Transformation:
Water Infrastructure for a Sustainable Future

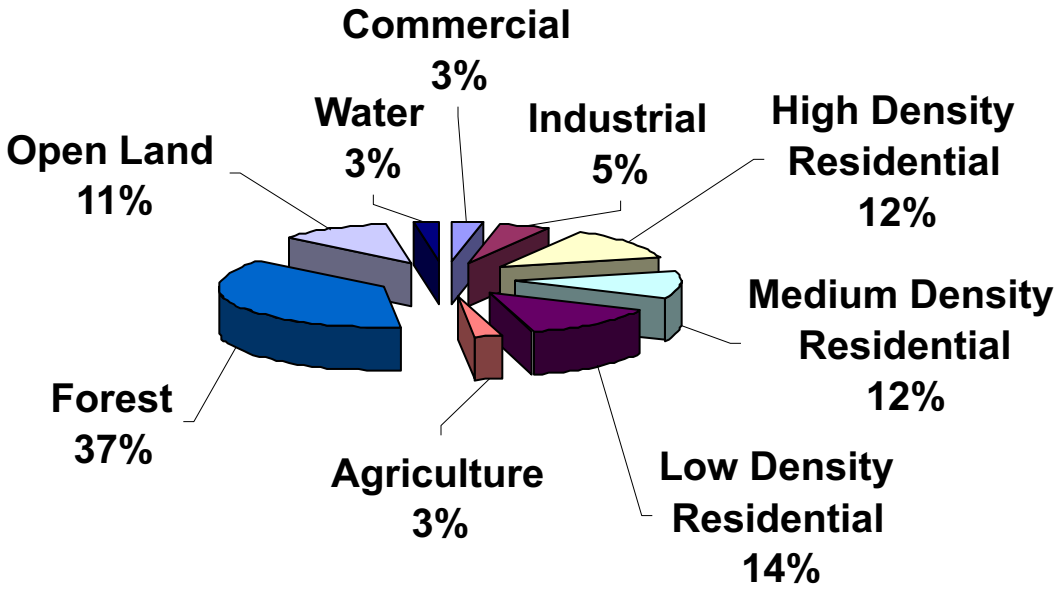
Charles River Watershed Association

www.charlesriver.org

CRWA

Regulatory Change: Residual Designation

Land Cover Distribution - Charles River Watershed



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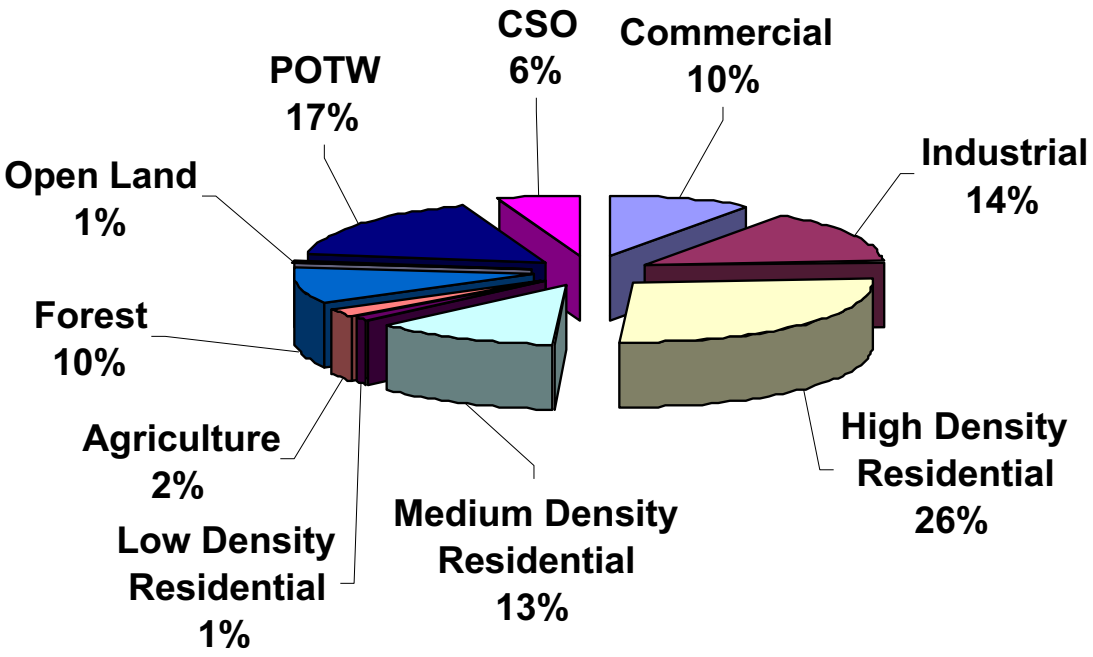
Distribution of Annual Phosphorus Load to the Charles River by Source Category (1998-2002)



