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

Public Workshop #2
June 23, 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

- Review of Stakeholder Comments from Public Meeting 1
- Updated Survey Results
- Model Validation and Results for Tropical Storm Ida
- Baseline Model Development with Pell Bridge Improvements
- Flood Mitigation Alternatives
  - Blue-Green Infrastructure
  - Gray Infrastructure
- Alternatives Evaluation Process
- Next Steps
- Open Discussion

Review of Stakeholder Comments from Public Meeting 1

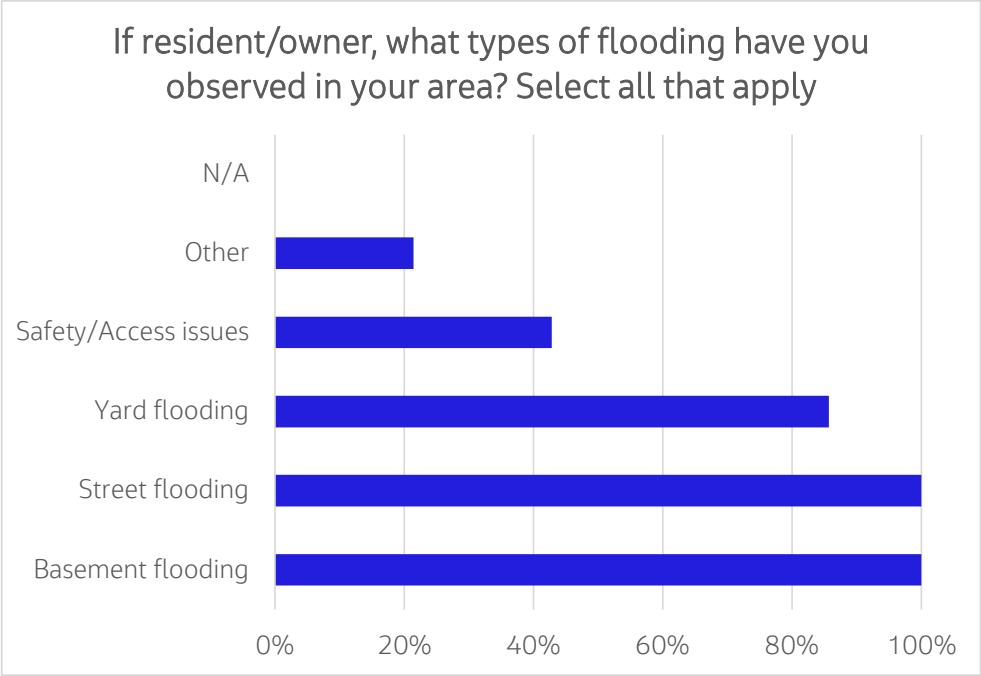
Public Meeting 1 Stakeholder Comments

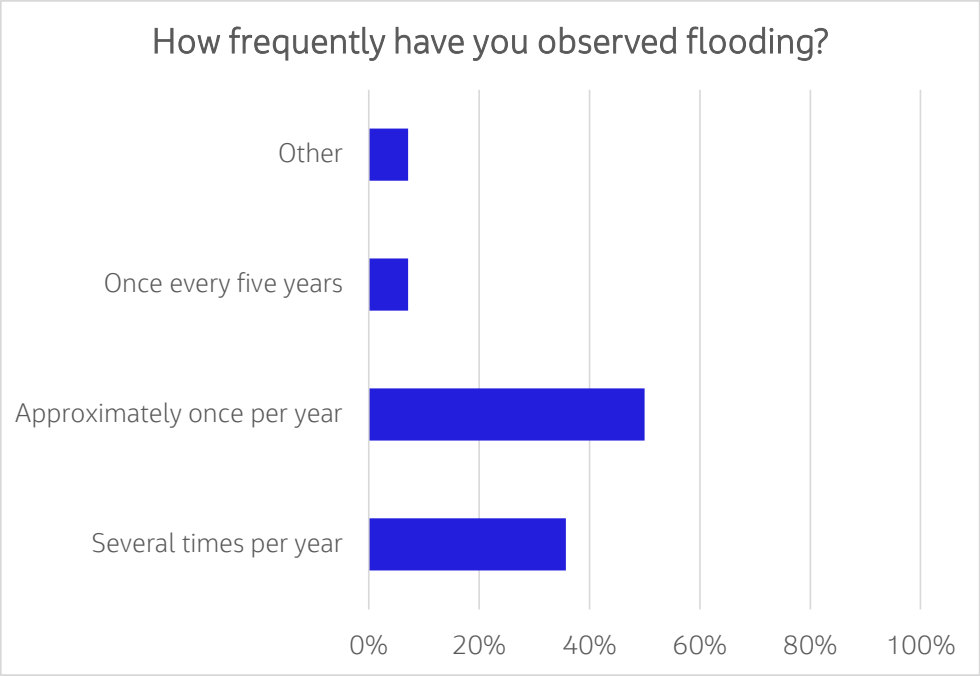
- Magnitude and frequency of future flooding events
  - Will be addressed as part of this study
- July 2020 event
  - This storm has been reviewed as suggested, results included in this presentation
- Schedule of proposed improvements
  - Will likely include a combination of short-term solutions (1-3 years) and long-term solutions (3+ years)
  - Review of mitigation alternatives including implementation schedules will be part of Public Meeting #3 in August-September
- Pell Bridge project retaining wall
  - Impacts of Pell Bridge improvements project included within this presentation

Updated Survey Results

Survey Results

- Total responses as of June 22nd: 14

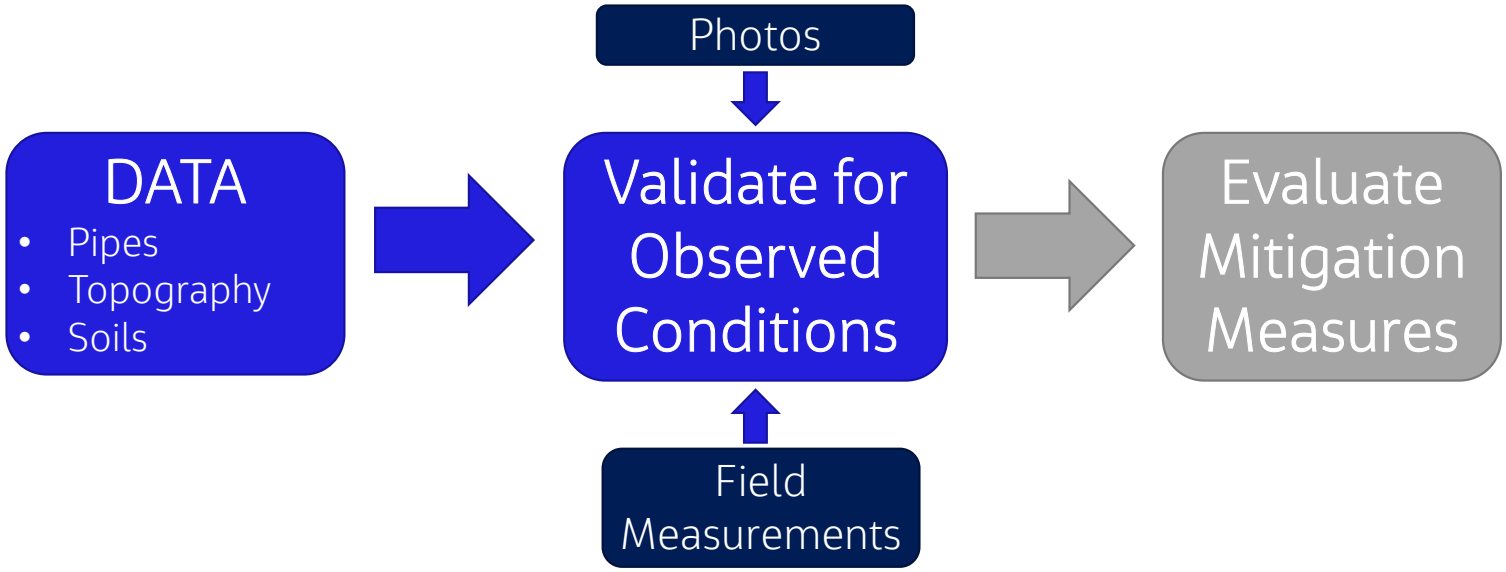




Model Validation and Results for Tropical Storm Ida

Model Validation

- Model validation is the process by which model outputs are (systematically) compared to independent real-world observations to judge the quantitative and qualitative correspondence with reality.

