NEW ENGLAND WATER ENVIRONMENT ASSOCIATION
NEWEA
WORKING FOR WATER QUALITY

ARCADIS
Design & Consultancy
for natural and
built assets

RESILIENT BYLAWS & ORDINANCES

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Portsmouth, NH
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Climate Ready Boston Report
Image courtesy of Sasaki

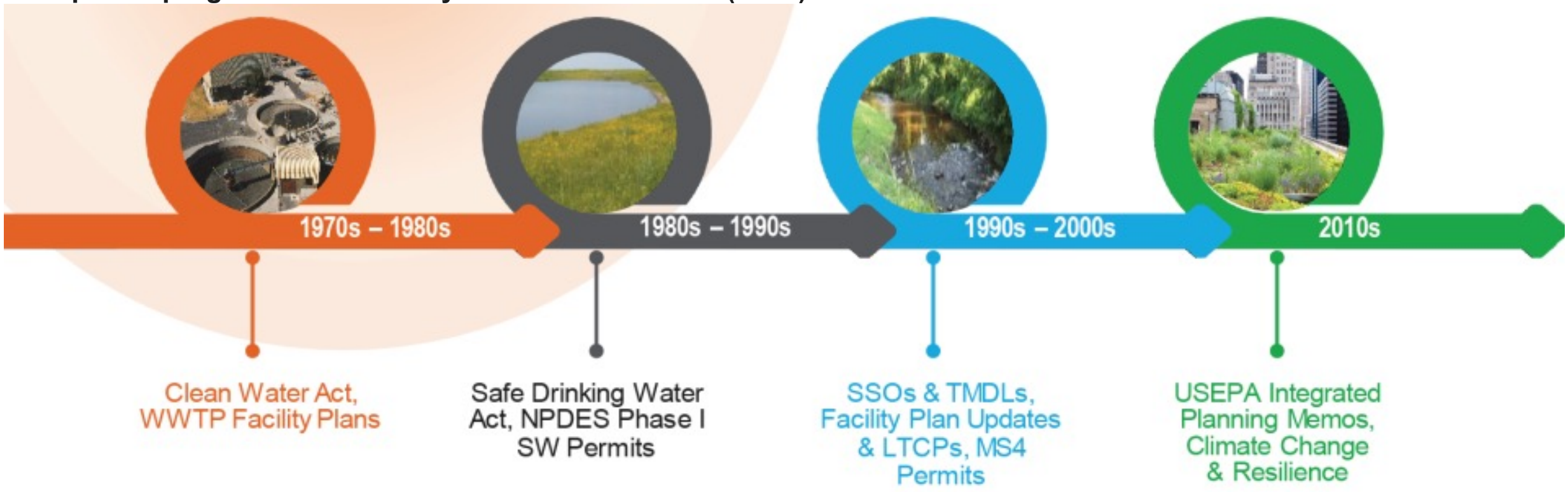
Agenda

- Introduction
- Municipal Stakeholder Process
- NPDES/MS4 Requirements
- Resiliency Needs
- Examples

INTRODUCTION

The Evolution of the Clean Water Act

National Pollutant Discharge Elimination System (NPDES) permit program authorized by the Clean Water Act (CWA)



