

# Prescott Hall Drainage Study Project No. 22-012-3

Public Workshop #3  
September 15, 2022

**Jacobs** Challenging today.  
Reinventing tomorrow.



## Introductions

- City of Newport
  - Rob Schultz, PE – Director of Utilities
- RIDOT
  - Jody Richards, PE – Pell Bridge Improvements Project Manager
- Jacobs
  - Peter von Zweck, PE – Project Principal
  - McKenzie Banahan, PE – Project Manager
  - Andrea Braga, PE – Water Resources Service Lead
  - Erin O'Shea, EIT – Modeling Lead

# Agenda

- New Stakeholder Input
- Alternatives Evaluation Process
  - Survey 2 Results
  - Summary of Alternatives Considered
  - Alternatives Scoring Matrix Results
- Presentation of 'Best Fit' Mitigation Measures
  - Implementation Plan
  - Modeling Results and Flood Control Benefits
- Climate Change and Adaptation
- Conceptual Construction Costs
- Next Steps
- Open Discussion

# New Stakeholder Input

## Additional Photos and Videos from Past Flooding Events

- September 13, 2022
  - 1.36 inches rain in 20 minutes



- July 14, 2020
  - 1.53 inches rain in 40 minutes



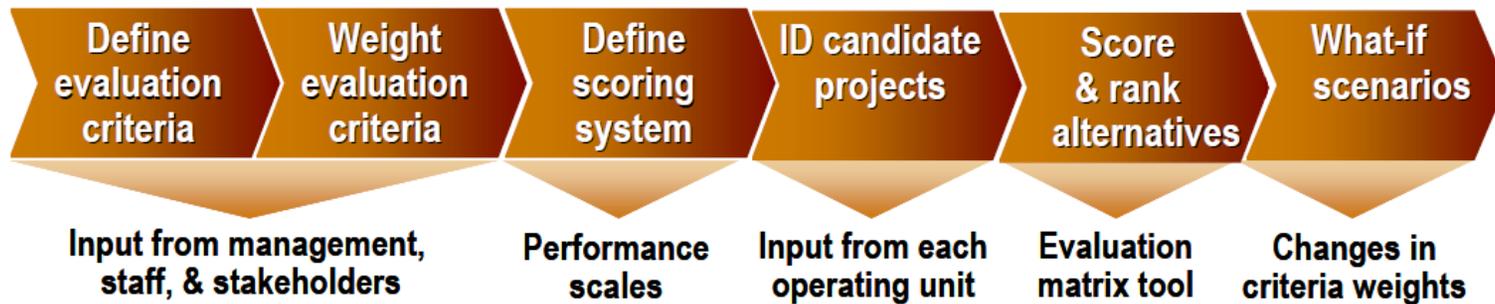
## Public Meeting 2 Stakeholder Comments

- Alternatives suggested by stakeholders:
  - Pump station
  - Diverting flow west down Van Zandt Ave to a new outfall
  - Upsizing 42" outlet pipe from Prescott Hall, as previously recommended in the 2014 study
  - *Included in the alternative evaluation process summarized later in this presentation*
- Feedback on the evaluation criteria
  - Residents top priority is to reduce the depth of flooding
  - *Issued survey to solicit input from all stakeholders regarding evaluation criteria weightings; results are included in this presentation*

# Alternatives Evaluation Process

## Alternatives Evaluation Process

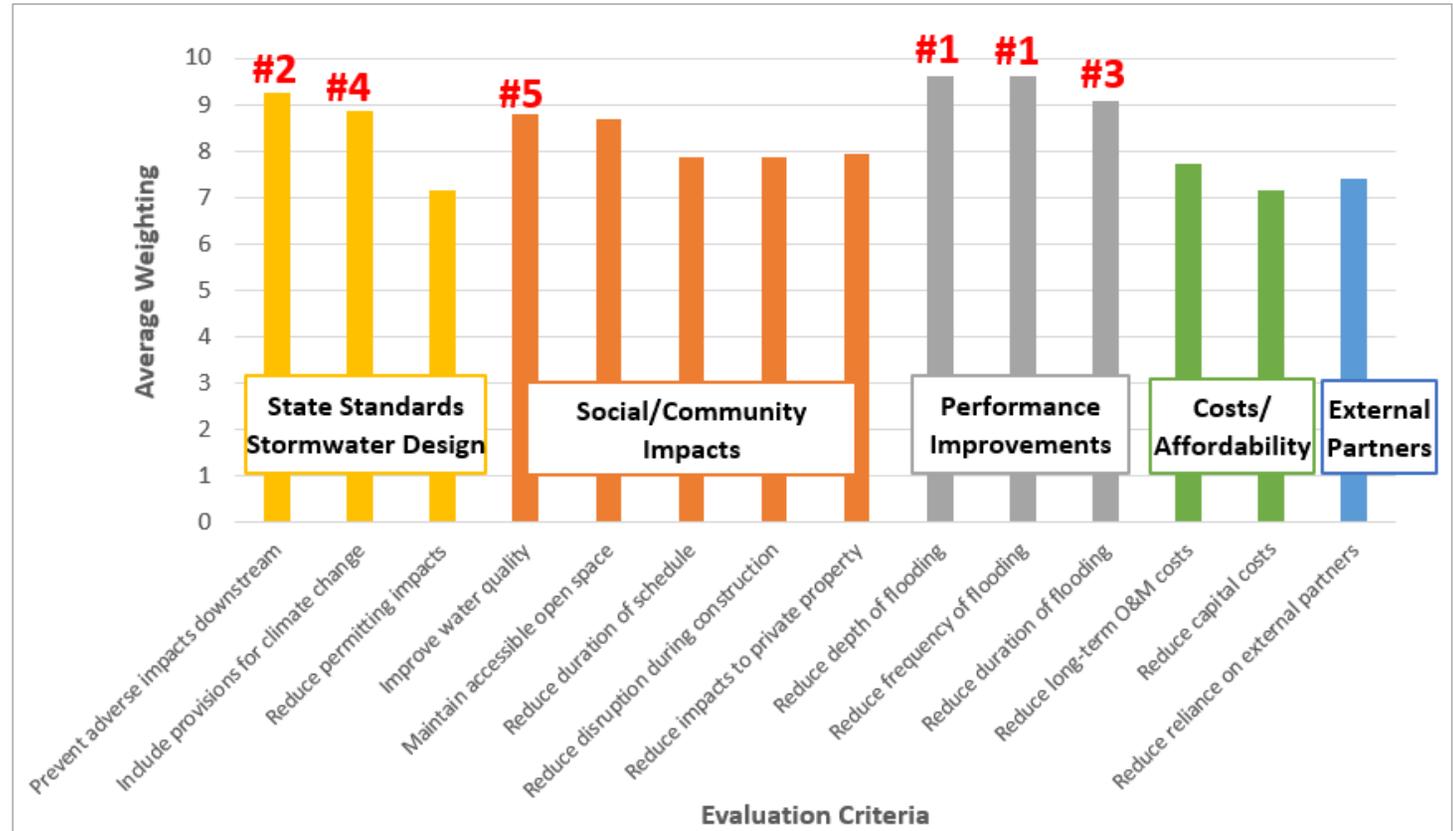
Our approach to identify solutions that address a broad range of constraints and community issues.



- Utilizing multi-objective decision analysis (MODA) allows for evaluation of all factors

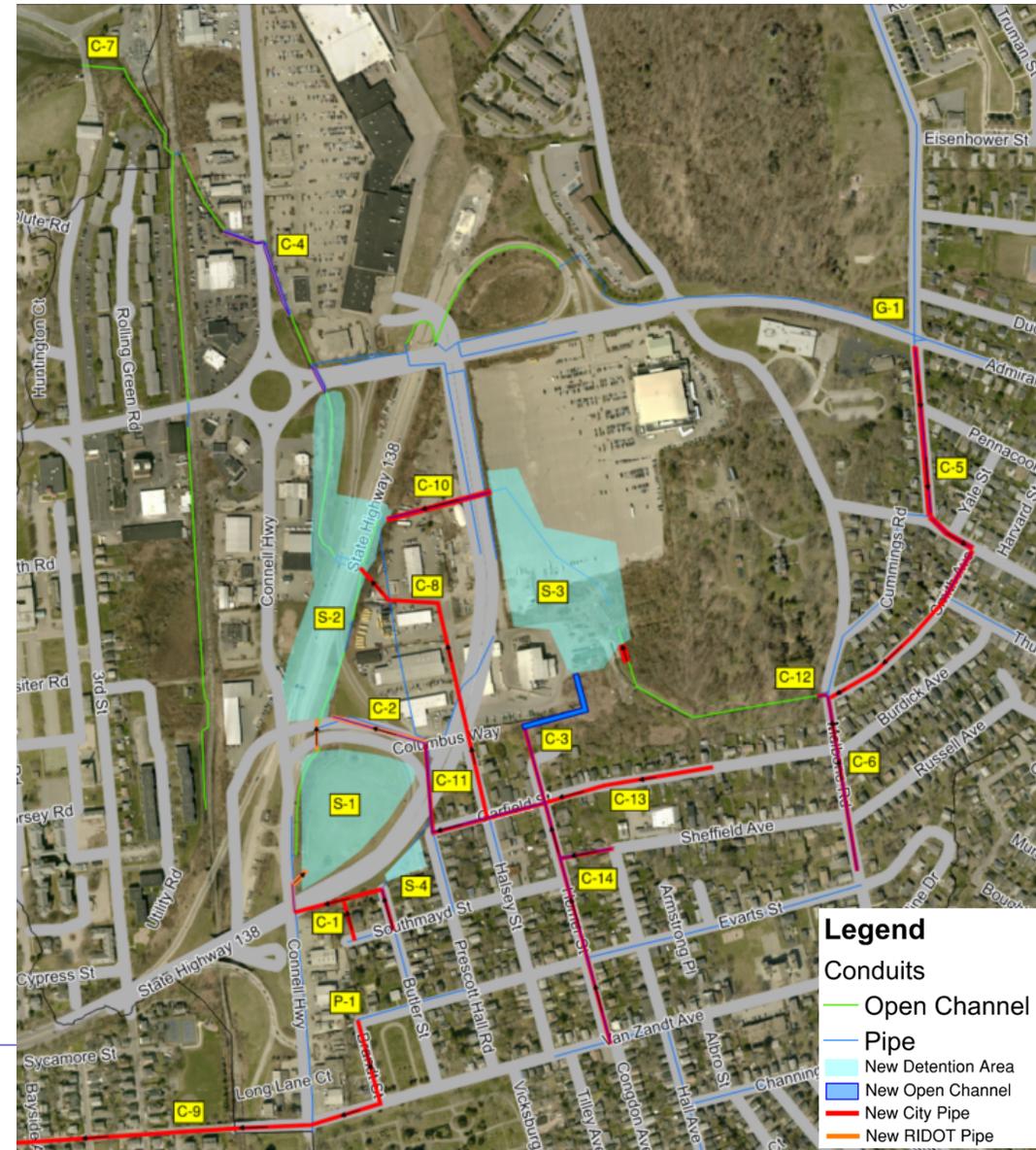
## Survey 2 Results

- Total responses as of 9/14/22: 15
- All respondents are residents/property owners



## Summary of Alternatives Considered

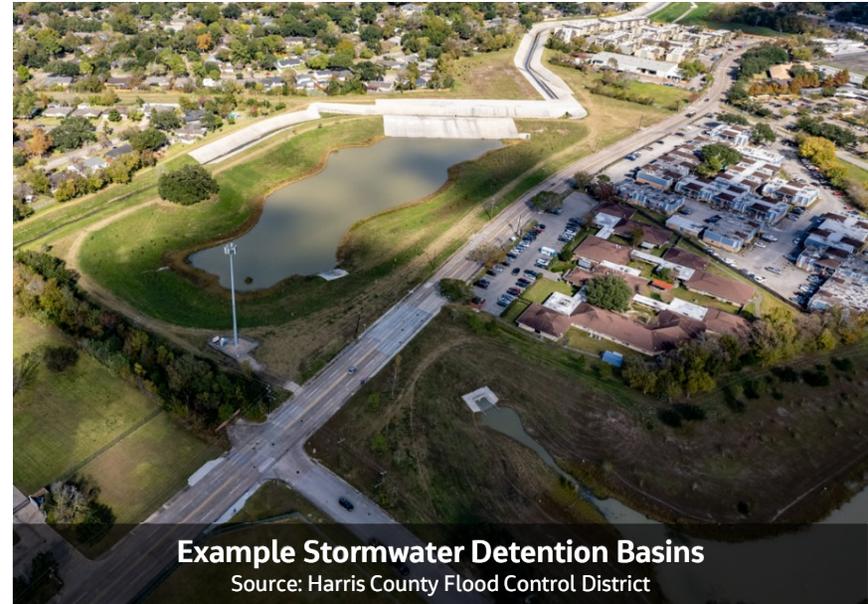
- 20 total improvement projects considered:
  - 14 conveyance "C" alternatives
  - 4 storage "S" alternatives
  - 1 green infrastructure "G" alternative
  - 1 pump station "P" alternative



## Summary of Alternatives Considered – Storage and Green Infrastructure

- S-1: Detention Area 1 (adjacent to new DOT ramp)
- S-2: Detention Area 2 (existing Hwy 138)
- S-3: Detention Area 3 (Old Casino Parking Lot)
- S-4: Detention Area 4 (near Prescott Hall & Garfield)
- G-1: Green Infrastructure Upstream of Watershed

Note: DETENTION is the temporary, short-term storage of excess stormwater.