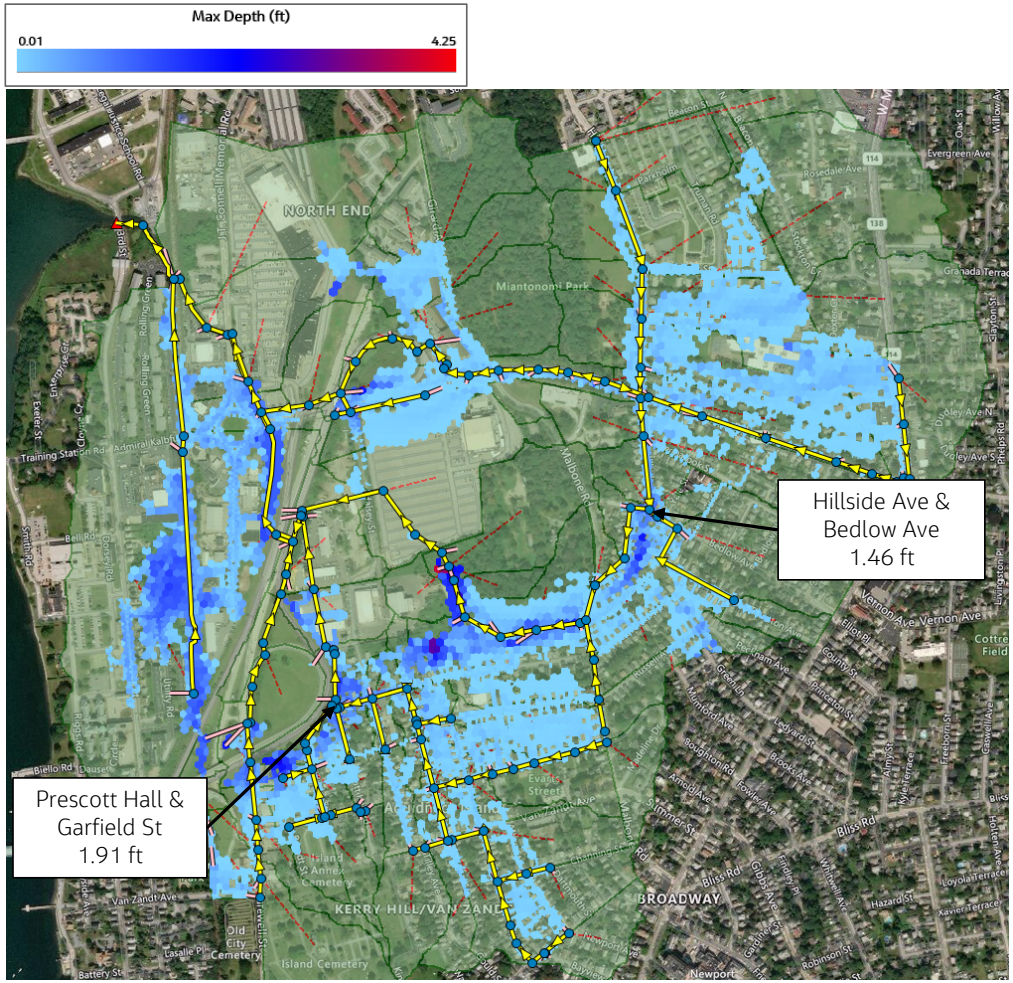


Model Validation – July 2020

- July 14, 2020
- 1.53 inches rain in 40 minutes
- Comparable to 10-25 yr return frequency

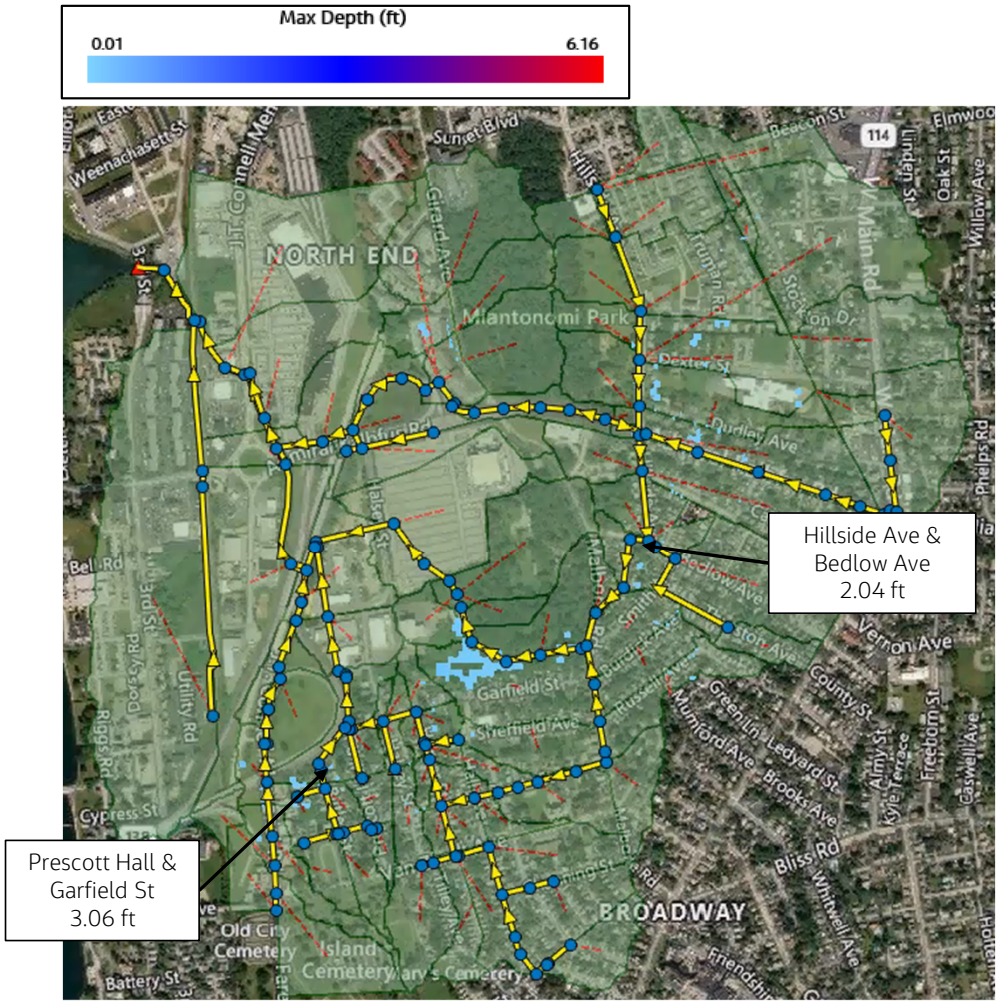
1.) 79 Garfield St.
Model Depth: 0.92 – 1.79 ft

2.) JT Connell Highway
Model Depth: 0.5 – 0.91 ft
https://www.newportri.com/story/news/local/2020/07/14/fast-moving-storm-floods-newport-streets-knocks-out-power/113764828/



Model Validation – Tropical Storm Ida

- September 1-2, 2021
- 6.34 inches rain in 24 hours
- Comparable to 100-yr, 6-hr return frequency
- Peak observed tide coincident with peak precipitation intensity at 3:30 AM

