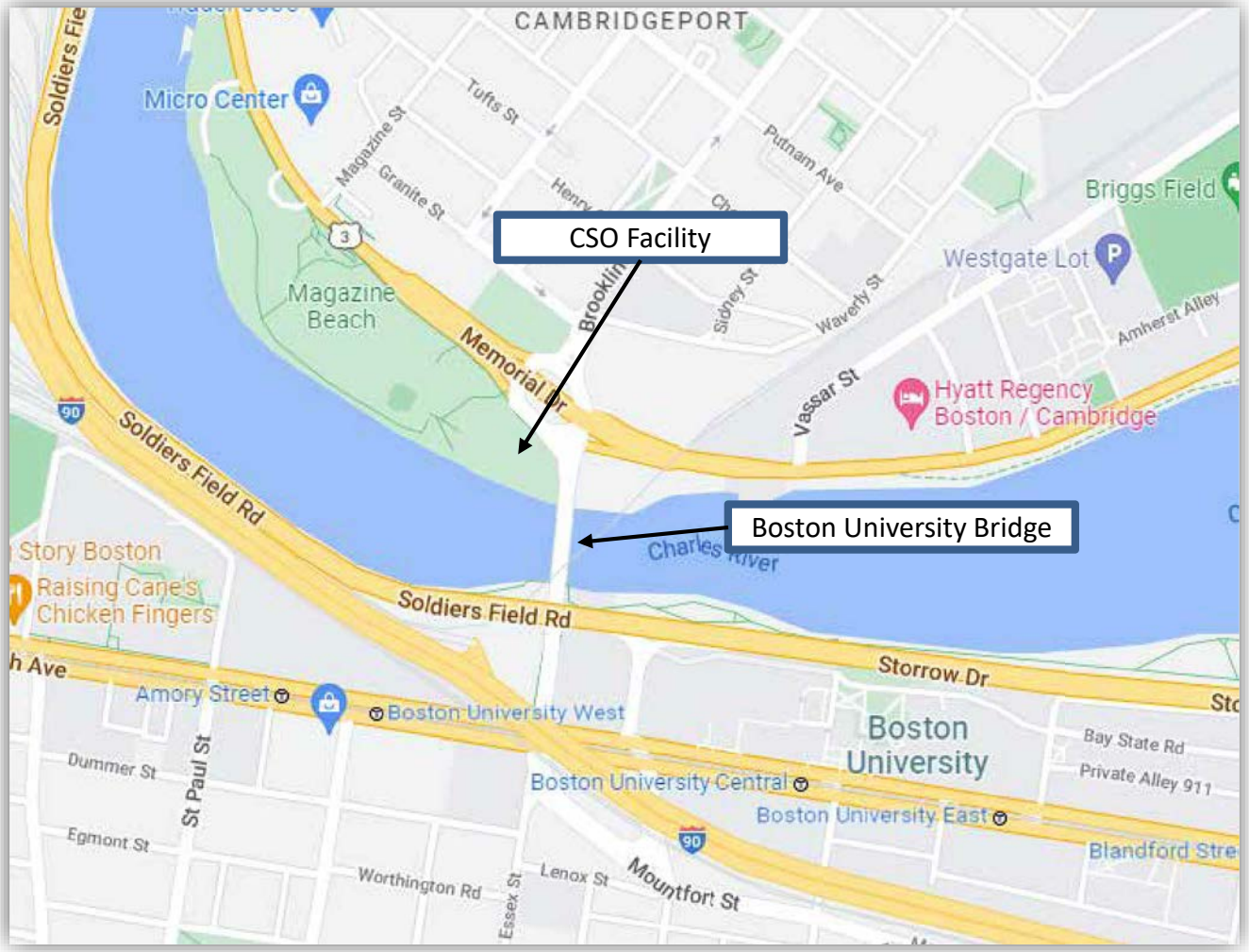
Next Step:
Move forward with detailed design

- Include conceptual design phase to validate staff's preliminary results and to resolve questions such as:
  - Sizing of CHP array
  - Location of CHP