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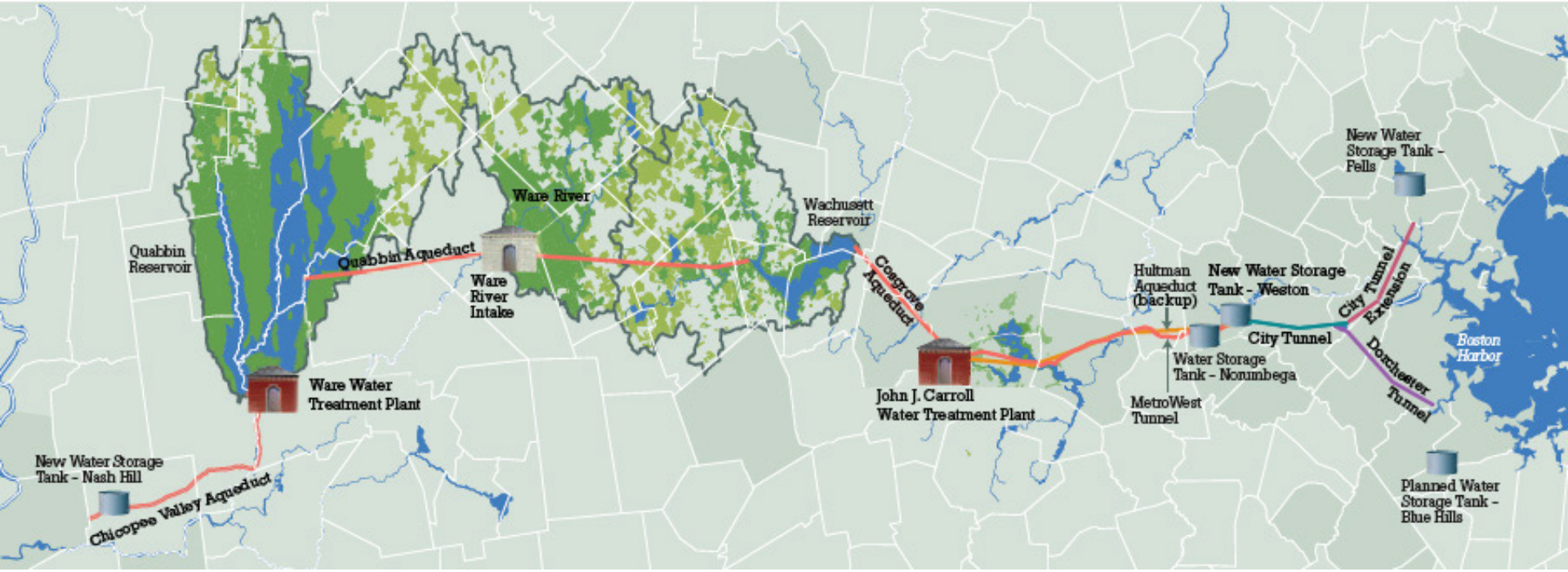
MWRA Water Supply System



Water flows from Quabbin and Wachusett Reservoirs to 48 communities in the greater Boston area

Figure A:

