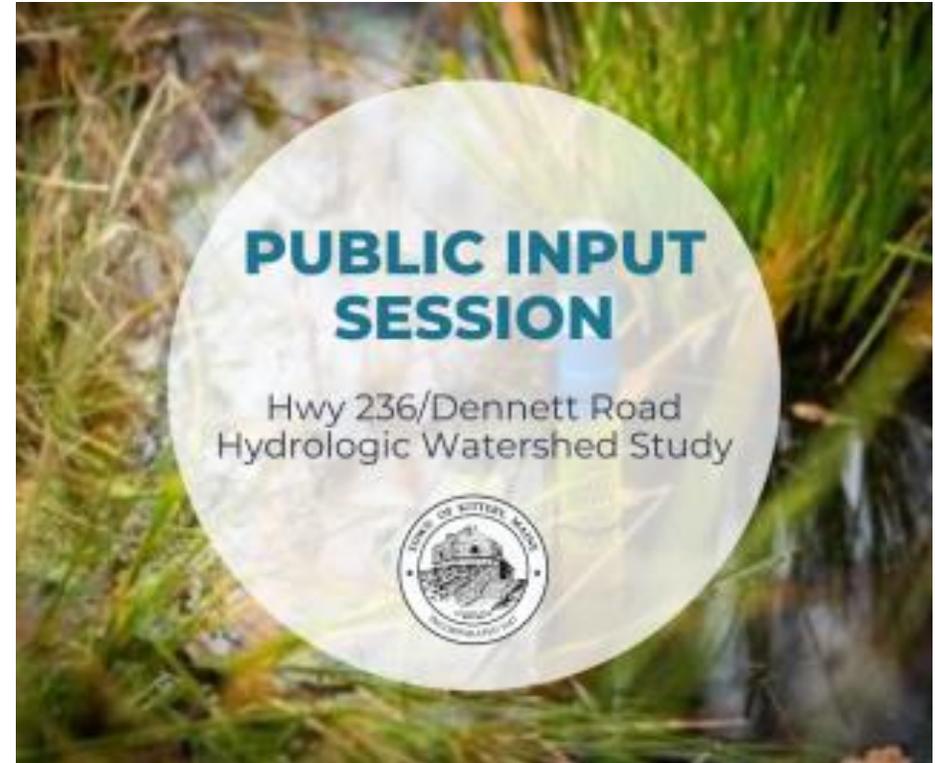




Town of Kittery Highway 236/Dennett Road Hydrologic Watershed Study

Agenda

- I. Project Recap / Progress Review
- II. Stormwater Modeling Results
 - I. Quantity and Quality
- III. Priority Area Findings
- IV. Stormwater Opportunity Matrix
- V. Initial Recommendations
 - I. Six Projects for further evaluation
- VI. Next Steps & Project Schedule



Project Recap



Project Team

- Town of Kittery
- Barton & Loguidice, D.P.C.
- Streamworks, PLLC
- FB Environmental Associates
- Stakeholders

