

# CITY OF CAMBRIDGE STORMWATER MANAGEMENT PROGRAM

Phase II NPDES

Stormwater Management Program

Public Meeting

March 27, 2018

# AGENDA

- ▶ NPDES Program Overview
- ▶ Year 15 accomplishments
- ▶ Looking Forward: New Permit Requirements
- ▶ Update on Climate Change Preparedness & Resiliency Plan

# NPDES PROGRAM OVERVIEW

# Clean Water Act



United States Environmental Protection Agency

- ▶ The Federal Water Pollution Control Act of 1948 was the first major U.S. law to address water pollution.
- ▶ Growing public awareness and concern led to sweeping amendments in 1972, the law became commonly known as the Clean Water Act (CWA).
- ▶ The 1972 amendments:
  - ▶ Established the basic structure for regulating pollutants discharges into the waters of the United States.
  - ▶ Made it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained. **Stormwater was not considered a point source discharge.**



Cuyahoga River, OH 1969



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# NPDES:

National Pollutant Discharge Elimination System



**Water Quality Act of 1987 regulated stormwater as a point source discharge**

## **1990: Phase I**

- ▶ Regulated stormwater discharges from Municipalities (over 100,000 population), industrial operations, construction sites (>5 acres) Boston, Worcester

## **1999: Phase II**

- ▶ Regulates stormwater discharges from small Municipalities, 1 – 5 acre construction sites, prisons, state universities, others...
- ▶ Initial Notice of Intent submitted July 2003
- ▶ Currently Completing Year 15
- ▶ Reissued Permit Effective – July 1, 2018 - 2023 (?)



# Impaired Waters

Stormwater discharges are causing or contributing to at least **55%** of the impairments in all Massachusetts' assessed waters

Source: EPA



# Pollutants

**Trash**

**Heavy Metals**

**Nutrients**

**Sediment**

**Pathogens**

**Oil & Grease**

**Attention  
Dog Guardians**

Pick up after your  
dogs. Thank you.

**Attention Dogs**

Grrrr, bark, woof.  
Good dog.

District of North Vancouver  
Bylaw 5981-11(j)

Source: EPA

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# Program Objective

## Fishable and Swimmable



Source: EPA

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# How do we do this?

Reduce discharges of pollutants from the regulated separate stormwater system (MS4) *to the maximum extent practicable*



Runoff  
Discharges to  
Nearby Waters  
(Charles River and  
Alewife Brook)



# STORMWATER MANAGEMENT PROGRAM

## Address 6 Minimum Control Measures

1. Public education/outreach
2. Public involvement/participation
3. Illicit discharge detection/elimination
4. Construction Site stormwater runoff control
5. Post-construction stormwater management
6. Pollution prevention/good housekeeping for municipal operations



Develop and implement Best Management Practices to address each program area to the *MEP*

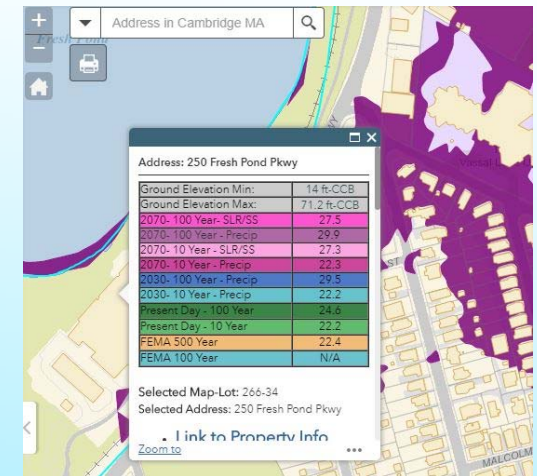
# YEAR 15 ACCOMPLISHMENTS



# #1. PUBLIC EDUCATION & OUTREACH

## Neighborhood and Business Outreach

- ▶ Meetings with community groups (Alewife Sewer Separation, The Port, Williard Street, Community Gardens, Cottage/Lopez, City Hall Annex)
- ▶ coffee talks (6) (Alewife Sewer Separation)
- ▶ Alewife Stormwater Wetland tour (Alewife Sewer Separation neighborhood and Pedestrian Committee – June 10)
- ▶ Celebrations (Sept 13, Fern St end of construction Alewife Sewer Separation, Sept 19 Community BBQ)



## Web Site Updates

- ▶ Stormwater [www.cambridgema.gov/stormwater](http://www.cambridgema.gov/stormwater) (resources)
- ▶ PSA on HHW – YouTube <https://t.co/Bapi6dYrtQ>
- ▶ Flood Viewer [www.cambridgema.gov/Services/FloodMap](http://www.cambridgema.gov/Services/FloodMap)

## Rain Barrel Promotion – June 1, 2017

- ▶ Displays around City (DPW, City Hall, Water Dept.)
- ▶ Partnership with *Green Cambridge* for installation
- ▶ 108 barrels sold





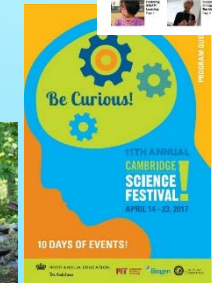
# #1. Public Education & Outreach (cont.)

## Curb Marker installations

- ▶ Added during street & sidewalk construction
- ▶ Veolia Stenciling – June 23

## Youth Outreach

- ▶ Alewife Wetland Tour - August 8
- ▶ Enviroscape demonstration
  - DPW Roadshow – May 22
  - Fresh Pond Day – May 20
- ▶ Cambridge Science Festival
- ▶ Arbor Week – April 24-28



## MyRWA Stormwater Education Collaborative

## City Publications: City View and Cambridge Life

(Envision Cambridge, Community Investment, Comm. Sustainability, Urban Forestry, Commonwealth Connect)

## Brochures (2)

Fats, Oils & Grease (FOG) for residence and businesses



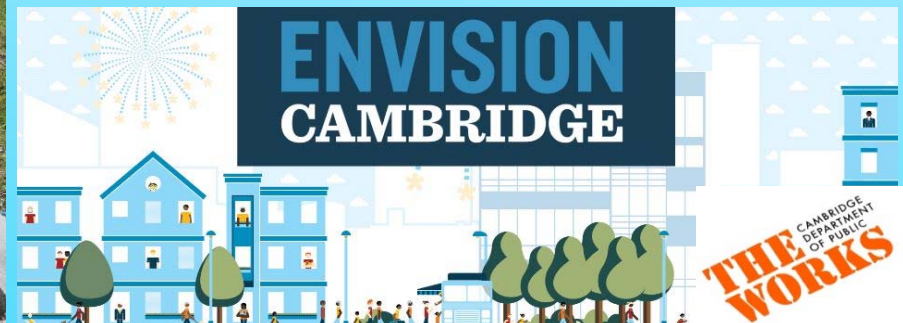
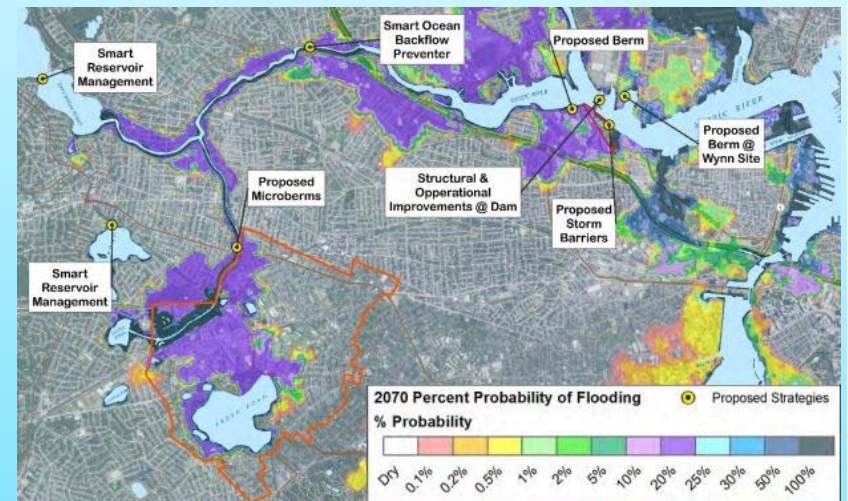
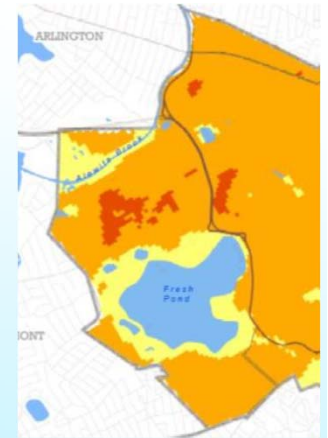