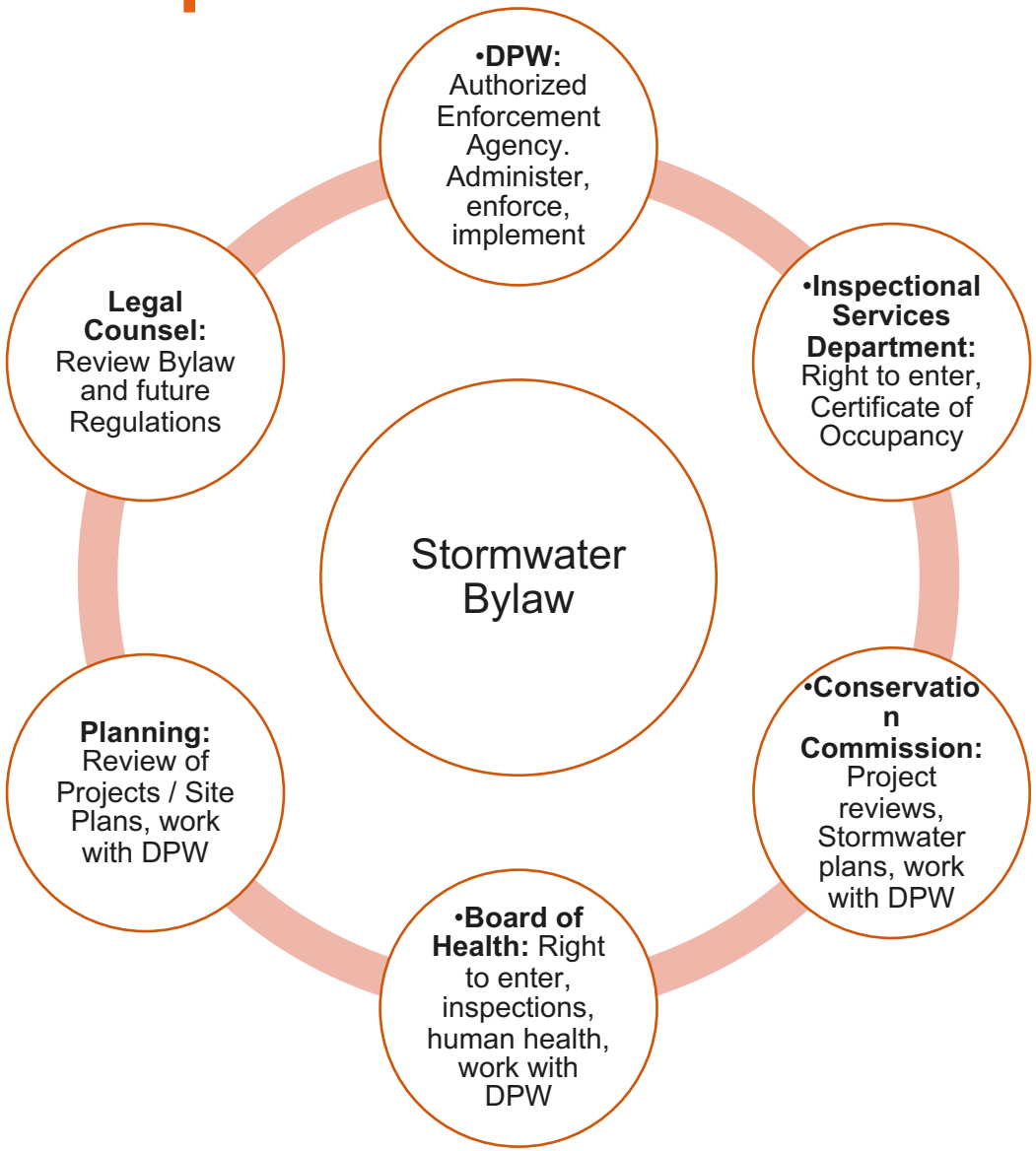
INTRODUCTION

Stormwater Management Documents

Bylaw or Ordinance	Rules & Regulations	Guidance Materials
••Legal Authority	••Technical Requirements ••Procedures	••Examples & Details ••BMPs

STORMWATER MANAGEMENT DOCUMENTS

Authority & New Responsibilities



STORMWATER MANAGEMENT DOCUMENTS

Municipal Stakeholders

Key to Success:

Get Everyone to the Table!

Define Priorities Together

You Know Your Municipality

Municipal Departments/Boards:

- DPW – Water, Sewer, Stormwater, Highway
- Planning Department and Planning Board – Zoning and Subdivisions
- Conservation Commission - Wetlands
- Inspectional Services/Board of Health – Building Inspectors, Jurisdiction
- Sustainability/Resilience/Coastal departments – Resiliency, Green Infrastructure, LID
- Historic Commission – historic structures
- Mayor/Town Administration and Town Government – Decision makers

Other Key Stakeholders:

- Developers
- Utilities
- Environmental Groups

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MS4 Permits

Regulatory Mechanism Requirements

Illicit Discharge Detection and Elimination

Construction Site Stormwater Runoff Control

Stormwater Management in New Development & Redevelopment

MS4 Permits

Illicit Discharge Detection & Elimination

Permittee must develop, implement and enforce a program to detect and eliminate illicit discharges…

To extent allowable under state law, Permittee must effectively prohibit through a regulatory mechanism, non stormwater discharges into the system and implement appropriate enforcement procedures and actions…

- Plan to detect and address non-stormwater discharges, including illegal dumping…
- Prohibit, investigate, eliminate illicit discharges including discharges from properties not owned by or controlled by the MS4;
- Implement appropriate enforcement procedures and actions.
- Prohibit the dumping of industrial and commercial wastes, trash, used motor vehicle fluids, pesticides, fertilizers, food preparation waste, leaf litter, grass clippings, and animal wastes into its MS4.

Municipality must establish the legal authority to ensure compliance with the provisions of the bylaw or ordinance through inspection, monitoring, and enforcement.

MS4 Permits

Construction Site Stormwater Runoff Control

“Permittee must develop, implement, and enforce a program to reduce pollutants in any stormwater runoff…that result in a land disturbance greater than or equal to 1 Acre…”

- Sediment and erosion control regulatory mechanism
- Authority to ensure compliance
- Control of waste including demolition debris, discarded building material, concrete truck wash out, chemicals, litter and sanitary wastes
- Inspection and enforcement procedures
- Written procedures for site plan review
- Sanctions/ enforcement actions (monetary or otherwise)
- Inspect just prior to or within 24 hours of a rain event greater than .2 inches, and one inspection at project completion BMPs were properly installed, and that final stabilization of the site has been properly completed.

MS4 Permits

Stormwater Management in New Development & Redevelopment

…regulatory mechanism to ensure

- adequate long term O & M BMPs are in place
- controls in-place to prevent or minimize impacts to water quality…
- **Retain or treat the first 1.0 or 0.8 inches of runoff from all impervious area on site. Removal of TSS and Phosphorus.**
- **Comply with Massachusetts Stormwater Standards 1,2, 3, 5, 6, 9**
- **Low Impact Development to maximum extent feasible**
- Treatment of discharges from salt and snow storage areas
- Compliance with Volume 2 of NH Stormwater Manual
- 1) for redevelopment of sites that are currently developed with Directly Connected Impervious Area (DCIA) of forty percent or more, retain on-site half the water quality volume for the site, or 2) for new development and redevelopment of sites with less than forty percent DCIA, retain the water quality volume for the site

Green Infrastructure and Low Impact Development

Green Infrastructure

Natural and engineered features that mimic vegetated areas

Minimize impervious area

Retain/infiltrate stormwater close to the source

Low Impact Development

Preserve natural features

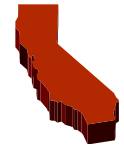
Minimize impervious area

Retain/infiltrate stormwater close to the source

Green and natural spaces help manage stormwater and reduce the effects of climate change such as heat island effect and flooding due to increased precipitation. Natural buffer areas for rivers and streams provide protection against flooding.