Interim Measures to Address PCBs at the Cottage Farm CSO Facility

September 14, 2022

Cottage Farm CSO Facility, 660 Memorial Drive, Cambridge



Cottage Farm CSO Facility, 660 Memorial Dr, Cambridge

Control Room and Air Scrubber Units

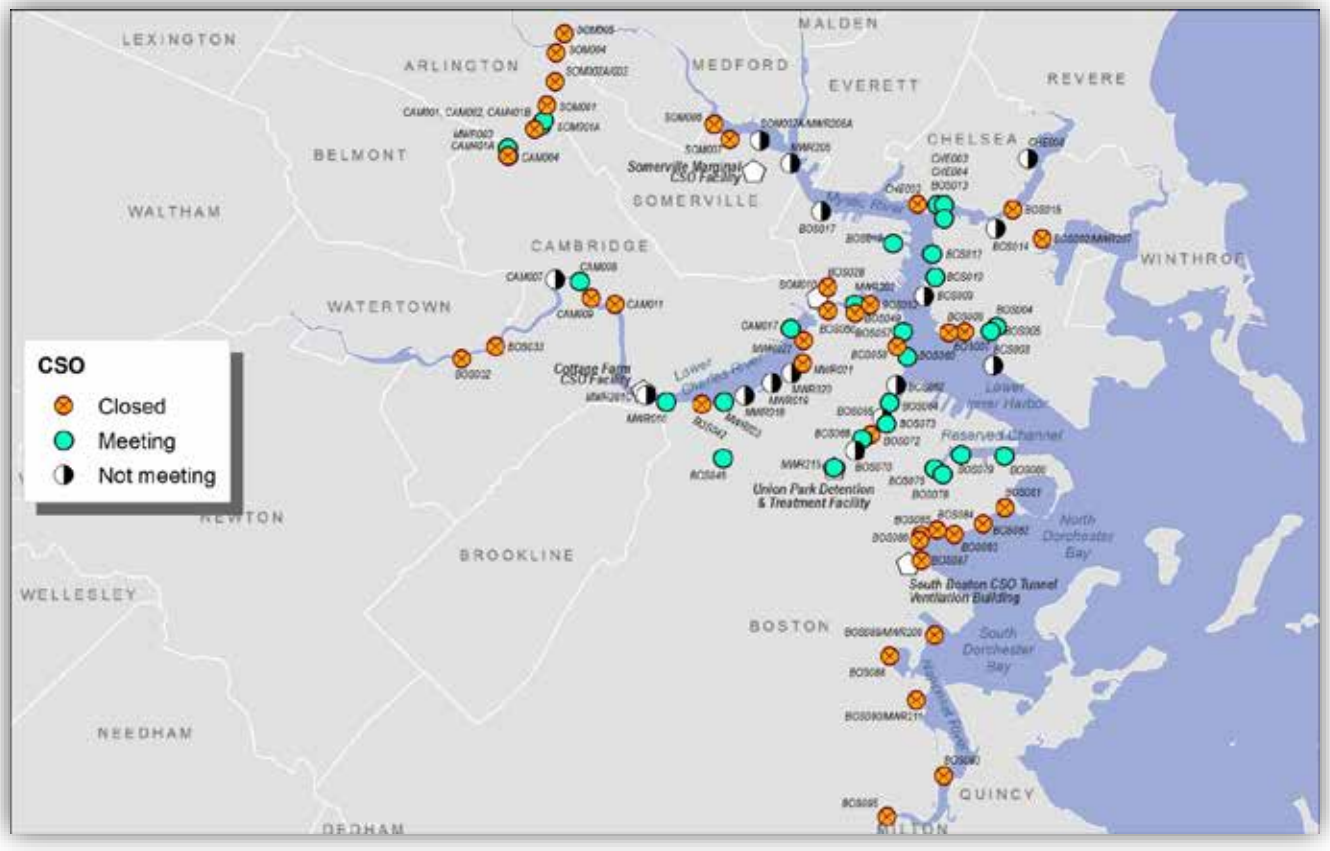
Engine Room

Staff Trailer

Charles River and Alewife Brook/Upper Mystic River Variance Extension Requests

September 14, 2022

CSO Performance Assessment Results for 86 Outfalls



- 35 court ordered projects completed
- $912 million spent to date
- 40 of 86 CSO outfalls closed
- 3.3 billion gallons of CSO reduced to 414 million gallons today (87% reduction)
- 93% of remaining CSO volume is treated

CSO Outfalls to Variance Waters

New Long-Term Control Plans required for remaining CSO outfalls in Variance Waters:

- 6 CSO outfalls to Alewife Brook
- 1 CSO outfall (treated) to Upper Mystic River
- 9 CSOs outfalls (1 treated) to Charles River

Schedule Extension

MWRA, Cambridge and Somerville all required to submit Control Plans for their outfalls in accordance with schedules established in variances

Comments from EPA and MassDEP during approval of MWRA work plan require:

- Coordination of planning efforts
  - This increases time needed during alternatives development
  - This increases time needed for preparation of draft and final reports
- Update of rainfall 'typical year' to include climate change projections
- Emphasis on increased public participation process
  - This increases number of meetings
  - This increases time needed to coordinate/prepare for meetings

Recent meetings suggest MEPA process will take more time than anticipated

Metropolitan Water Tunnel Program
Program Update

September 14, 2022

Program Update

- Evaluation of Alternatives
- Preferred Alternative
- DEIR Submittal / Draft Section 61 Findings
- Preliminary Design
- Community and Stakeholder Outreach

- Program Schedule
  - Currently in preliminary design – through January 2024
  - Begin final design in 2024
  - Targeting first tunnel segment construction to start in 2027

Key Locations

Construction Shaft Sites

- Fernald Property, Waltham
- I90/I95 Interchange, Weston
- Highland Ave/I95 Interchange, Needham
- American Legion, Mattapan

Connection Shaft Sites

- Lexington St Pump Station, Waltham
- Cedarwood Pump Station, Waltham
- Hegarty Pump Station, Wellesley
- St. Mary Street Pump Station, Needham
- Newton Street Pump Station, Brookline
- Southern Spine Mains, Boston

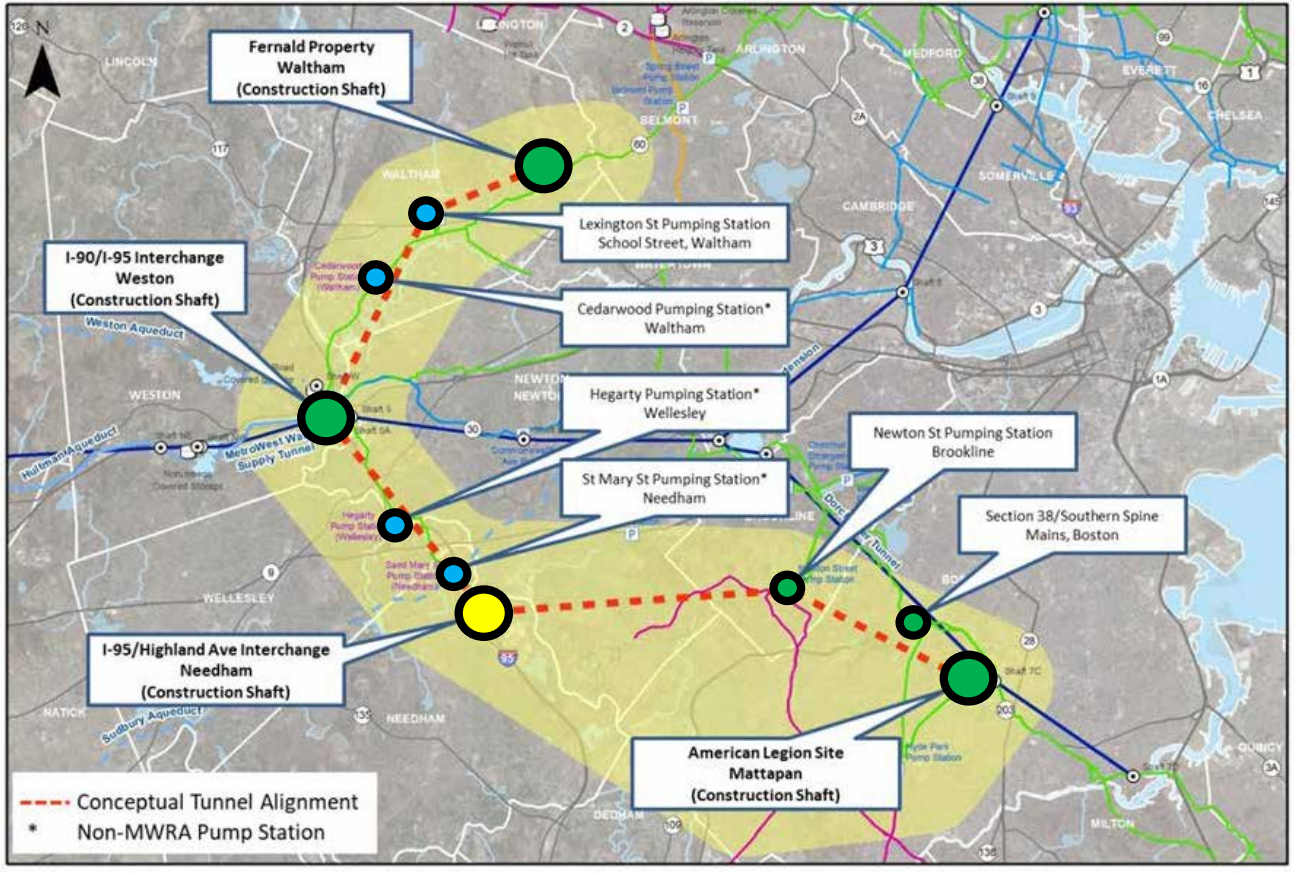
Final shaft locations subject to permits and real estate acquisition