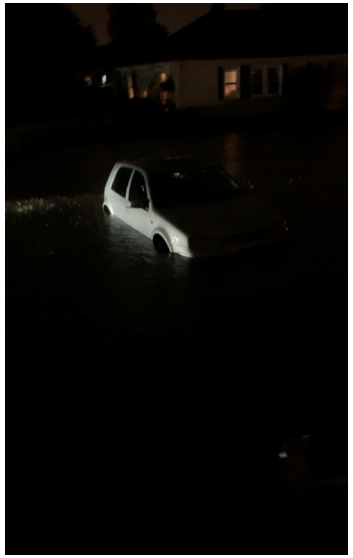


Model Validation – Tropical Storm Ida

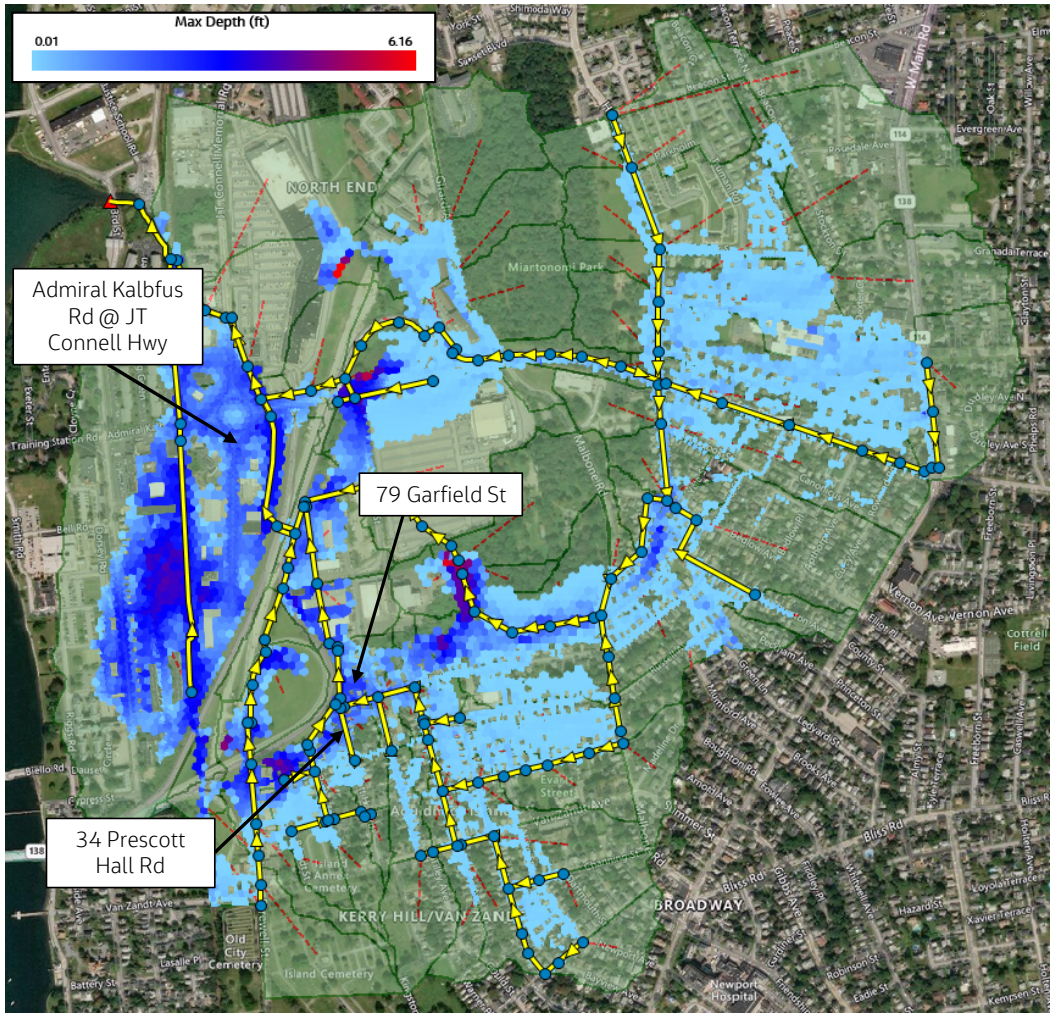
9/2/21 6.34 inches rain in 24 hours

1.) Admiral Kalbfus Rd @ JT Connell Hwy, South (10 AM on 9/2). **Model Depth: 1.46 – 1.92 ft**

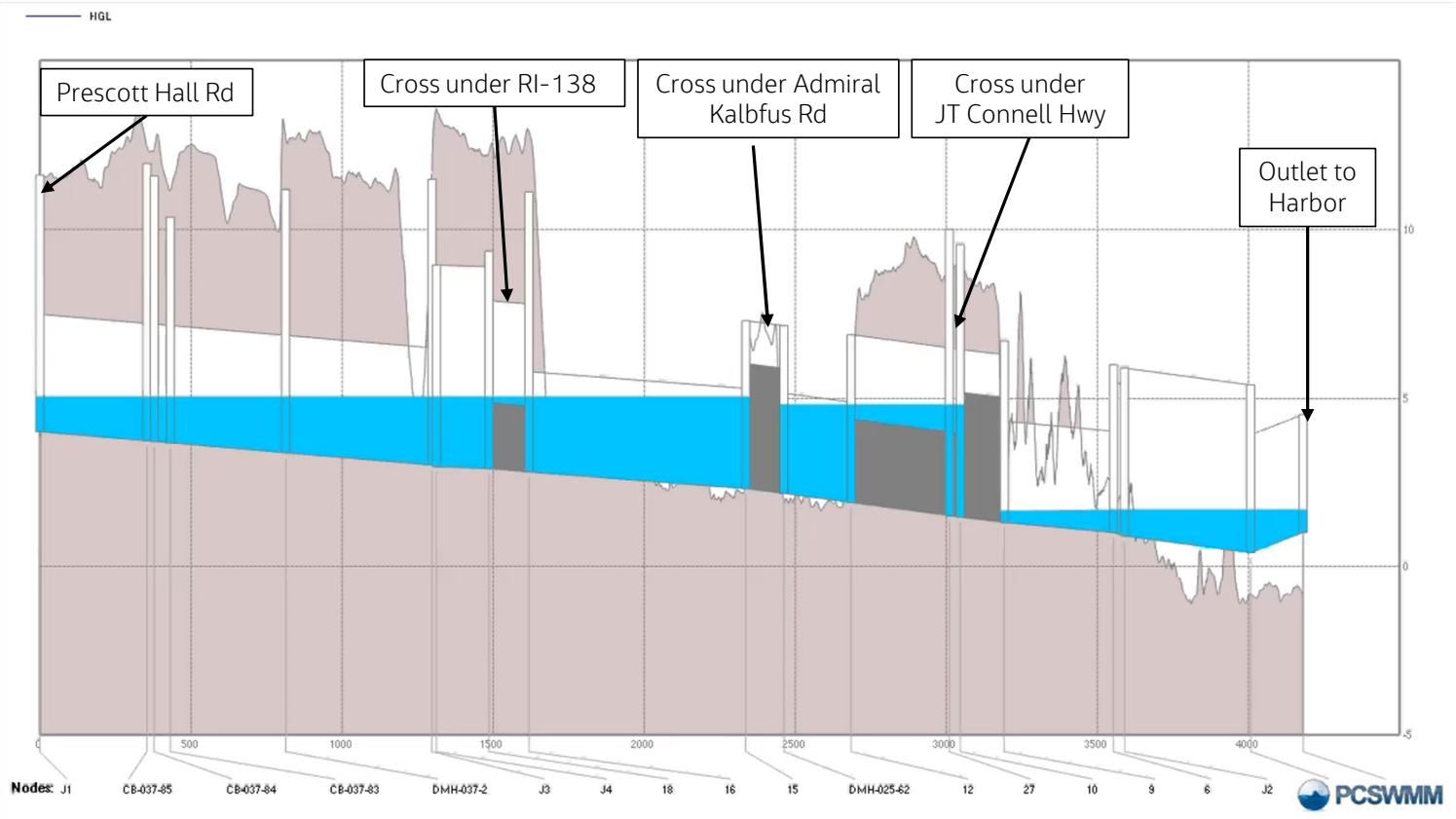
2.) 34 Prescott Hall Rd.
Model Depth: 1.5 – 2.37 ft