Integration of Provisions for GI

Several states have promoted or required green infrastructure in MS4 permits.



- **California**. Phase 1 permits require new development and redevelopment projects retain the **85th percentile storm event**

- **Massachusetts**. Draft MS4 encourages use of practices which infiltrate, evapotranspire, and/or harvest and reuse rainwater to the **90th percentile storm event (1 inch storm)**, including GI options in new development and redevelopment

- **Washington, DC**. MS4 permit includes a **retention standard of 1.2 inches** for all development projects greater than or equal to 5,000 sf, along with numeric targets for green roofs and tree canopy.

Challenge: rewriting existing ordinances and codes

RESILIENCE

Climate Change and Resilience

Climate Change Concerns

- Extreme temperatures
- Sea Level Rise
- Extreme Precipitation
- Extreme Drought
- Storms
- Coastal and Riverine Flooding
- Stormwater Flooding

re·sil·ience

rəˈzilyəns/

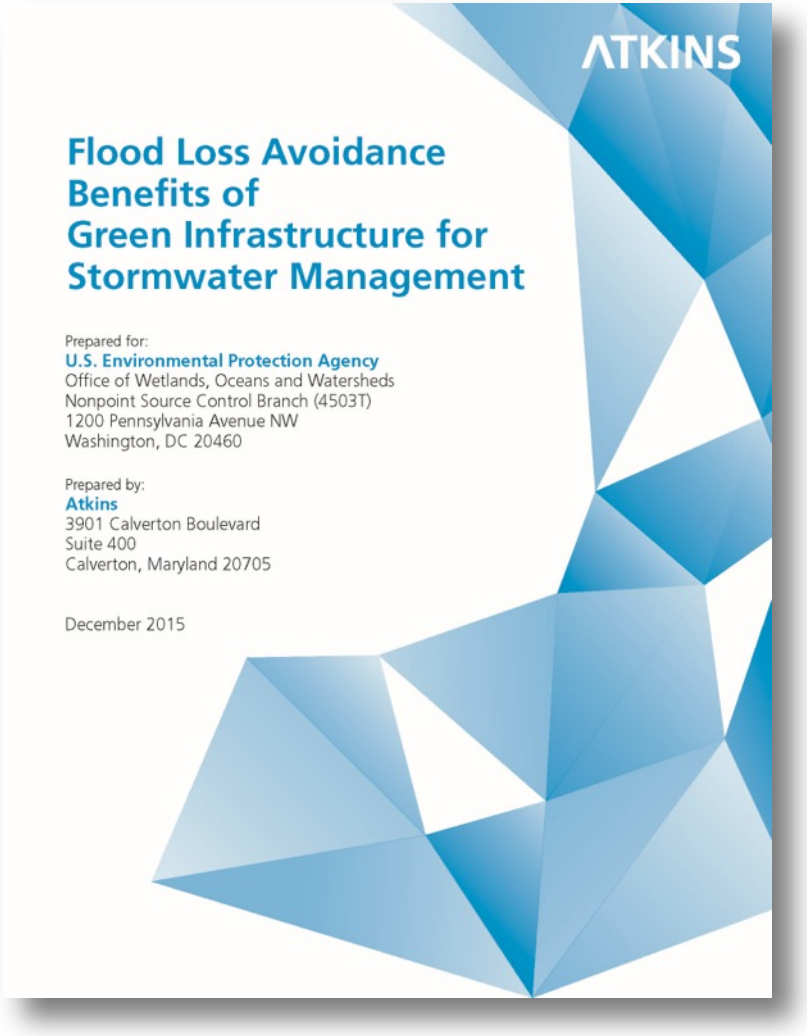
noun

1. the capacity to recover quickly from difficulties; toughness.

2. the ability of a substance or object to spring back into shape; elasticity.

Use of Green Infrastructure to Mitigate Flooding

- USEPA document “Flood Loss Avoidance Benefits of Green Infrastructure for Stormwater Management”
- U.S. could save $5 billion in avoided flood losses if GI used for new development