Example Stormwater Detention Basins

Source: Harris County Flood Control District



Example Green Infrastructure  
Pervious Pavement and Bioretention

# Summary of Alternatives Considered – Conveyance and Pumps

- C-1: Drainage Improvements on Butler/Southmayd
- C-2: Redirect Outlet from Prescott Hall to New Detention Area (S-2)
- C-3: New Pipe/Channel from Garfield to New Detention Area (S-3)
- C-4: Upgrade Existing RIDOT Culverts
- C-5: Drainage Improvements on Hillside/Smith
- C-6: Drainage Improvements on Malbone
- C-7: Install a Tide Gate
- C-8: Halsey Street Box Culvert
- C-9: New Outfall West of Van Zandt
- C-10: New Box Culvert from Casino Parking Lot
- C-11: Line 42" Outlet Pipe from Prescott Hall
- C-12: Malbone Channel Box Culvert
- C-13: Drainage Improvements on Garfield
- C-14: Drainage Improvements on Homer/Sheffield
- P-1: Pump Station



**Grass-lined Channel**  
*(via epa.gov)*



**Box Culvert Under Railroad**

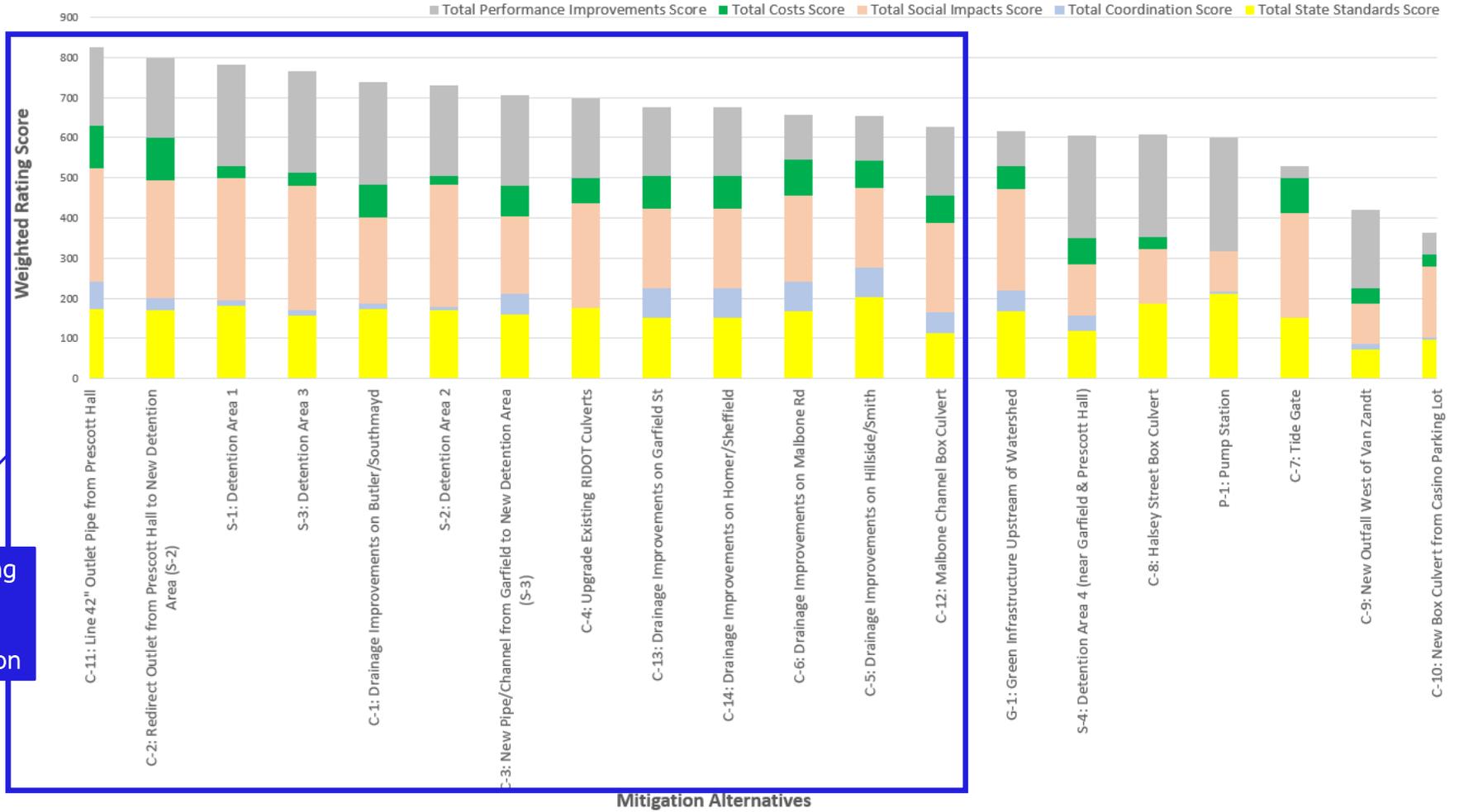


**Tide Gate**



**Wellington Ave Pump Station**

# Alternatives Scoring Matrix Results



High-performing alternatives selected for further evaluation

# 'Best Fit' Mitigation Measures

# Recommended Mitigation Measures

- S-1: Detention Area 1
- S-2: Detention Area 2
- S-3: Detention Area 3
- C-1: Drainage Improvements on Butler/Southmayd
- C-2: Redirect Outlet from Prescott Hall to New Detention Area (S-2)
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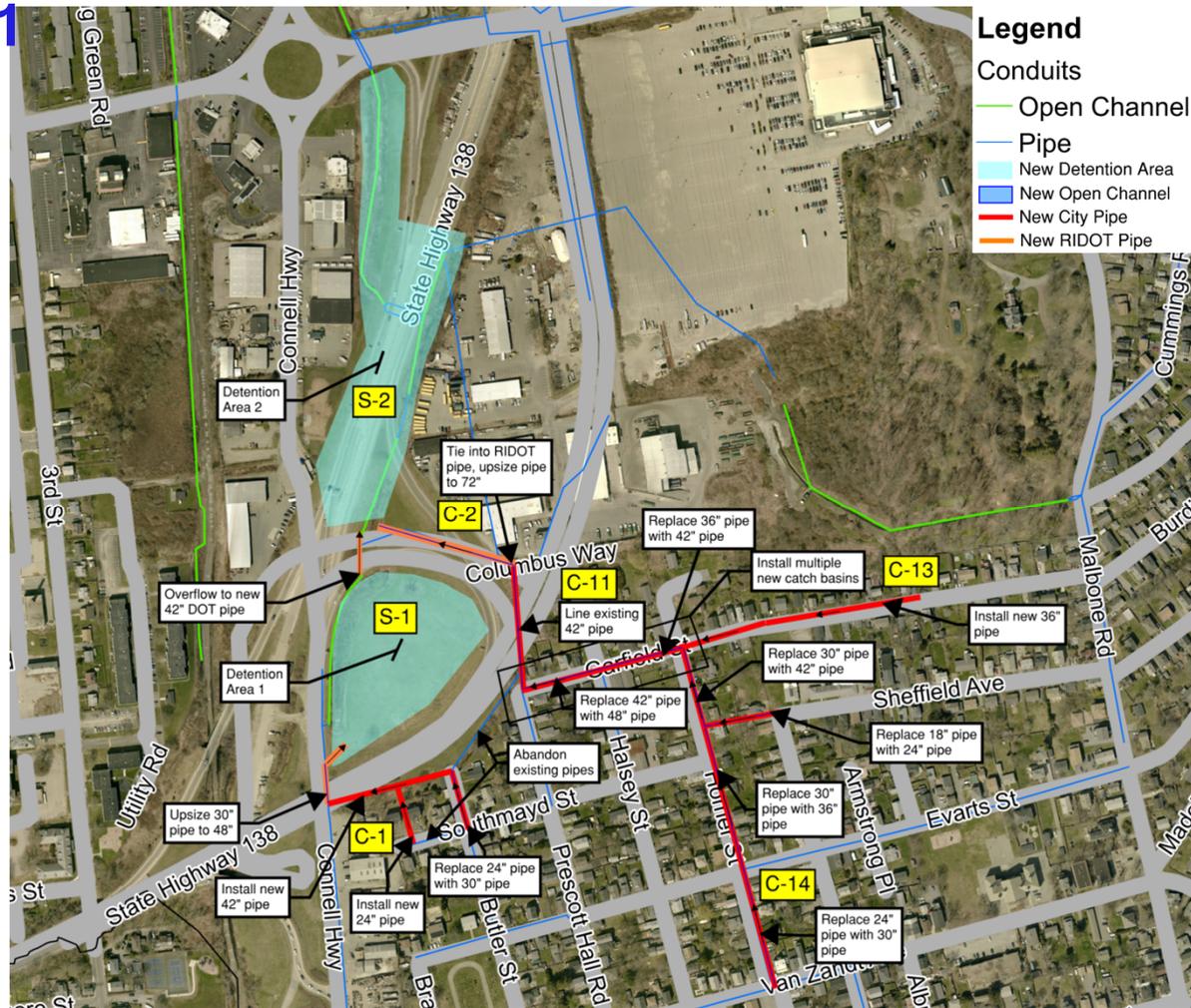


## Implementation Plan

- A phased implementation schedule allows for:
  - Ability to prioritize alternatives that can be implemented more quickly than others
  - Necessary coordination with relevant property owners
  - Time to acquire necessary permits and easements
  - Ability to disperse costs to accommodate funding limitations
- Phase 1:
  - Short-Term Controls
  - Alternatives prioritized based on most direct benefit to Prescott Hall and mitigation of impacts from the Pell Bridge project
  - Timeline: ±1-3 years
- Phase 2:
  - Long-Term Controls
  - Alternatives focus on capturing flow further upstream and/or require more time to coordinate with external partners
  - Timeline: ±3-8 years