MWRA SEWERAGE SYSTEM SERVICE AREA

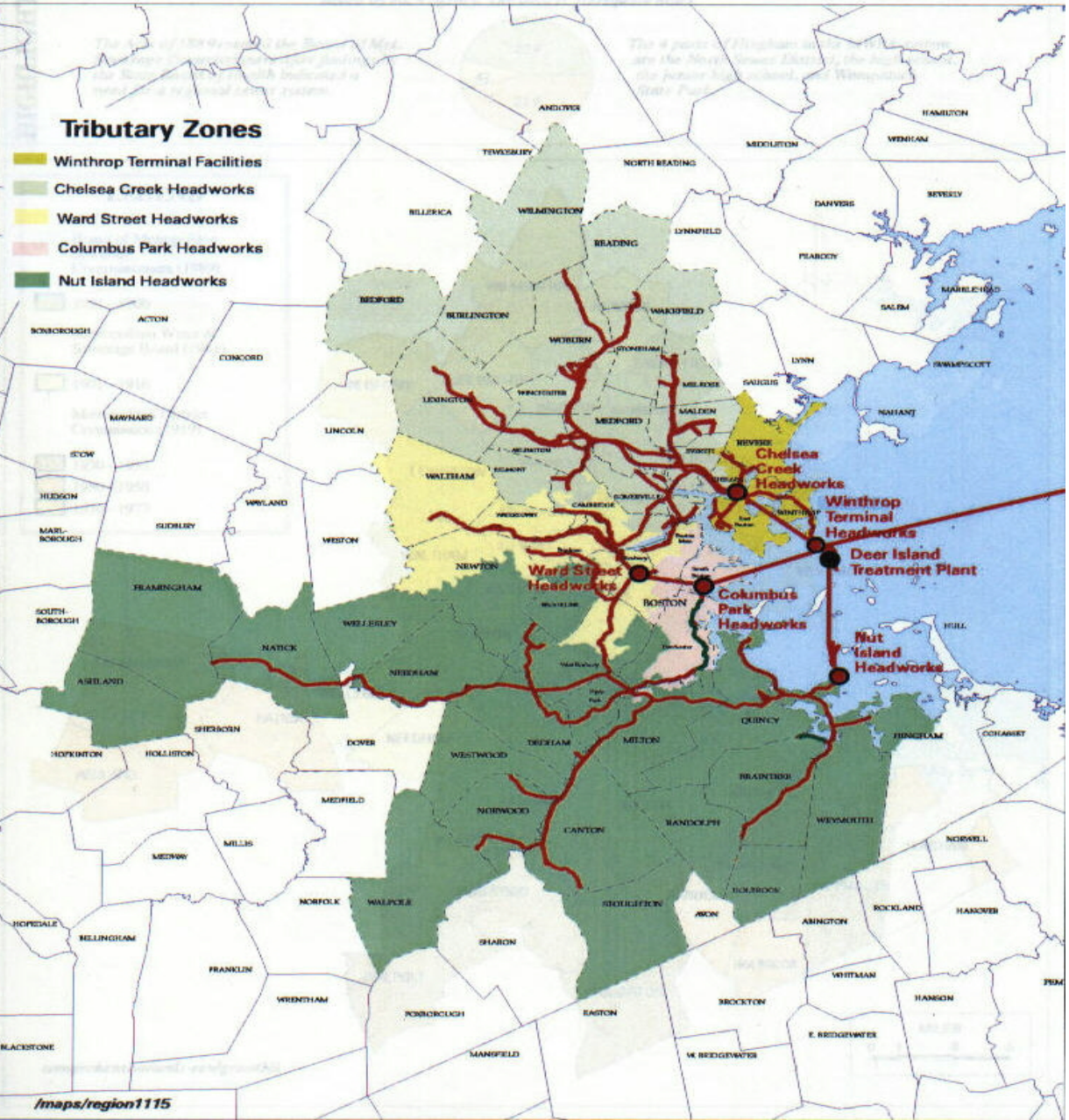