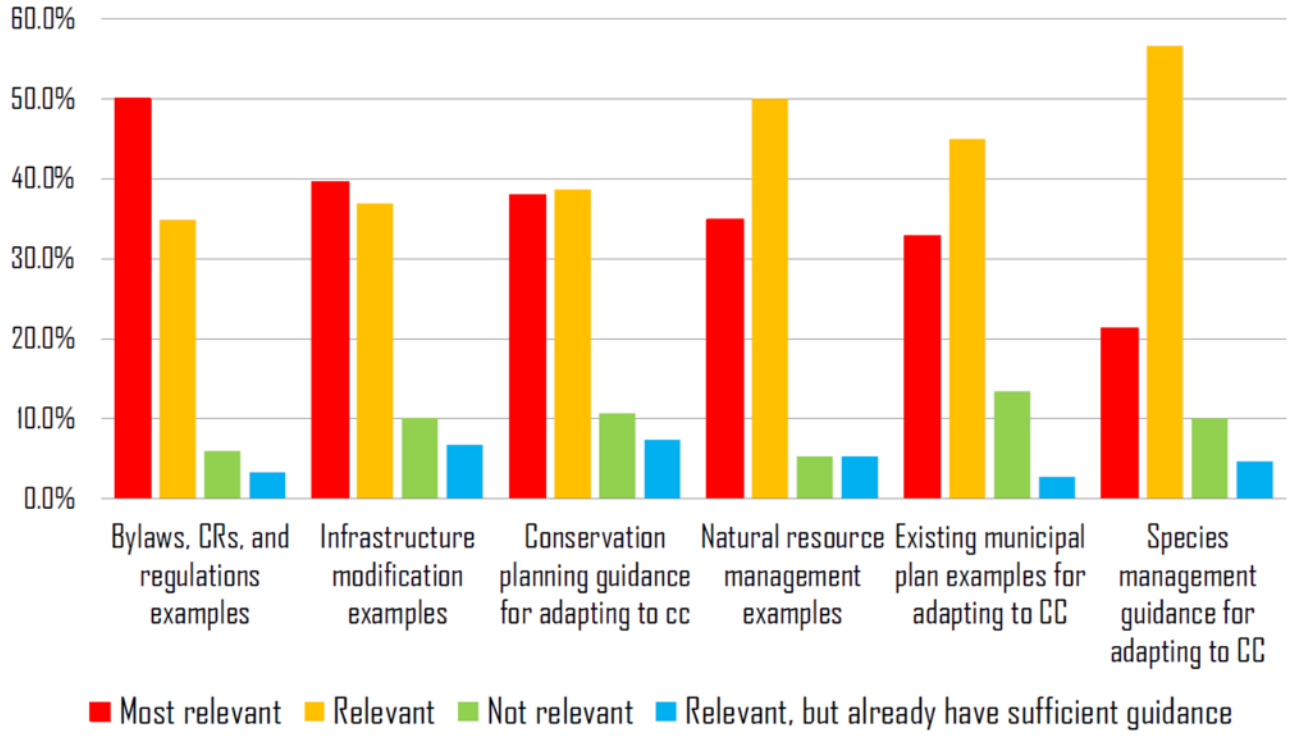


RESILIENCE

Municipal Resilience Needs

Needs and Wants

From the Climate Action Tool survey, 2015

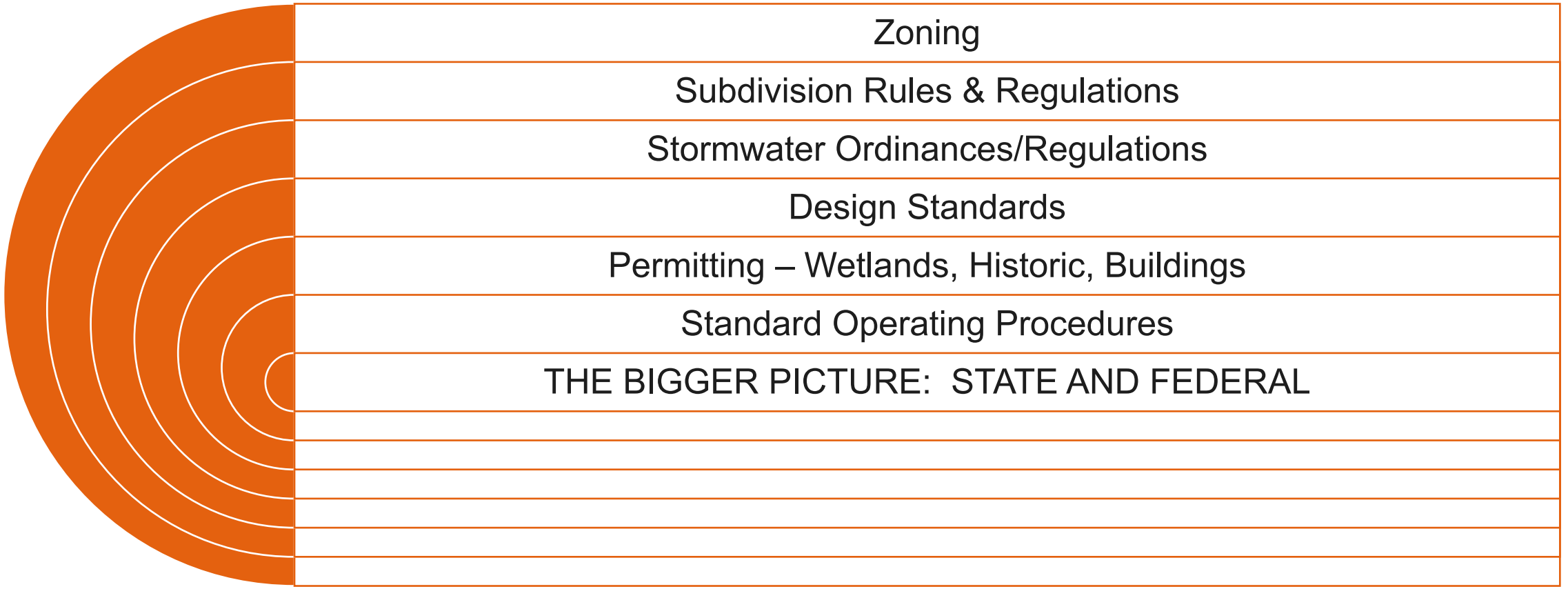


*Note! 70% of respondents were municipal professionals, but most already engaged in land conservation.