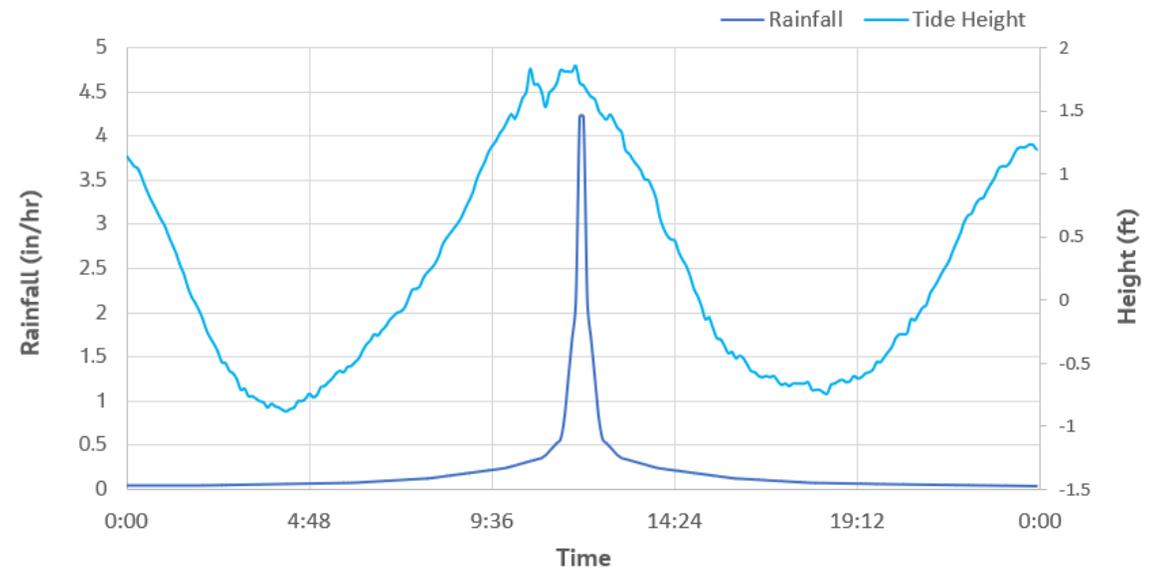
# Implementation Plan – Phase 1 (Short-Term Controls)

- Anticipated Timeline: ±1-3 years
- Alternatives Included:
  - S-1: Detention Area 1
  - S-2: Detention Area 2
  - C-1: Drainage Improvements on Butler/Southmayd
  - C-2: Redirect Outlet from Prescott Hall to New Detention Area (S-2)
  - C-11: Line 42" Outlet Pipe from Prescott Hall
  - C-13: Drainage Improvements on Garfield
  - C-14: Drainage Improvements on Homer/Sheffield



## 10-year, 24-hour Design Storm

- 5.03 inches in 24 hours<sup>1</sup>
- Peak intensity: 4.22 in/hr
- Meets Rhode Island State Standards for stormwater design<sup>2</sup>
- Used tidal data from the July 14, 2020, storm with peaks lined up



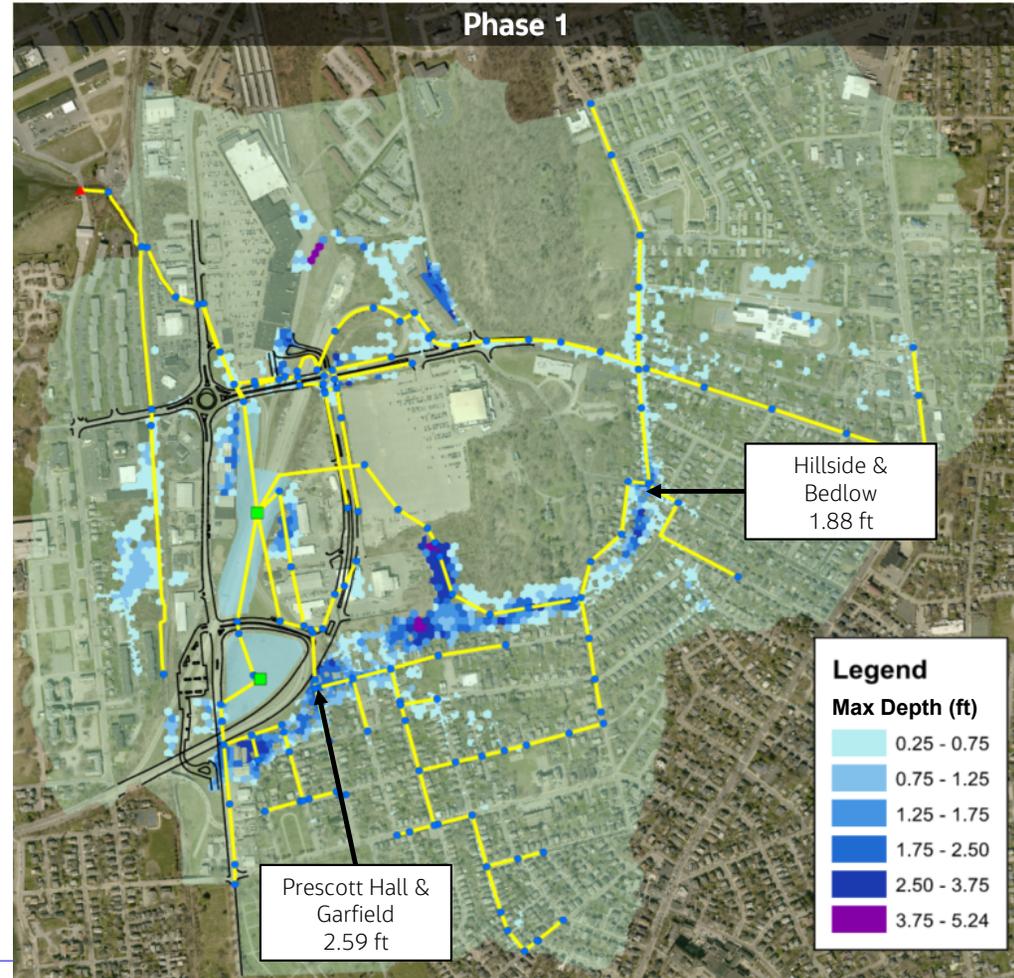
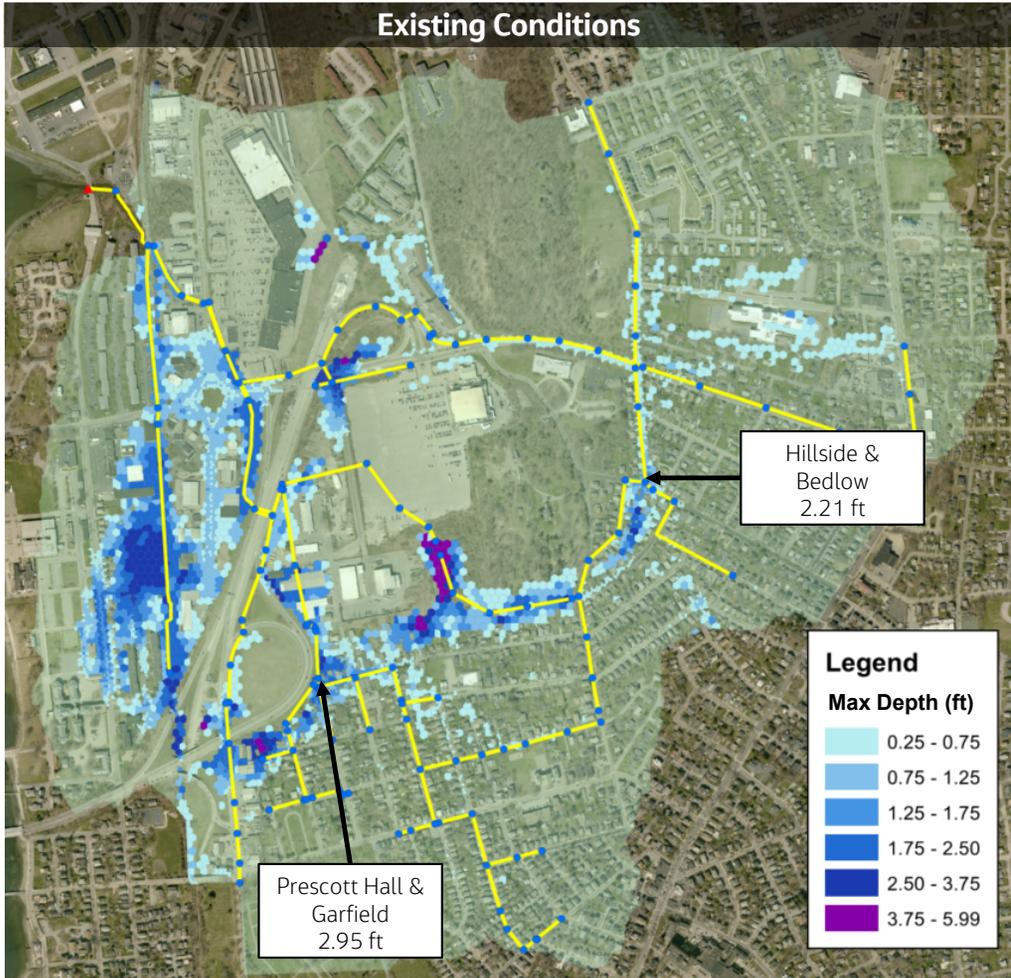
<sup>1</sup> NOAA Atlas 14 Point Precipitation Frequency Estimates

[https://hdsc.nws.noaa.gov/hdsc/pfds/pfds\\_map\\_cont.html?bkmrk=ri](https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ri)

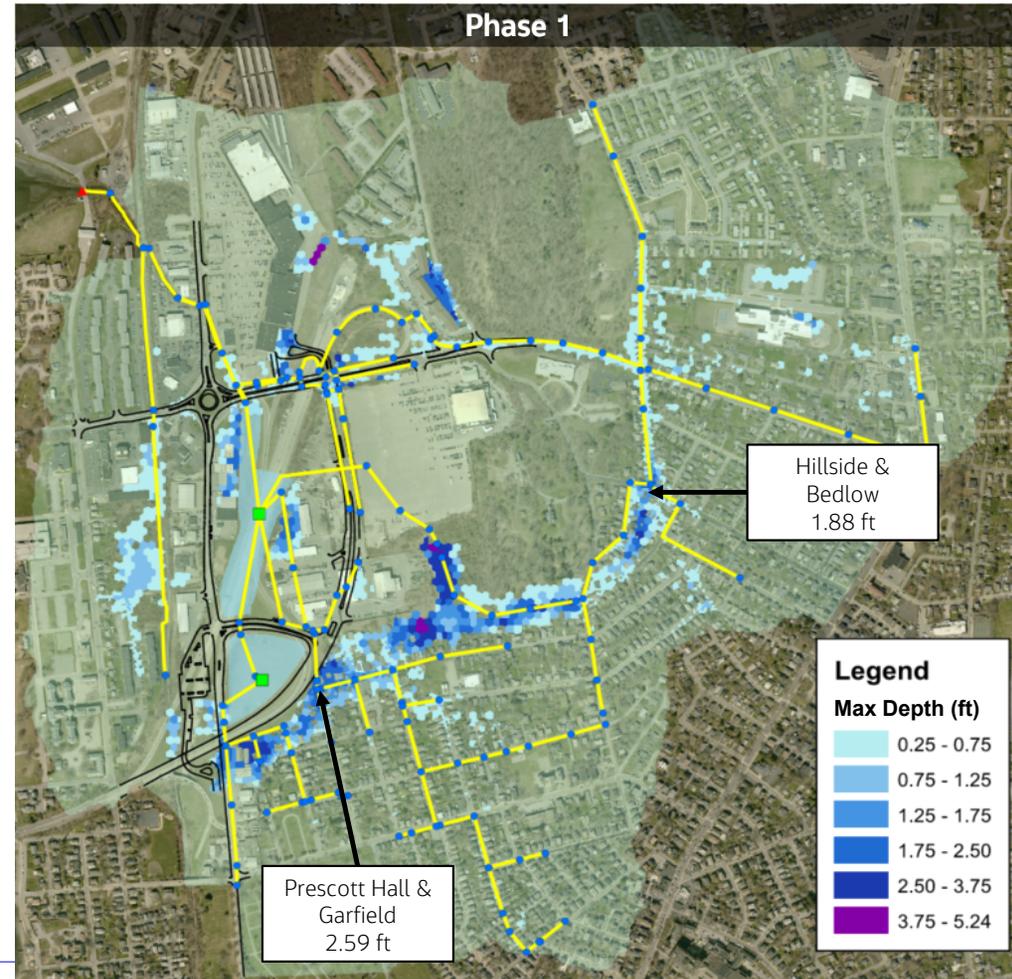
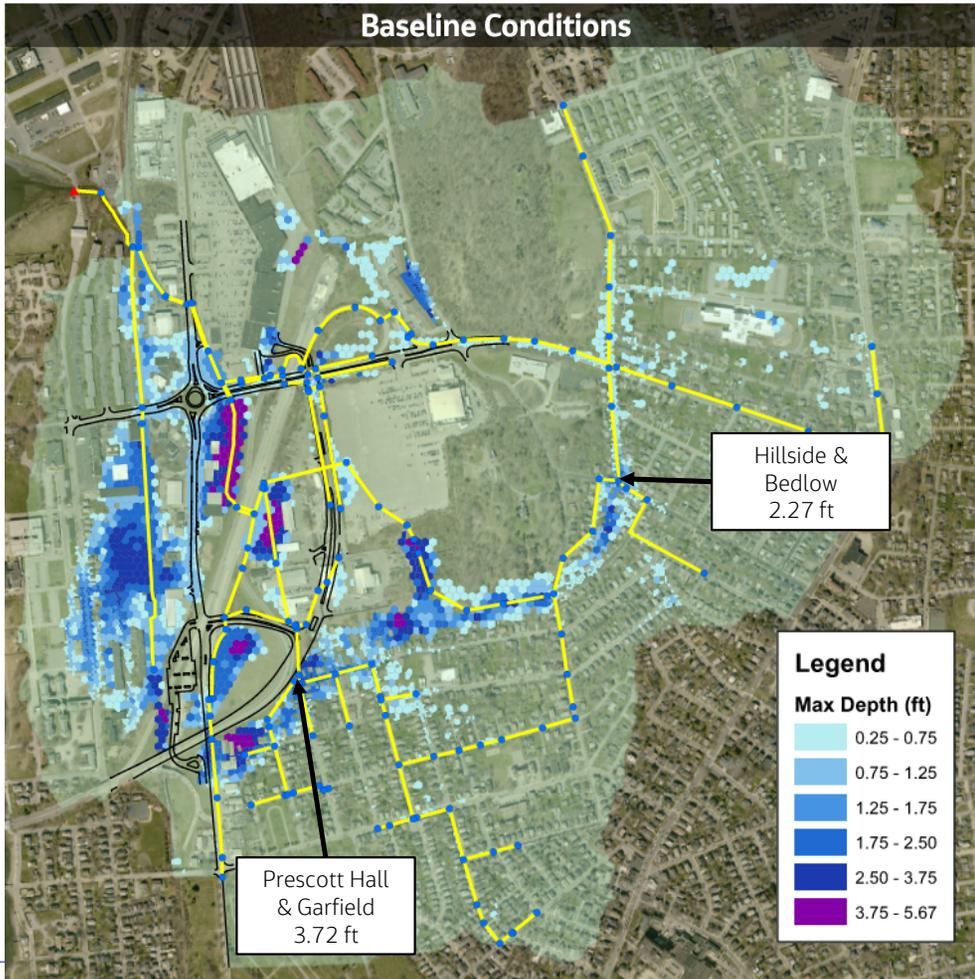
<sup>2</sup> Rhode Island Stormwater Design and Installation Standards Manual