3.) 79 Garfield St.
Model Depth: 1.74 – 2.38 ft



Prescott Hall Road to Harbor Profile – Tropical Storm Ida



Baseline Conditions Model Development

Pell Bridge Project Modifications in Project Area

Existing Conditions Model – 10-yr, 24-hr Design Storm

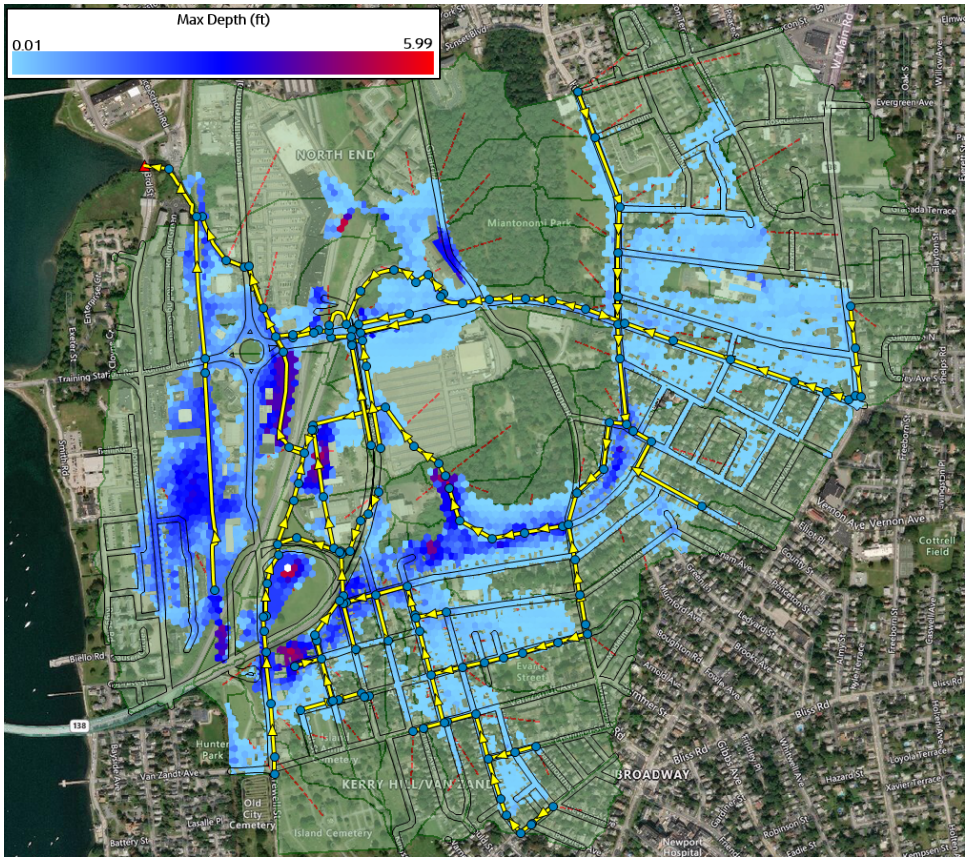
- 36.0 MG flood volume
- Equivalent to:
  - 84 football fields, 1 foot deep
  - 55 Olympic swimming pools

Pell Bridge Improvement Project

- Construction began in Summer 2021 and is ongoing
- Key components
  - realign Farewell Street and J. T. Connell Hwy
  - relocate the ramp to downtown
- Drainage features
  - new/upsized drains along ramp and JT Connell Hwy
  - wetland restoration
  - drainage culverts and channels downstream of Prescott Hall watershed retained at existing sizes
  - Several acres will be made available for City development

https://www.dot.ri.gov/projects/pellbridgeramps/

Baseline Conditions Model – 10-yr, 24-hr Design Storm



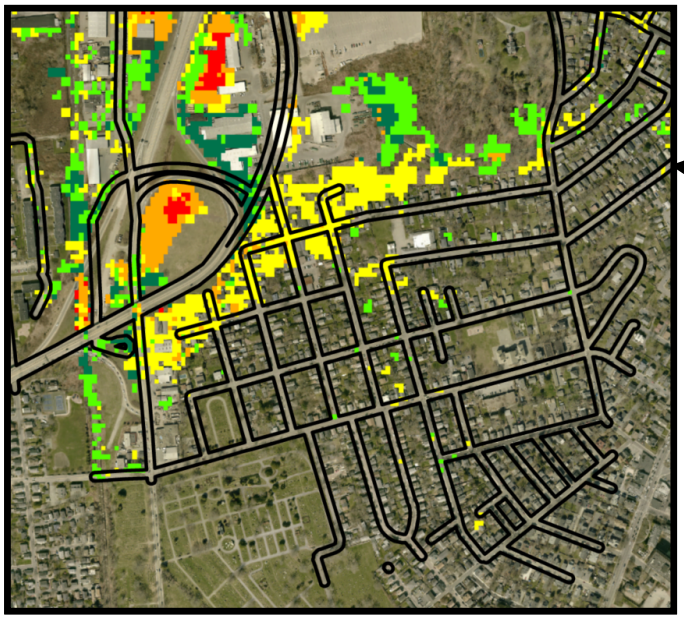
Model Run	Total Flood Volume (MG)	Prescott Hall Neighborhood Flood Volume (MG)
Existing Conditions	36.0	4.13
"Cleaned" Existing Conditions	30.0	4.05
Baseline Conditions ("Cleaned" Existing w/ Pell Bridge project)	38.9	5.54

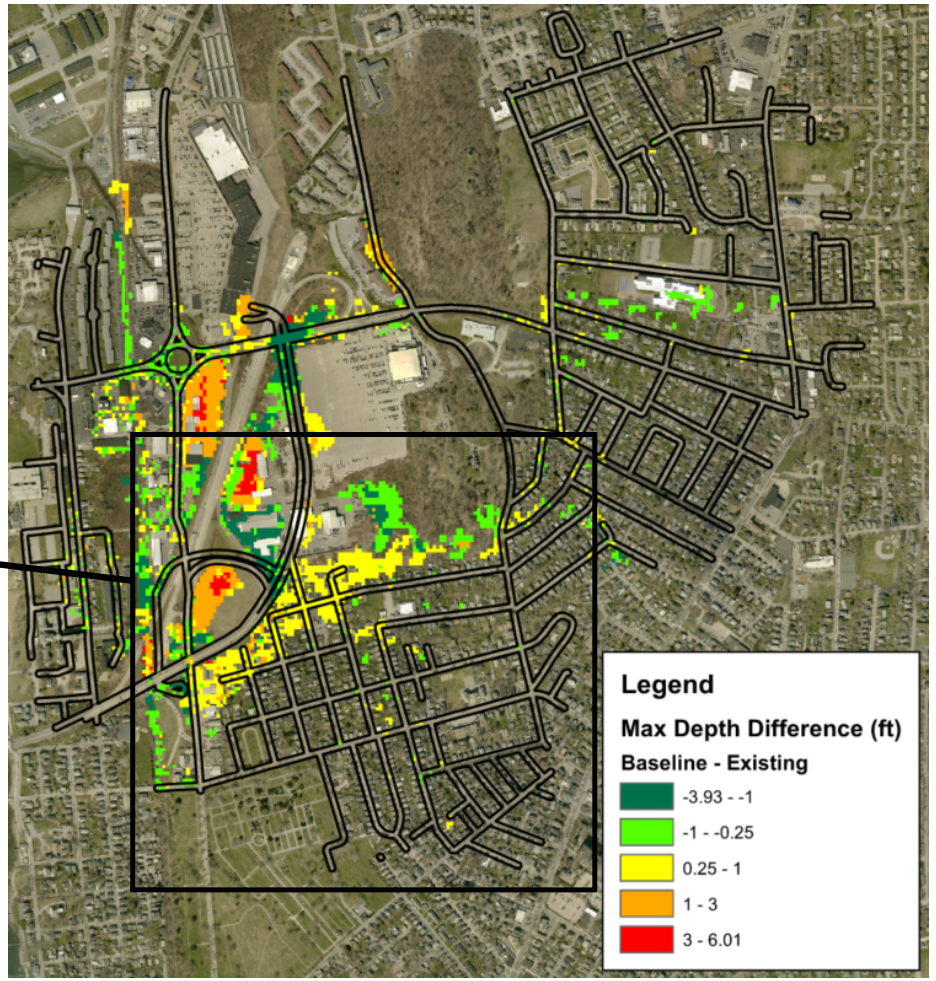
Baseline Conditions: ~38.9 MG flood volume

MG = millions of gallons

Baseline Conditions Model Comparison 10-yr, 24-hr Design Storm

- Green areas show where flooding decreased
- Red areas show where flooding increased most drastically