Source: Massachusetts Municipal Vulnerability Preparedness (MVP) Program

REGULATORY DOCUMENTS

Opportunities for Resilience



REGULATORY DOCUMENTS

Incorporating Resilience into Regulation

Wetlands (local)	Subdivision Rules and Regulations	Zoning	Building Code Considerations	Stormwater
••**Stricter protections in buffer zones.** ••Setbacks to set developments back further from wetlands/waterways. ••Land elevation (not just distance from resource area)	••Limit clearing/grading ••Require protection of existing landscape ••Limit impervious area ••**Revegetation with Native plants** ••LID ••**Narrow roads, no curbs** ••**Grass / grass height**	••**Flood Overlay or Resiliency District based on updated flooding projections and sea level rise (rather than FIRMs)** ••Flood Damage Prevention Standards ••**Flexible Dimensional Requirements** ••Prioritize Natural features ••Requires LID features	••Higher Building Code Standards ••Freeboard ••Substantial Improvement ••Substantial Damage ••**Repetitive Loss Properties**	••**More stringent thresholds triggering reviews (less than 1 acre disturbance)** ••Retain/infiltrate water on site ••**Low Impact Development required** ••Green infrastructure encouraged ••Steep slope areas

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STORMWATER REGULATIONS

MUNICIPAL EXAMPLES

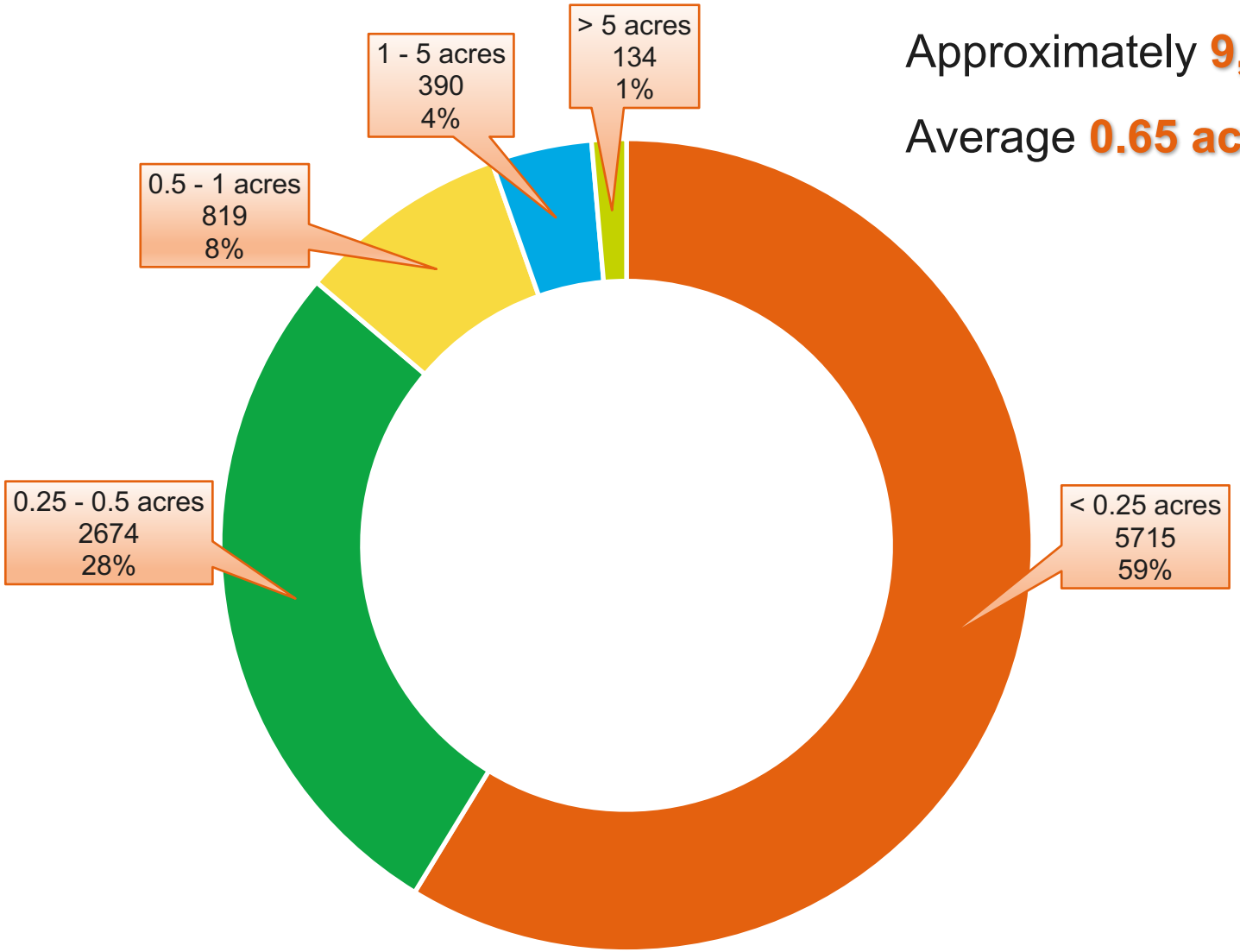
Construction Statistics

Number of Sites seeking coverage under EPA's Construction General Permit by Year

Year	NOI's Filed
2012	6
2013	4
2014	1
2015	1
2016	4
2017	0

Based on EPA's website: https://ofmpub.epa.gov/apex/aps/f?p=CGP_2012:HOME (last updated by EPA on November 1, 2017)