<https://dem.ri.gov/sites/g/files/xkqbur861/files/pubs/regs/regs/water/swmanual15.pdf>

# Phase 1 Modeling Results – 10-yr, 24-hr Design Storm



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## Phase 1 Modeling Results – 10-yr, 24-hr Design Storm

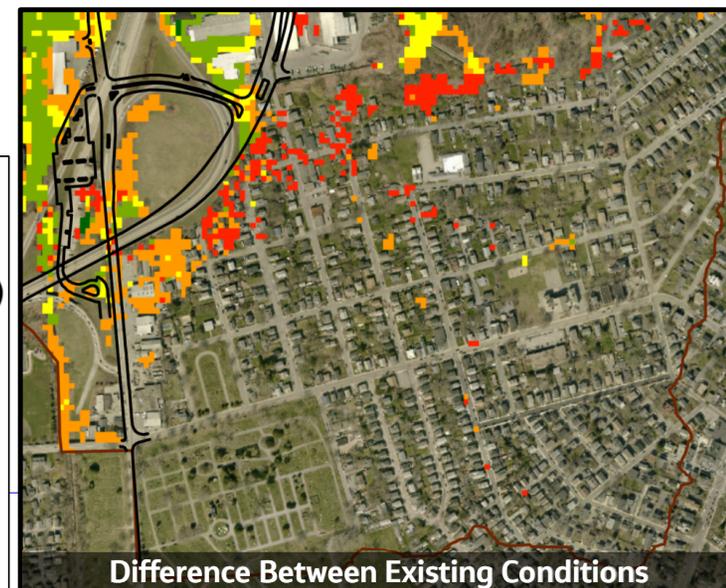
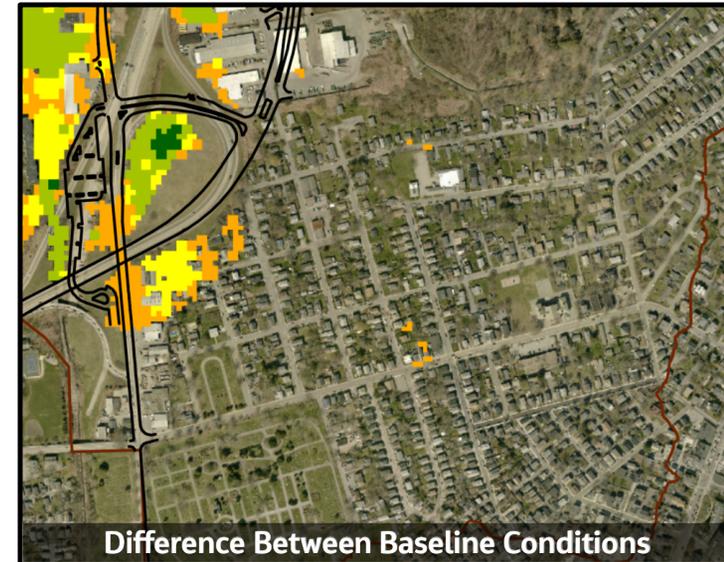
- Flood Volume Differences in Prescott Hall
  - 7% reduction from existing conditions
  - 22% reduction from baseline conditions
- Total Flood Volume Differences
  - 51% reduction from existing conditions
  - 55% reduction from baseline conditions

### Legend

— Proposed Roadway Alignment

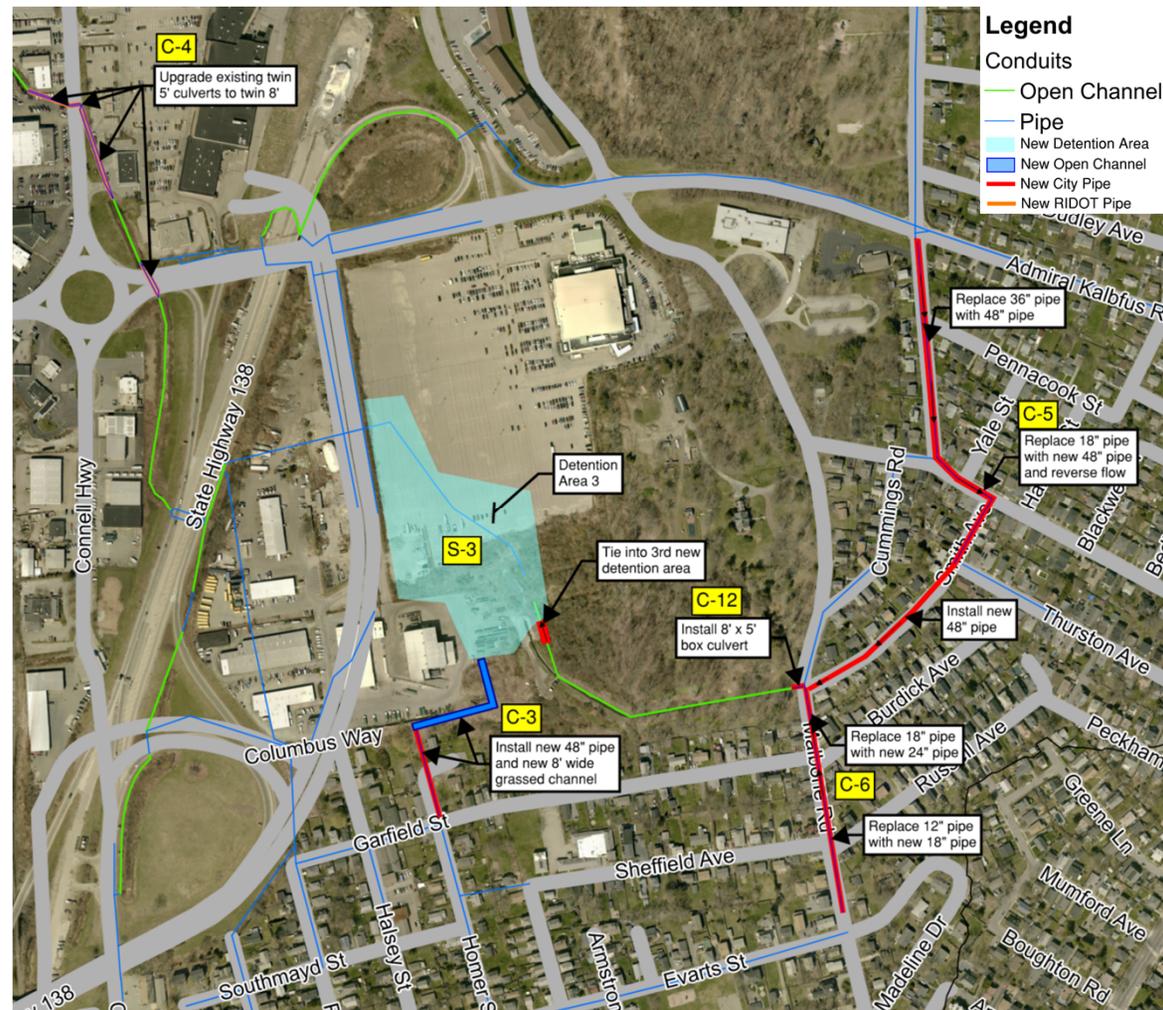
### Max Cell Depth Difference (ft)