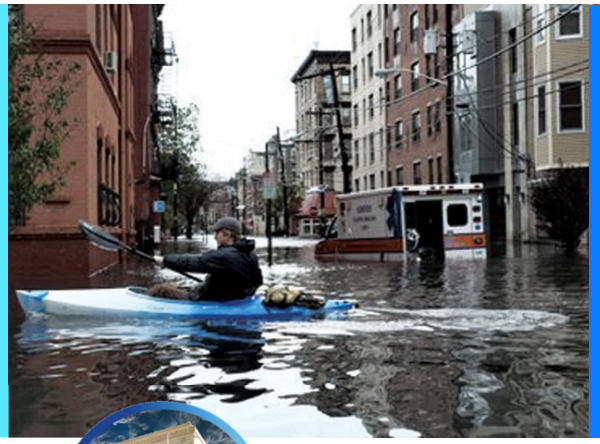


Flood Mitigation Alternatives

Rethinking Our Current Drainage Infrastructure

A new approach is needed to address new regulations and provide meaningful triple-bottom line (social, environmental, and financial) benefits

- Our current drainage infrastructure has not aged well
- Insufficient capacity
- Does not improve water quality
- Does not reduce volume
- Often just sends the problem downstream



Interior flood modeling of WMATA's Archives - Navy station near 7th and Constitution Ave, for projected 500-year storm in 2065.

A New and *Evolving* Approach to Stormwater Management

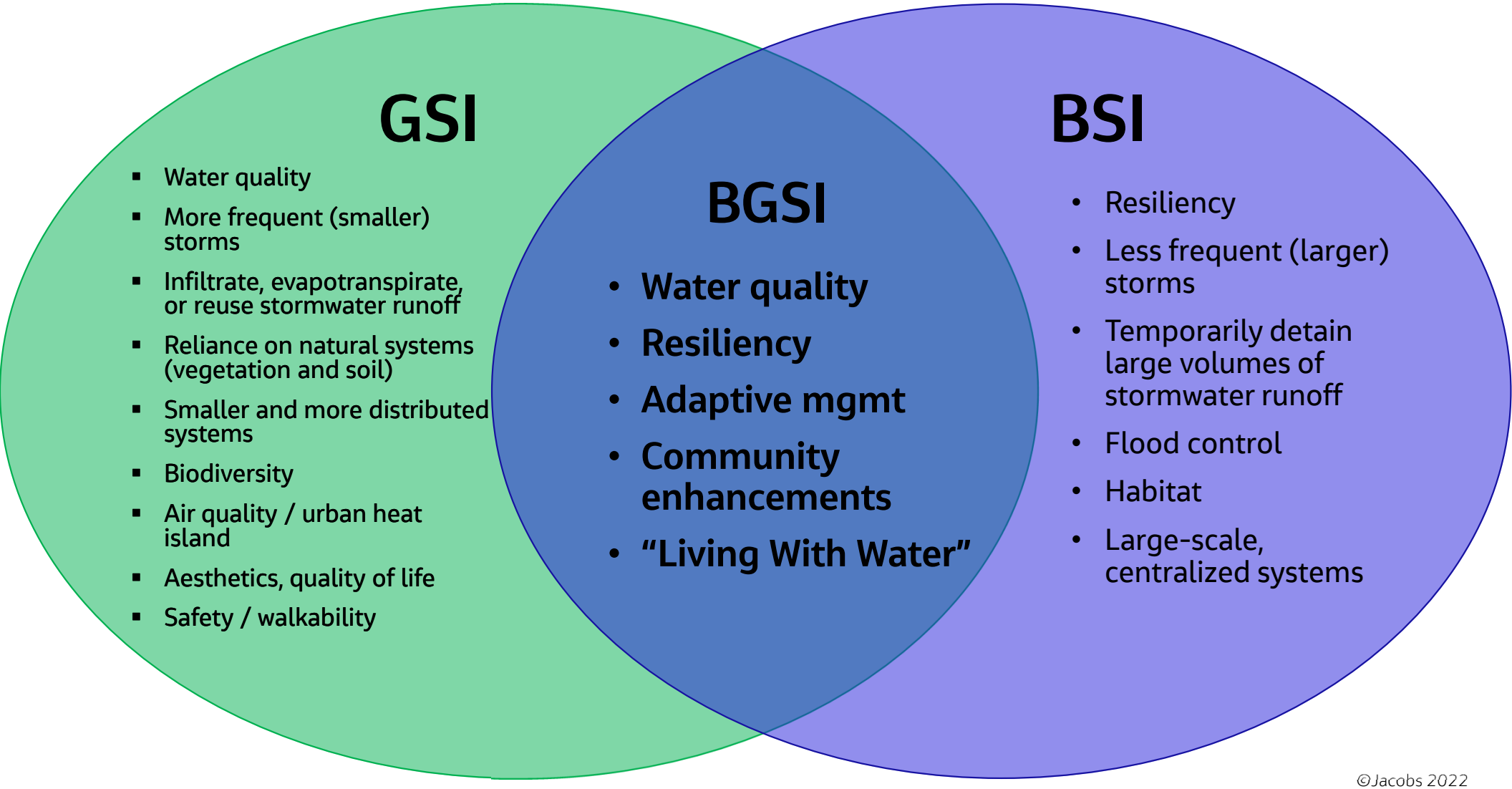
- Many communities face the following challenges:
  - Can we redevelop or retrofit our communities to **reduce flooding, improve water quality, AND create better places**?
  - Can we design stormwater practices that are both sized for **resiliency** AND **cost efficient**?
  - Can we reimagine our public spaces as both useable for **recreation** AND feasible for **flood storage**? Can we embrace the concept of "**living with water**"?

A New and *Evolving* Approach to Stormwater Management

- Can we **retrofit our existing stormwater management facilities** to be more effective for water quality and resiliency?
- Can we more effectively **engage with the community**, manage their expectations, and enhance their quality of life?

Blue-Green Infrastructure: A Working Definition…

- **BGSI** is a strategy that combines the **water quality and community enriching benefits** of "green" stormwater infrastructure (GSI) coupled with the **flood reduction and climate resiliency benefits** of "blue" stormwater infrastructure (BSI)


GSI
Water quality
More frequent (smaller) storms
Infiltrate, evapotranspirate, or reuse stormwater runoff
Reliance on natural systems (vegetation and soil)
Smaller and more distributed systems
Biodiversity
Air quality / urban heat island
Aesthetics, quality of life
Safety / walkability
BGSI
Water quality
Resiliency
Adaptive mgmt
Community enhancements
"Living With Water"
BSI
Resiliency
Less frequent (larger) storms
Temporarily detain large volumes of stormwater runoff
Flood control
Habitat
Large-scale, centralized systems

Improving Resilience to Climate Change – A Combined Strategy Green/Blue/Gray Strategy

- Includes innovative, “floodable” systems such as “floodable parks”, “wet plazas”, and “retention boulevards”
- Stormwater benefits include water quality improvements, groundwater recharge, and detention and flood mitigation
- Community benefits entail urban heat island mitigation, air quality improvement, and habitat creation and improvement
- Other social benefits like…job creation, urban aesthetics, property values, pedestrian safety, and enhanced recreational spaces

Re-imagining Public Spaces for Multi-Use

How can we re-imagine our public plazas, parks, and streets to achieve multiple benefits and create "living with water" opportunities?