# #2. PUBLIC PARTICIPATION & INVOLVEMENT

Household Hazardous Waste Collections (4) April 8, June 17, Sept 9, Nov 4

Meetings:

- ▶ Annual Stormwater Meeting March 27
- ▶ Envision Cambridge 75 outreach activities: advisory committee, working groups, street team
- ▶ Climate Change Preparedness & Resiliency Alewife (DRAFT Plan) April 27, Nov 30





# #3. ILLICIT DISCHARGE DETECTION & ELIMINATION (IDDE)

PROHIBIT, IDENTIFY AND REMOVE  
ILLICIT CONNECTION AND  
DISCHARGES

Water quality sampling

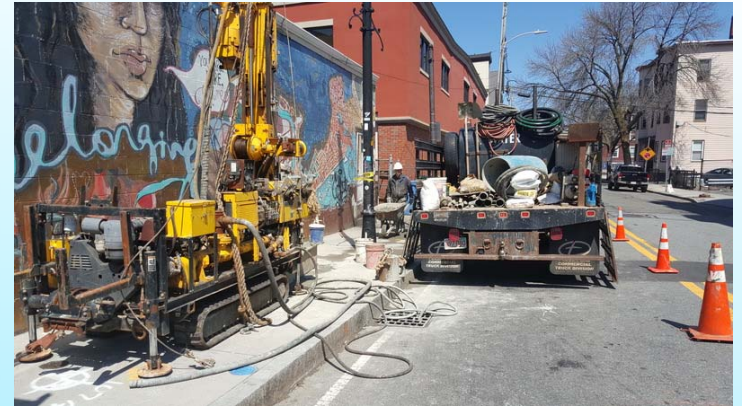
- ▶ Charles –Dry, wet, Oil & Grease
- ▶ Alewife - Dry, wet, Oil & Grease
- ▶ Fresh Pond Reservoir

Illicit Connections Identification/Removal

- ▶ Murray Hill Road Combined Manhole

Investigation of Complaints (20)

- ▶ See, Click, Fix (10) – Dumping Into Stormdrain (sewer odors, construction sludge/sediment, restaurant dumping, etc.)
- ▶ Other (10) (discharge plum, floating materials in Alewife Forebay, dewatering concern, construction discharge, etc.)



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# #3 IDDE (CONT.)

Automatic Sampling Stations (5) (Harrison Ave,  
Stormwater Wetland (2), Western Ave, Sparks St at Foster)

- ▶ Working on live website connection  
(delayed for QA/QC and contract)
- ▶ Began wet weather sampling

## Sewer Holding Tank Inspection Program

- ▶ Total # private sanitary tanks (20), 1 in construction
- ▶ Total # inspected this year (16)



Weland Outlet



Sparks Street



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# #4. CONSTRUCTION SITE RUNOFF CONTROL

REDUCE POLLUTANTS FROM CONSTRUCTION SITES THAT DISTURB  $\geq 1$  ACRE AND SIGNIFICANT PROJECTS

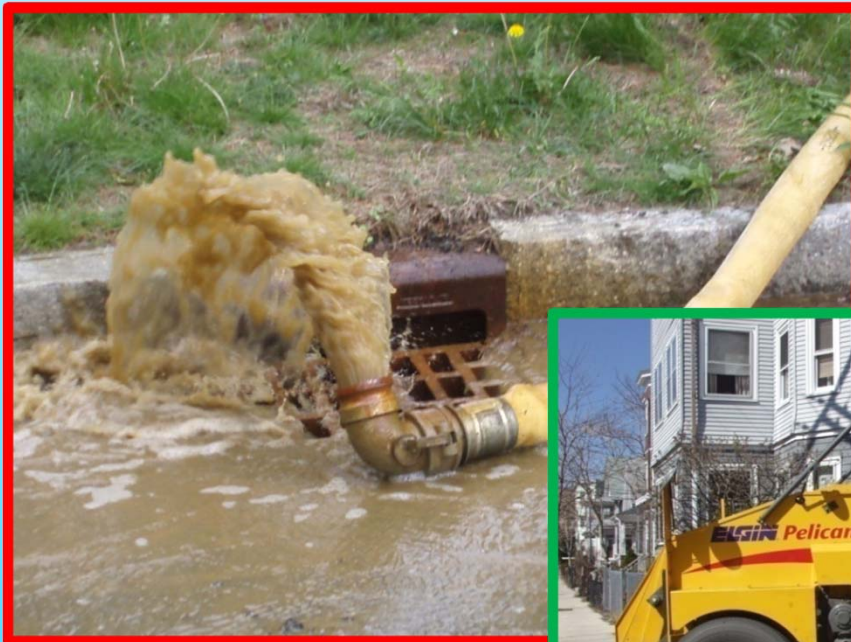
- ▶ Stormwater Control Permits: Erosion Control Plans approved: 31
- ▶ Weekly meetings with large contractors during March – Nov
- ▶ Number of active construction sites inspected: 30
- ▶ Total number of erosion & sediment control inspections: 87
- ▶ WARNING tickets issued: 55
- ▶ Presentation to contractors: 2





# #4. CONSTRUCTION SITE RUNOFF CONTROL (CONT.)

Construction dewatering requires a permit from EPA/MWRA and City of Cambridge before dewatering



# #5. POST CONSTRUCTION STORMWATER MANAGEMENT

ADDRESS RUNOFF FROM NEW AND REDEVELOPMENT PROJECTS  
THROUGH THE USE OF BMPS

- ▶ Stormwater Control Permits: approved – 31, under review – 7
- ▶ Store on site the difference in volume between the 2 yr 24 hr preconstruction runoff and the 25 yr 24hr post construction runoff
- ▶ Peak development discharge rate less than existing conditions
- ▶ Manage stormwater runoff to reduce 80% TSS and 65% TP from site.
- ▶ Manage sewer discharge to ensure no increase in CSOs or SSOs.
- ▶ **Build to the 2070 10yr storm with a recovery plan for the 2070 100yr storm** (updated based upon CCVA Reports – still evolving)