	-4.11 - -2.97
	-2.97 - -1.63
	-1.63 - -0.94
	-0.94 - -0.25
	0.25 - 2.88

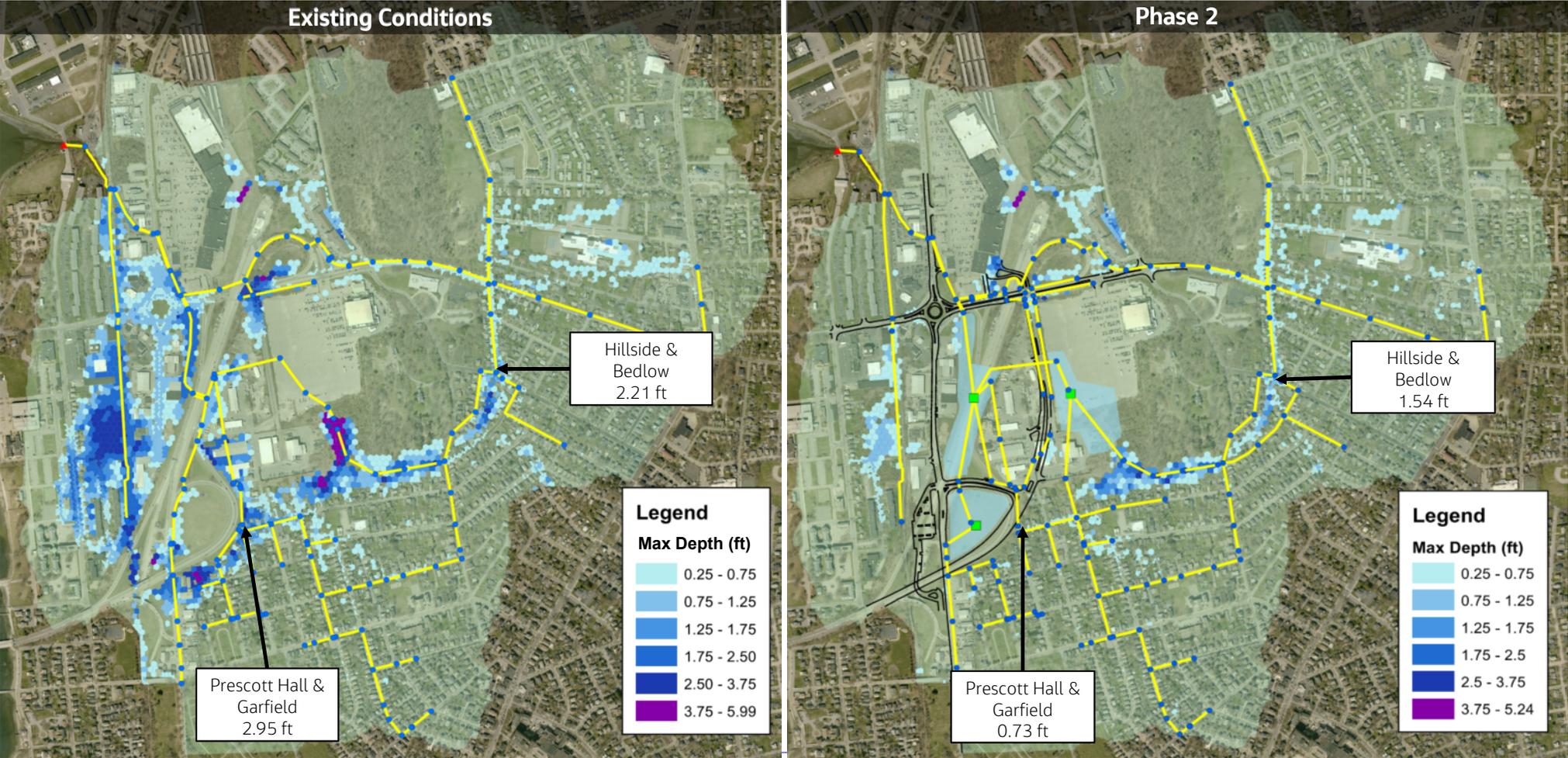


## Implementation Plan – Phase 2 (Long-Term Controls)

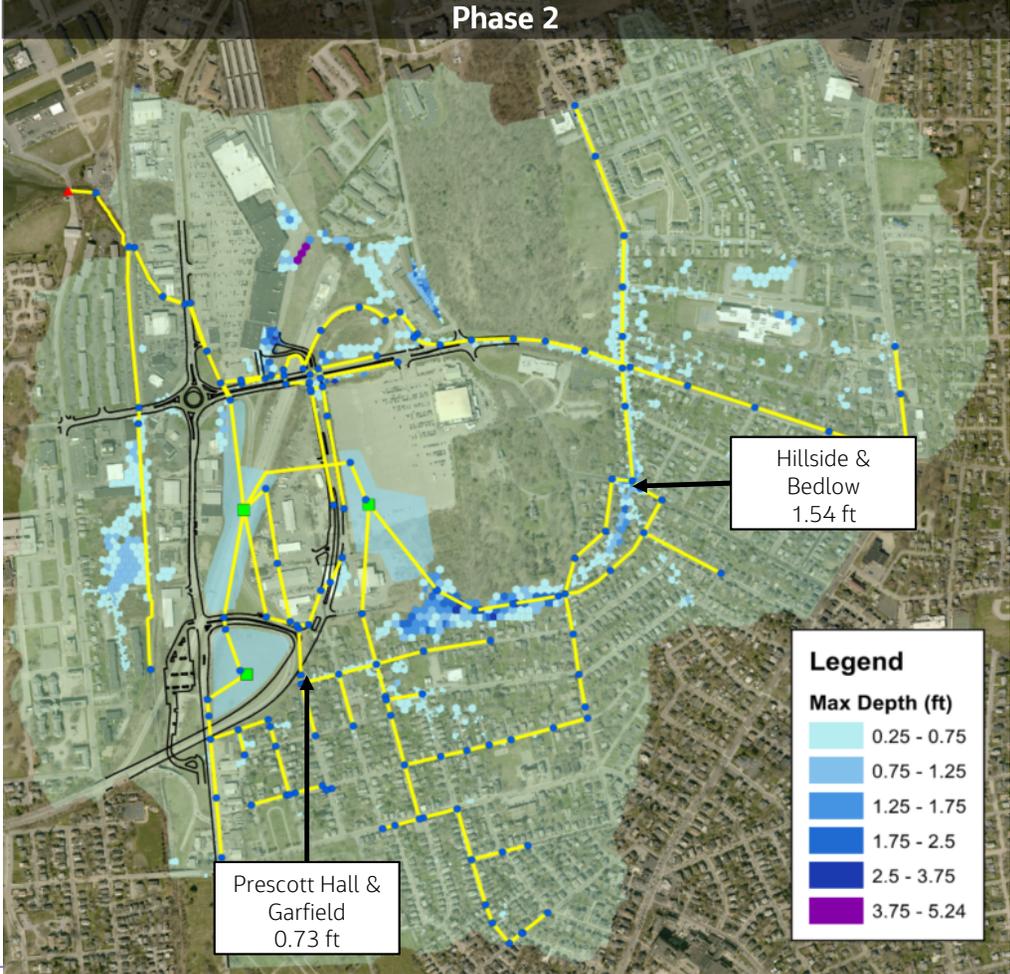
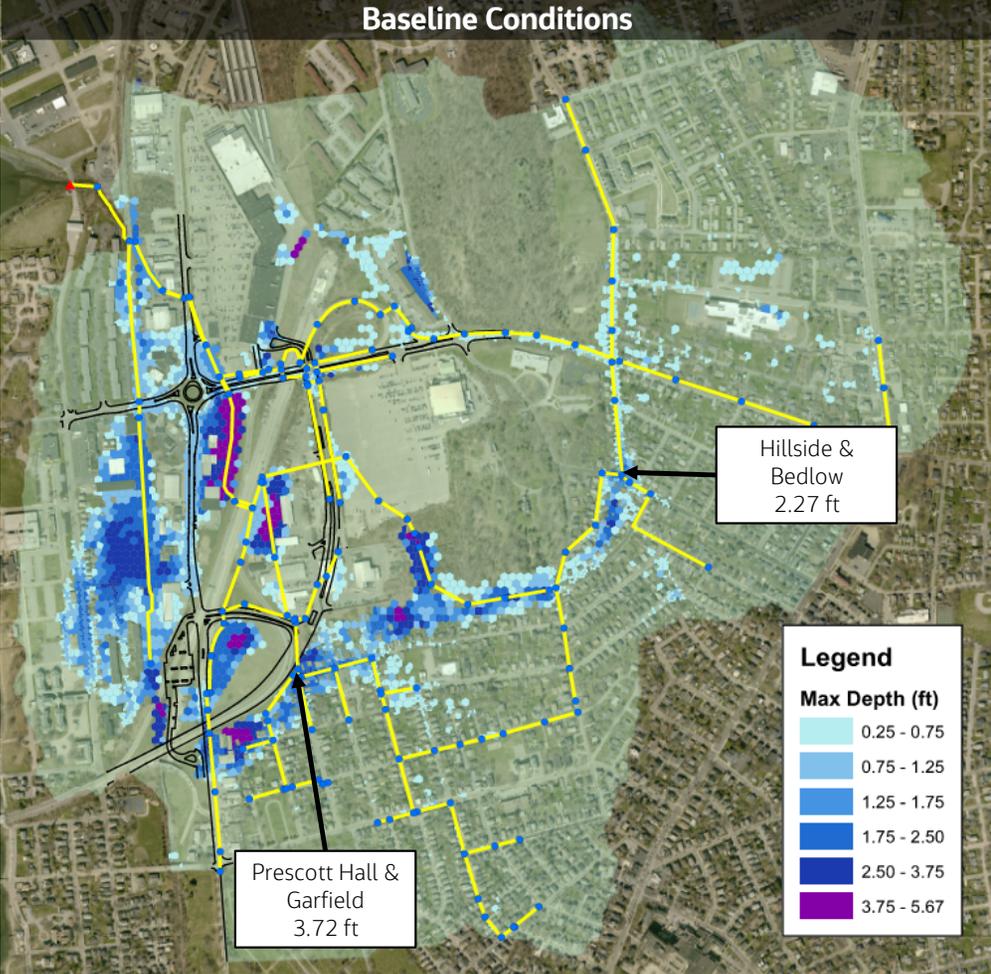
- Anticipated Timeline: ±3-8 years
- Alternatives Included:
  - S-3: Detention Area 3
  - C-3: New Pipe/Channel from Garfield to New Detention Area (S-3)
  - C-4: Upgrade Existing RIDOT Culverts
  - C-5: Drainage Improvements on Hillside/Smith
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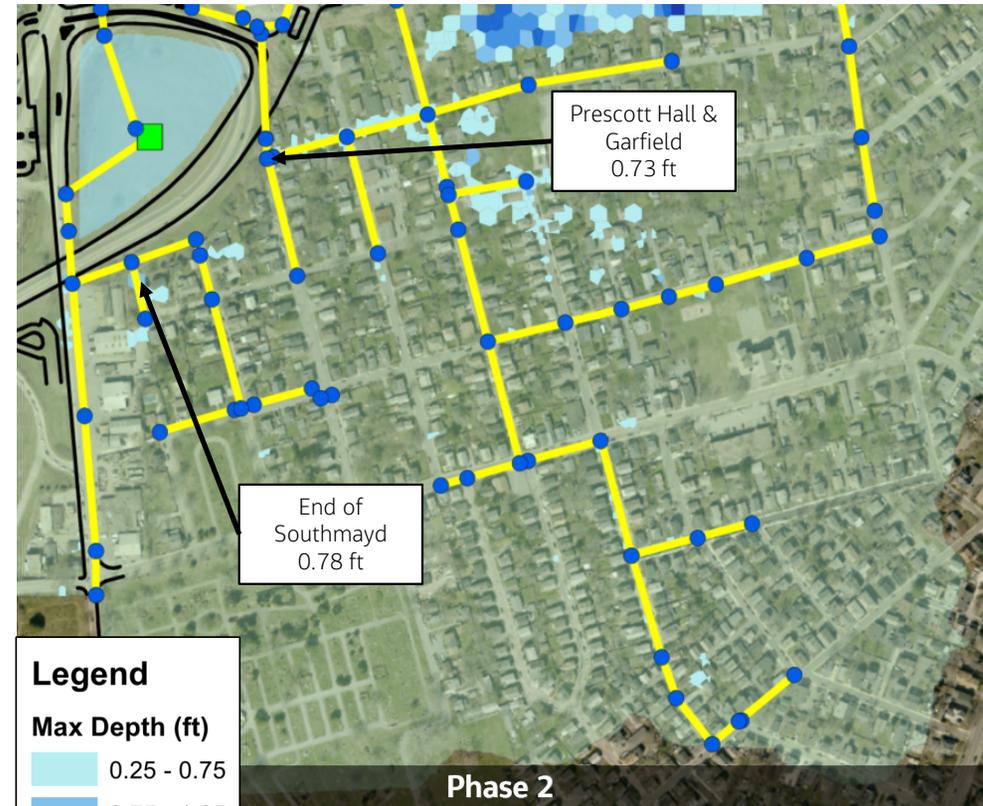
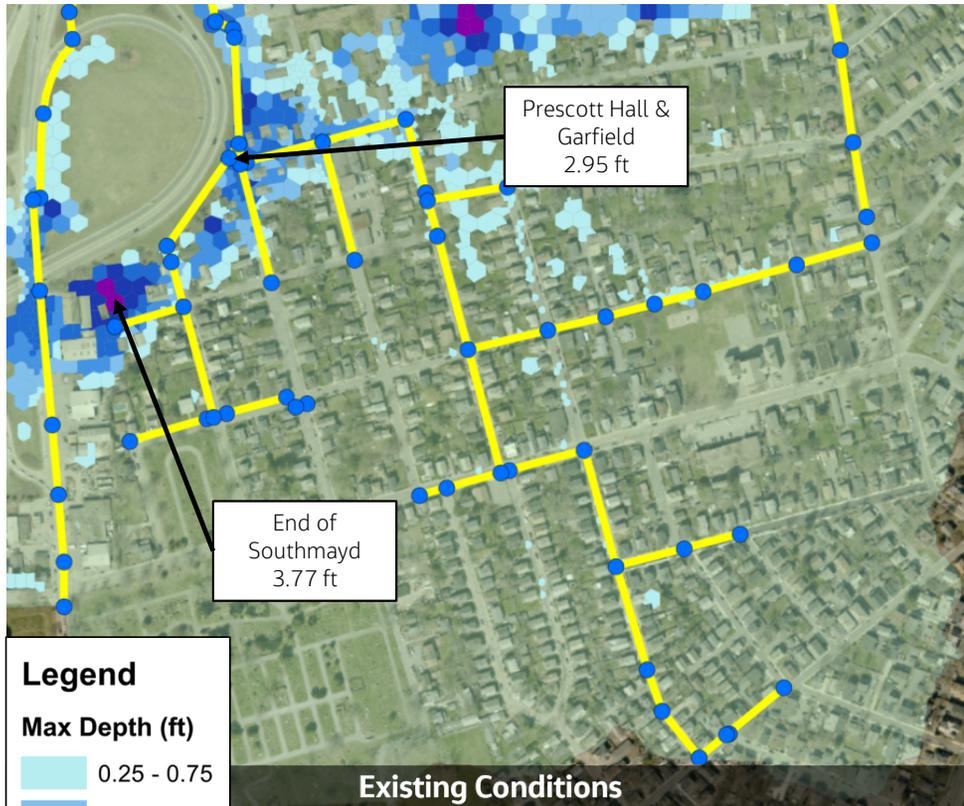
# Phase 2 Modeling Results – 10-yr, 24-hr Design Storm



