



Wakefield Public Works

William Renault, Jr., P.E.
Town Engineer
&
Chair of Clean Lake Committee

Engineering Division Update
FOLQ Annual Meeting | May 26, 2021

Background

- **September 9, 2019 – Town Council Forms Clean Lake Committee**

"The Committee's goal is to make [Lake Quannapowitt](#), our largest Town asset, swimmable and fishable. This Committee will be focused on implementation of new strategies to improve the water quality of the Lake while being compliant with federal and state government regulations. A focus will also include improving stormwater solutions for Lake Quannapowitt, Crystal Lake, and other waterways within Town.

The Committee will work to achieve better alignment and coordination between Department of Public Works and National Pollutant Discharge Elimination System (NPDES) efforts to maximize efficiencies and tactically create maximum impacts to improving water quality.

The Committee will consider the work and [assessments of predecessors](#) while pursuing new grant funding opportunities and developing new connections with available local and regional resources. The work of this Committee is expected to be ongoing and extend over several years."

- **Meetings:**

- Began in March 2020
- 3 Meetings in 2020 – March 5th, March 23rd, April 9th.
- Planned to meet 3rd Thursday each month



Watershed Approach

LAKE QUANNAPOWITT COMMITTEE REPORT

June 27, 2016



ENSR.

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LAKE QUANNAPOWITT DATA REVIEW

MARCH 2000

Using a watershed approach to fix Lake Q's woes

By ALISON SIMCOX
and DOUG HEATH

Editor's note: Alison Simcox,
(PhD Water Resources Engineer-
ing, Tufts University) and Douglas

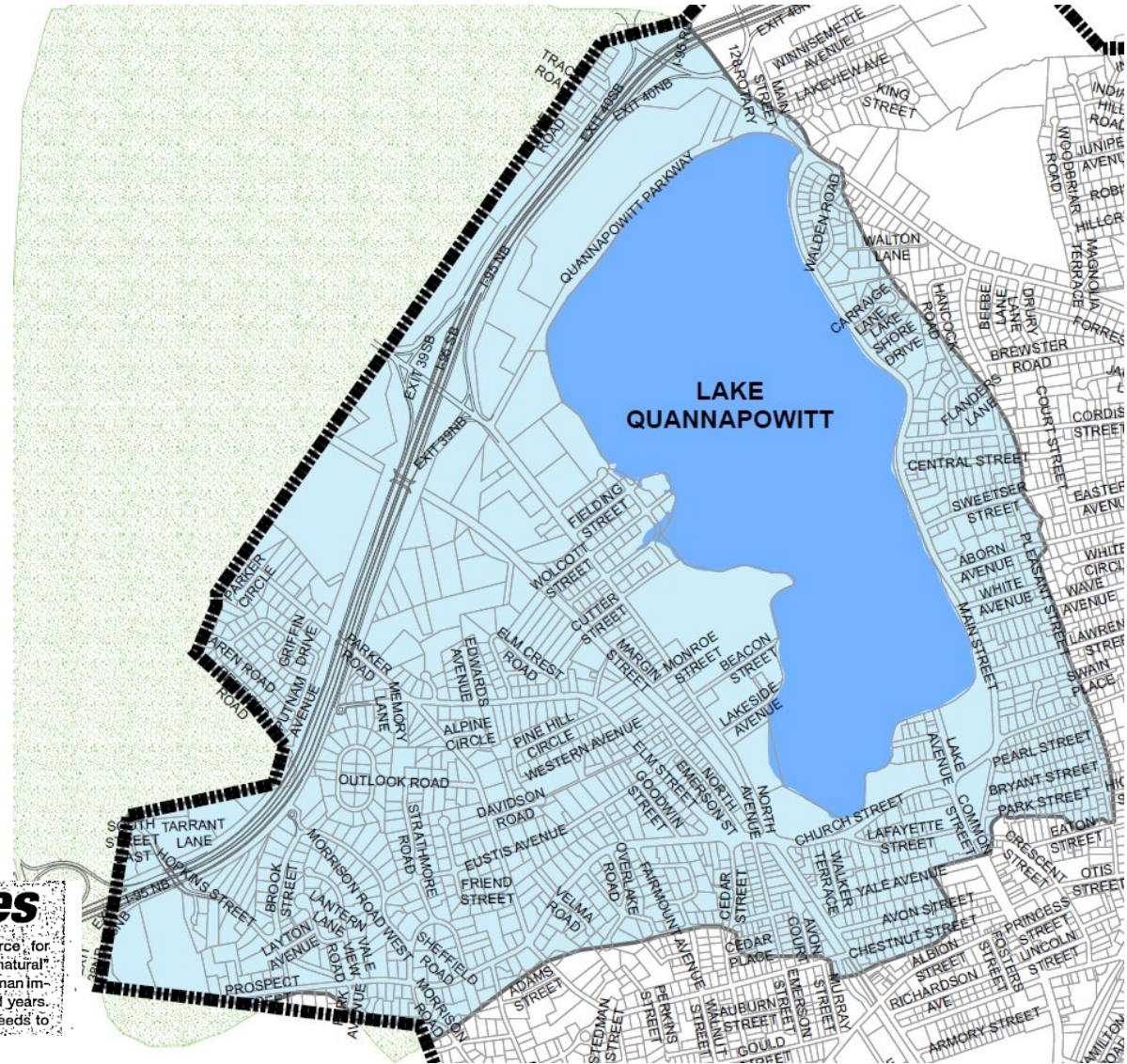
WAKEFIELD — In a three-part
series of articles, David Carpenter
claims that our Lake is in serious
distress and calls on the town to
take action following a weeks-

new phenomenon nor necessarily
a cause for alarm.