Parcel Area Distribution



Approximately **9,732 parcels**

Average **0.65 acres**

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MUNICIPAL EXAMPLES

Stormwater Rules & Regulations Are Key to Success

Begin by understanding what the development patterns are like in your area.

More stringent thresholds for Stormwater Permitting

- Project disturbs 1 or more acres of land. Half an acre, quarter of an acre, 10,000 square feet of land disturbance
- Project parcel(s) equals or exceeds 1 Acre in size
- Project exceeds 50,000 square feet of Gross Square Area
- Addition of 10 or more parking spaces, addition of 25% more impervious surface, etc.
- Special Permit is required by Planning Board.
- Land disturbance within flood overlay district, waterfront district, steep slope district, etc.

On-site management of runoff

- Retain or infiltrate first inch on site.
- Retain first half inch, first inch, etc.

Low Impact Development first

- Applicants must demonstrate that they have made a complete evaluation of possible low impact development (1st) and green infrastructure (2nd) measures that could be used on site.

Integrate GI Throughout Your Municipality

FRANKLIN, MA

Resilience through Municipal Programs

Every Project = Stormwater Element

Roadway Reconstruction

- Sidewalk Removal / Narrow Roadway

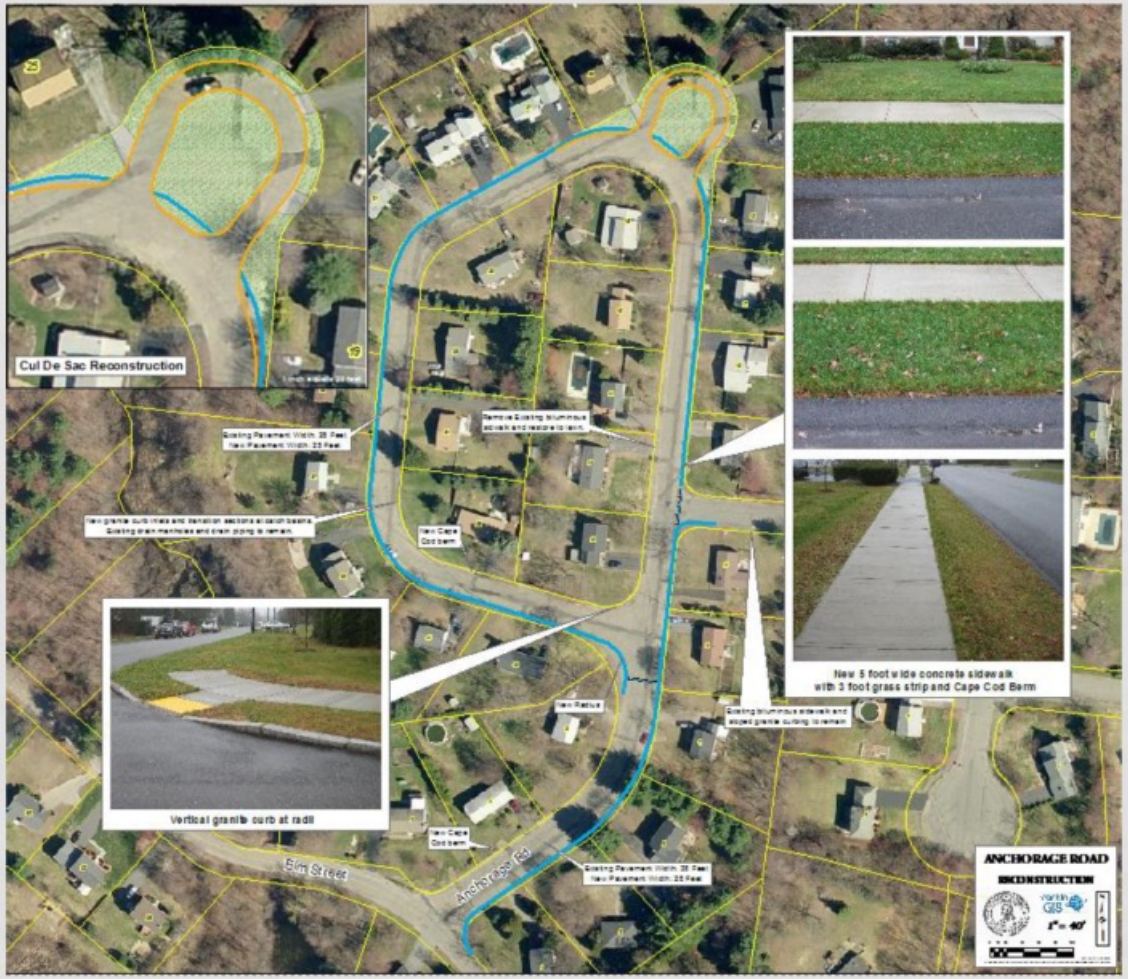
- BMPs
  - Rain Gardens
  - Tree Wells
  - Bio retention Areas
- Local By-Laws
- Grants
  - 319
  - SWMI
  - Residential Rain Garden Program