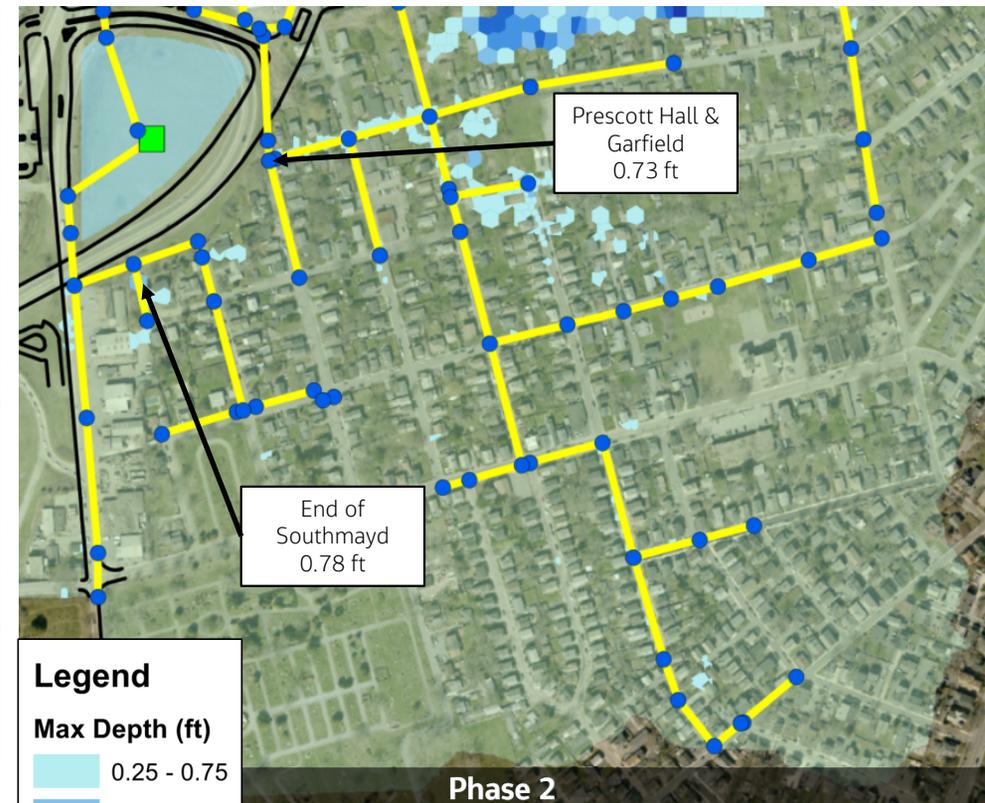
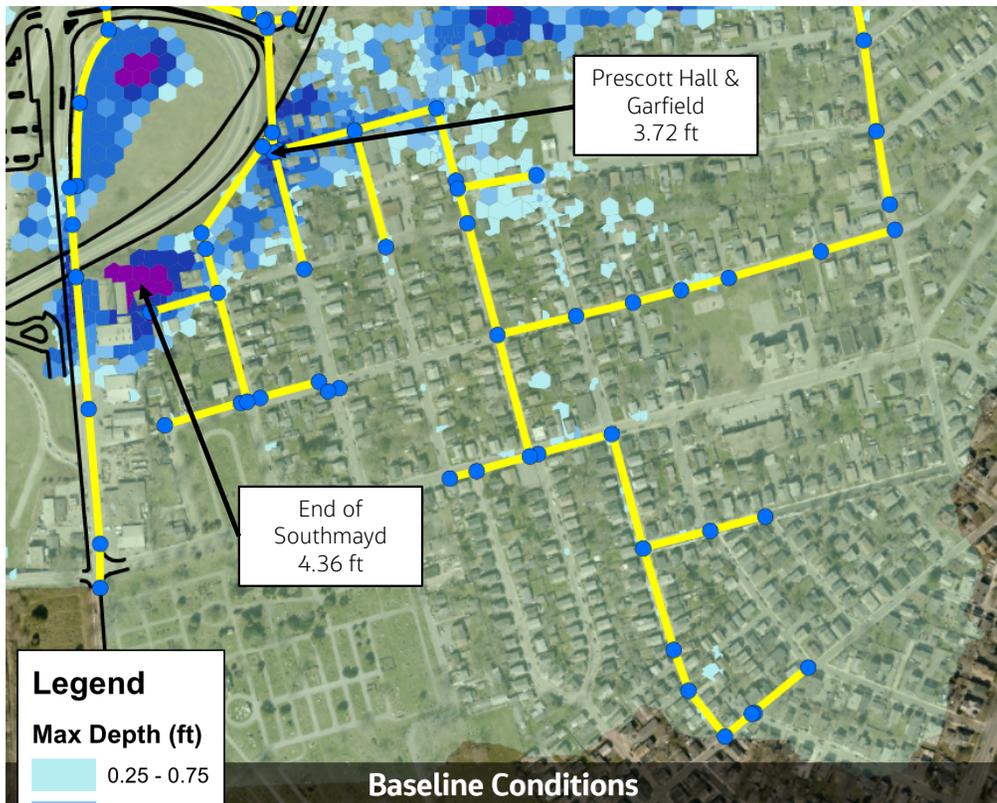
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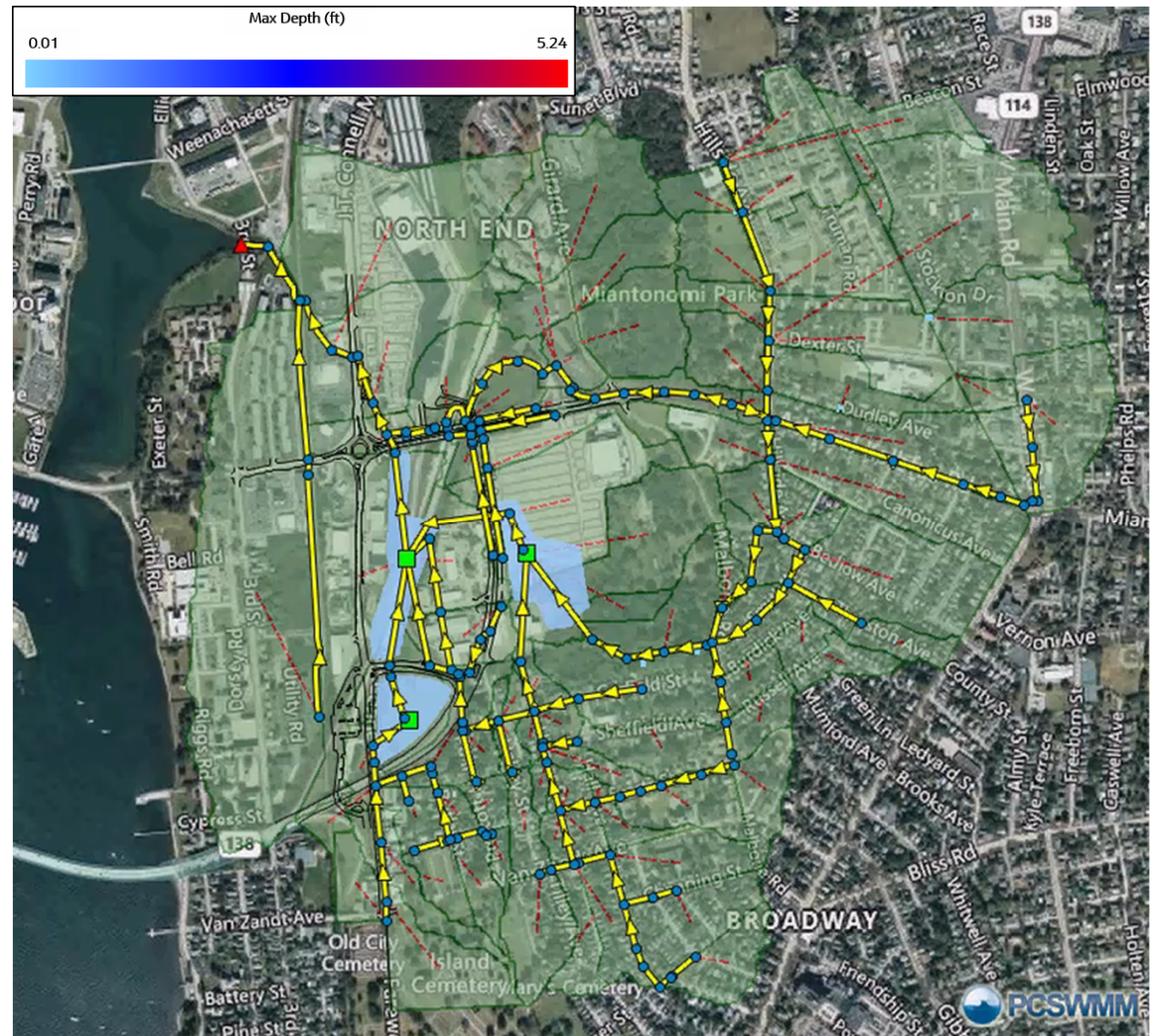
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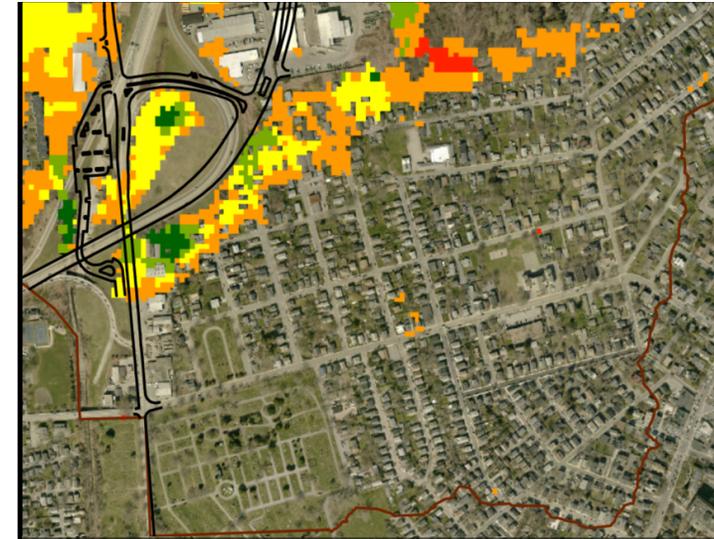
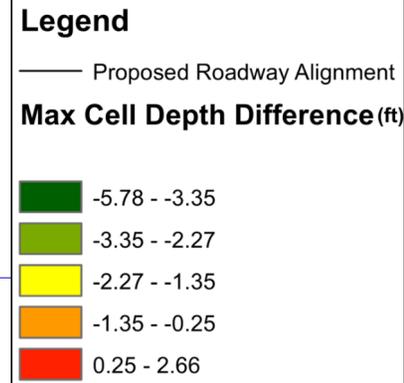