Six months ago, we wrote a let-
ter describing why the technology
called "SolarBees" (solar-powered

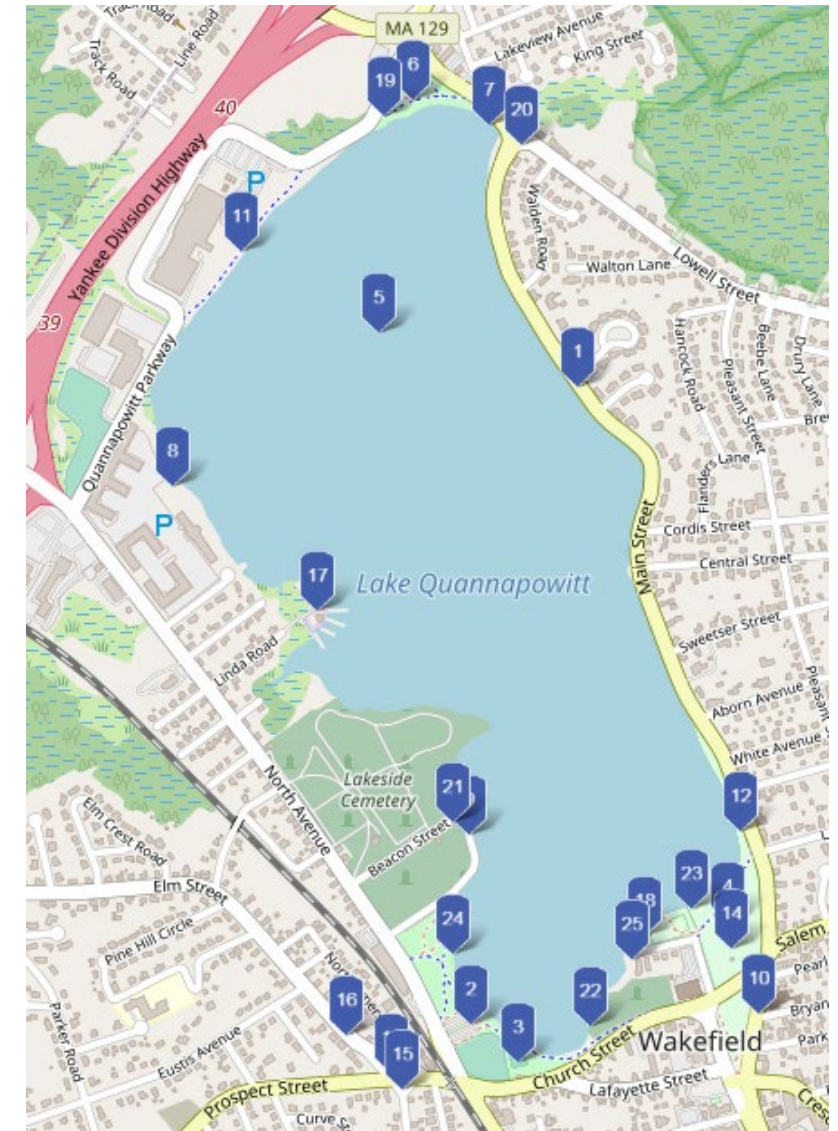
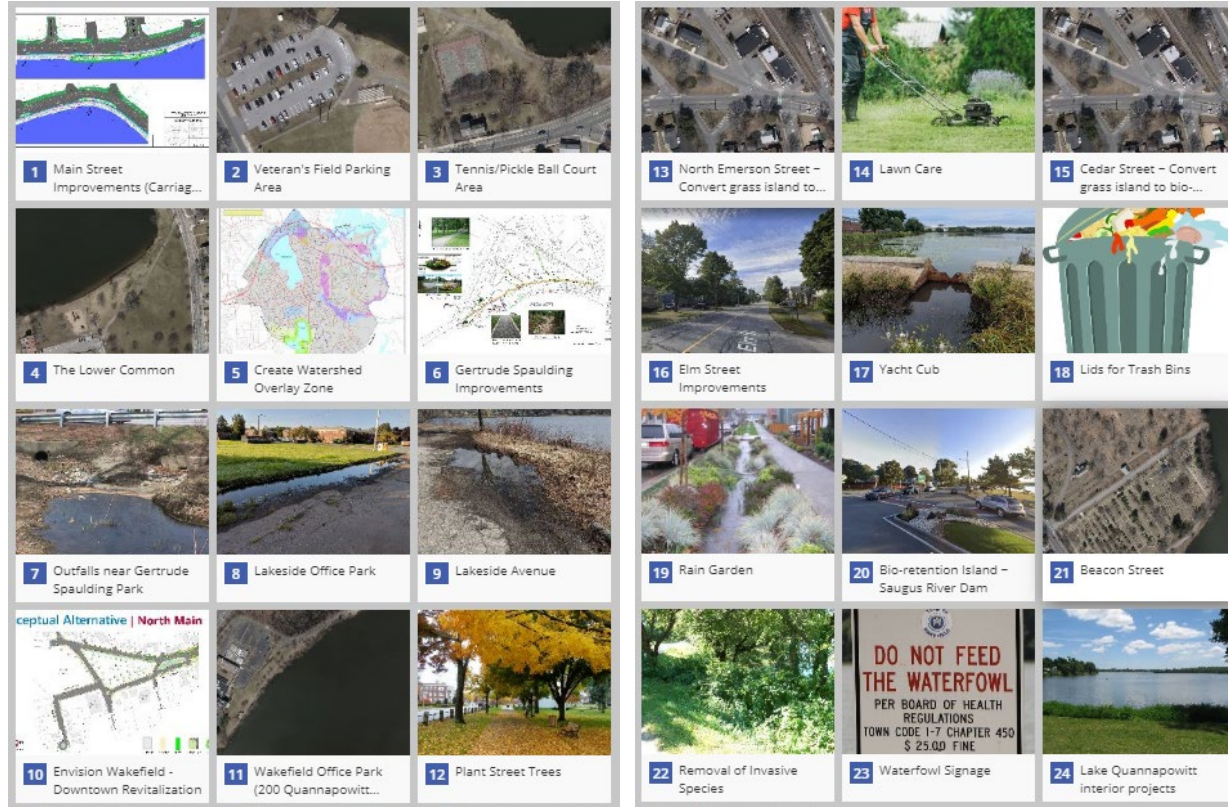
Quannapowitt and its long history
of over-enrichment by phospho-
rus, a plant nutrient. This histo-
ry, which is traced in detail in our
book "Lake Quannapowitt," is key

is a great natural resource for
Wakefield; but the term "natural"
needs to be qualified by human im-
pacts over several hundred years.
And the term "resource" needs to