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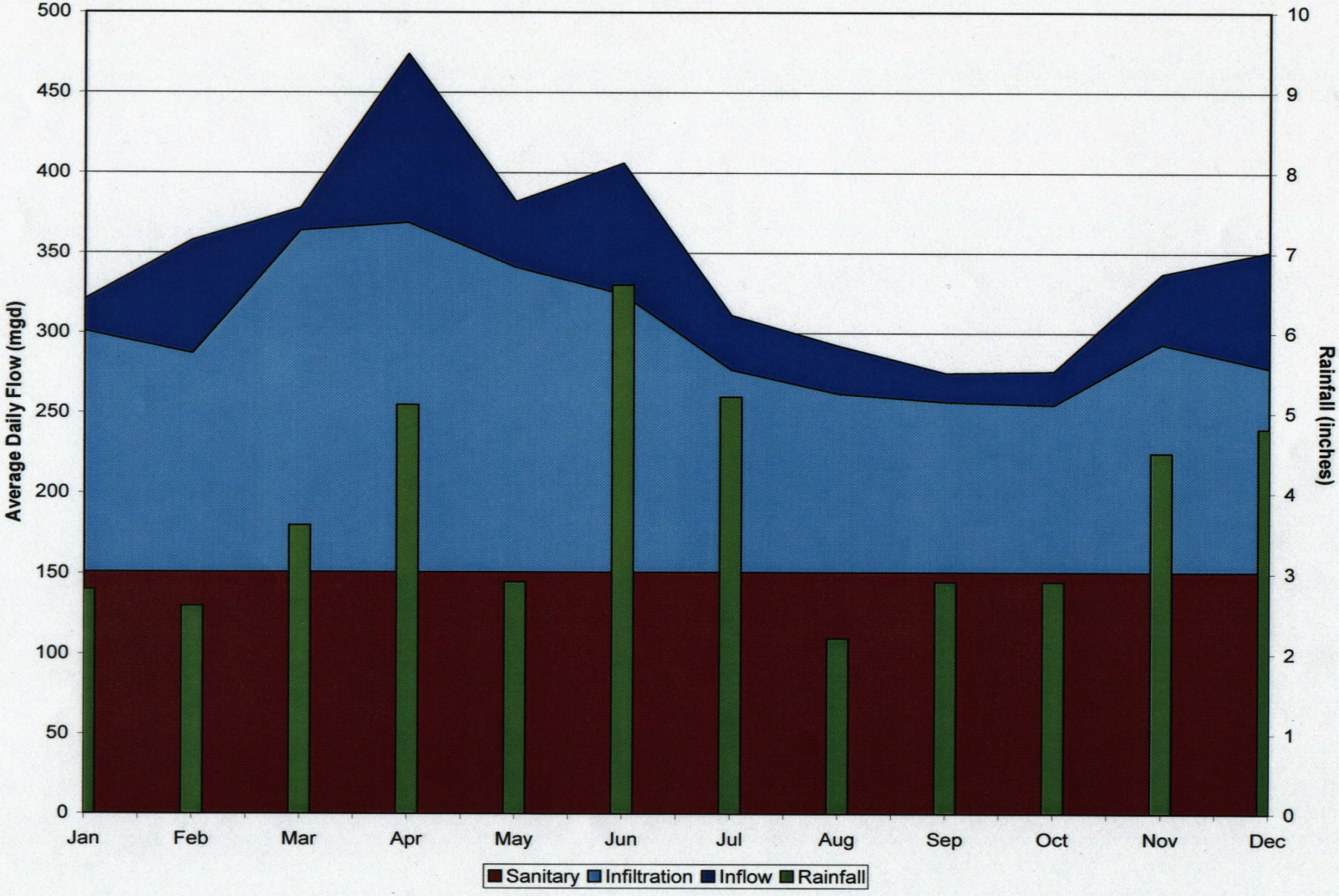
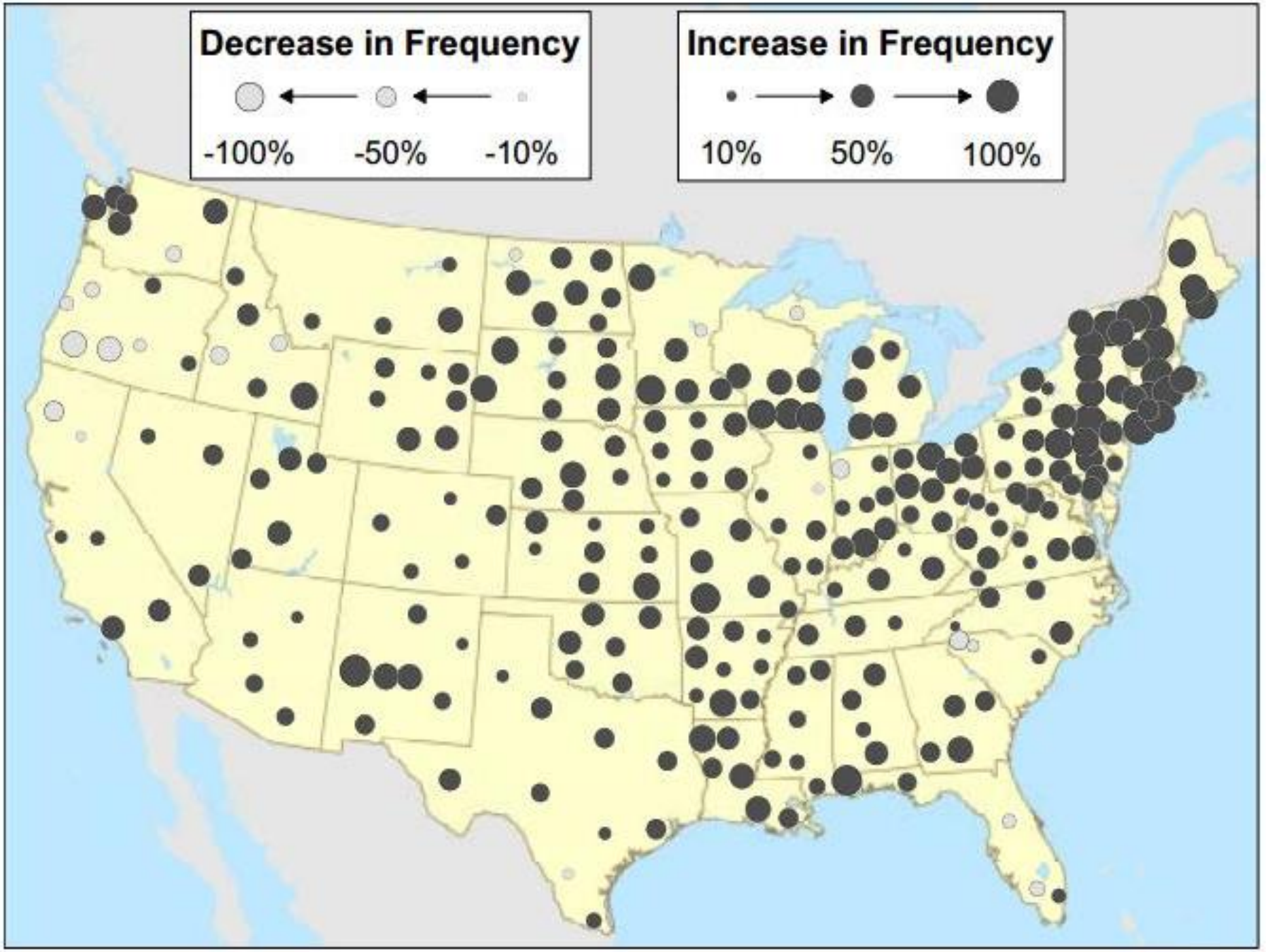
FIGURE E