Program summary courtesy of:
Town of Franklin, MA

FRANKLIN, MA

Resilience through Municipal Programs

- **Anchorage Road Reconstruction**
  - Removal of 1 Sidewalk
  - 30 ft Roadway Width Reduced to 28 ft
  - Cul-de-sac Removed and Replaced with Rain Garden
  - Public Information Sessions Held and Increased Resident Support & Education



Project summary courtesy of: Town of Franklin, MA

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DESIGN STANDARDS

MWRA Facility Design Standards

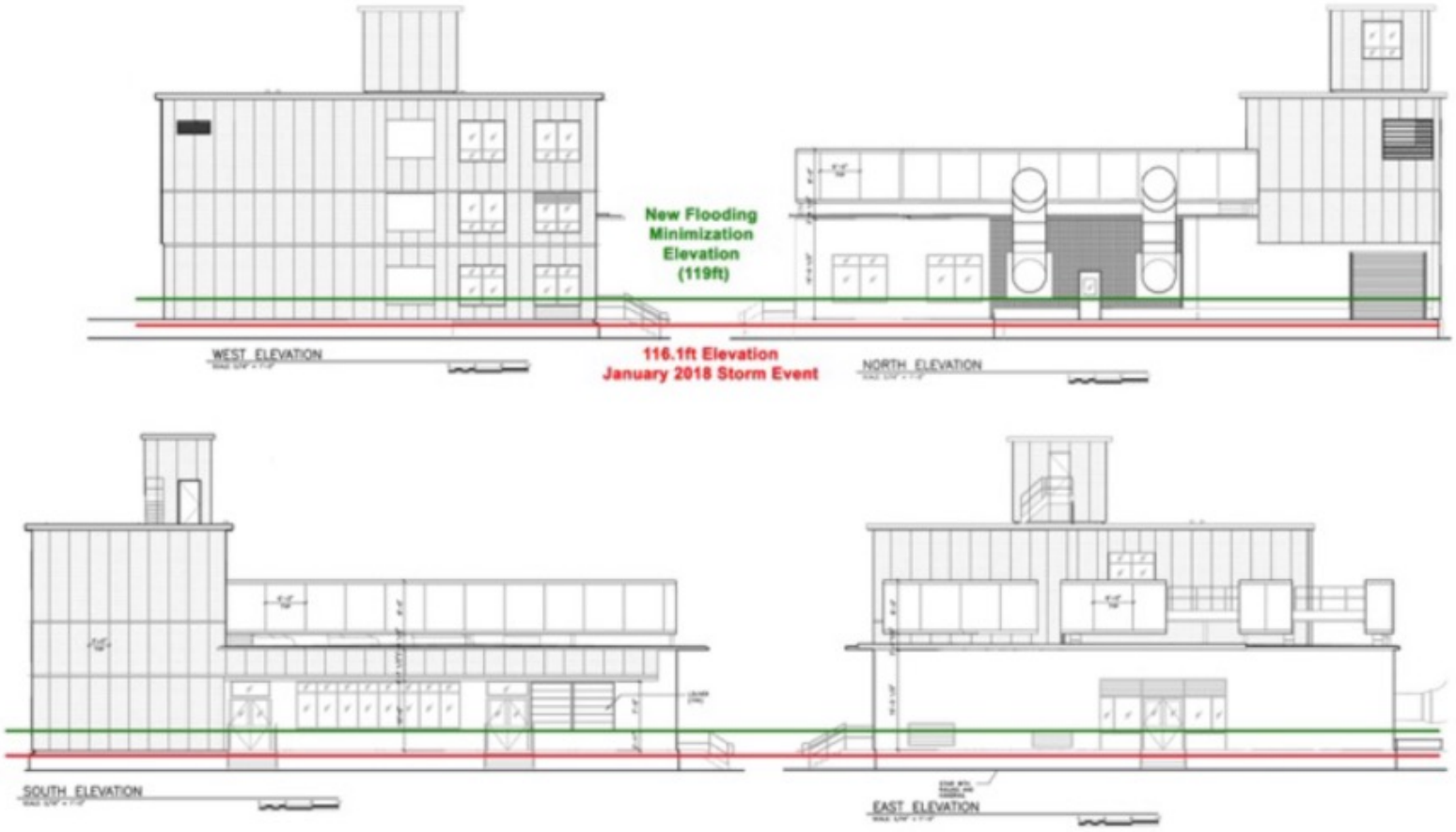
Observations of Impacted Areas in Chelsea