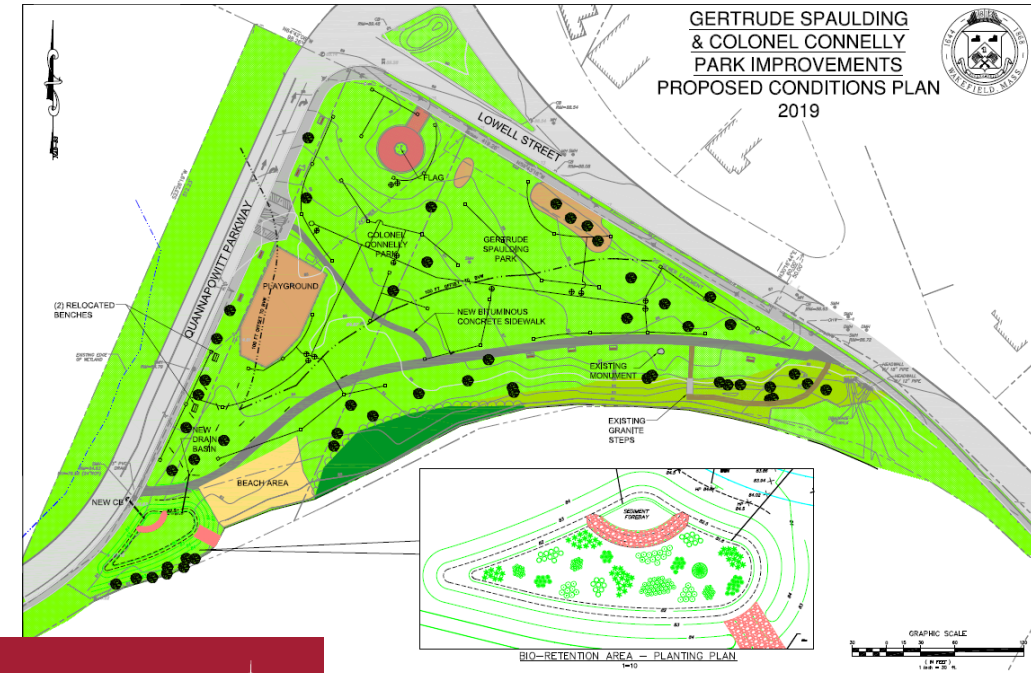
TOWN OF WAKEFIELD

Project List Development



6. Gertrude Spaulding

- Funded through a gift from FOLQ – **THANK YOU**
- Installed new bioretention area to treat a portion of Quannapowitt Pkwy and the majority of the park.
- Project removed 98% P and 99% N with the contributing watershed.
- New ADA compliant walkways
- Included a new interpretive sign.
- On-going maintenance of the bioretention area and grass by contractor for 2 additional years



BIO-RETENTION AREAS

A Sustainable Stormwater Solution

TOWN OF WAKEFIELD

What is a bio-retention area or rain garden?
Runoff from stormwater and snowmelt can be polluted by oil, sediment, and chemicals that build up on our streets, driveways, and parking lots as a result of daily activities. Bio-retention areas capture the runoff in an engineered cell that uses natural processes and a simple design that fits within the landscape. Plants, stones, soils, and soil-dwelling organisms filter the pollutants from the stormwater. The cleaned stormwater filters downward to replenish the groundwater which feeds our streams, ponds, lakes, and rivers.

How does it work?
Polluted runoff from the adjacent roadway and park area enters the engineered cell through the curb inlets. The water infiltrates slowly through the mulch and underlying soils — a special combination of sand, topsoil, and organic matter. This stormwater creates an environment for plants and microorganisms to thrive. Nitrogen, phosphorus, zinc, lead, and other pollutants are taken up by the plants and soil. The filtered water then flows underground to replenish Lake Quannapowitt with clean water.

Why is this important?

- Improves water quality in streams, ponds, lakes, and rivers
- Recharges groundwater and aquifers
- Provides flood control and reduces erosion by stormwater
- Provides native plant bio-diversity
- Contributes to wildlife habitat
- Beautifies our built environment
- Educates and promotes discussion about low-impact development techniques to improve sustainability

Spotting Native Species
This bio-retention site features many species of native plants. Among others, you will notice:

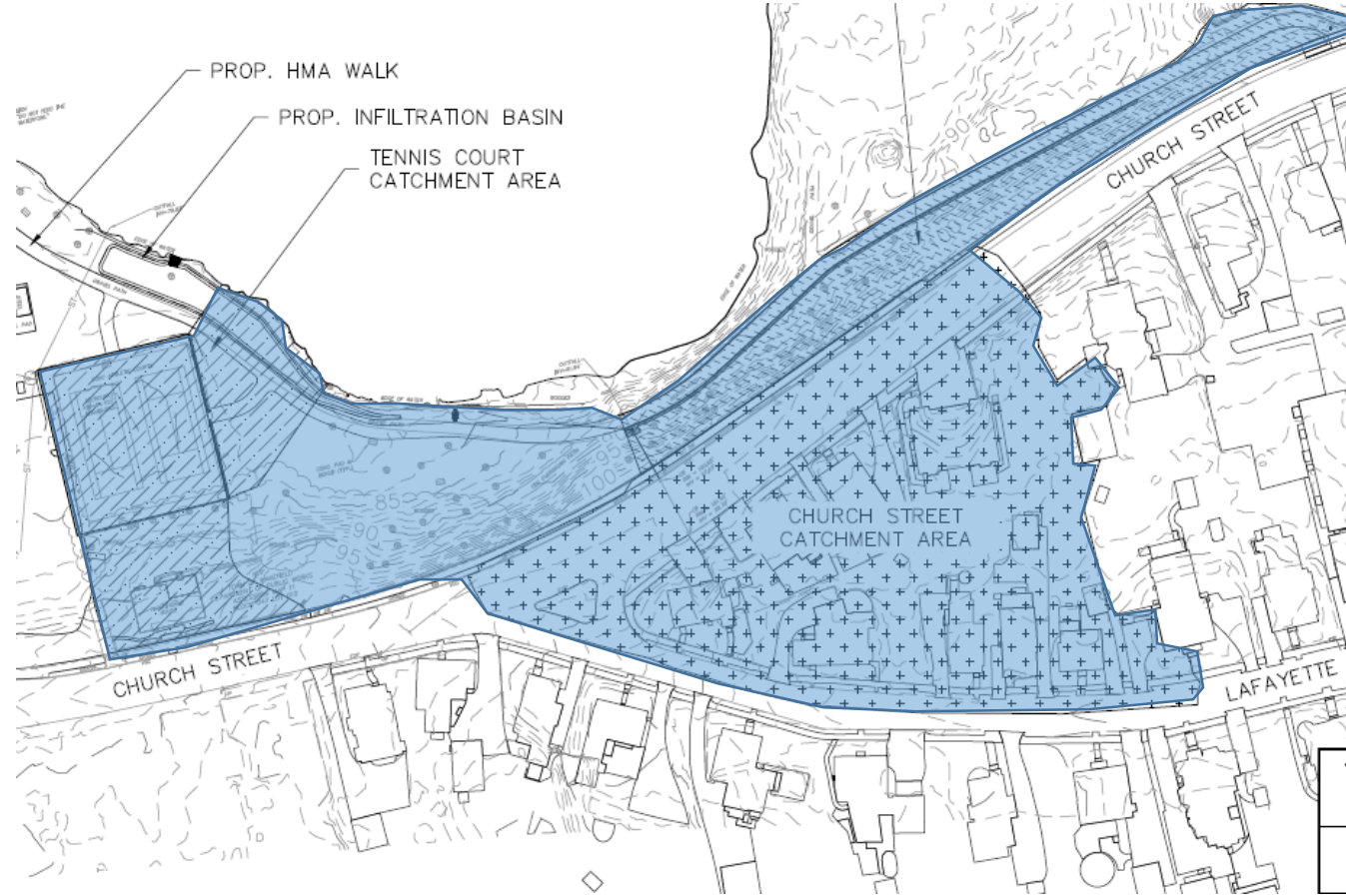
Autumn Joy Sedum	Bee Balm
Black-Eyed Susan	Joe Pye Weed
Purple Coneflower	Switchgrass