BMP inspection



Filtration system

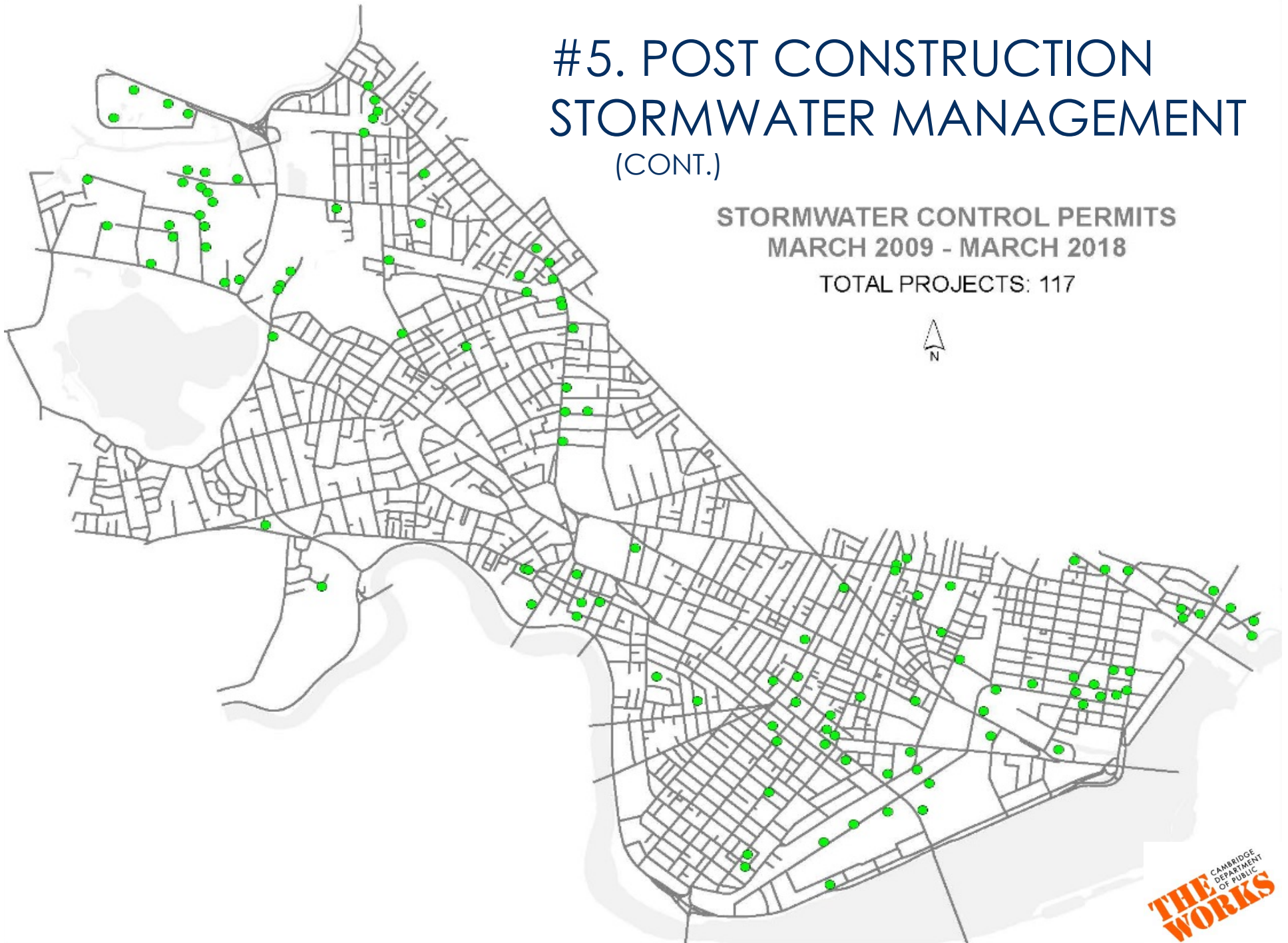


Infiltration swale



## #5. POST CONSTRUCTION STORMWATER MANAGEMENT (CONT.)

STORMWATER CONTROL PERMITS  
MARCH 2009 - MARCH 2018  
TOTAL PROJECTS: 117



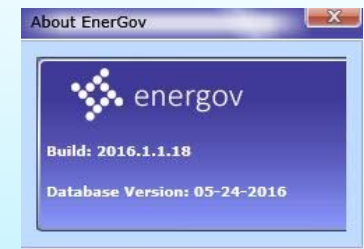


# #5. POST CONSTRUCTION STORMWATER MANAGEMENT (CONT.)

Post Construction BMP Inspections: ?

Database maintained for private BMP facilities

Energov software: to manage permitting, inspections and code enforcement on stormwater control permits



Underground flood storage



Treatment swale



Sewer storage tank

# #6. Pollution Prevention & Good Housekeeping for Municipal Operations

## Street Maintenance

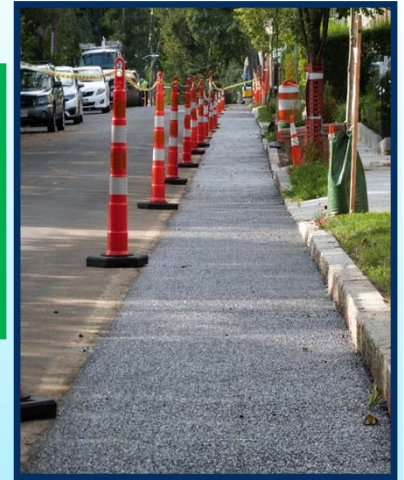
- ▶ 1141.66 ton of street sweeping debris
- ▶ 1956 catch basins cleaned (281 tons)



Street Sweeping

## Stormwater Best Management Practices

- ▶ Porous Asphalt:
  - ▶ Alewife Sewer Separation (Huron B): 1,231 LF
  - ▶ Alewife Sewer Separation (Concord Area): 1,676 LF
- ▶ Rain Gardens/Biobasins:
  - ▶ Alewife Sewer Separation (Concord Area)
- ▶ Replaced missing CB hoods (260)
- ▶ Infiltrating Catch Basins:
  - ▶ 88 CambridgePark Drive (I/I mitigation)
  - ▶ Dudley Street



Porous Pavement



Biobasin



Rain Barrel



Biobasin



# #6. Pollution Prevention & Good Housekeeping for Municipal Operations

Trees Planted – 727

Municipal Facility Inspections (156 +/- total facilities )

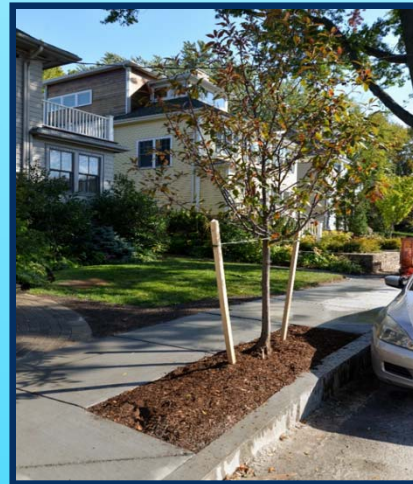
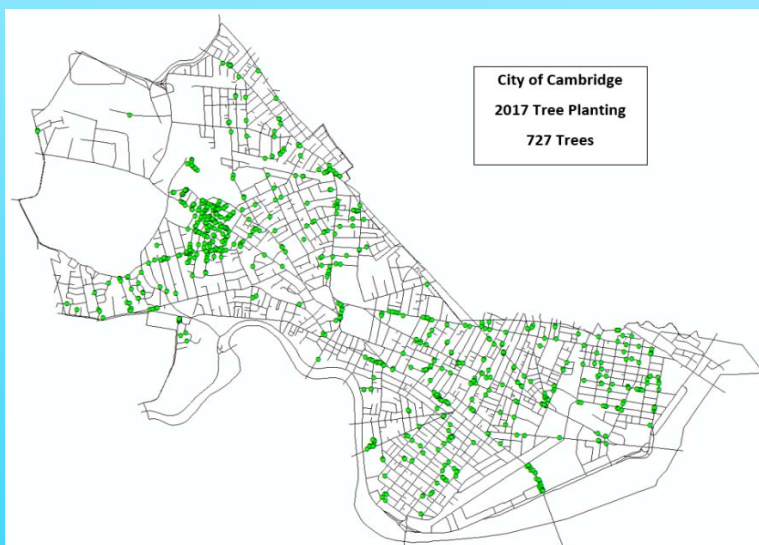
- ▶ Number in separated areas (72 sites)