* Non MWRA Pump Station

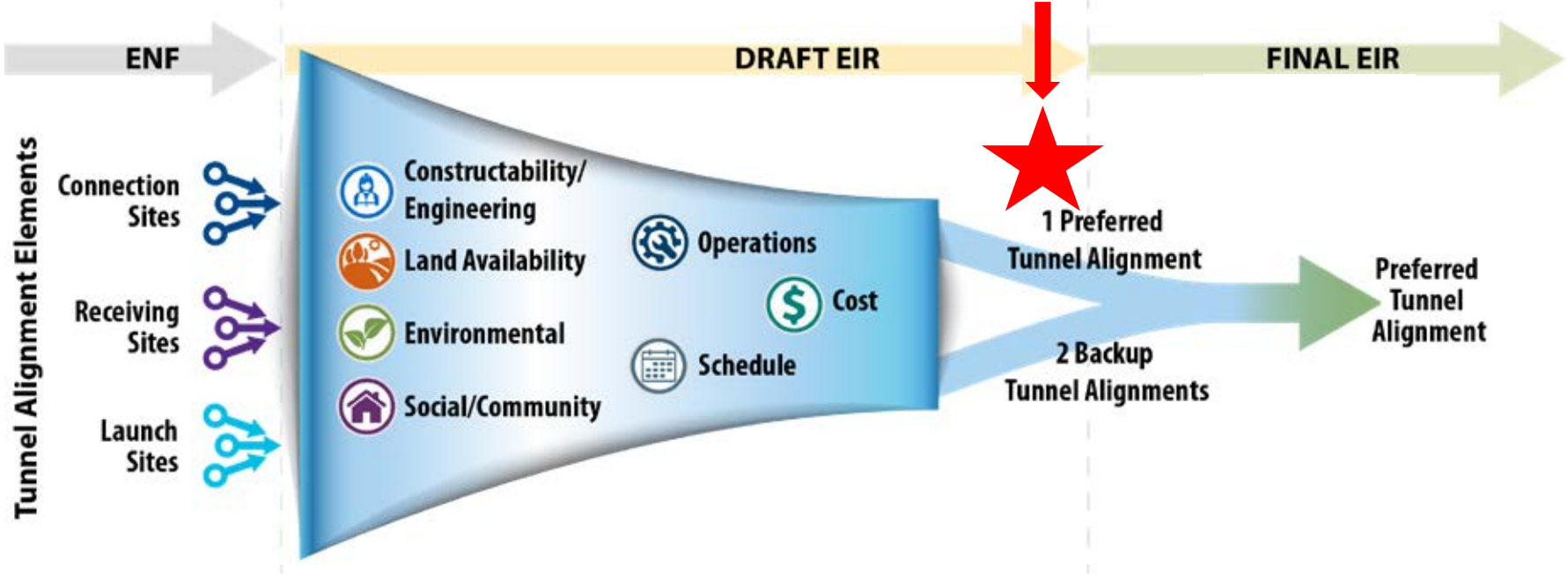
Required Connection (required for system redundancy)

Secondary Connection (provides local benefit)

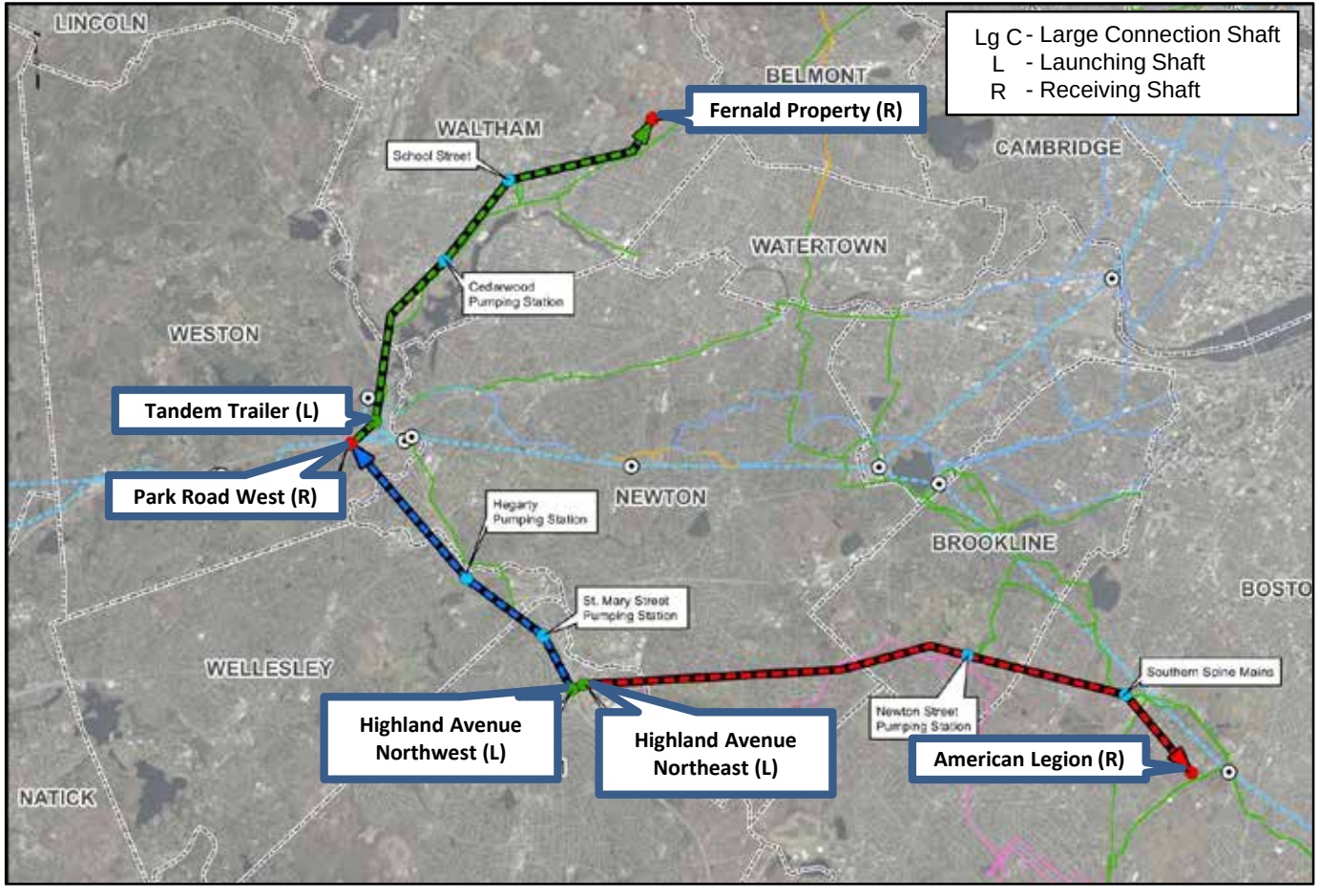
Construction Shaft (no connection)