This project was funded by a gift from the Friends of Lake Quannapowitt.
The Town of Wakefield thanks all those involved for the opportunity to improve the water quality of our largest Town asset.

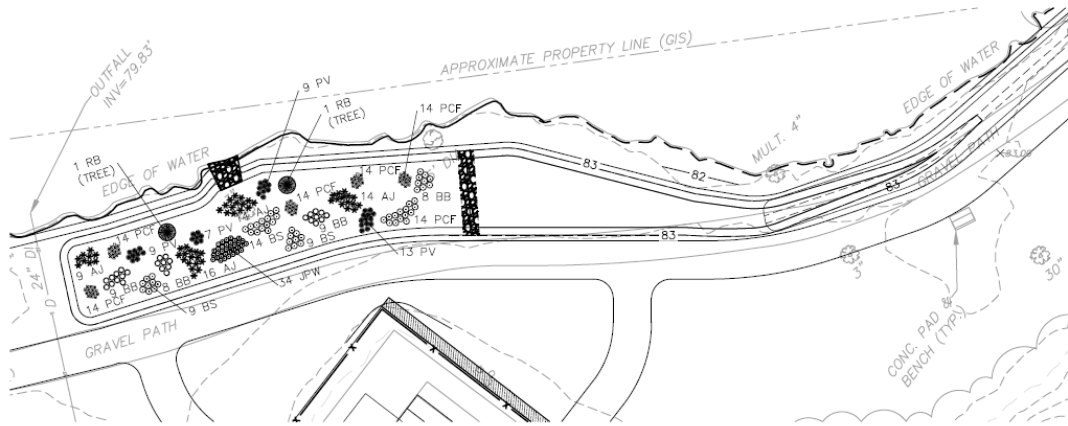


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3. Vets Field – Pickle Ball & Tennis Court



3. Vets Field – Pickle Ball & Tennis Court



INFILTRATION BASIN PLANTING PLAN
N.T.S.

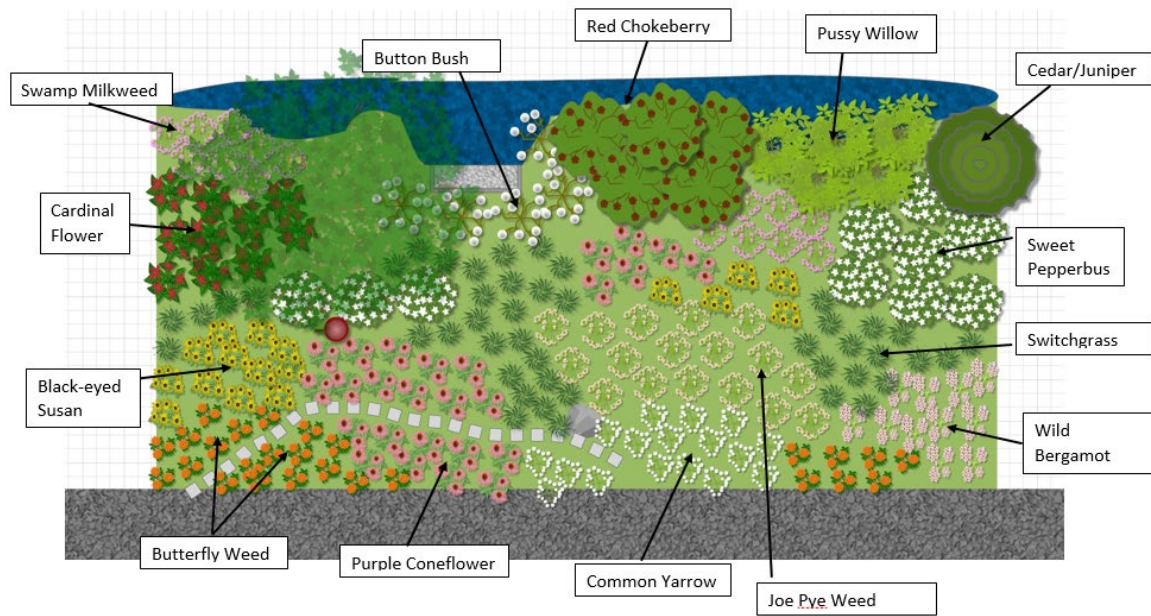
ABBREVIATION	QTY.	BOTANICAL NAME	COMMON NAME	SIZE
LANDSCAPE AREA (BIORETENTION AREA)				
BS	45	RUDBECKIA	BLACK-EYED SUSAN	9" POT
AJ	71	SEDUM	AUTUMN JOY	1 GAL
PCF	98	ECHINACHIA PURPUREA	PURPLE CONE FLOWER	9" POT
JPW	34	EUPATORIUM PURPUREUM	JOE PYE WEEED	1 GALLON
PV	54	PANICUM VIRGATUM	SWITCH GRASS	.3 GALLON
BB	43	MONARDA	BEE BALM	9" POT
RB	3	BETULA NIGRA	RIVER BIRCH (TREE)	2" CAL.

PLANTING SCHEDULE
N.T.S.