Employee Training 32

- ▶ 6 Municipal Pollution Prevention Measures
- ▶ 26 Stormwater Permit Regulations

Cartegraph for work order management

Urban Forest Master Plan development



# #6. Pollution Prevention & Good Housekeeping for Municipal Operations

## Capital Improvement Projects

- ▶ SCADA Improvements: real time monitoring of stormwater sampling stations (5), drain vaults #1-5, sewer vaults #1-2, and Hovey St tanks operational
- ▶ Wadsworth Sewer Pump Station Reconstruction in construction (may 2018 complete)
- ▶ The Port: Bishop Allen Drive Flood Control (stormwater tank and pump station): Out to Bid
- ▶ Roseland St/Newport Rd/Appleton St sewer separation: completed
- ▶ Stormwater Sampling Stations (5): undergoing QA/QC
- ▶ N. Point Sewer Pump Station (in construction)
- ▶ Cottage /Lopez Drainage Improvement Project (in construction)



# #6. Pollution Prevention & Good Housekeeping for Municipal Operations

## Capital Improvement Projects cont.

- ▶ Capital Repair Program (\$6M):
  - ▶ Sewer and Drain lining Contracts:
    - ▶ Infomaster software to characterize code defects ongoing,
    - ▶ 1<sup>st</sup> lining contract (\$1.1 m) construction complete
    - ▶ 2<sup>nd</sup> lining contract (\$1.0 m) out to bid April 2018
  - ▶ Remedial Reconstruction
  - ▶ TV & Cleaning
- ▶ Monsignor O'Brien Drain and New Outfall in design
- ▶ Broad Canal Drain extension improvements April 2018
- ▶ Broad Canal Drain Capacity Improvements in construction (July 2018)
- ▶ The Port: (2<sup>nd</sup> stormwater tank and pump station) in planning
- ▶ Talbot Street Outfall design complete, permitting
- ▶ Willard Street Outfall re-establishment design complete, permitting



# #6. Pollution Prevention & Good Housekeeping for Municipal Operations

## CAPITAL IMPROVEMENT HIGHLIGHTS FOR NEXT PERMIT YEAR

- ▶ Willard St. outfall re-establishment in construction 2018
- ▶ The Port: Bishop Allen flood control in construction 2018
- ▶ Talbot Street IDDE 2018
- ▶ Talbot St Outfall in construction 2018
- ▶ Stormwater Sampling Stations live updates on website 2018
- ▶ Capital Repair Program: \$6.25 M (3<sup>rd</sup> lining contract, TV& Cleaning contract and Remedial Contract)



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# LOOKING FORWARD: NEW PERMIT REQUIREMENTS

# Status of New NPDES MS4 Permit

- ▶ Effective Date: July 1, 2018 ???
- ▶ Notice of Intent Due: September 27, 2018
- ▶ Stormwater Management Plan Due (SWMP): July 1, 2019

<https://www.epa.gov/npdes-permits/massachusetts-small-ms4-general-permit>

What's New: More prescriptive





# Changes in the new permit

## *Highlights*

SWMP is a living document – updated annually



- ▶ Description of Best Management Practices (BMP) and updates
- ▶ Sanitary Sewer Overflow (SSO) inventory and management
- ▶ Document compliance with regulations and authority
- ▶ All written procedures for inspections, enforcement, reviews

Develop and implement programs to address TMDLs

- ▶ Charles River: Phosphorous and Pathogens

Enhanced Program to address Water Quality Limited Waterbodies

- ▶ Nitrogen: N/A
- ▶ Phosphorus: Alewife Brook
- ▶ Solids, Metals, Oil And Grease: Charles River and Alewife Brook
- ▶ Bacteria or Pathogens: Alewife Brook
- ▶ Chloride: Segment of Charles River

# Changes in the new permit cont.



## 6 MINIMUM CONTROL MEASURES

### 1. Public education/outreach

- ▶ DPW is working with Mystic River Watershed Education Collaborative and Charles River Watershed Stormwater Collaborative
- ▶ 4 groups, 2 targeted messages each year residential, business/commercial/institutional, developers/construction, industrial

### 2. Public involvement/participation

- ▶ Provide public an opportunity to review and implement the SWMP

### 3. Illicit discharge detection/elimination

- ▶ Sanitary Sewer Overflow (SSO) inventory and management (5 years). Maintain updates in SWMP
- ▶ System catchment mapping
- ▶ Written IDDE Program
- ▶ Assessment and Ranking of Outfalls
- ▶ Dry and Wet weather sampling system vulnerability factors
- ▶ Employee Training

# Changes in the new permit cont.

## 4. Construction Site stormwater runoff control

- ▶ Written procedures for site plan review, E&S control inspection and enforcement



## 5. Post-construction stormwater management

- ▶ Low Impact Development strategies must be used (MEP)
- ▶ New Development and Redevelopment projects must meet certain requirements and standards from the Massachusetts Stormwater Handbook
- ▶ As-built drawings must be submitted within 2 years
- ▶ Assess street design and parking lot guidelines and other regulations that affect the creation of impervious surfaces. Modify regulations to support low impact design options
- ▶ Review municipal facilities for opportunities to install BMPs and reduce impervious area through retrofits

# Changes in the new permit cont

6. Pollution prevention/good housekeeping for municipal operations
  - ▶ Written programs included in SWMP O&M procedures for municipal facilities and infrastructure
  - ▶ Catch Basin maintenance – 50% sump and prioritization of problem areas
  - ▶ Road salt use optimization plan
  - ▶ Annual inspection of all stormwater treatment structures
  - ▶ Stormwater Pollution Prevention Plans (SWPPP) maintenance garages, public works yards, transfer stations and other waste handling facilities