- Streets typically represent 25 to 35% of the total urban impervious area
- Opportunities often exist within the public right-of-way, even in confined urban areas
- Align well with urban greening efforts and goals; good for business, property values, etc.
- Potential to enhance traffic calming and pedestrian/bicyclist safety
- Can be cost-effectively implemented by integrating with planned utility or other improvements
- Enhance urban landscapes and promote healthier, longer-lived trees

Re-Imagining Public Spaces – Parks

- Sidmouth Amphitheatre, UK
- **Driver:** flooding in beautiful coastal town
  - Insufficient space to deliver flood protection in the town center, due to low elevation, narrow streets, and buildings on shallow foundations
- **Goals:** capture exceedance flows, enhance / minimize negative impacts on parkland, create dual use flood storage facility / public performance space, biodiversity
- **Design Components:** diversion of road runoff, swale w/energy dissipation and check dams, spiral filter drain over drainage blanket and modular storage, and central control chamber that manages infiltration in relation to groundwater levels
- **Community Engagement:** tours to local interest groups, signage, film being developed

See the video at:
Day 2 Session 3 Paul Hargreaves - YouTube

Flood Mitigation – Deer Creek, Brentwood, MO

Address ongoing flooding issues

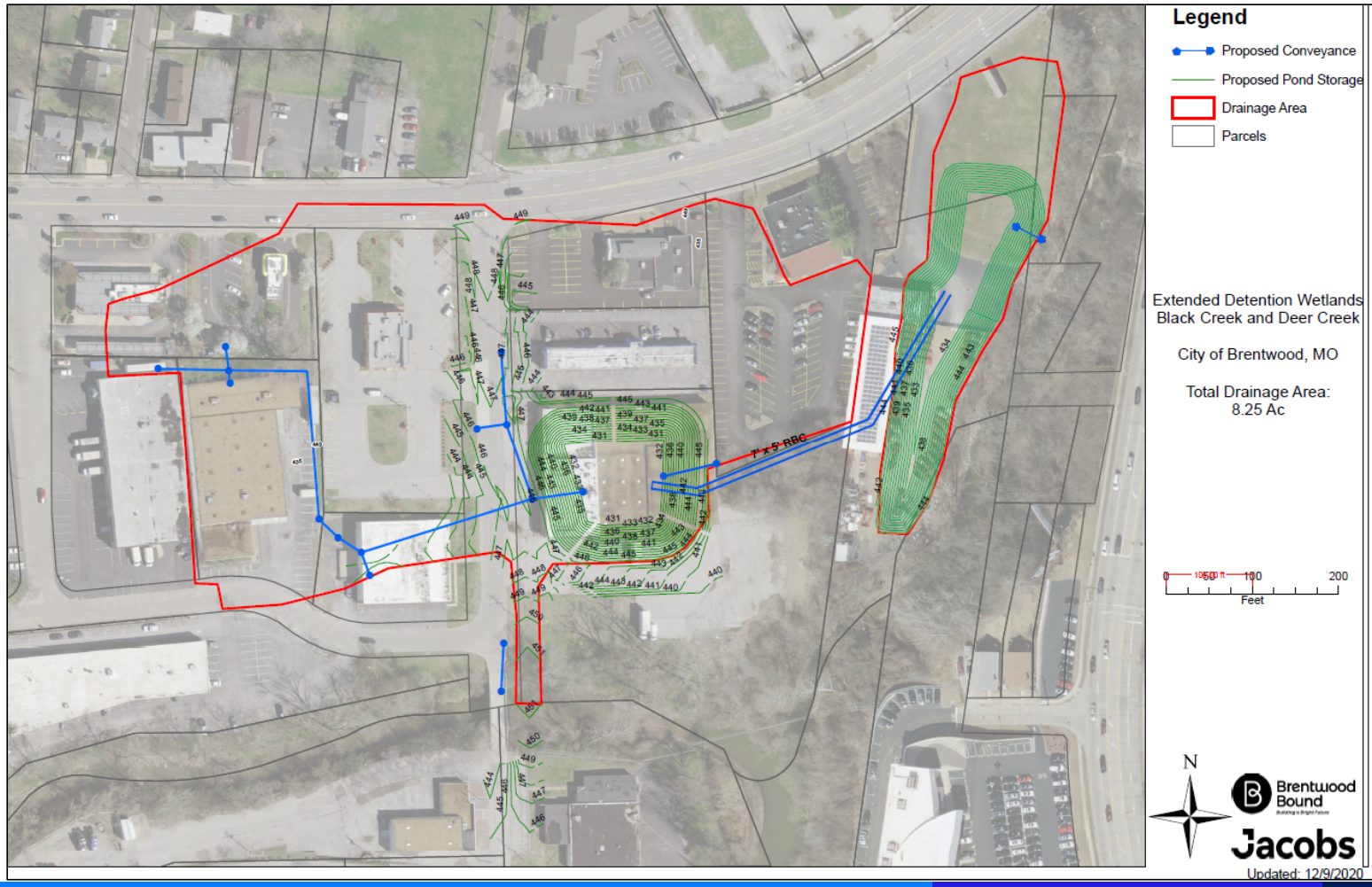
- Opportunity for sustainable urban creek area and redevelopment unique in St. Louis
- Solve 100-year recurring public health & safety problem
- Area has flooded over 30 times since 1957
- Remove Manchester Road from the 100-year floodplain
- Reduce 100-year floodplain from 60 acres to 29 acres (reclaim approximately 31 acres)
- 29 acres remaining in floodplain will adequately handle anticipated stormwater volume

Brentwood Bound – Project Area Current Floodplain

Brentwood Bound – Project Area Future Floodplain

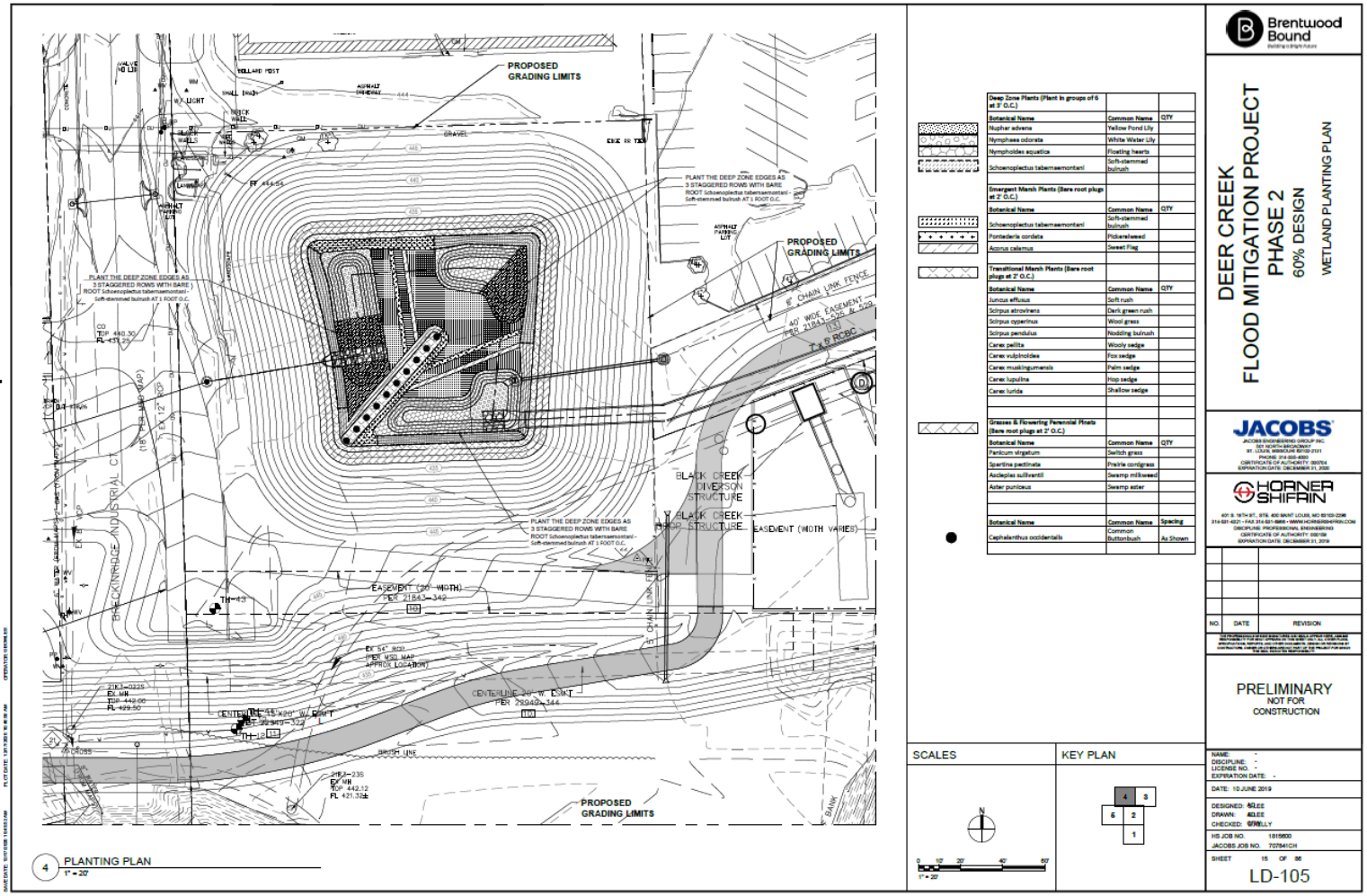
Early Concept of Flood Control Ponds (Blue Only)