3. Vets Field – Pickle Ball & Tennis Court

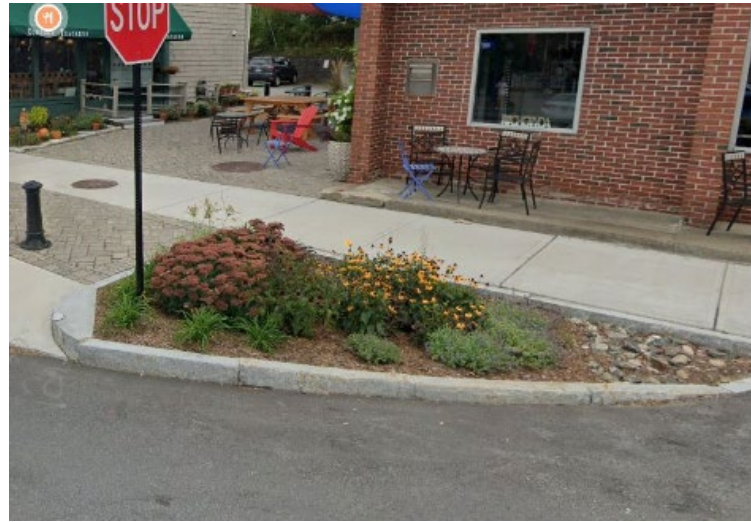
Pollinator Garden



Main Street Preliminary Design (2020)

(Carriage Lane to Salem Street)

- Consolidate and treat outfalls along the Main Street: 18 Outfalls to 11 Outfalls
- Installation of 11 new Retrofit Green Infrastructure Stormwater Treatment
 - Bioretention/Rain Gardens, Tree Box Filters, Porous Pavers, Street trees
 - Installation of 4 treatment units within roadway shoulder
- Unsuccessful \$2MM 2020 Municipal Vulnerability Preparedness (MVP) Action Grant to fund the proposed stormwater improvements.



Rain Garden/Bioretention Area



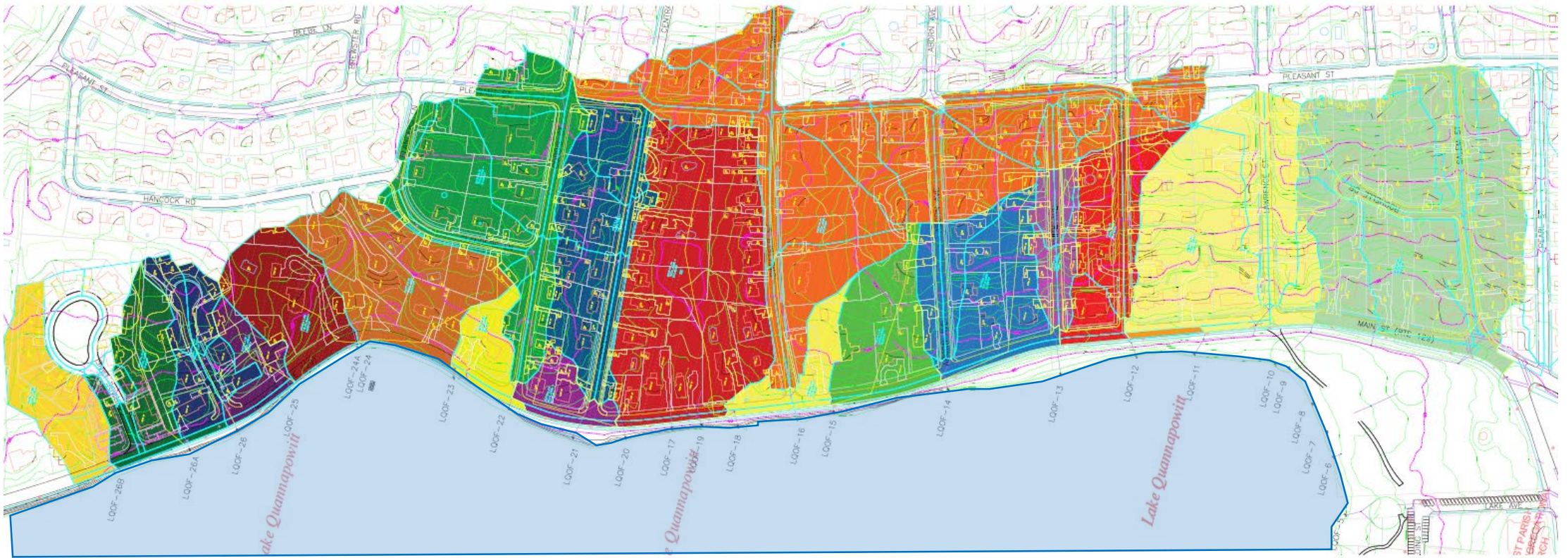
Porous Pavers



Tree Box Filter

1. Main Street Preliminary Design (2020)

(Carriage Lane to Salem Street)