CY2000 MWRA Wastewater Flow Component Estimates




Decrease in Frequency
-100%
-50%
-10%
Increase in Frequency
10%
50%
100%

Inland Flooding

Thinking Like CRWA

- What is “wastewater?”
- What are the impacts of the water delivery and wastewater collection and treatment systems we currently use?
- Of the listed impacts, how many are inherent to the system – they will never go away?
- How much will it cost to repair, replace, and extend our current water/wastewater/stormwater systems in the coming 10 years?
- How will climate change impact these systems?
- *And yet we don’t question that these systems are the basis for all future design?*

Nature's Principles

Restore Nature

…Four billion years of land and water evolution trump our 19th Century water infrastructure in every conceivable way.

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Nature's Principles

Resource to Waste to Resource

There are no wastewater treatment plants or landfills in nature.

Every waste becomes a resource, generating tremendous energy in place.

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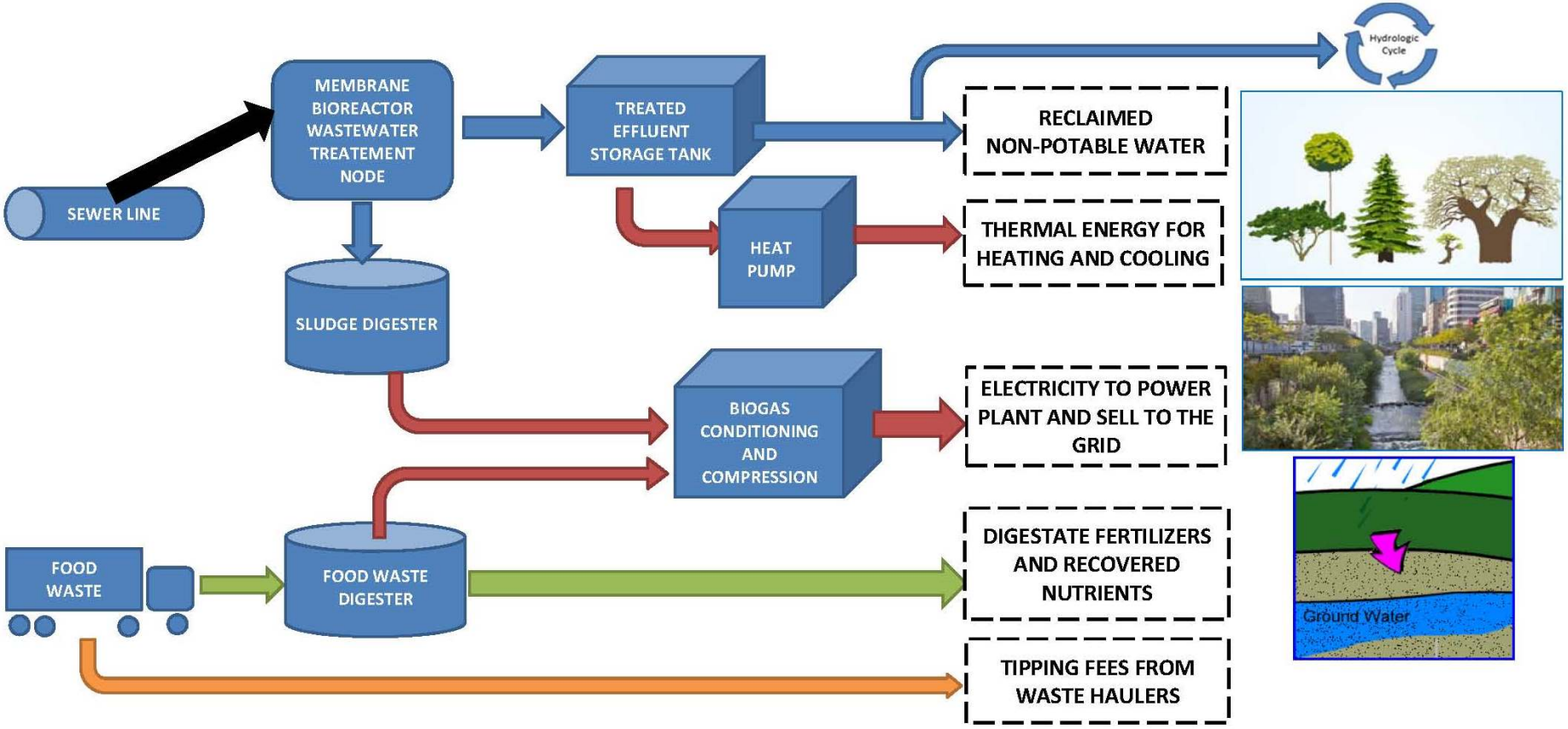
Maximizing Water and Energy Resources



Community Water and Energy Resource Centers (CWERCs)

- Treat and resell a portion of the water (MBR)
- Capture and use/sell thermal energy (heat pump/exchange)
- Produce and use/sell biogas through co-digestion (CHP)
- Capture nutrients (N) for resale
- Produce compost for resale (2 tiers, separating sludge and SSO streams)

Community Water and Energy Resource Center
Capital Cost and Revenue – N1

- Total capital cost: $46.8 million
  - headworks, MBR, storage tank, heat pump, anaerobic digestor for municipal sludge, food waste digestor, dewater biosolids, dewatering food solids, food receiving station, digester storage tanks (2, 100K gallon tanks) digester pumps, CHP unit, nutrient recovery, composting
  - does not reflect prevailing wage requirements

- Total O&M costs: $4.9 M / year
  - wastewater treatment, pumping, energy, chemicals, labor, misc. supplies
  - does not take into account the value of any energy produced on site.

- Total product fees/revenues: $7.4M-$11M / year

Major Benefit Categories Examined

- Energy benefits
- Emissions reduction and climate change benefits
- Functional open space and other GI benefits
- Distributional benefits

Nature's Principles

Keep Water Local

Infiltration, aquifers, vernal pools, swales, wetlands, intermittent streams, streams and tributaries, ponds, lakes, rivers.