- Two pond system
- River backs up into West Pond
- West Pond is connected to East Pond
- Creates extra storage for 50+ year event



Final Design of Flood Control Ponds (BGSI)

- Deer Creek is impaired for E. coli
- Helped City obtain a s.319 grant
- East Pond was converted to dual purpose – Flood Control + Water Quality – as an extended detention wetland
- Pathogens (coliform, E. coli) - Up to 75% reduction with stormwater wetlands

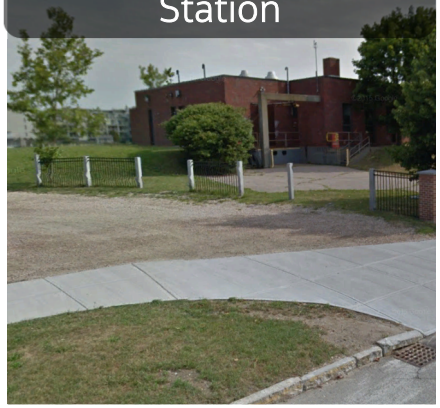


Example Mitigation Measures using Gray Infrastructure

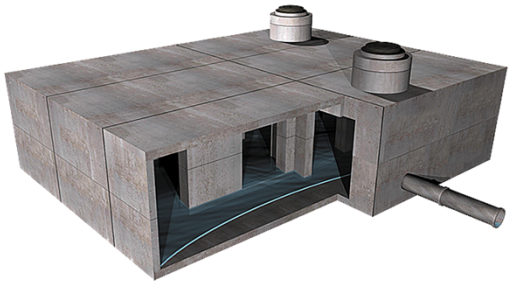
- Tide Gates
  - Prevent tidal water backing into system
  - May prolong rain event flooding; dependent on tide returning to lower levels
- Larger Pipes/Culverts
  - Increased conveyance
  - Space constraints with other utilities (gas, water, etc.)
- New Drainage Channels and/or Pipes
  - Increased conveyance
  - Space constraints
- Storage
  - Requires large open space
  - Expensive
- Pump Station
  - Complete solution
  - Expensive, large facility

Tide Gates

Wellington Ave. Pump Station

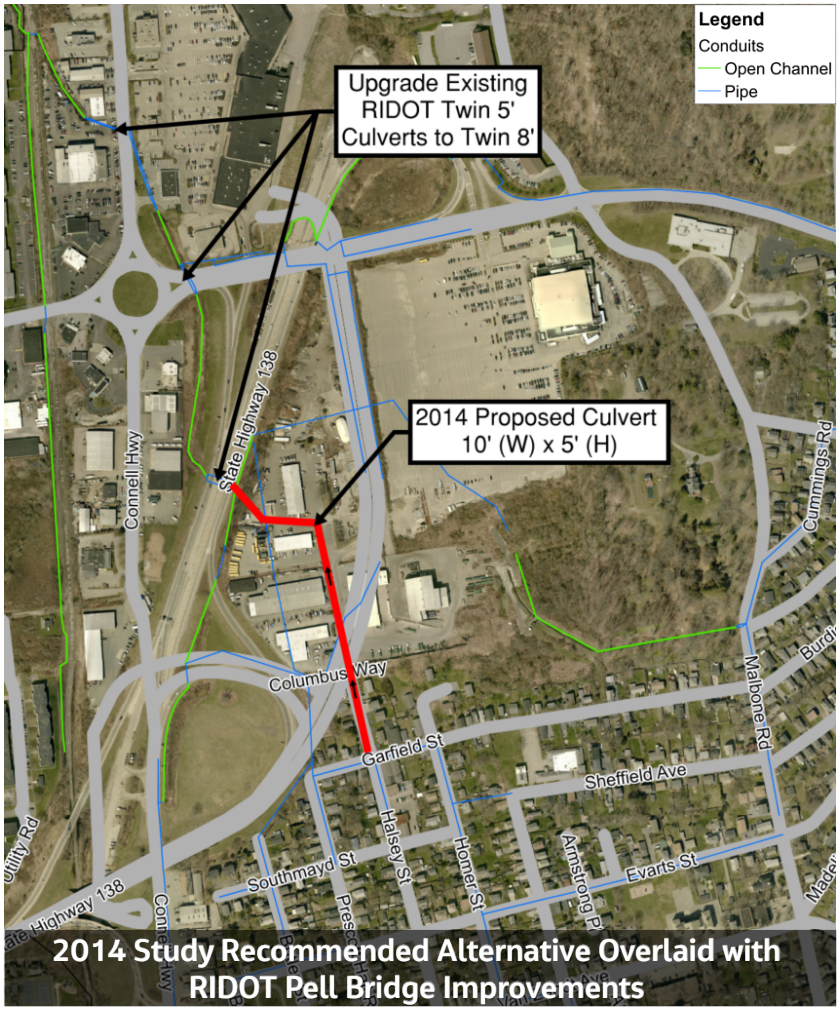


Underground Storage Tank



Gray Infrastructure Alternative for Prescott Hall Watershed (2014 Study)

- Recommended gray solution from 2014 drainage study: **Halsey Street Box Culvert**
  - New 1,200 linear foot 10-ft by 5-ft underground box culvert
  - Planning Level Project Cost Estimate (in 2014 dollars): $3.28 Million
  - Improvements to the State's infrastructure were also recommended to improve conveyance downstream
- Does not work within the current constraints (conflicts with the new RIDOT ramp)



2014 Study Recommended Alternative Overlaid with RIDOT Pell Bridge Improvements

Blue-Green Infrastructure Alternative for Prescott Hall

A. Consider adding overflow from Prescott Hall Rd & Garfield St to DOT's drain on JT Connell Hwy

B. Potential new detention area 1

C. Potential new detention area 2

D. Consider daylighting existing 42" outlet pipe earlier by redirecting to new detention area

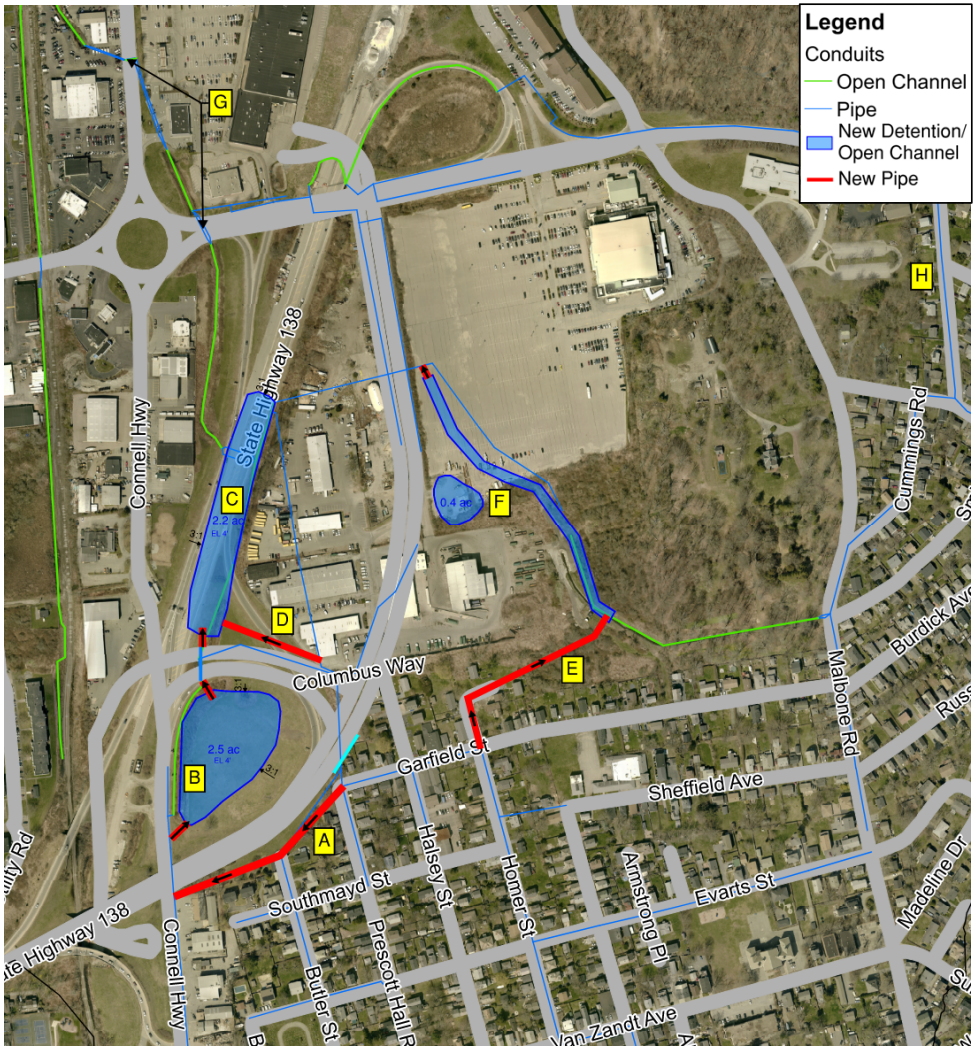
E. Consider adding overflow from Homer St & Garfield St to Malbone Channel