# UPDATE ON CLIMATE CHANGE PREPAREDNESS AND RESILIENCY PLAN (CCPR)

# CLIMATE CHANGE PREPAREDNESS AND RESILIENCE (CCPR) PLAN

## Climate Change Vulnerability

Assessment – temperature, precipitation and sea level rise

- ▶ Technical Foundation for Preparedness and Resiliency Plan

## Alewife CCPR and Handbook (draft)

- ▶ Comment period ended

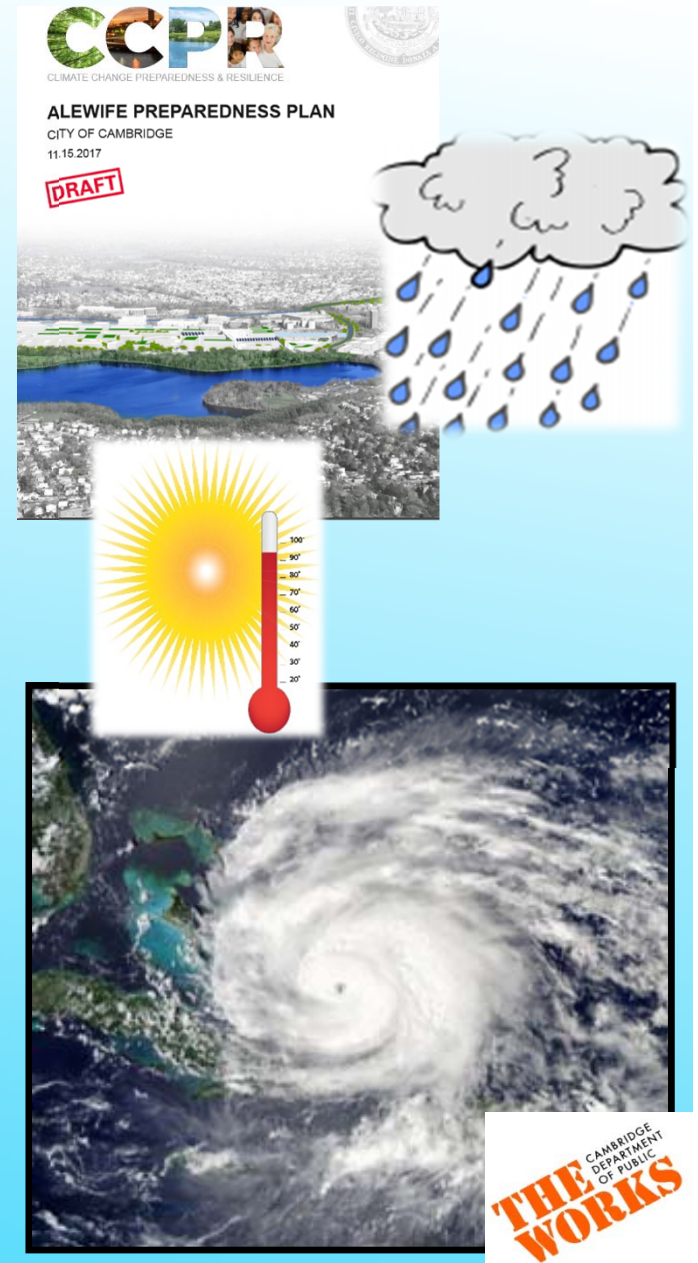
## The Port CCPR

- ▶ 2018 (now through Summer)

## Citywide CCPR

- ▶ Informed by Alewife and The Port plans (late summer)
- ▶ Spring of 2019

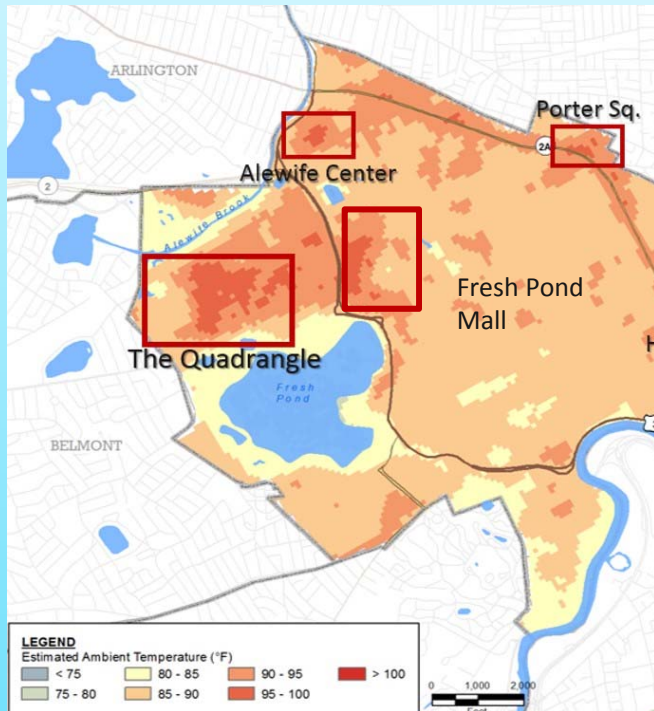
[www.cambridgema.gov/climateprep](http://www.cambridgema.gov/climateprep)