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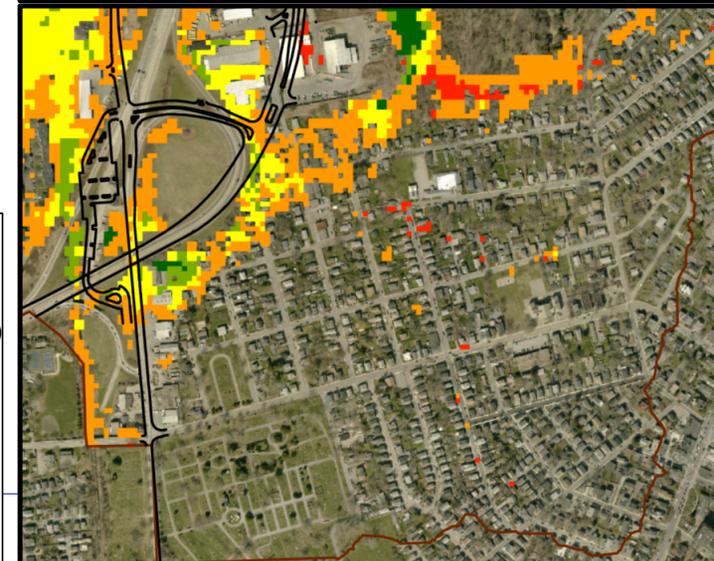


## Phase 2 Modeling Results – 10-yr, 24-hr Design Storm

- Flood Volume Differences in Prescott Hall
  - 78% reduction from existing conditions
  - 82% reduction from baseline conditions
- Total Flood Volume Differences
  - 72% reduction from existing conditions
  - 74% reduction from baseline conditions



Difference Between Baseline Conditions



Difference Between Existing Conditions

## Modeling Results and Flood Control Benefits – Summary

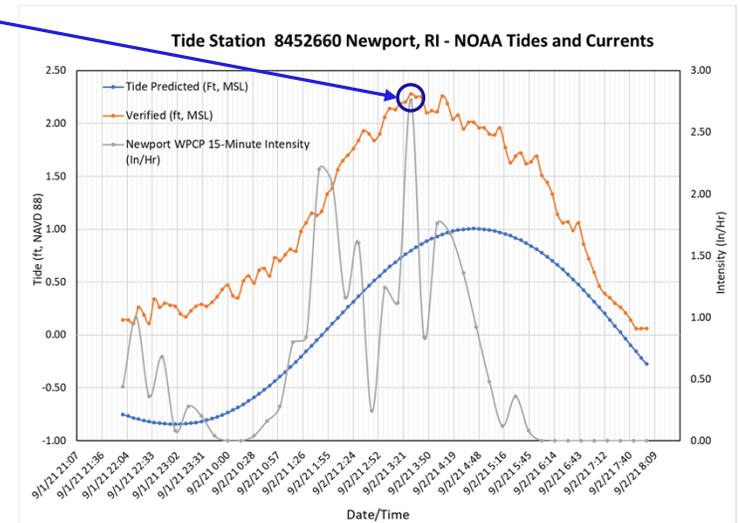
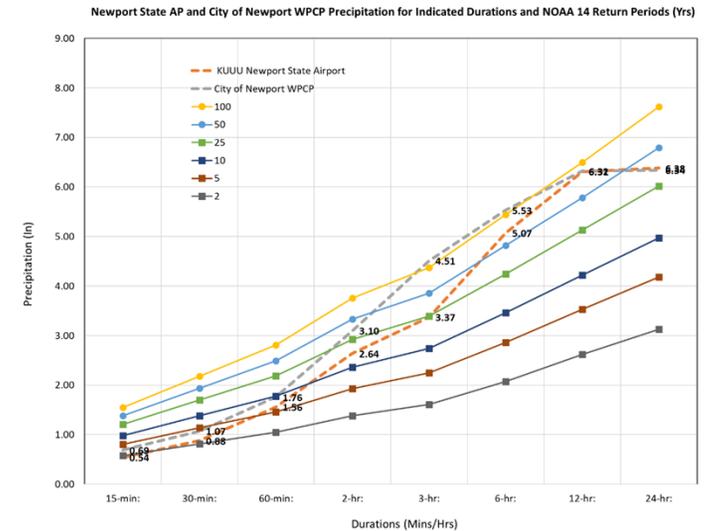
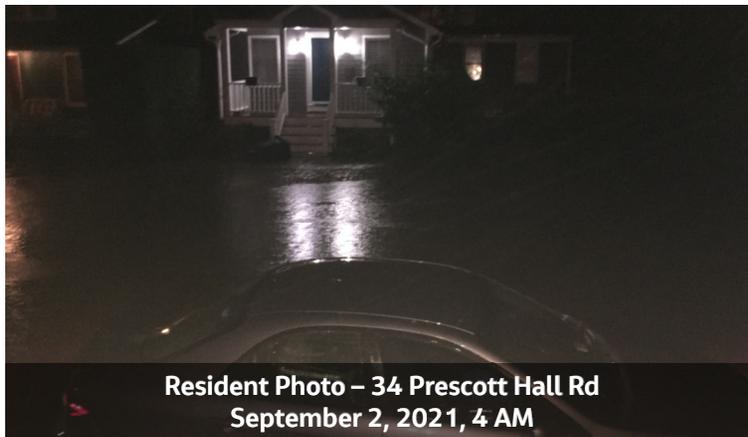
### 10-year, 24-hour Design Storm

Location	Parameter	Existing	Baseline	Phase 1	Phase 2
Prescott Hall	Total Flood Volume (MG)	3.92	4.67	3.65	0.87
	Flood Volume Change from Existing (%)	-	+19.1%	-6.89%	-77.8%
Total Across Watershed	Total Flood Volume (MG)	31.8	34.6	15.5	8.96
	Flood Volume Change from Existing (%)	-	+8.09%	-51.3%	-71.8%

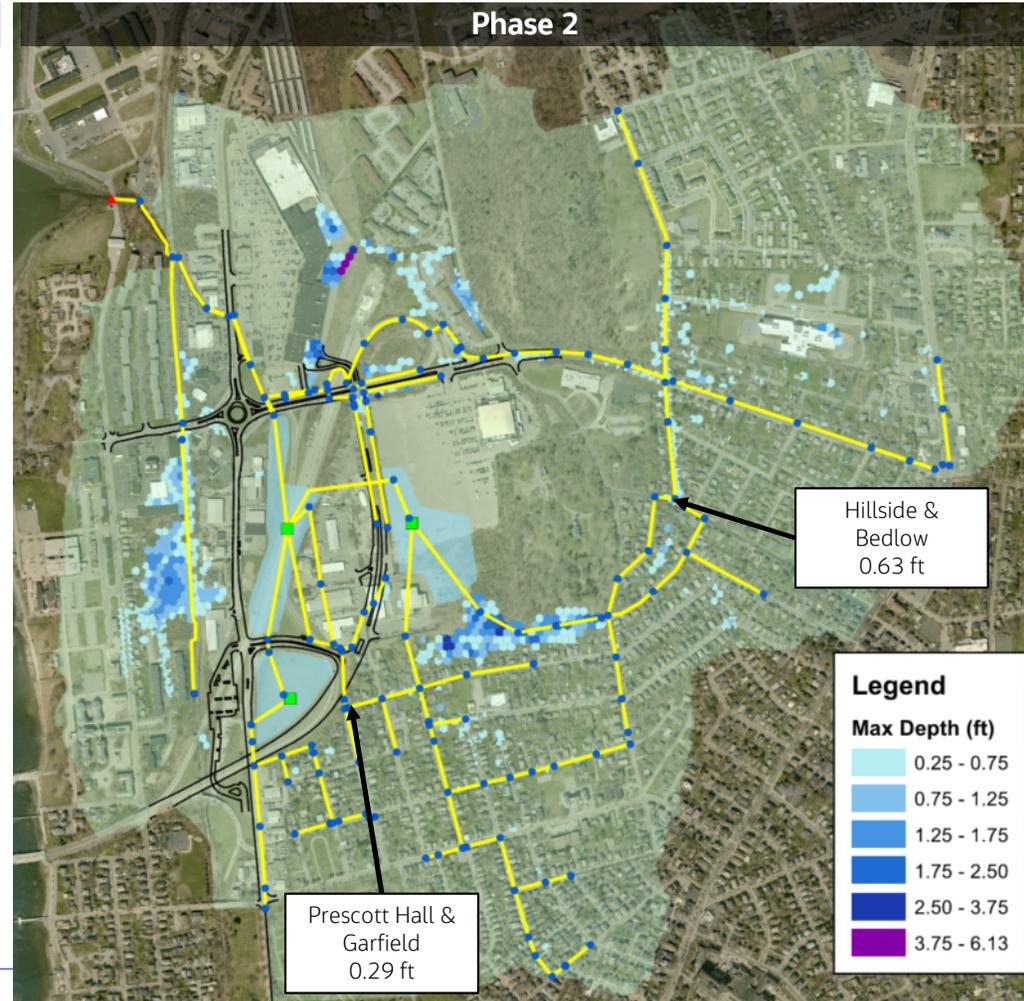
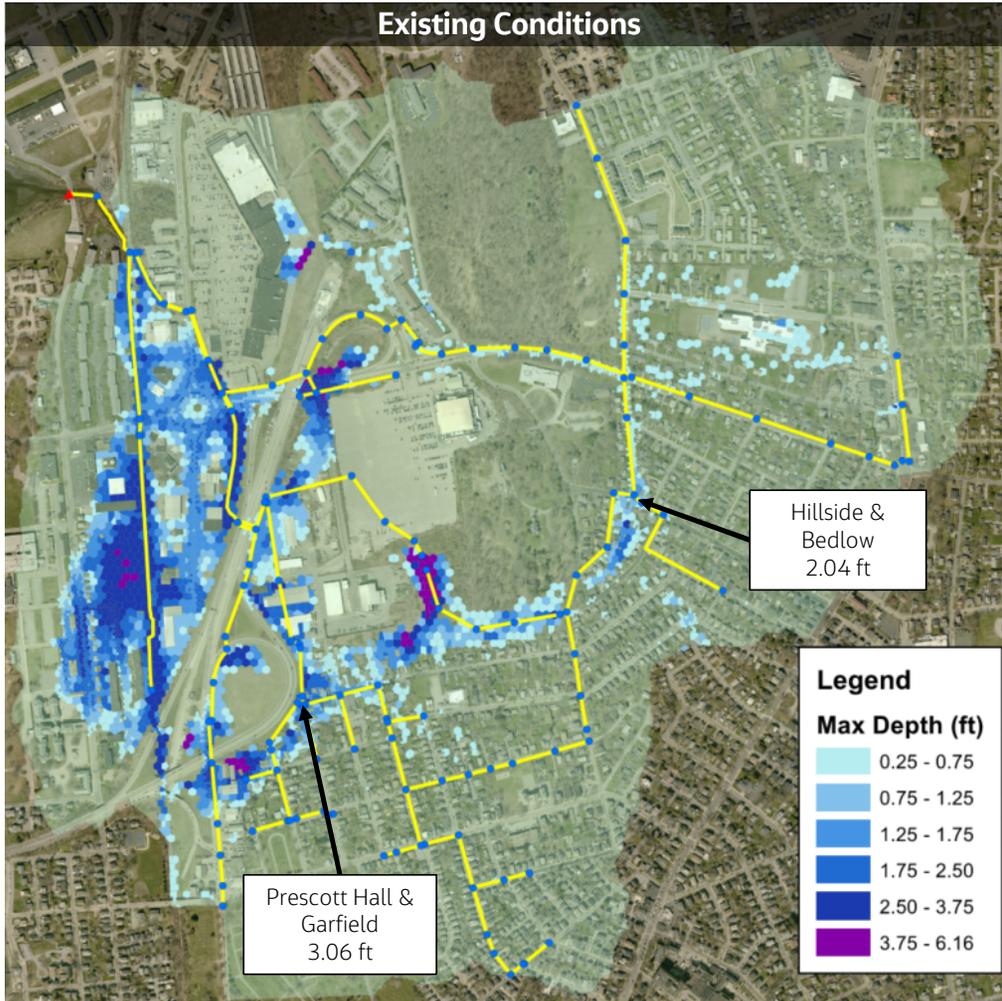
# Climate Change and Adaptation