Alternatives Evaluation Process



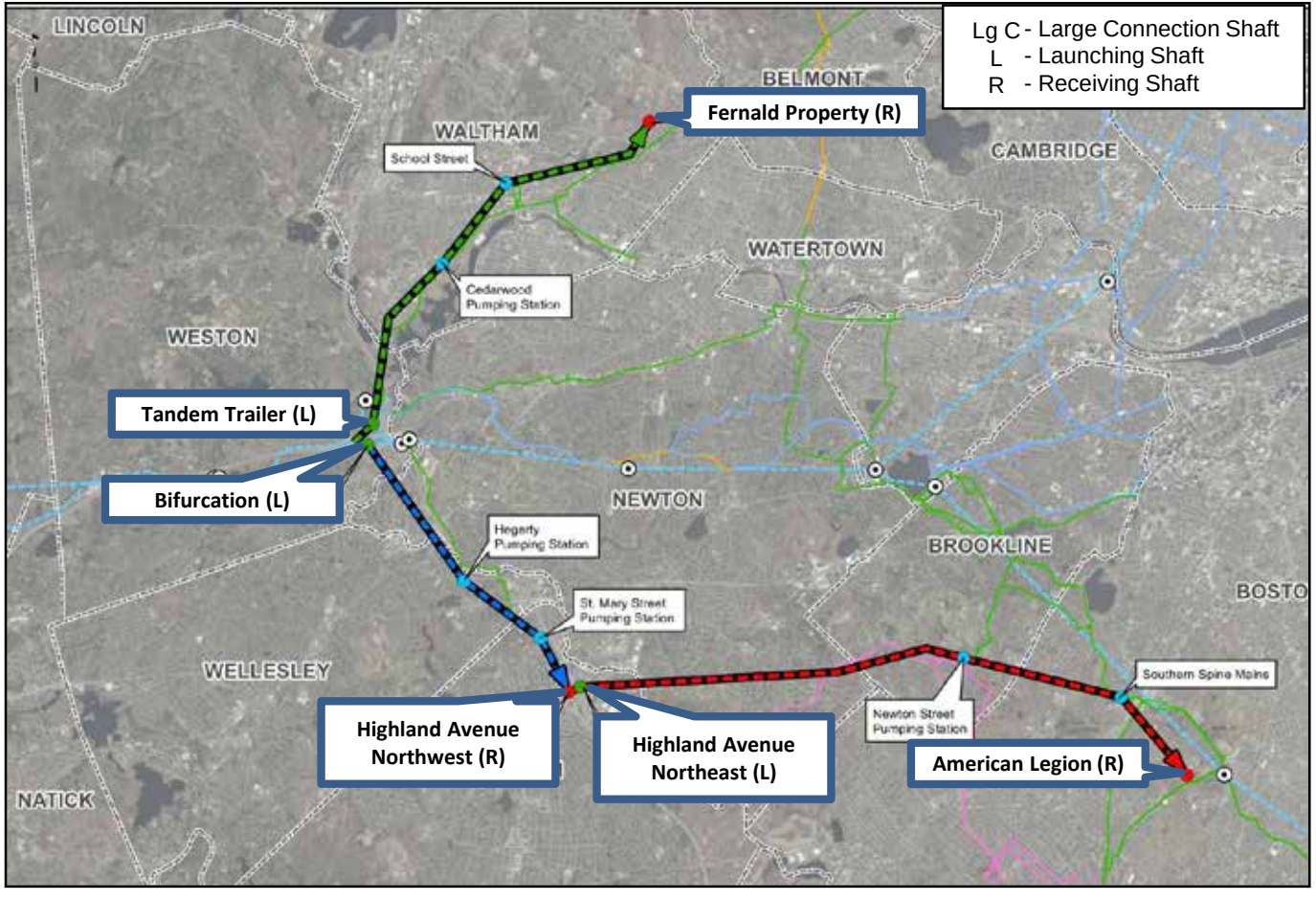
Alternative 4 – Preferred



- Use of Tandem Trailer Parcel after completion of future MassDOT bridge construction

- Shares Tandem Trailer parcel
- Substantially mitigates impact from MassDOT bridge project
- Highland Ave splits southern tunnel into shorter tunnel segments
- Provides additional security by separating Hultman connections
- Contract packaging flexibility (2 or 3 packages)
- Earliest opportunity to put either north or south tunnel “in service”