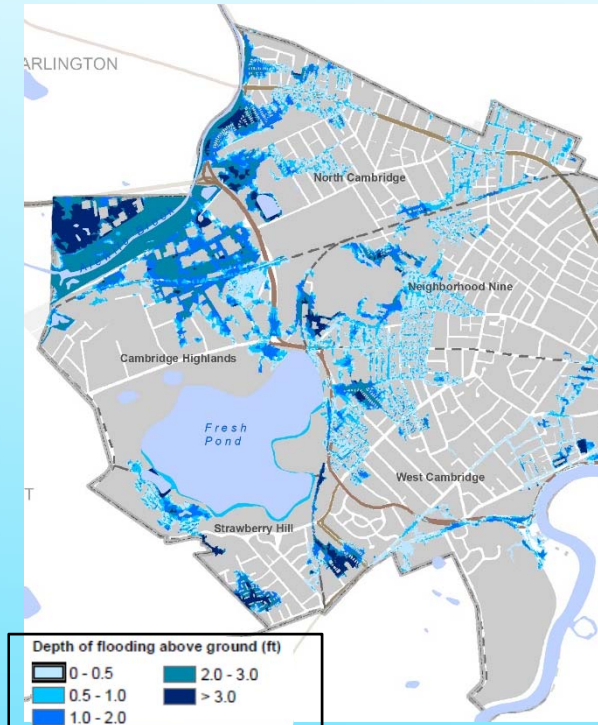
# Climate Change Impacts in Alewife

## Heat



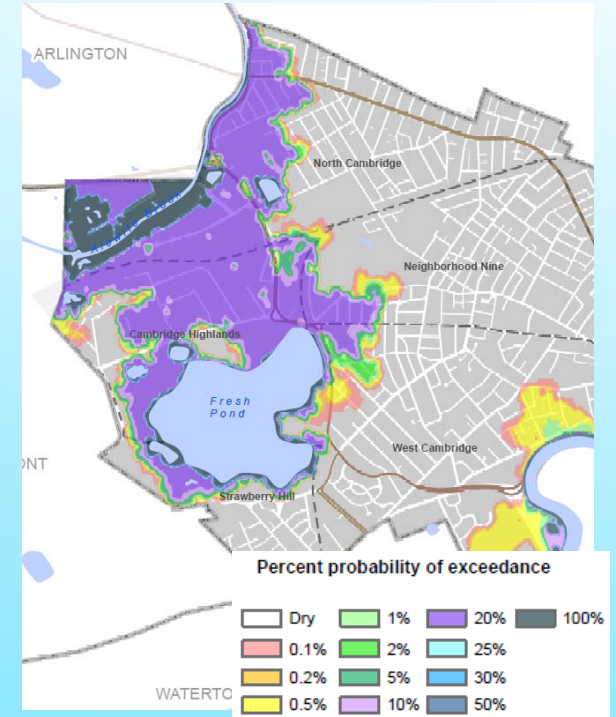
2030 Urban Heat  
Island Effect

## Precipitation



2070 100-Year  
Precipitation  
Flood

## Sea Level Rise/ Storm Surge



2070 Probability of Flooding  
from  
Sea Level Rise /Storm Surge

# Draft Alewife Preparedness Plan – 4 Categories with 29 Strategies



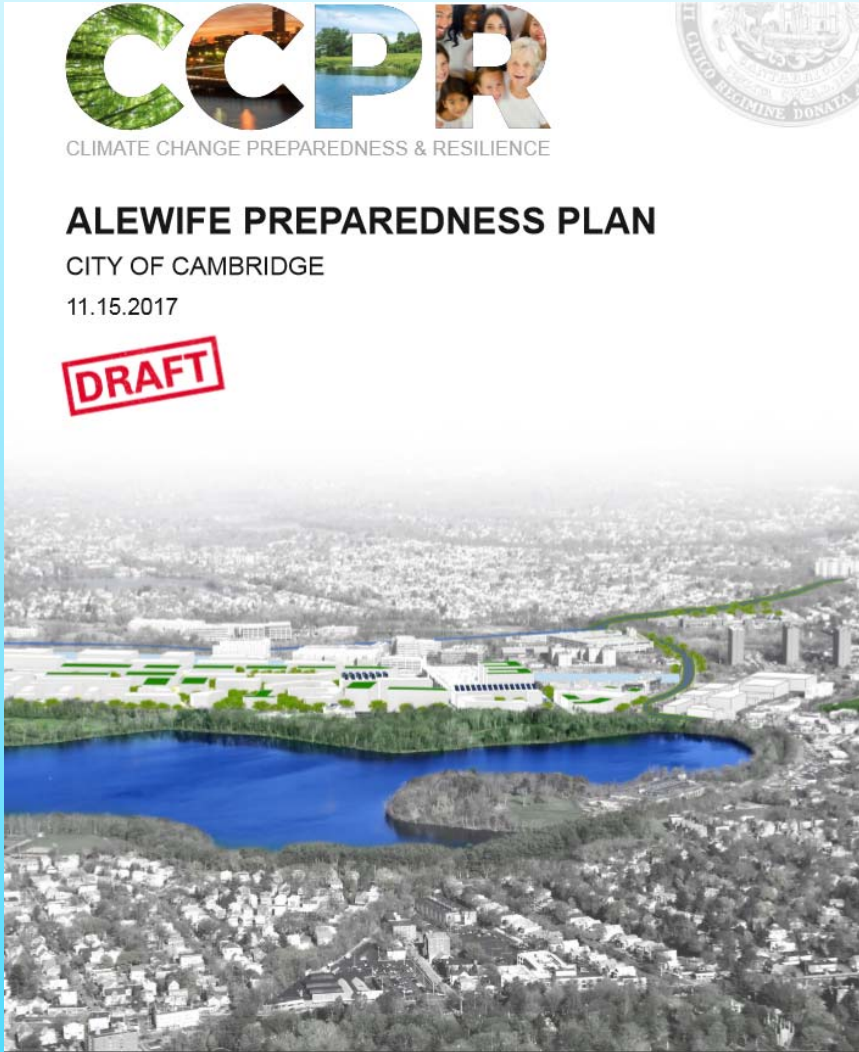
CLIMATE CHANGE PREPAREDNESS & RESILIENCE

## ALEWIFE PREPAREDNESS PLAN

CITY OF CAMBRIDGE

11.15.2017

**DRAFT**



**A Prepared Community:** strengthen community, social, and economic resilience.

**B Adapted Buildings:** protect buildings against projected climate change impacts.

**C Resilient Infrastructure:** ensure continued service or a speedy recovery from community-wide infrastructure systems.

**D Resilient ecosystems:** enhanced living environment integrating air quality, waterways, green infrastructure, and the urban forest as a system resilient to climate impacts.





# PREPARED COMMUNITY

STRATEGIES TO STRENGTHEN COMMUNITY, SOCIAL, AND ECONOMIC RESILIENCE.

## A1: NEIGHBORHOOD RESILIENCE HUB

*Establish a neighborhood resilience hub to foster community networks on a daily basis and increase preparedness and resilience among residents and businesses through education, training, planning, and implementation of resilience and sustainability measures*



### TOOLBOX / ACTIONS:

1. Establish Disaster Support Hubs where local community leaders can obtain resources and meet with Emergency Management and Public Health Preparedness officials. Coordinate the structure and engagement opportunities with existing Local Emergency Planning Committees (LEPC), for example by forming a Climate Change subcommittee with expanded membership that fully integrates preparation for climate change events
2. Recruit, train, and manage evacuation volunteers to assist with City's public evacuations. Use established Cambridge Community Response Network (CCRN), or similar systems, to reach out to volunteers
3. Help residents, business owners and institutional leaders from "high risk" communities to complete and implement individualized disaster readiness and response plans based on MA's Know, Plan, Prepare while applying the community-driven approach FEMA's Whole Communities Program. Coordinate with local business associations and the Cambridge Economic Opportunity Center
4. Organize a disaster preparedness and climate resiliency education program and offer courses on resilience and emergency preparedness

- 9 strategies A1-A9
- Each strategy has a toolbox/actions

[Source: CCVA, 2015]

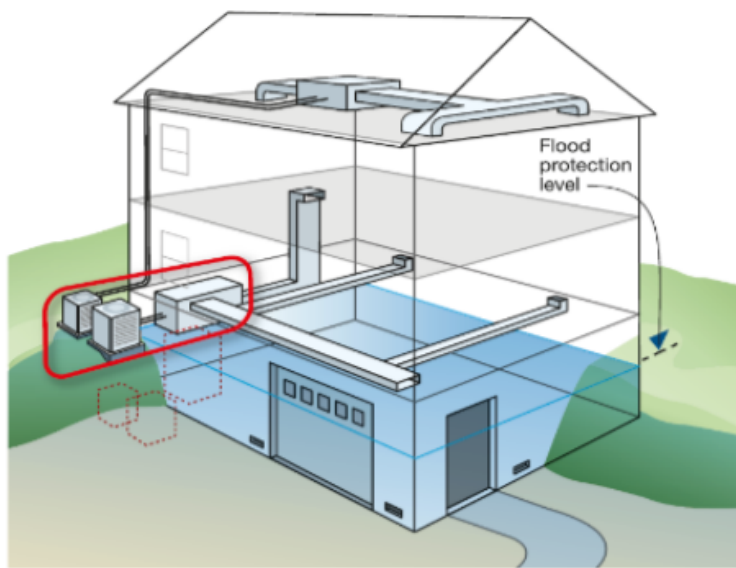
# B

## Adapted Buildings

*Strategies to protect buildings against projected climate change impacts.*

### B1: FLOOD PROTECTION FOR NEW BUILDINGS

*Establish regulations and design guidelines for new buildings and re-developments to be resilient to future flood risks identified for the neighborhood*



Source: FEMA, "Protecting Building Utility Systems from Flood Damage"