Main Street Preliminary Design

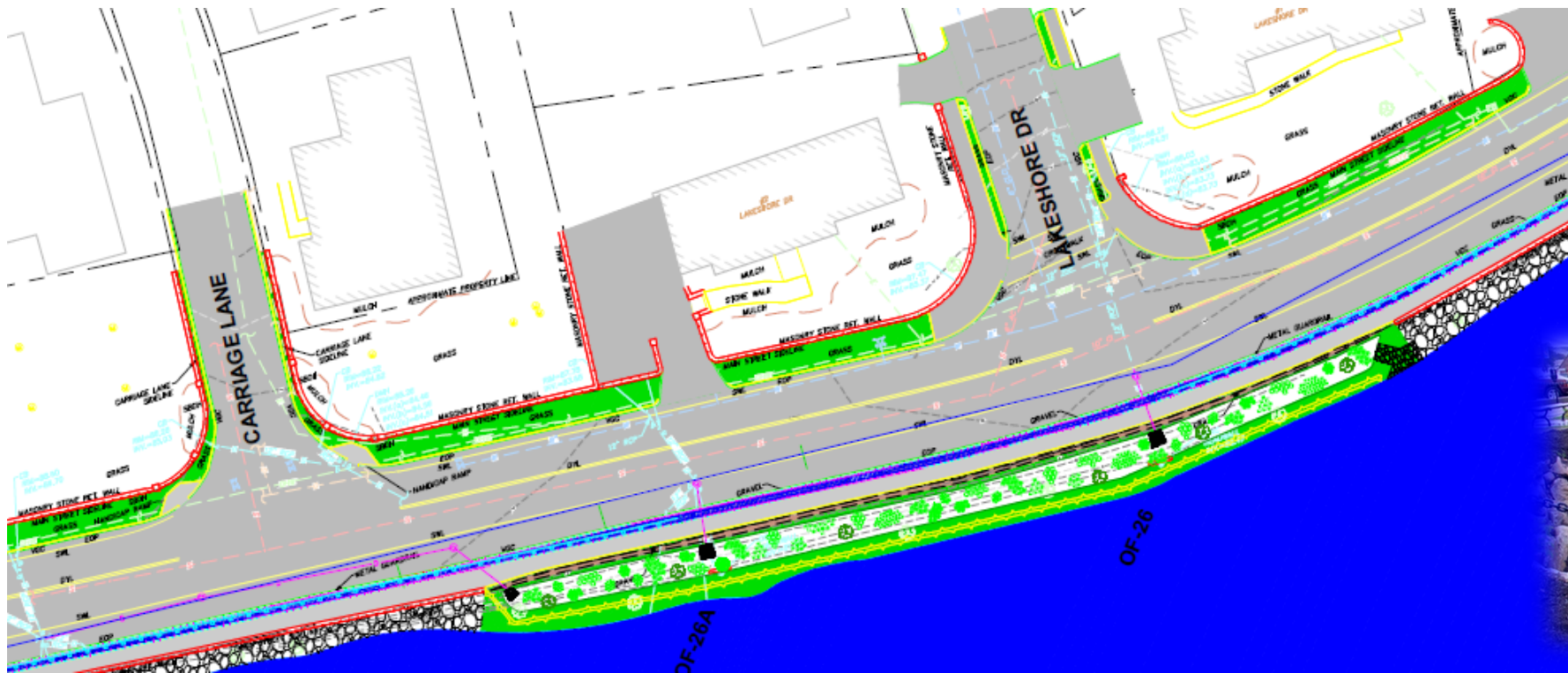
Metrics – Nutrient Load Reductions

Catchments OFs feeding Bio-retention area	10, 11 & 12	13	14	15, 16, 18 & 19	20	21 & 22	23	24 & 24A	25	26, 26A & 26B
Required Surface Area (35% removal)	2891	231	494	3022	166	1457	134	660	136	889
Design Surface Area	4900	363	565	3208	224	2995	195	672	194	2873
Phosphorus										
Non-structural P removal	8.0%	8.9%	8.2%	7.8%	9.7%	8.2%	8.7%	6.5%	8.9%	7.7%
Structural P removal	59%	57%	50%	47%	52%	62%	54%	59%	53%	77%
Total P removal	62.3%	60.8%	54.1%	51.1%	56.7%	65.1%	58.0%	61.7%	57.2%	78.8%
Nitrogen										
Non-structural N removal	10.4%	11.7%	10.4%	10.0%	12.4%	10.4%	10.8%	8.3%	11.1%	10.2%
Structural N removal	75%	72%	68%	63%	69%	77%	71%	75%	70%	88%
Total N removal	77.6%	75.3%	71.3%	66.7%	72.8%	79.4%	74.1%	77.1%	73.3%	89.2%
Required Surface Area (90% removal)	18449	1439	3167	19381	1028	9333	855	4370	865	5666
Increase design size by	3.8	4.0	5.6	6.0	4.6	3.1	4.4	6.5	4.5	2.0

- 51% to 79% removal of annual **P**hosphorous load
- 67% to 89% removal of annual **N**itrogen load
- **Proposed annual load removal will EXCEED the upcoming MADEP & EPA Standard**

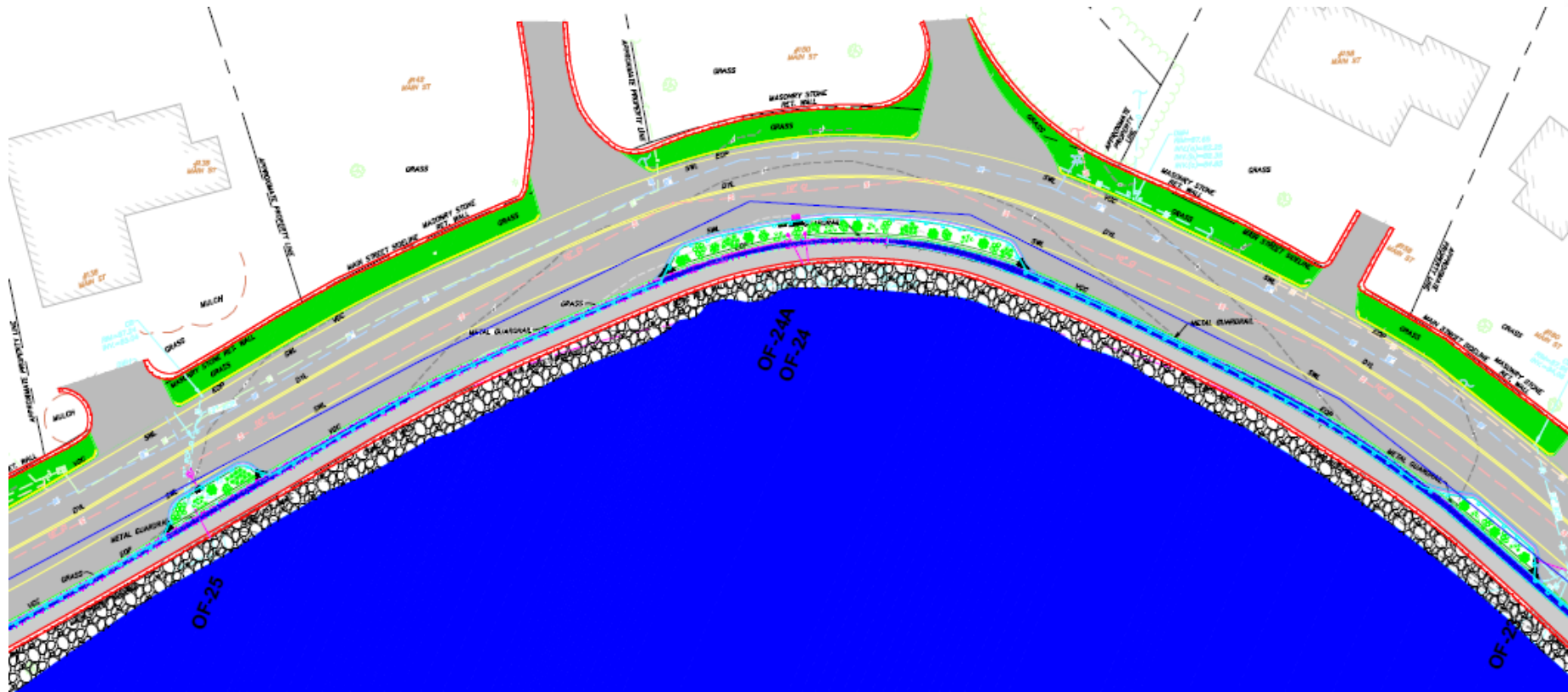
Main Street Preliminary Design 2020

(Carriage Lane to Lake Shore Drive)