F. Modify slope/grading of Malbone Channel as needed; consider extending channel through old Newport Casino parking lot

- Consider adding detention area in SW corner of parking lot if needed

G. Upgrade DOT's existing twin 5' culverts to twin 8' as recommended in 2014 study

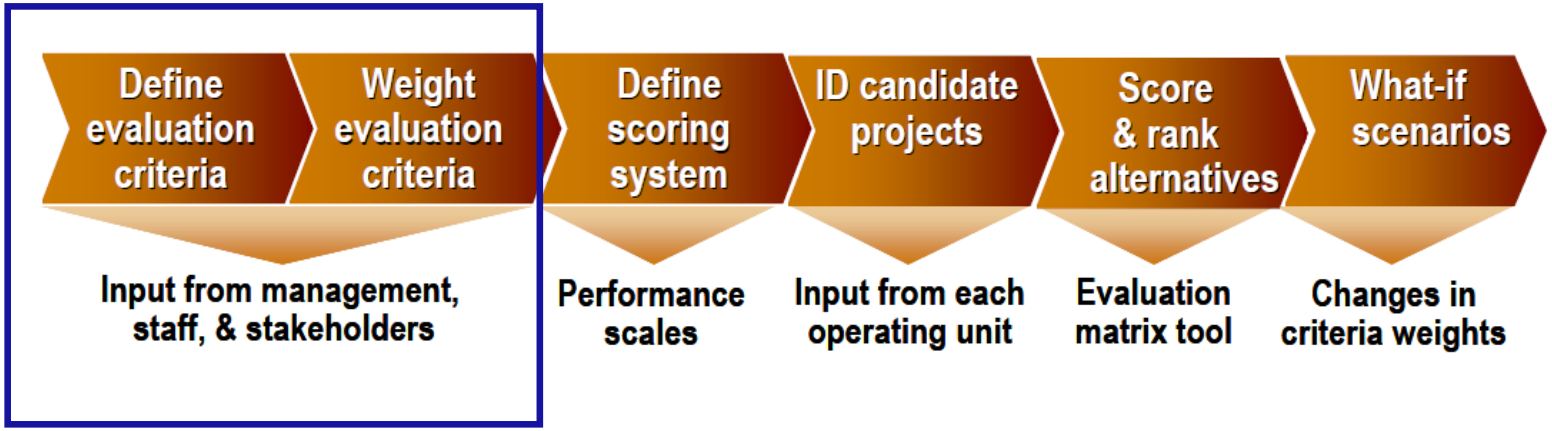
H. Consider implementing green infrastructure in upstream watershed as recommended in 2014 study



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

Alternatives Evaluation Criteria

State Standards for Stormwater Design

- Level of control
- Adverse impacts
- Climate change
- Permitting

Community Impacts

- Siting of new facilities
- Accessible open space
- Improved water quality
- Disruption during construction
- Implementation schedule

Coordination

- Partners (RIDOT, Waste Management, RIDEM, developers, private property owners, etc.)
- Scheduling

Performance Improvements

- Depth of flooding
- Frequency of flooding
- Duration of flooding

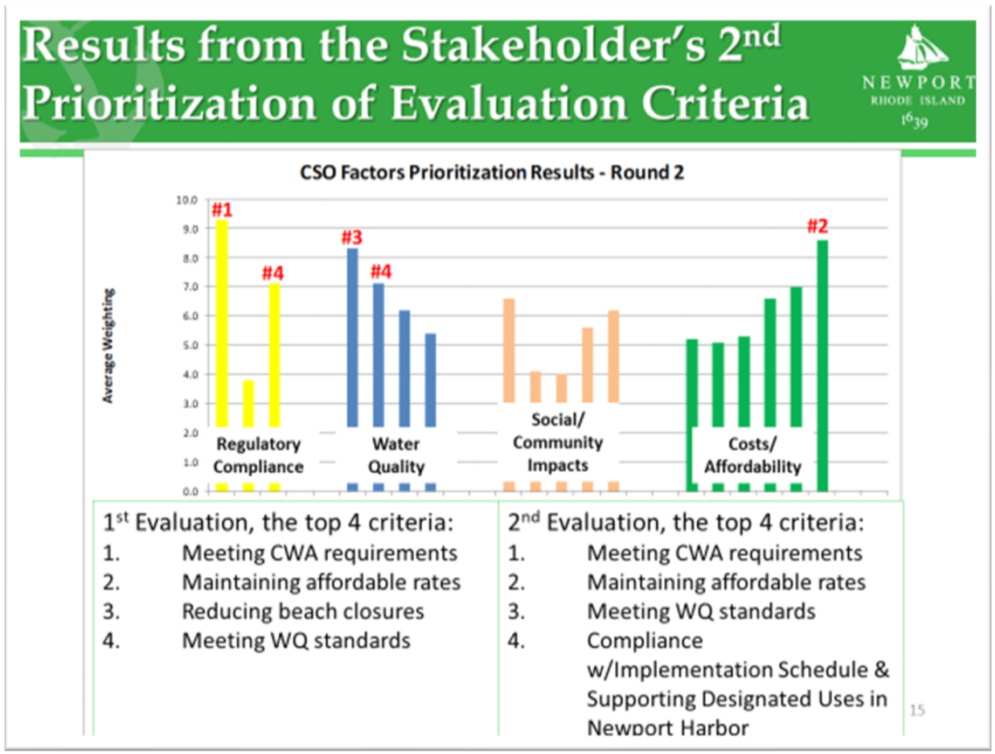
Costs

- Capital Costs
- Life-Cycle Costs
- Funding

Alternatives Evaluation Process

- Evaluate combinations of technologies as potential mitigation options using the model
- Develop conceptual cost estimates
- Rate and compare alternatives
- Hold third public meeting in August-September to review modeling results and recommendations

Example of Prioritized Criteria for Newport's CSO Program



Next Steps

Next Steps – July through September

- Complete online survey to prioritize evaluation criteria
  - Input from all stakeholders
  - Priorities/weighting for differing criteria
- Evaluate potential mitigation alternatives using model
  - Blue-Green and Gray improvements
  - Reduction of key metrics for improved performance
- Develop conceptual cost estimates for high performing alternatives
- Hold third public workshop in August-September 2022 to review model results and obtain feedback on mitigation alternatives

Additional Opportunities for Stakeholder Involvement

- A new survey will be developed and sent out following this meeting to collect feedback on alternatives evaluation criteria and priority ranking
- Additional photos and information can be sent to Erin O'Shea at erin.oshea@jacobs.com
- Public Workshop #3 in August-September 2022
- Thank you for the information provided so far!

Thank you!

Jacobs

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Reinventing tomorrow.