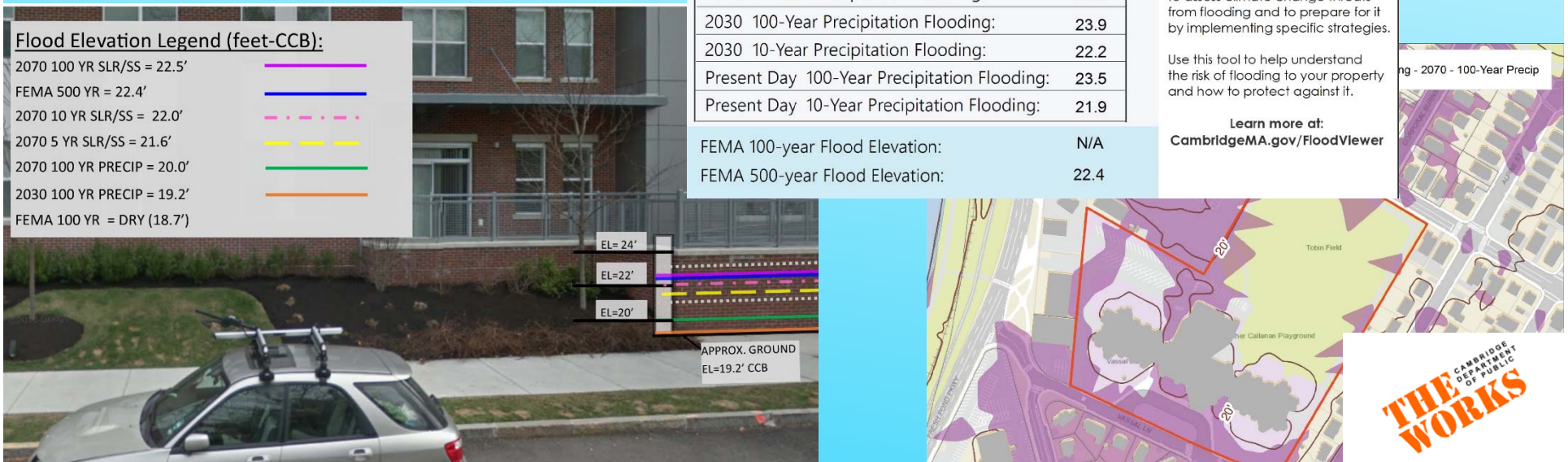
#### TOOL BOX / ACTIONS:

1. Build/protect to the 2070 10-year flood elevation from precipitation or sea level rise/storm surge, whichever is higher
2. Recover to the 2070 100-year flood elevation from precipitation or sea level rise/storm surge whichever is higher
3. Establish requirements for all vulnerable utilities to be located above the determined flood elevation based on building use type
4. Require the American Society of Civil Engineers (ASCE) 24-14 Flood Resistant Design and Construction below 2070 100-yr flood elevation
5. Locate electrical shut-off to building at or above grade level, not in basement

# Flood Viewer Tool

The tool provides flood elevations, surface elevations, and flood extent for FEMA flood insurance zones, and City modeling of present, 2030, and 2070 precipitation and sea level rise/storm surge scenarios.

<http://www.cambridgema.gov/Services/FloodMap>





# C Resilient Infrastructure

*Strategies to ensure continued service or a speedy recovery from community-wide infrastructure systems.*

## C4: REGIONAL FLOOD RESILIENCY AT AMELIA EARHART DAM AND OTHER SITES

*Collaborate regionally and with the State on structural and operational improvements at the Amelia Earhart Dam. Plan, design and implement storm-surge barriers, "smart" flood prevention systems and conveyance improvements at appropriate sites*



**Amelia Earhart Dam**

Source: Google Earth

### TOOLBOX / ACTIONS:

1. Raise the top of the Amelia Earhart Dam (AED)
2. Modify pump operations at AED by adding a fourth pump and including real-time control and optimization
3. Evaluate building storm barriers at the storm pathway along the Mystic River downstream of the AED
4. Evaluate building a berm on the south side of the AED (Assembly Square area) to eliminate or reduce flanking
5. Evaluate building a berm on the north side of the AED to eliminate the point of entry between Alford Street and railroad track (near Wynn Casino site)
6. Analyze how and in which locations "smart" ocean backflow (flood) prevention systems can be installed
7. Evaluate improvements in existing bridges, culverts, and other hydraulic bottlenecks along the river flow path towards the dam
8. Evaluate building micro-berms at strategic locations along both sides of Alewife Brook at identified points of entry. This action has regulatory challenges considering the floodplains along the Brook, and therefore options of obtaining regulatory variances will need to be explored

## 9 Strategies C1-C9

Some actions include:

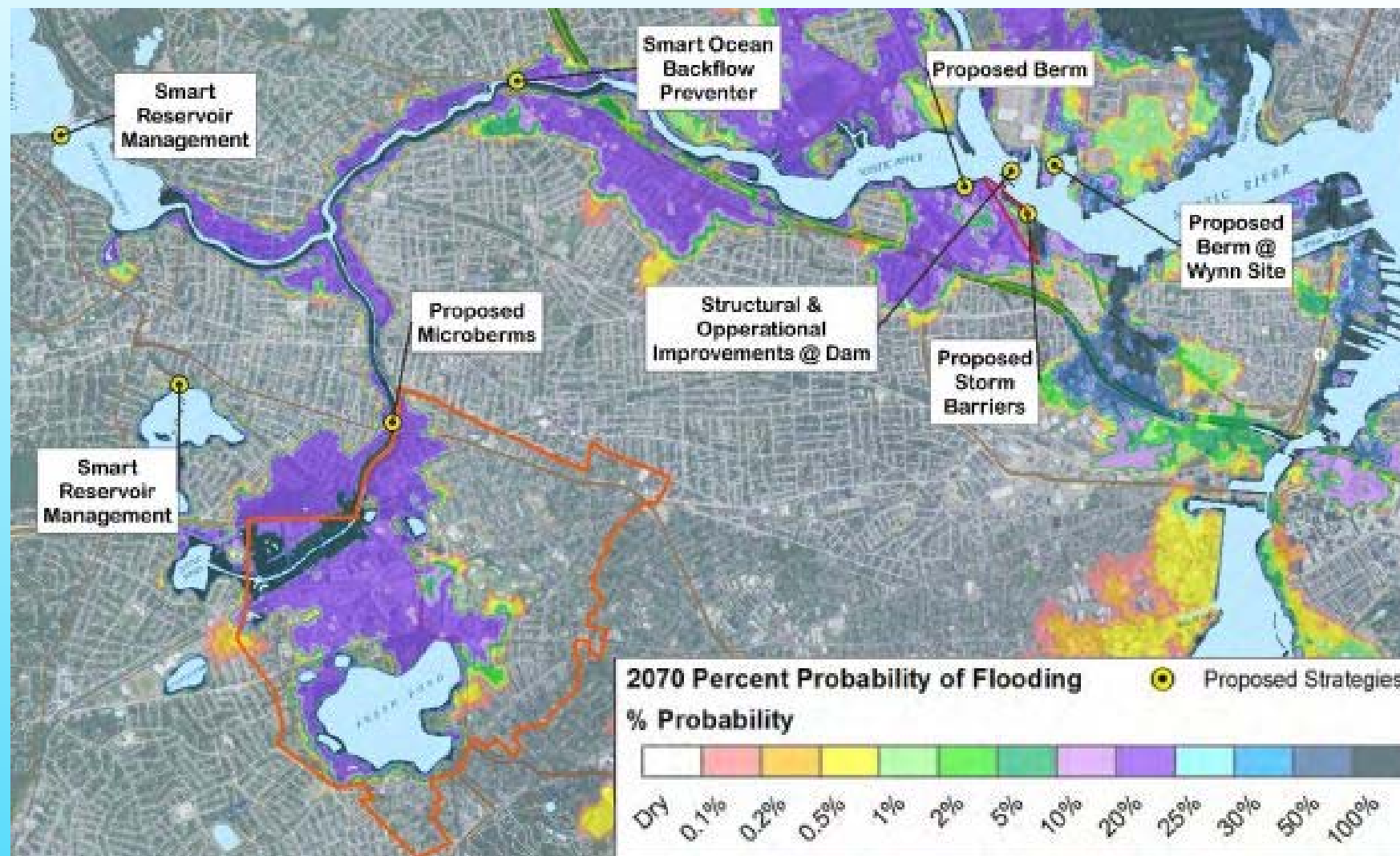
- Continue Sewer Separation in Alewife Area to Reduce Adverse Public Health Impacts
- Changing the "25:2" Stormwater Mitigation Requirement
- *Maximization of stormwater management of the Mystic River Watershed*
- *Protection of potable water-Fresh Pond Reservoir*