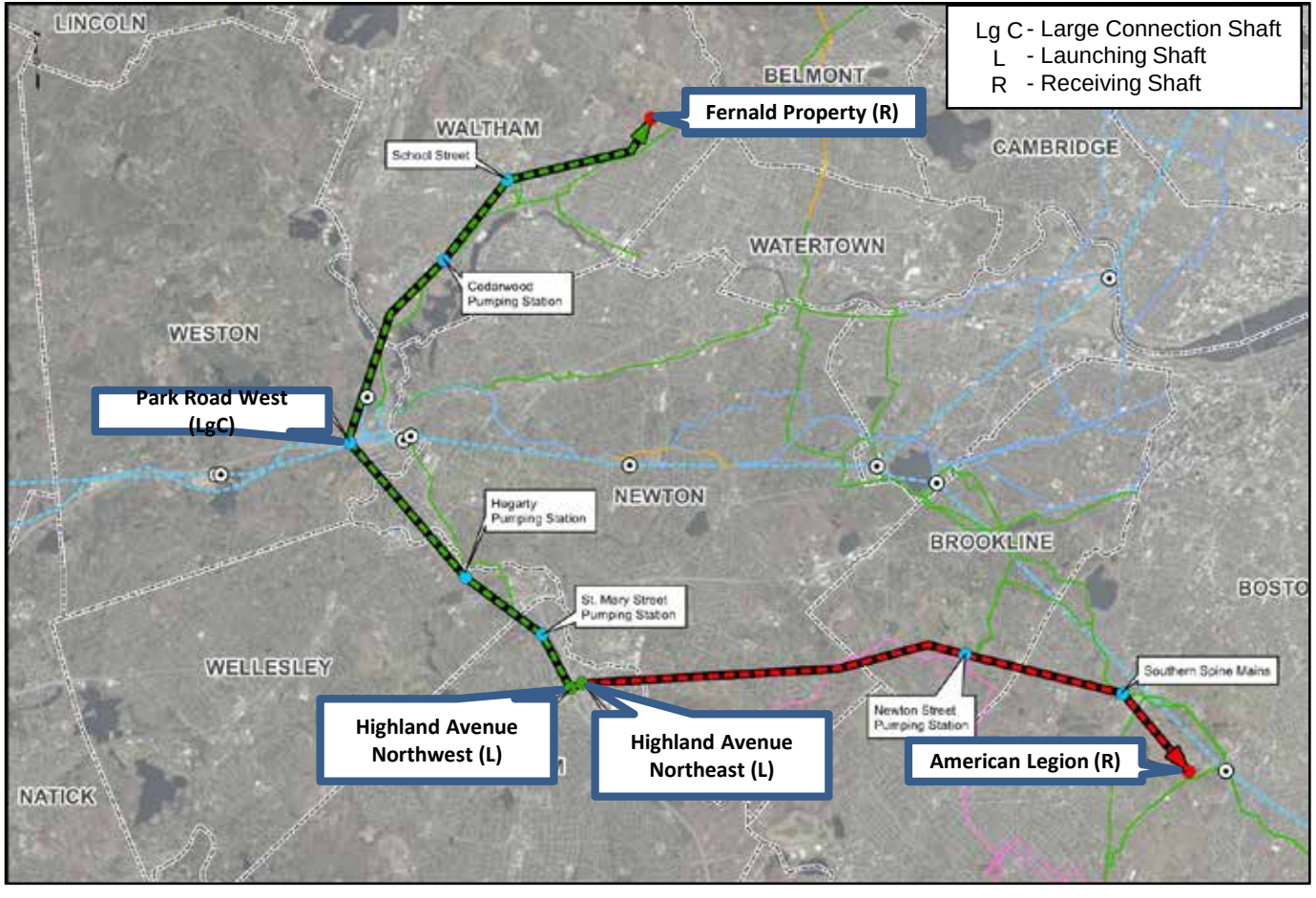
Alternative 3 - Backup



- Use of Tandem Trailer Parcel after completion of future MassDOT bridge construction
- Heavily relies on MassDOT I-90/I-95 sites for two launching shaft sites
- Includes three launch sites, which complicates contract packaging

- Shares Tandem Trailer parcel
- Highland Ave splits southern tunnel into shorter tunnel segments
- Provides additional security by separating Hultman connections
- Earliest opportunity to put either north or south tunnel “in service” (tied with Alt 4)

Alternative 10 - Backup



- Latest “in service” of North or South Tunnel
- Long 8-mile long tunnel to construct
- Relies on completion of both contract packages for South Tunnel to be “in service”
- Two tunnel construction contracts. No option for 3 tunnel contract packages
- Provides least separation between Hultman connections

- Does not need to share Tandem Trailer parcel
- Substantially mitigates impact from MassDOT bridge project
- Least reliance on MassDOT I-90/95 interchange property

Draft Environmental Impact Report

- DEIR evaluates the preferred and 2 backup alternatives equally
  - All 3 alternatives meet hydraulics, redundancy, and operational needs
  - Similar environmental impact (land alteration, open space, wetlands, rare species habitat, water management act, and climate change) for both the construction period and for the build condition
  - Key differences between alternatives are a few shaft sites, direction of tunneling, tunnel segment length, and schedule
- Environmental Justice community outreach planned
  - Program Website https://www.mwra.com/mwtp.html
  - Translate Outreach Materials (Fact Sheets, Newspaper Notices, Advanced Notification Form)
  - Email Advanced Notification form to Community Based Organizations
  - Public Information Sessions (translation services as requested)
- DEIR filing (with draft Section 61 Findings) to the MEPA office in fall 2022
- Final EIR in late summer 2023 addressing public comments received

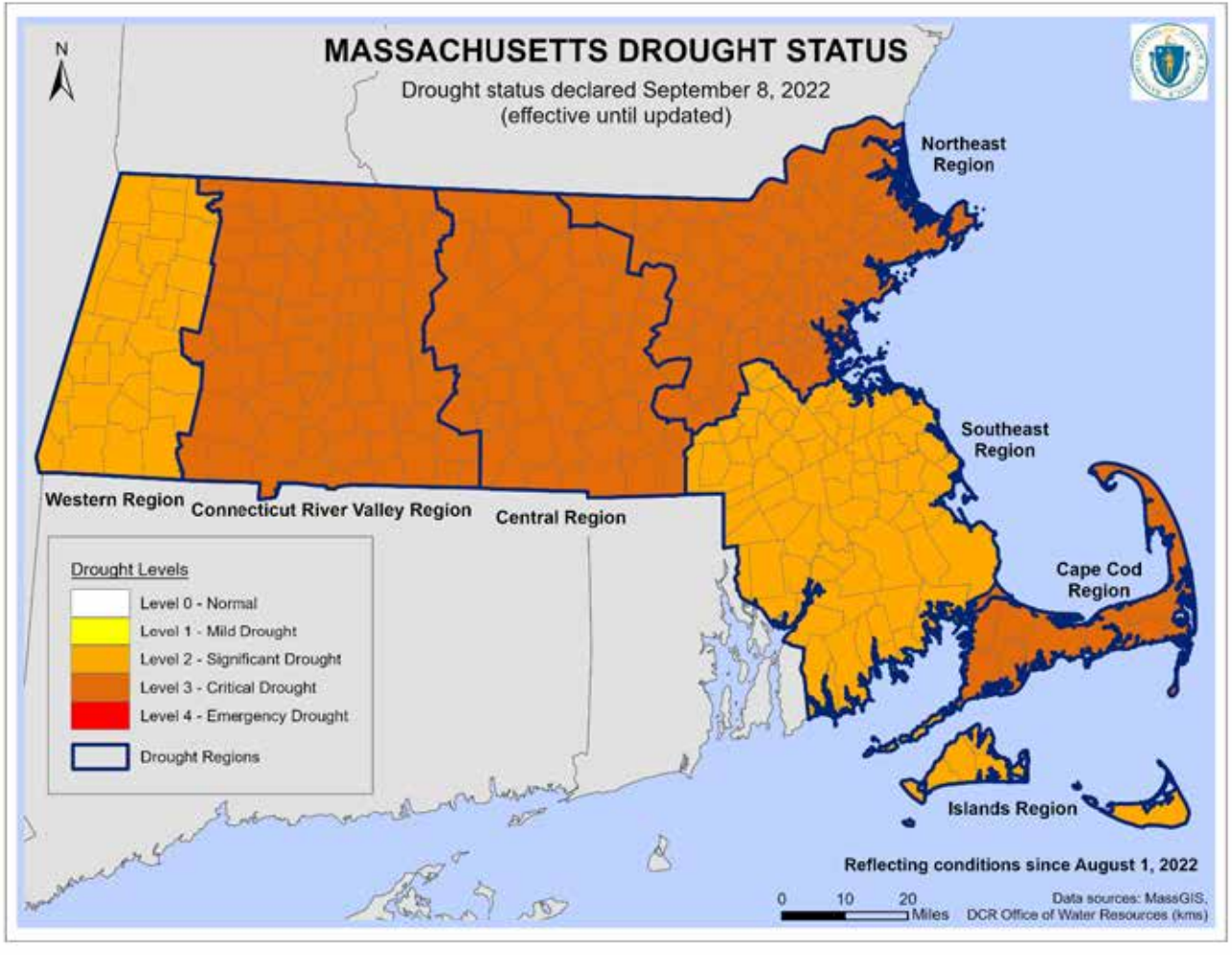
Preliminary Design

- Preliminary Design will be based on the prefered alternative only
  - Preliminary design report and drawings
  - Contract packaging, phasing, sequencing, etc.
  - Identify land acquisition needs
  - Updated Program cost estimates
  - Updated Program schedule
- Community and Stakeholder Outreach
  - Consultations held with MEPA, DEP, MHC, Communities, MassDOT, DCR, DPH
  - Working Group – representatives from all ten communities within the Program Study Area, MWRA Advisory Board, WSCAC, MAPC (met five times so far)
  - Additional meetings with community representatives of the seven communities in which the tunnel will be constructed