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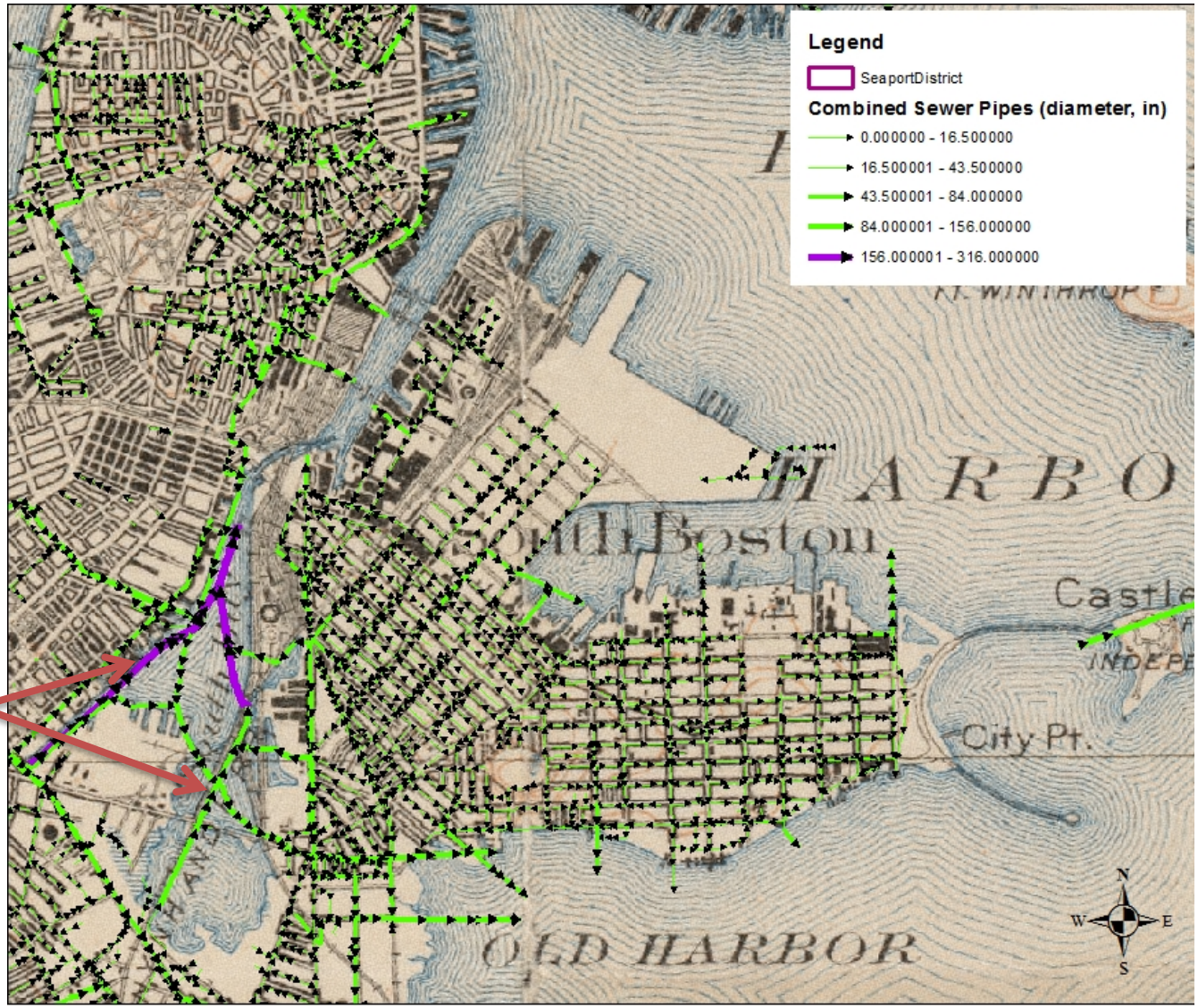
Natural History Research



Remnants of canal/ stream?

Nature's Principles

Flexibility, Adaptability, Interconnectedness

Nature lends the capacity of each landscape to all others in catastrophic events and endemic drought.

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Nature's Principles

Promote and Support Rich Diversity

In nature, diversity is a strength and critical to resilience.