Eastern Ave. Looking Towards
Chelsea Creek Headworks & Bridge

Central Ave. Chelsea Looking
Towards Bridge

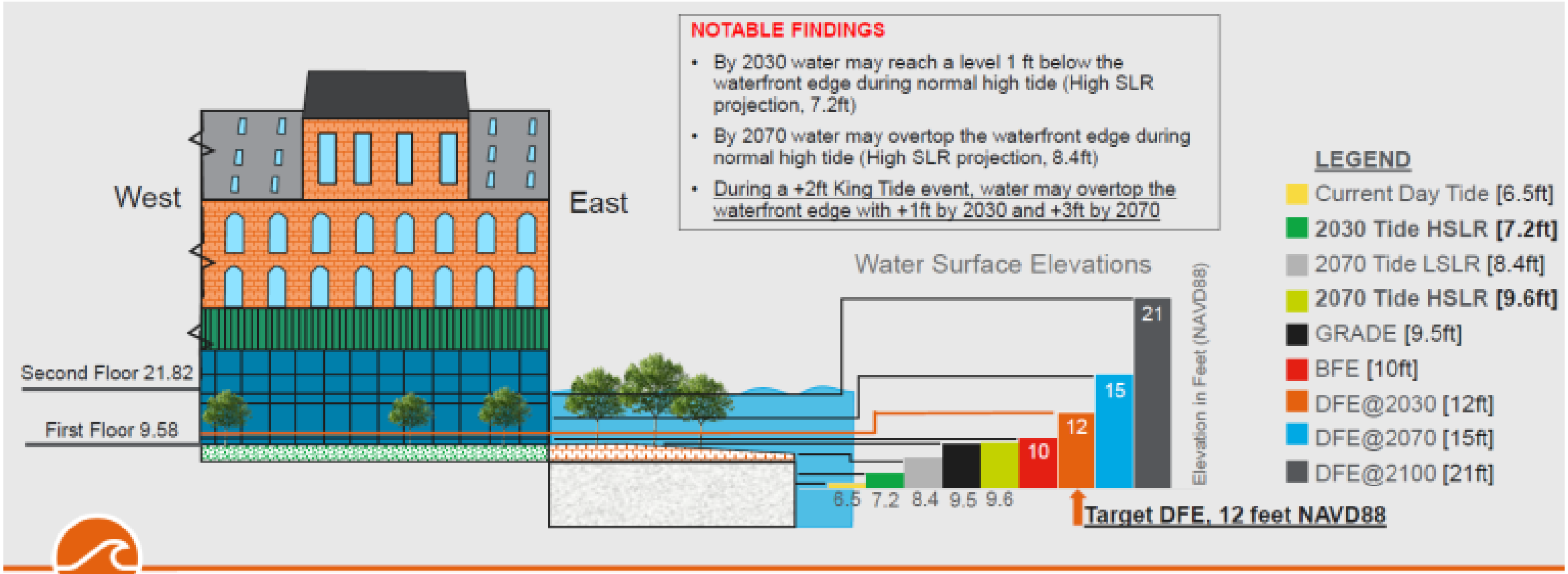
MWRA Facility Design Standards

Chelsea Creek Headworks Elevation View



Boston, MA

Vulnerability Assessment & Conceptual Solution Strategy



Boston, MA

Vulnerability Assessment & Conceptual Solution Strategy

Criteria	High Tide	100yr Storm Event, <2030
Remain in operation	✓	✗
Provide Shelter	✓	✗
Allow public parking and commercial activities	✓	✗
Return to operation immediately after weather event	✓	✓
Protect to the 2030s	✓	✓
Easily Deployable Systems	✓	✓
Off-the-shelf solutions, limited design life	✓	✓

GI: A PROVEN COMPLIANCE ALTERNATIVE

MANAGE LARGE STORMS AND IMPROVE RESILIENCY


Dayton, OH – Tech Town


Gwinnett County, GA – Collins Hill Park


Athens, GA – Lumpkin Bioswale


Chicago, IL – MWRD Master Planning

Off-Street Applications

Program Objectives Drive Design Standards

New York City Program: Manage 1” stormwater runoff from 10% of impervious surfaces in combined sewer areas system-wide, focus on high concentration in CSO priority areas

Philadelphia Program: Manage runoff from ~40% of impervious surface in combined sewer areas

Program Objectives Drive Design Standards

Implementation Approach
Standardized designs

Design Methodology
Systems designed for storage/infiltration; underdrain connections

Site Considerations
Focus on street projects and pilots for schools, public housing and other city properties

Landscape
Standardizing plant palette based on performance

Construction
Oversight is key

Maintenance
Consideration during design

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ZONING

HULL, MA

INCENTIVES FOR ADAPTIVE AND RESILIENT BUILDINGS

- Incentive for “adaptive” or “resilient” buildings that are designed to withstand increased flooding by sea-level rise by keeping the first floor “open” or non-habitable.
- Non-habitable first floor, mechanical and HVAC equipment on upper stories or the roof, provide generator space/capacity on upper stories or the roof, achieve certain performance standards for energy efficiency and sustainable design, and other requirements.
- The incentive = build to higher maximum height.
- Projects are permitted through Special Permit process. Must be CMR 780 Code Compliant. Must be otherwise compliant with laws/regs.
- Lowest floor uses: Farmer’s markets, art exhibition and performance art, beach visitor’s center, historic exhibits, temporary outdoor eating spaces, parking (with conditions).

Potential Incentives

- Expedited permit review / technical review
- City labor design assistance
- Fee discounts
- Flexible Requirements
- Incentives for businesses who follow LEED, Envision
- Incentives for businesses that bring Green jobs to the municipality
- Grant programs

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Questions

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