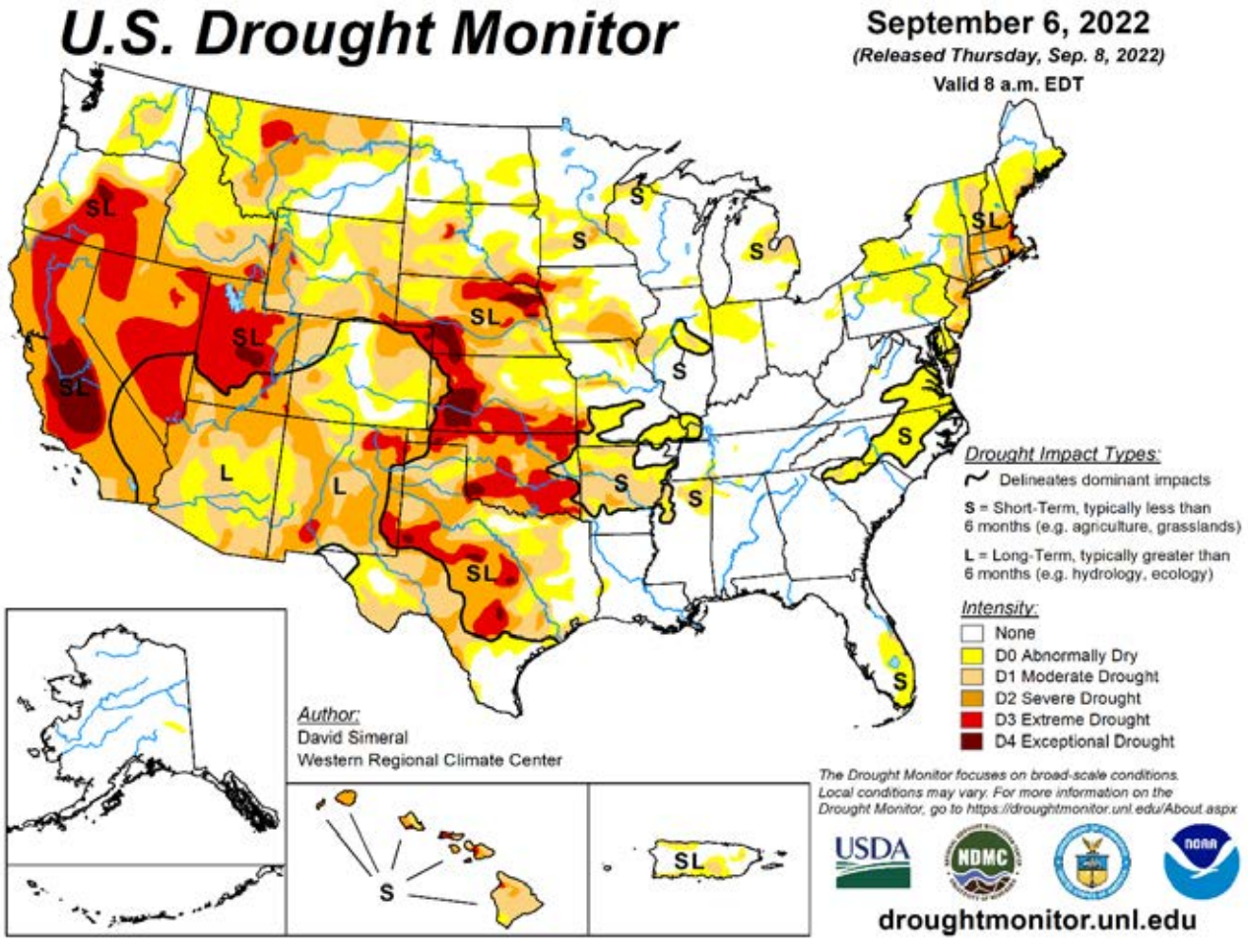
Quabbin Reservoir and Drought Status Update

September 14, 2022

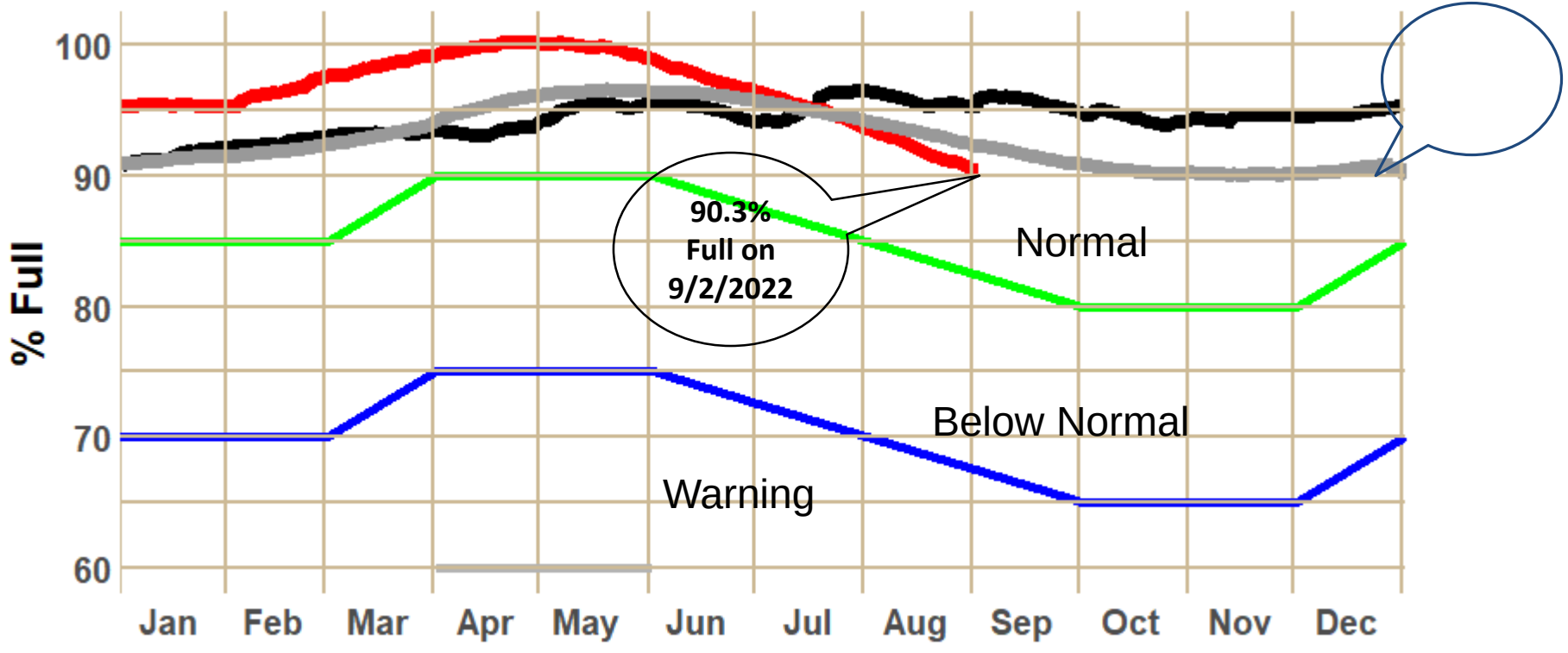
Massachusetts Drought Status Designations: September 8, 2022