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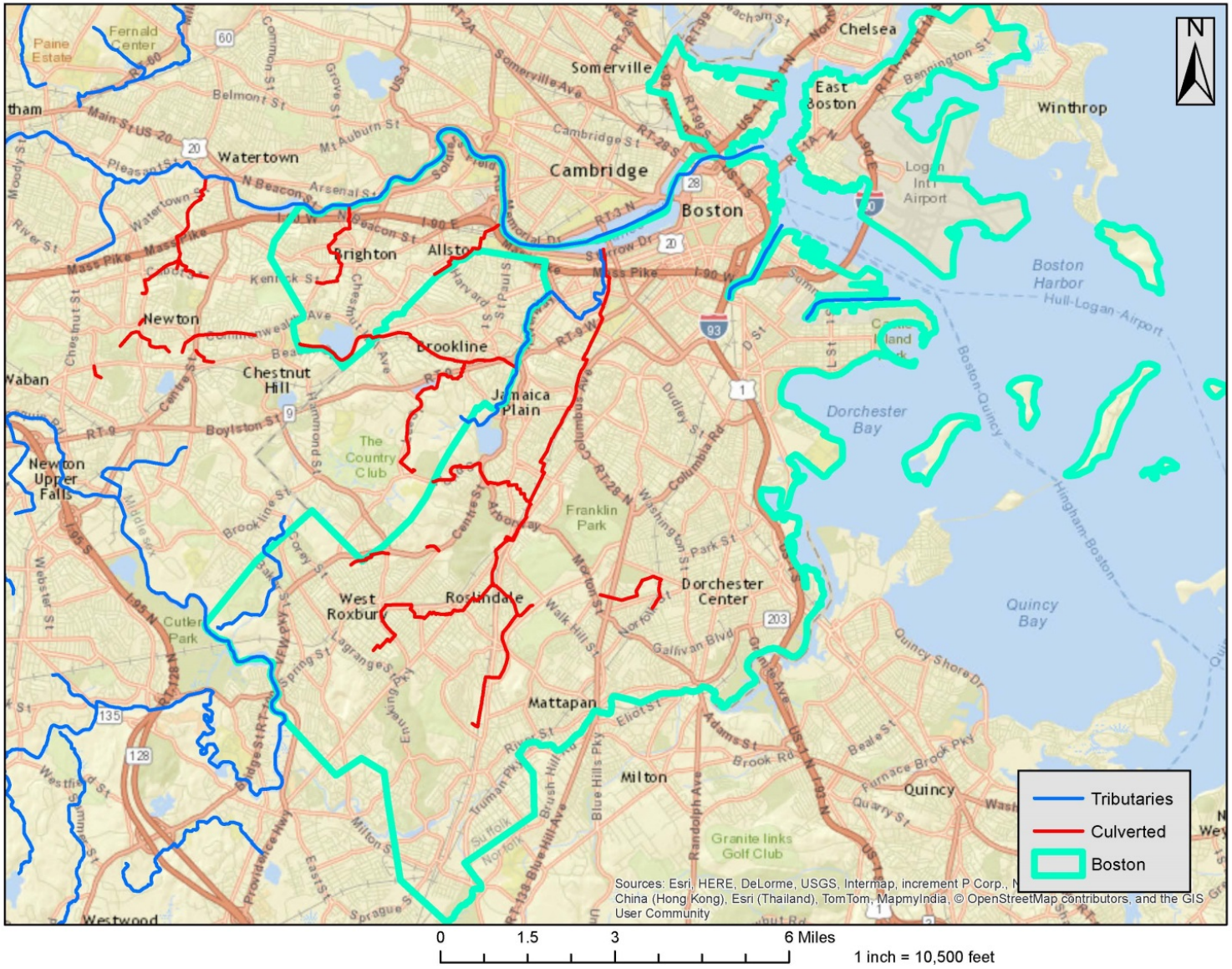
Boston's Buried Streams



Environmental Benefits

- Greenhouse Gas Emission Reduction
- Significant Flood Storage and Conveyance
- Drought Resilience
- Distributed Renewable Energy
- Distributed Reclaimed Water
- Evaporative City Cooling
- Restored Stream and River Flow

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Environmental Benefits

- New Economic Development Zones
- CSO Elimination
- Repurposed Pipes for Flood Control
- Reduced Vehicle Miles/Food Waste
- Aesthetics and Open Space
- Distributed Power, Water, and Flood

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… and a nearly fully restored

Charles River!

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Transformation: Water Infrastructure for a Sustainable Future

Available on Amazon for the Kindle App

www.charlesriver.org

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