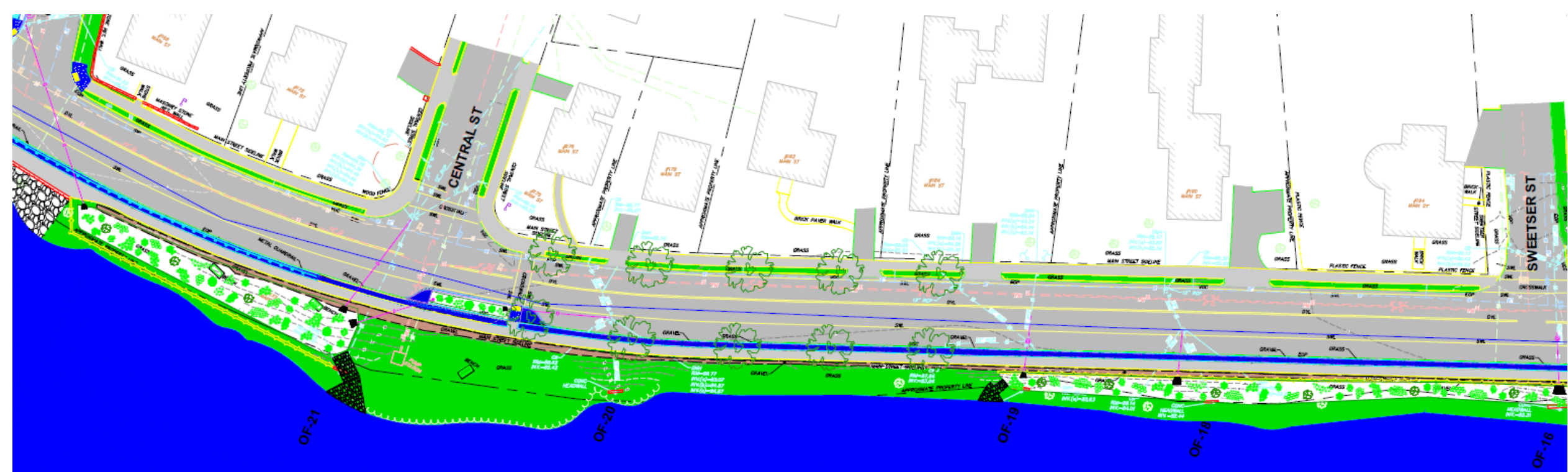
Main Street Preliminary Design 2020

(Lake Shore Drive to Cordis Street)



Main Street Preliminary Design 2020

(Cordis Street to Sweetser Street)

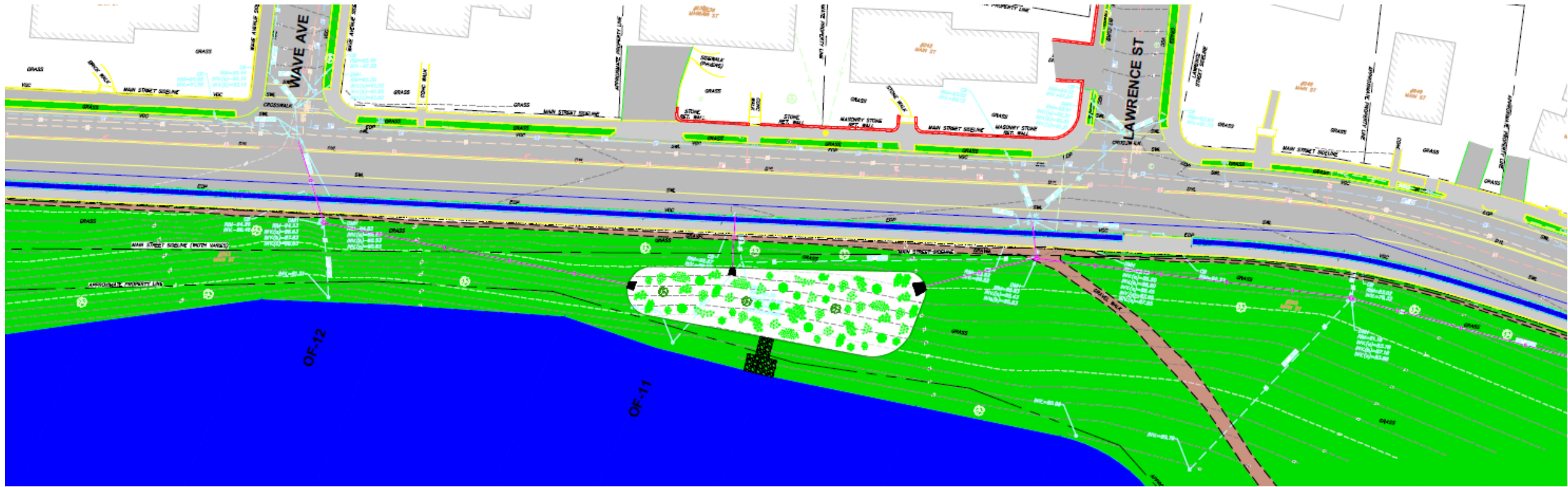


Main Street Preliminary Design (Sweetser Street to White Avenue)



Main Street Preliminary Design (2020)

(White Avenue to Salem Street)



Main Street MVP Grant Design Comparison

2020 Scope of Work Carriage to Salem (\$2M Grant Request)

- Consolidate **18** untreated stormwater outfalls through the installation of **11** new bioretention areas,
- **1,770 feet** of new infiltration trench and pipe,
- **930 feet** of new porous paver sidewalk accent strip
- 10 new tree box filters. Treat over **68.1 acres** of watershed including over **25.7 acres** of direct connected impervious area.
- Provide **68%-95%** of annual Phosphorus load reduction
- Provide **82%-98%** of annual Nitrogen load reduction