National Drought Mitigation Center Intensity: September 6, 2022



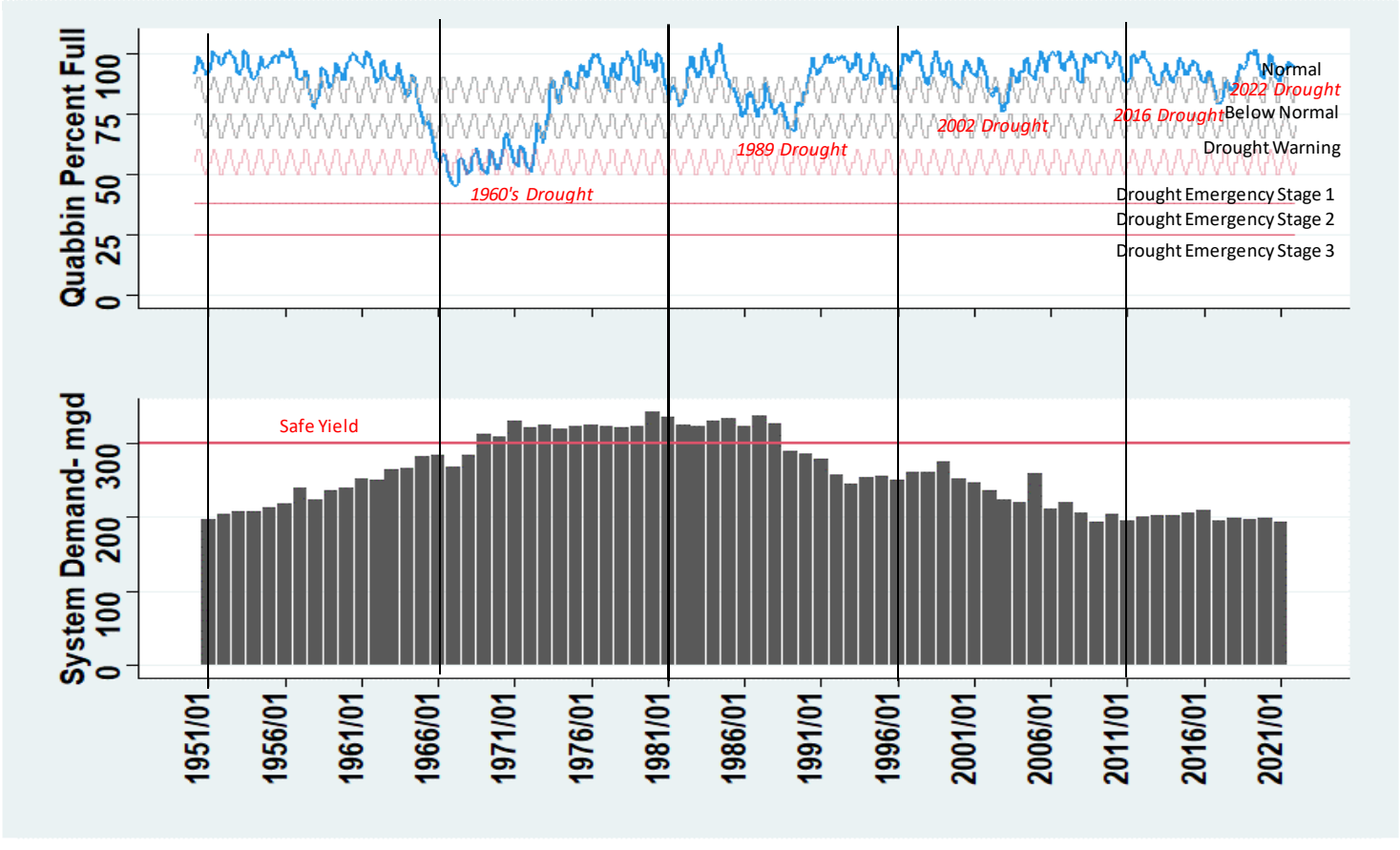
Quabbin Reservoir Volume



Quabbin Reservoir Projections with Varying Yield Scenarios Looking Forward from September 1, 2022

	1-Month	3-Months	6-Months	12-Months
Median Yield	Normal	Normal	Normal	Normal
Dry (75th Percentile)	Normal	Normal	Normal	Normal
Driest (of Record)	Normal	Normal	Below Normal	Below Normal