# Tropical Storm Ida – September 1-2, 2021

- 6.34 inches rain in 24 hours
- Comparable to 100-yr, 6-hr return frequency (1% chance of occurring in any given year)
- Heaviest rainfall between 1 AM – 5 AM on Sep 2, 2021
  - Peak observed tide coincident with peak precipitation intensity at 3:30 AM

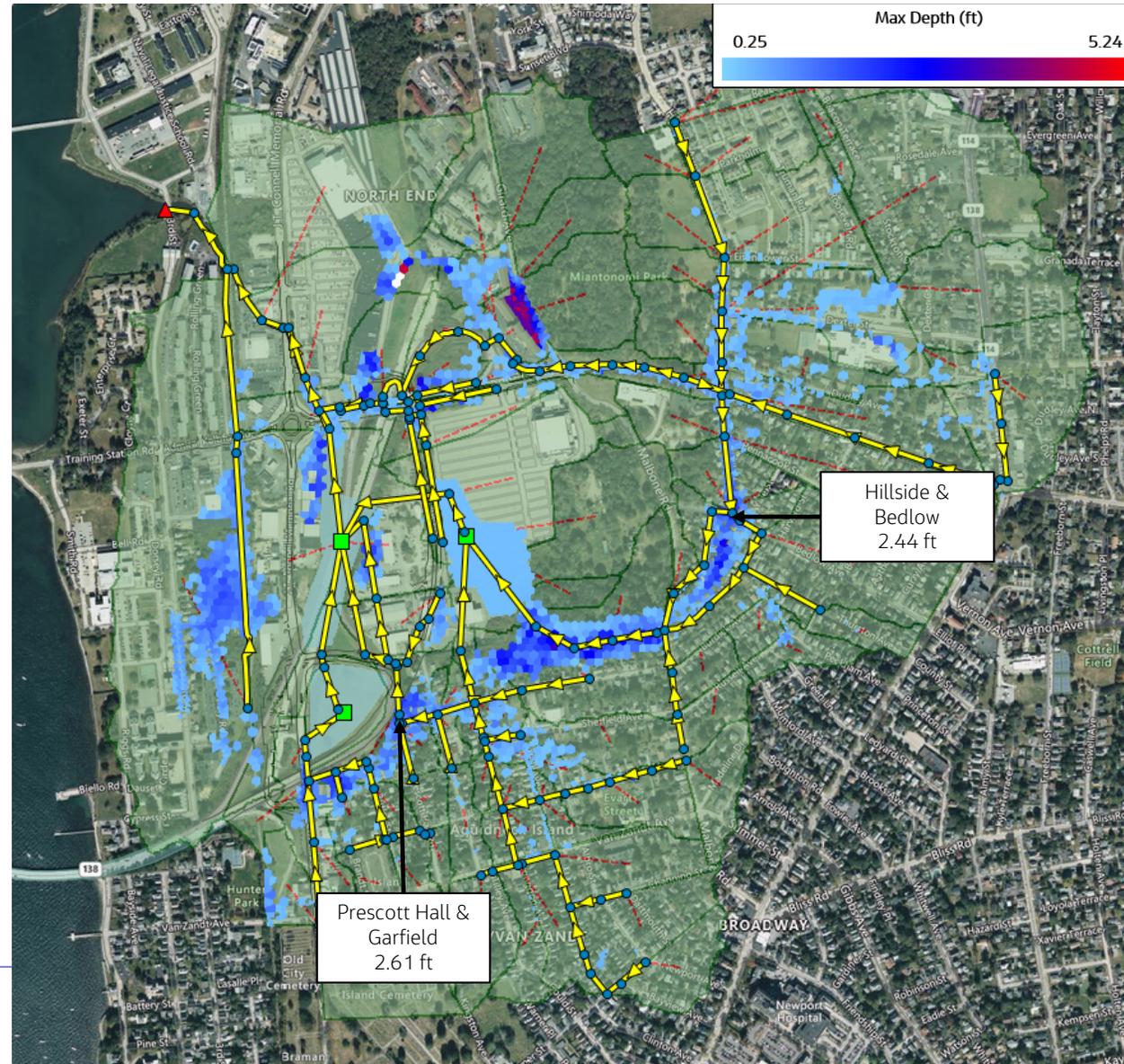


# Phase 2 Modeling Results – Tropical Storm Ida September 1-2, 2021

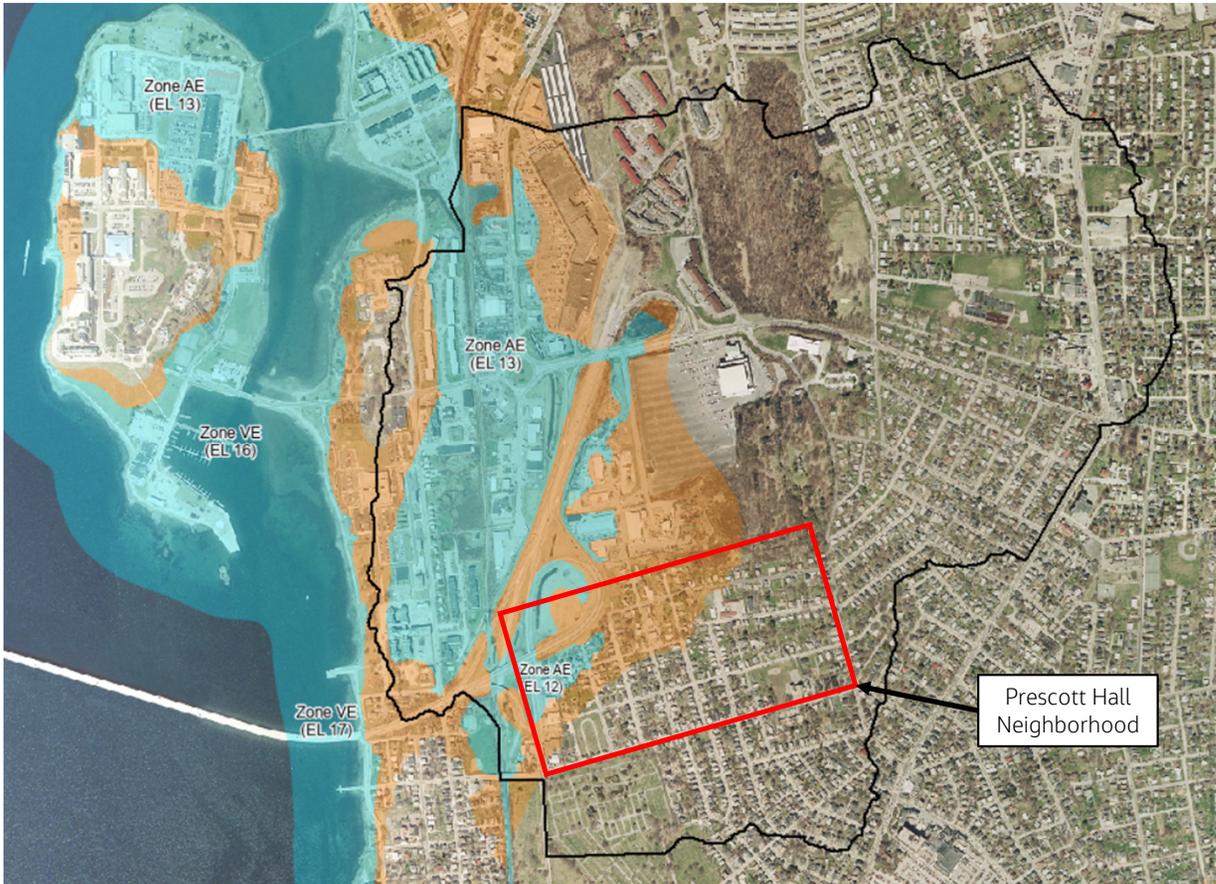


## Phase 2 Modeling Results – 100-yr, 24-hr Design Storm

- 7.62 inches in 24 hours
- Total flood volume: 18.75 MG
  - 52% increase from the 10-yr, 24-hr design storm
- Prescott Hall flood volume: 2.67 MG
  - 67% increase from the 10-yr, 24-hr design storm



# FEMA Flood Boundaries

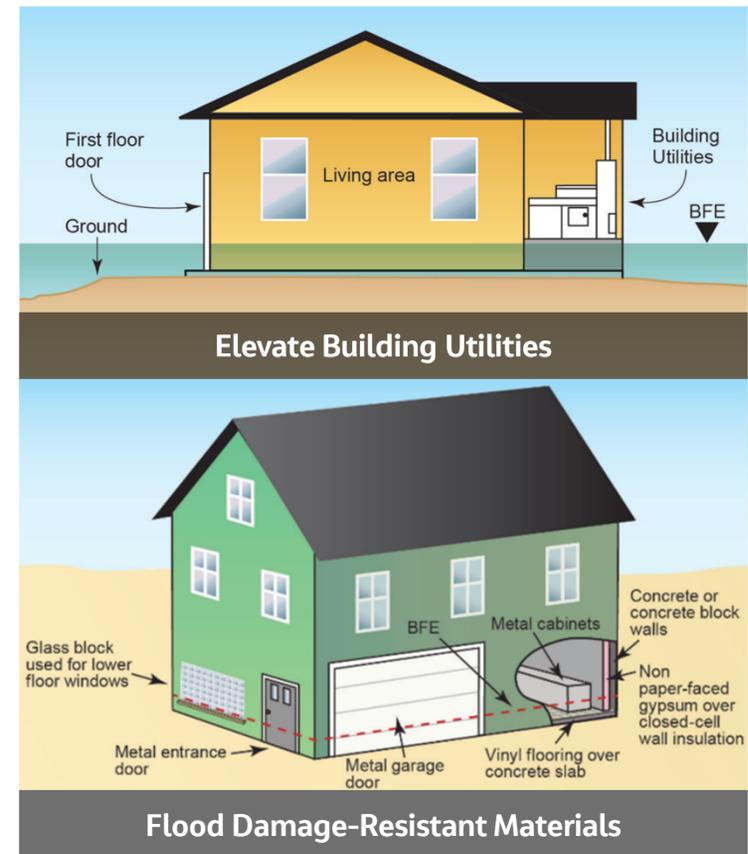


- 100-year Flood Zone (1%)
- 500-year Flood Zone (0.2%)
- Drainage Area

- Watershed lies within the 100-year and 500-year floodplains
- FEMA map does not take into consideration sea level rise or storm surge

## Adaptation Measures for Properties Within 100 and 500-yr Floodplains

- There will be events that exceed the 10-yr design criteria, which may be caused by extreme precipitation, storm surge, and sea level rise
- Examples of adaptation measures for residential buildings that cannot be elevated (FEMA P-1037, Sep 2015):
  - Elevate building utilities and associated equipment
  - Install flood resistant windows and doors
  - Basement infill; Abandon or elevate lowest interior floor
  - Backflow (non-return) valves/shutoff valves



Source: FEMA P-1037, September 2015

# Conceptual Construction Costs

## Conceptual Construction Costs

- **Phase 1:**
  - 7 improvement projects
  - 73.3 acre-ft detention
  - 4,200 linear feet pipes/culverts
  - Located in public right-of-way
- **Phase 2:**
  - 6 improvement projects
  - 59.3 acre-ft detention
  - 4,300 linear feet pipes/culverts
  - Located in public and private

	Phase 1			Phase 2		
	City	State	Private	City	State	Private
Construction Cost by Location <sup>1</sup>	\$3.2 M	\$17.0 M	-	\$5.1 M	\$8.7 M	\$17.3 M
<b>Total Construction Cost<sup>1</sup></b>	<b>\$20.2 M</b>			<b>\$31.1 M</b>		

<sup>1</sup>Phase 1 escalated to 2024; Phase 2 escalated to year 2028  
 Costs shown are planning level estimates (AACE Class 5)  
 Actual costs may vary +100%/-50% depending on final design and market conditions

# Next Steps

## Next Steps

### Current Study

- Issue draft and final report

### Future Work

- Coordinate with DOT to maximize what can be included in Pell Bridge project
- Initiate preliminary design
  - Optimize alternatives
  - Reduce costs
  - Address constructability
  - Evaluate permit requirements
  - Evaluate financing options and rate impacts

Thank you!