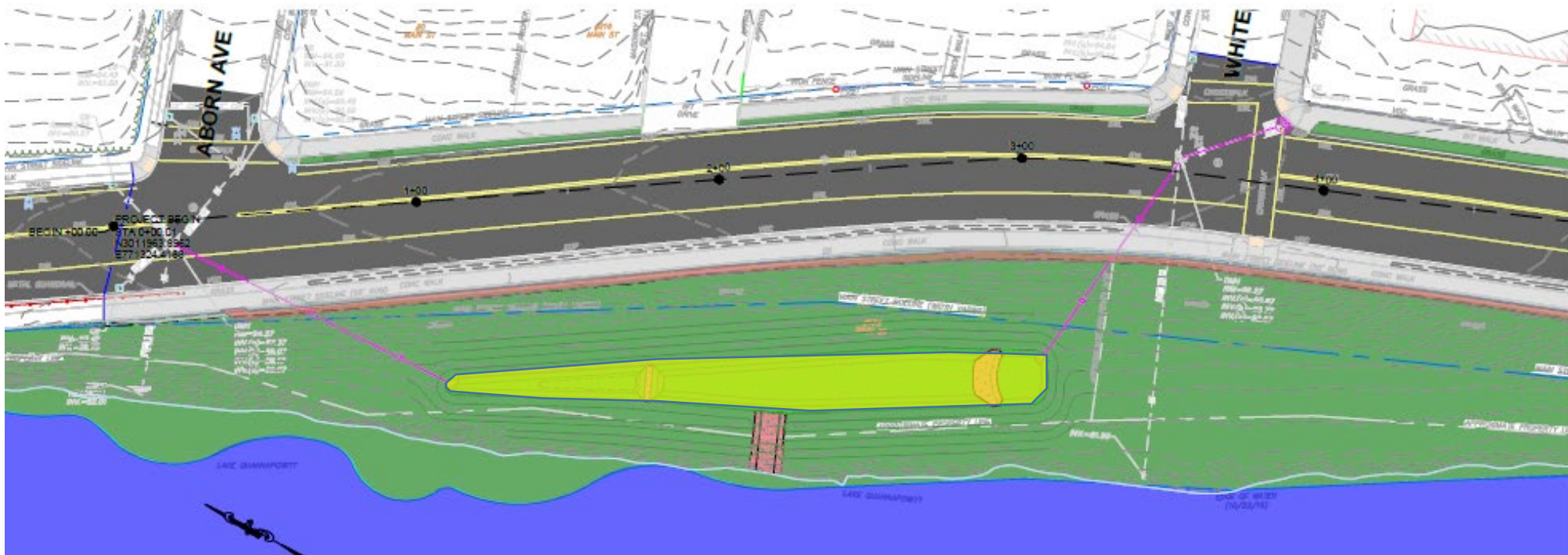
Original scope Aborn to 254 Main (\$750k Grant Request)

- Consolidate 4 untreated stormwater
- Through the installation of 2 new bioretention areas.
- The project in total will treat over **13.8 acres** of watershed including over **5.2 acres** of direct connected impervious area.
- Provide **95-97%** of annual Phosphorus load reduction
- Provide **98%-99%** of annual Nitrogen load reduction
- **Advance Temp paving and water main work.**



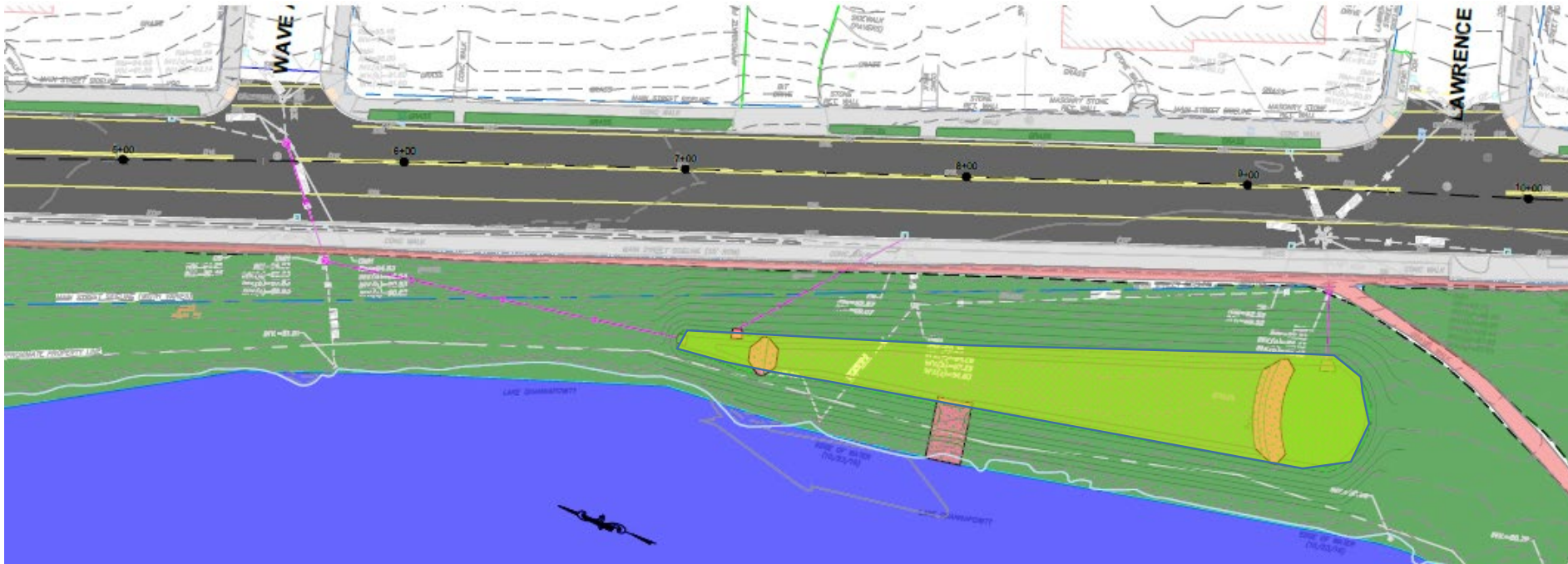
Main Street Updated Design (2021)

(Aborn Avenue to White Ave)



Main Street Updated Design (2021)

(Wave Avenue to Lawrence Street)



Next Steps – Upcoming Projects

- Project #1 (Main Street) –
 - Apply for 319 Action Grant (DEP) – Due June 2021
 - MVP Action Grant Award? – August 2021
- Project #3 (Pickle Ball Court) –
 - Finalize Appeal submittal – May 2021
 - Begin Construction - July 2021
- Project #5 (Watershed Overlay District)–
 - Evaluate for Town Meeting (PB, ZBA) – Fall 2021
- Project #11 (200 Quannapowitt Pkwy) –
 - Technical review for N & P Reduction – Ongoing
- Interactive Project Map
 - Finalize Website for Clean Lake Committee – May 2021



???QUESTIONS???



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