## Resilient Infrastructure

NOAA Grant coastal resilience strategies along Mystic River. Metro Boston Climate Preparedness Taskforce – MAPC, Boston, Cambridge, Chelsea



Source: Kleinfelder for the City of Cambridge, June 2017

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# D Resilient Ecosystems

## 4 Strategies D1-D4

### D4: GREEN INFRASTRUCTURE OPPORTUNITIES

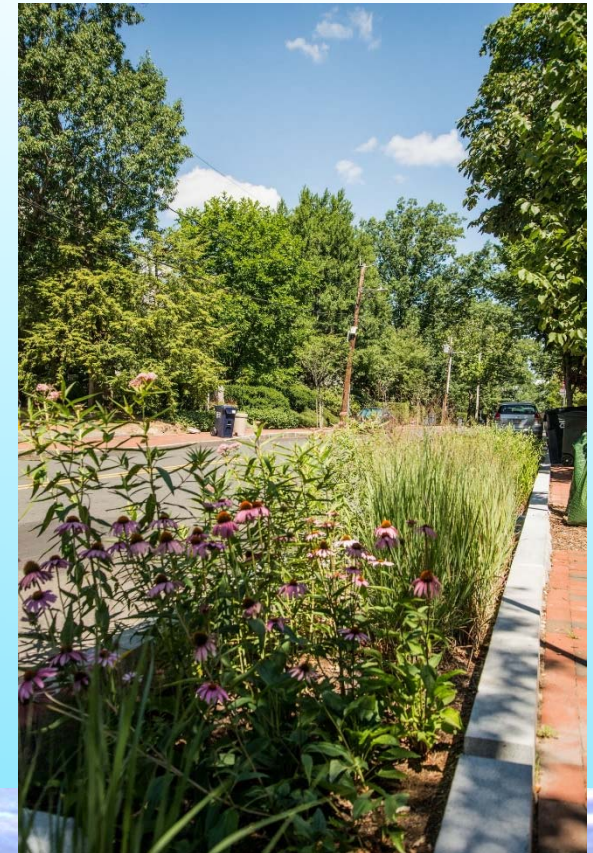
*Implement Green Infrastructure (GI) to improve water quality and reduce flooding impacts from smaller rainfall events and mitigate urban heat islands (UHI)*



Western Avenue Cambridge, MA. [Source: City of Cambridge]

#### TOOLBOX / ACTIONS:

1. Evaluate installation of raised planters in medium-density residential parcels
2. Evaluate landscaping to include bioretention basins in retrofitting medium-density residential parcels and in new high-density residential parcels, new light industrial development, public open space and public right-of-way
3. Evaluate using porous pavement and permeable pavers for residential driveways, new streets and parking lots of commercial parcels
4. Evaluate installation of green roofs in retrofitting existing commercial buildings, new light industrial buildings, and new high-density residential development
5. Evaluate constructing water quality swales in public open space
6. Evaluate installation of subsurface infiltration chambers in new high-density residential development
7. Explore developing an education program for residents and public schools on local green infrastructure opportunities benefit the watershed



### Some Action Already Being Taken

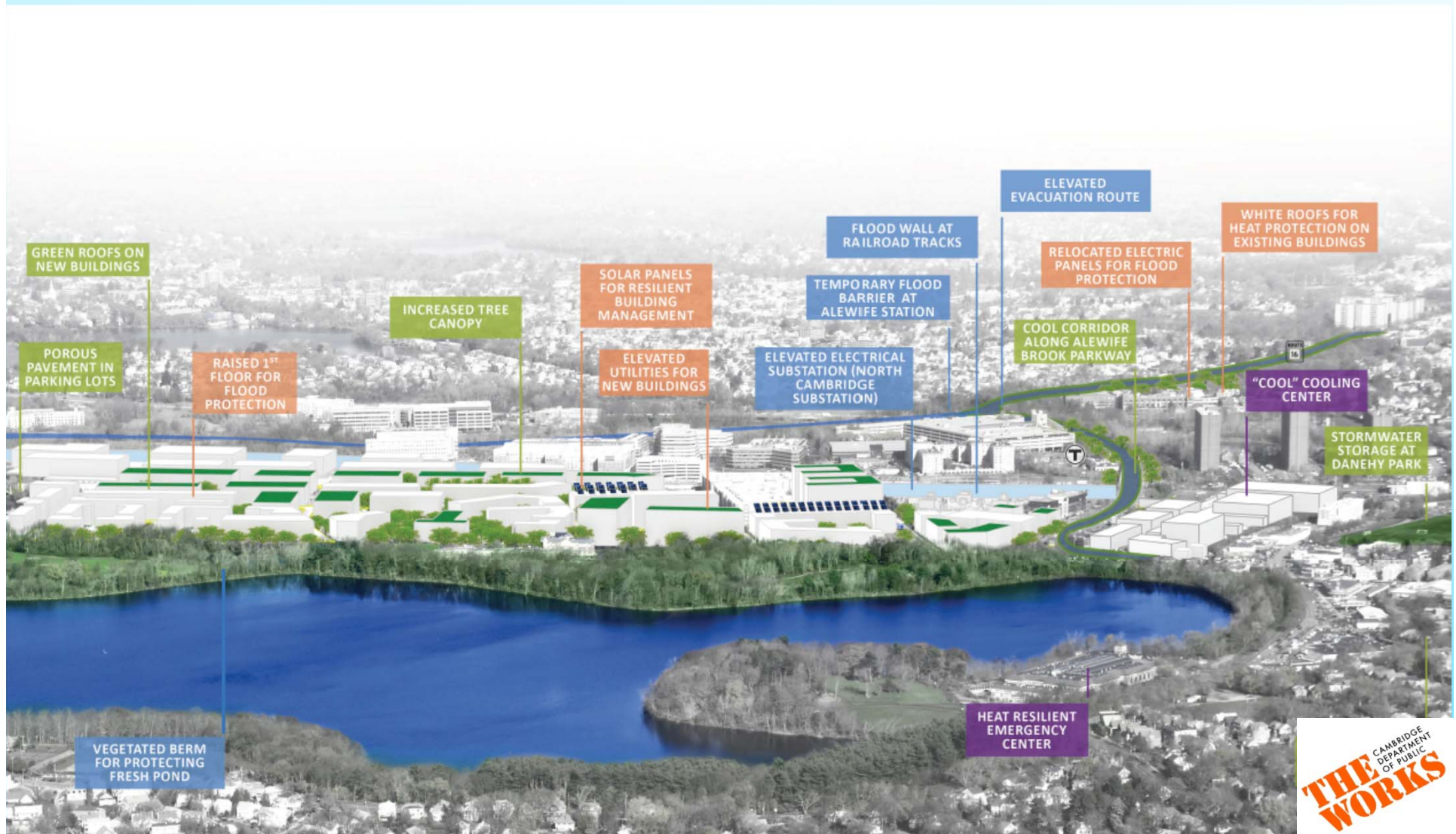
- Comprehensive tree inventory of public and park trees
- Porous pavement, infiltrating catch basins and bioretention gardens/stormwater wetland
- Storage volume between the pre - development 2-yr/24-hr storm event and post development 25-yr/24-hr storm event



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Implementation of the strategies allows for the transformation of the neighborhood. The proposed strategies will not only protect lives and livelihoods in Cambridge that are at risk from climate change impacts but should also enhance the well-being of the entire community.





# Comments/Questions

?