Barton
& **Loguidice**

 **streamworks**



Project Goals

- I. Evaluate Existing Conditions / Areas of Concern

- II. Evaluate Potential Future Development

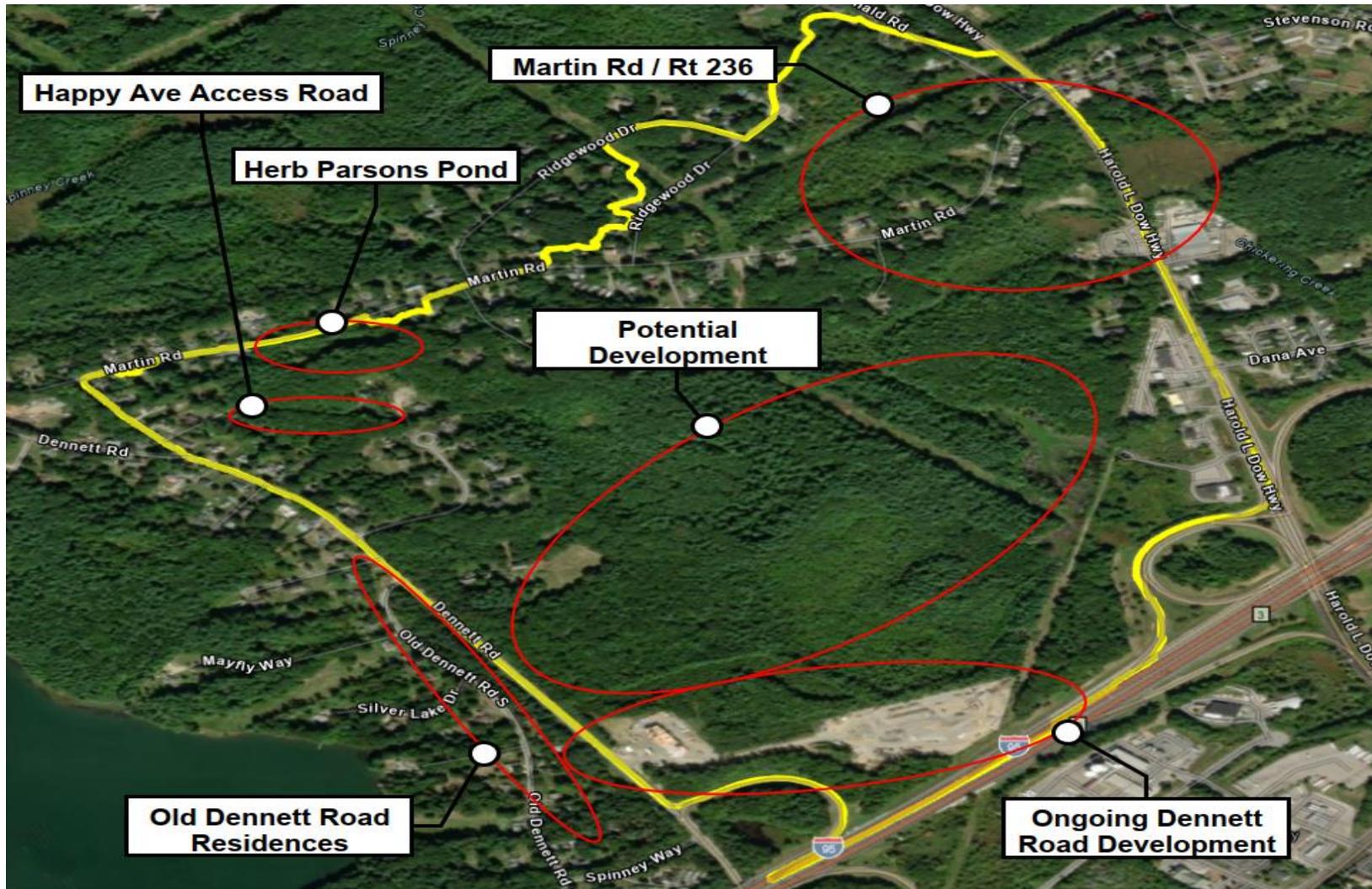
- III. Evaluate Mitigation Alternatives
 - I. Improve Existing Conditions
 - II. Future Development Considerations



Project Status

- Desktop Review/GIS Mapping
- Identify Existing Areas of Concern
 - Public outreach
 - www.kitteryme.gov/watershedinputsession
- Data Collection/Field Reconnaissance
- Drainage Modeling
- Pollutant Load Modeling
- Stormwater Opportunity Matrix
- Draft Stormwater Engineering Report

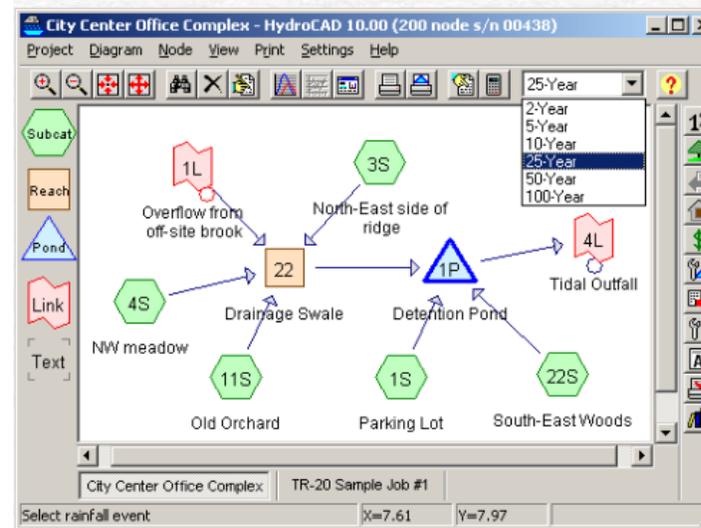
Areas of Interest



Stormwater Modeling Results

HydroCAD Modeling Software

- HydroCAD is currently utilized by hundreds of municipal, regulatory, educational, and professional design organizations, including:
 - Maine Department of Environmental Protection
 - Maine Department of Transportation
 - U.S. Army Corps of Engineers
 - U.S. Department of Energy
 - University of New Hampshire



Search:

[HydroCAD-10.2 update](#) [Case studies](#) [More news...](#)

HydroCAD[®]