Quabbin Historical Droughts



Drought Messaging

- Quabbin in Normal Operating Range

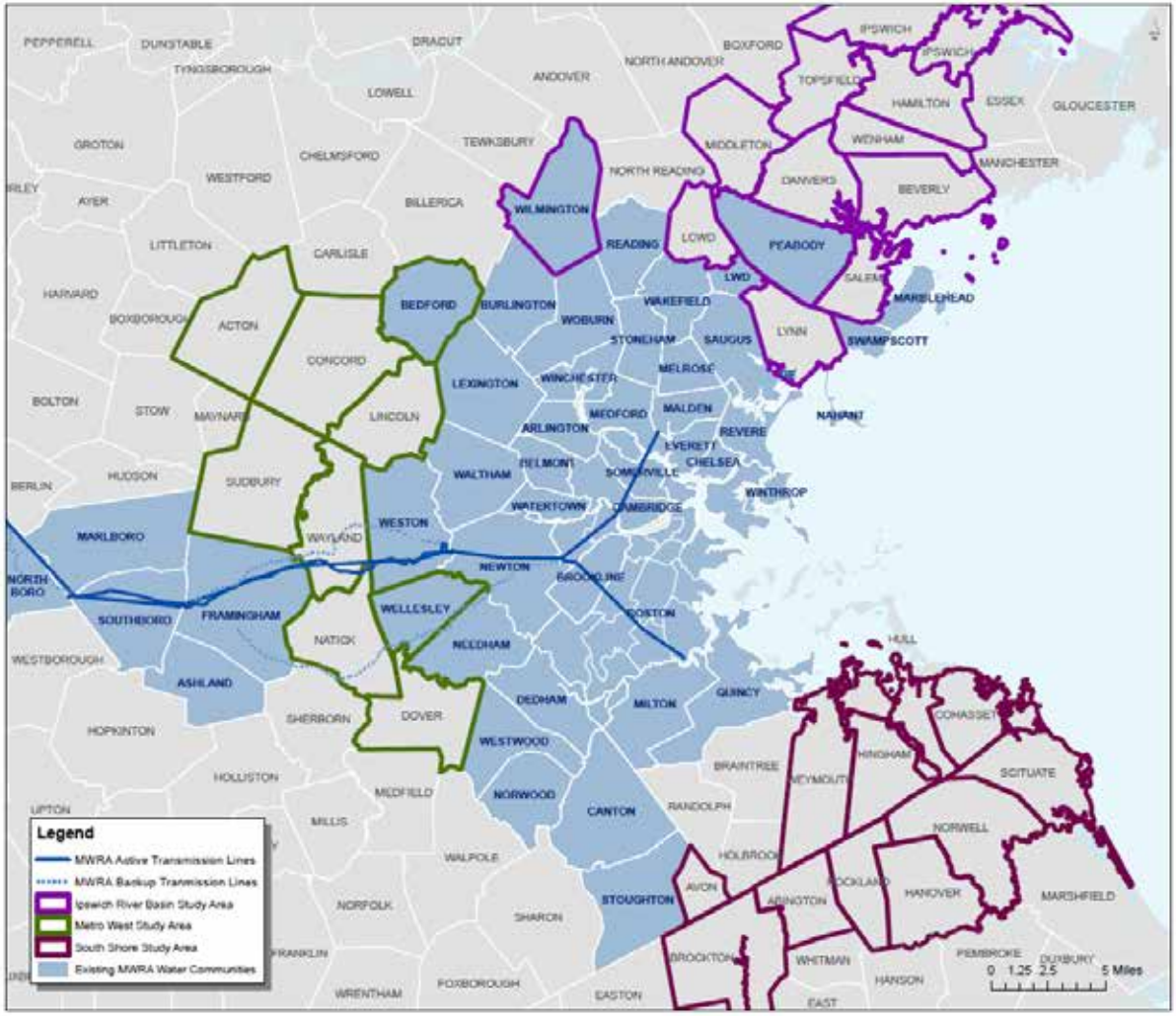
- No mandatory water use restrictions:
  Asking our customers to use water wisely and efficiently

- Even if drought extends several years:
  - Can supply all fully and partially supplied communities
  - Able to provide assistance to neighboring communities

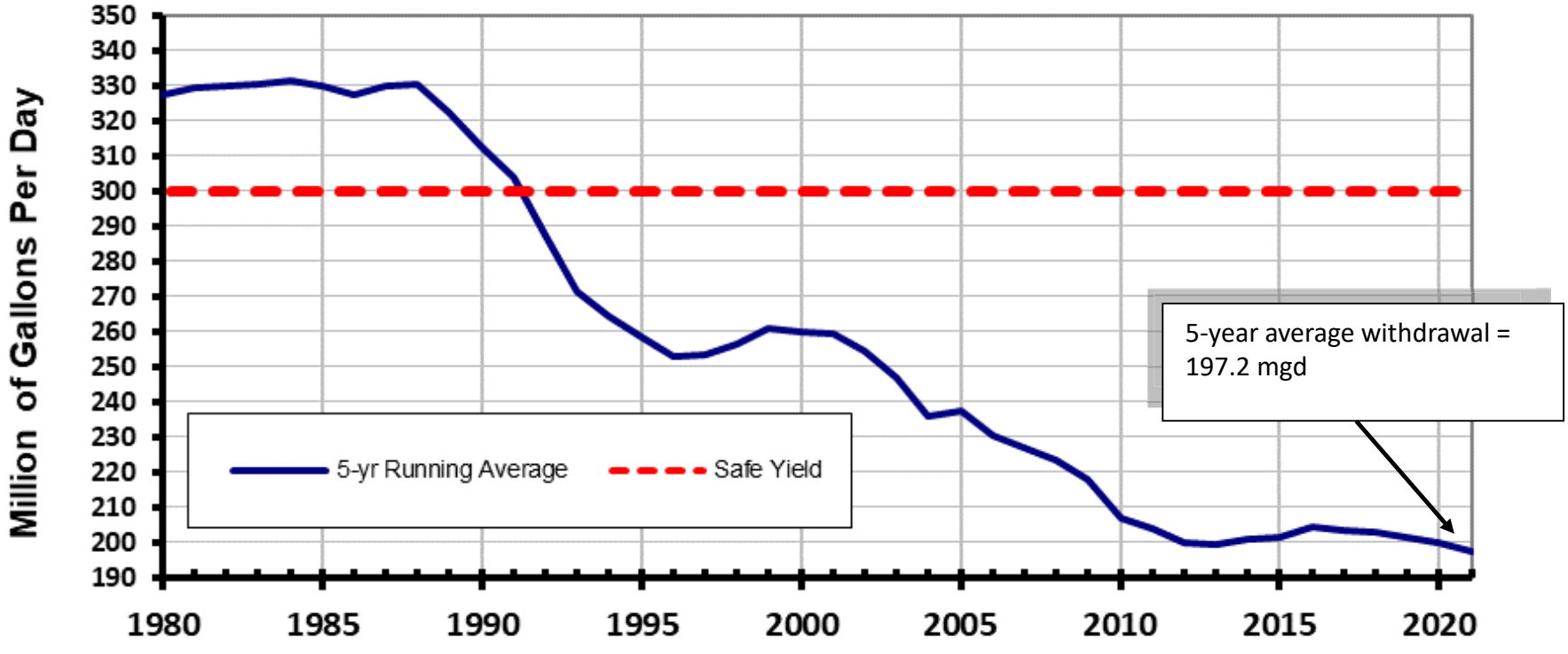
Five-Year Waiver of Entrance Fee

September 14, 2022

System Expansion Study Areas



Reservoir Withdrawals: Five-Year Running Average



The Water is Available: Safe Yield

(from 2018 Water Master Plan)

Current demand within the service area (5-year average) Potential growth due to increased population and employment Contingency for potential increase in demand (partial user communities)	203 MGD 29 MGD 17 MGD
TOTAL PROJECTED DEMAND IN 2040	249 MGD
MWRA Supply System Safe Yield	300 MGD
AVAILABLE MARGIN	51 MGD

Costs and Revenue Implications

	Usage	FY23 System Share	Revenue Reallocated	Current Entrance Fee
1-Year	5 MGD	2.85%	$ 8,205,923	$ 961,045
	20 MGD	10.49%	$ 30,241,437	$ 3,581,053
25-Year	5 MGD	2.85%	$ 205,148,075	$ 21,142,990
	20 MGD	10.49%	$ 756,035,925	$ 78,783,166

Agency-Wide Technical Assistance Consulting Services: CDM Smith Inc. Contract 7483, Change Order 3

September 14, 2022

System Expansion Study Areas