*Stormwater
Modeling*

The competitive edge in hydrology & hydraulics software ... since 1986

Hydrologic & Hydraulic Modeling

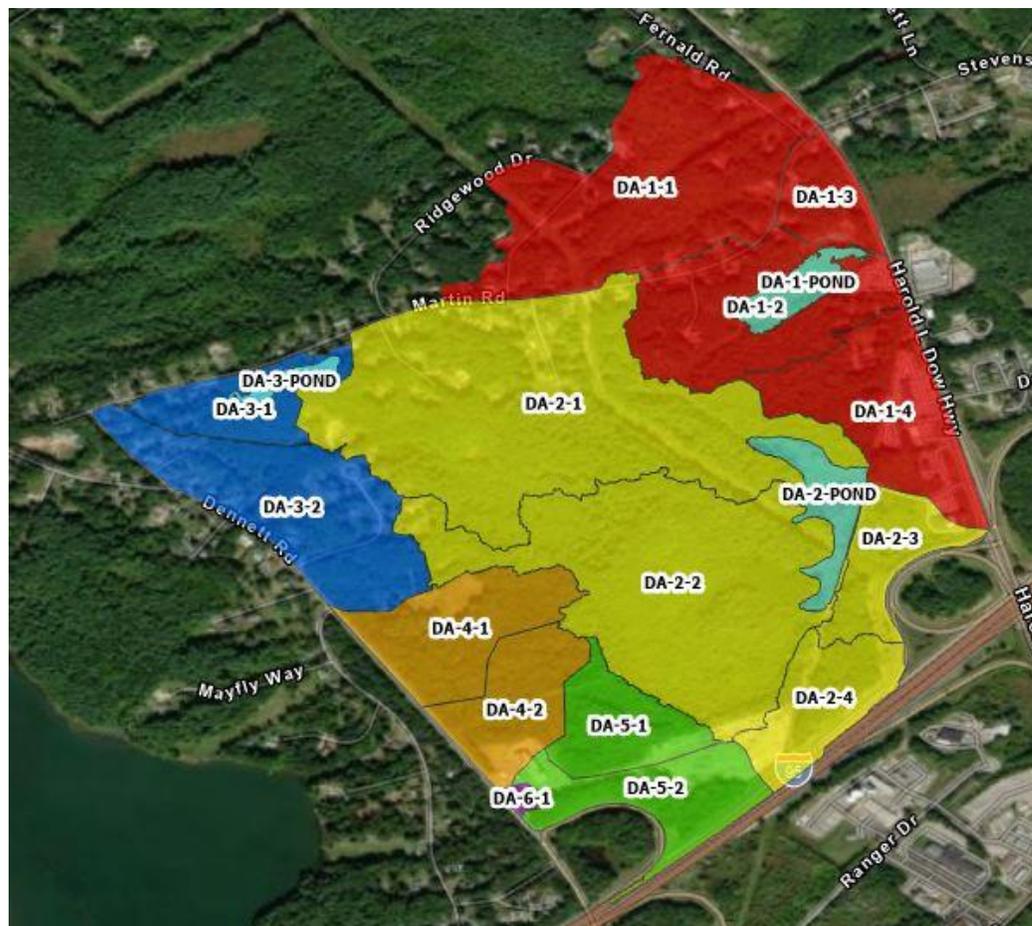
- **Model a range of flood intervals**
 - 1-Year (2.64")
 - › Anticipated on an annual basis
 - 10-Year (4.83")
 - › 10% annual chance
 - 100-Year, etc. (8.78")
 - › 1% annual chance

- **Model stormflow volumes, peak discharge rates, and timing**

Modeling Scenarios

- Existing Conditions
- Extreme Storm Event/Climate Change Scenarios
- Business Park and Commercial Development Scenarios
 - 50% Build Out
 - 100% Build Out

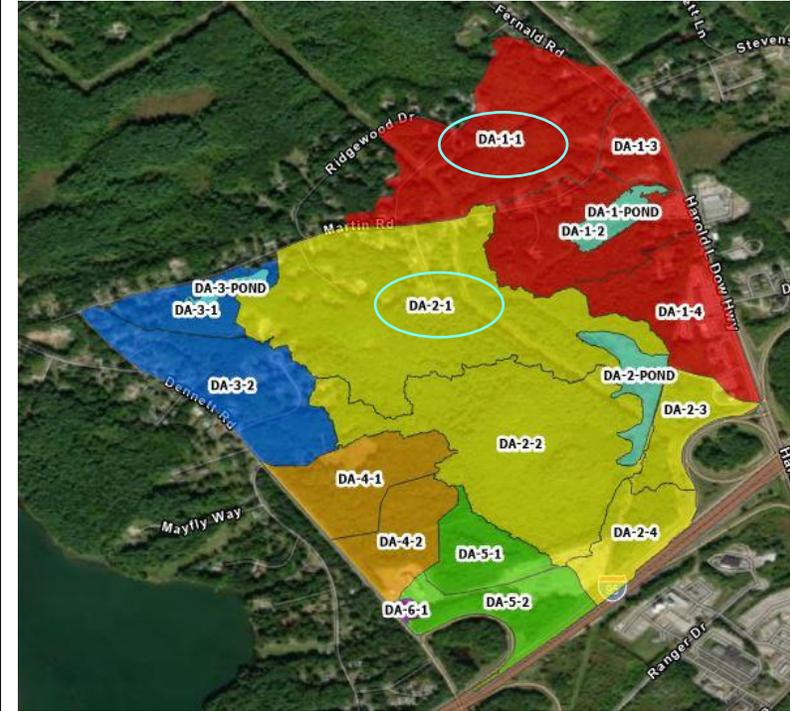
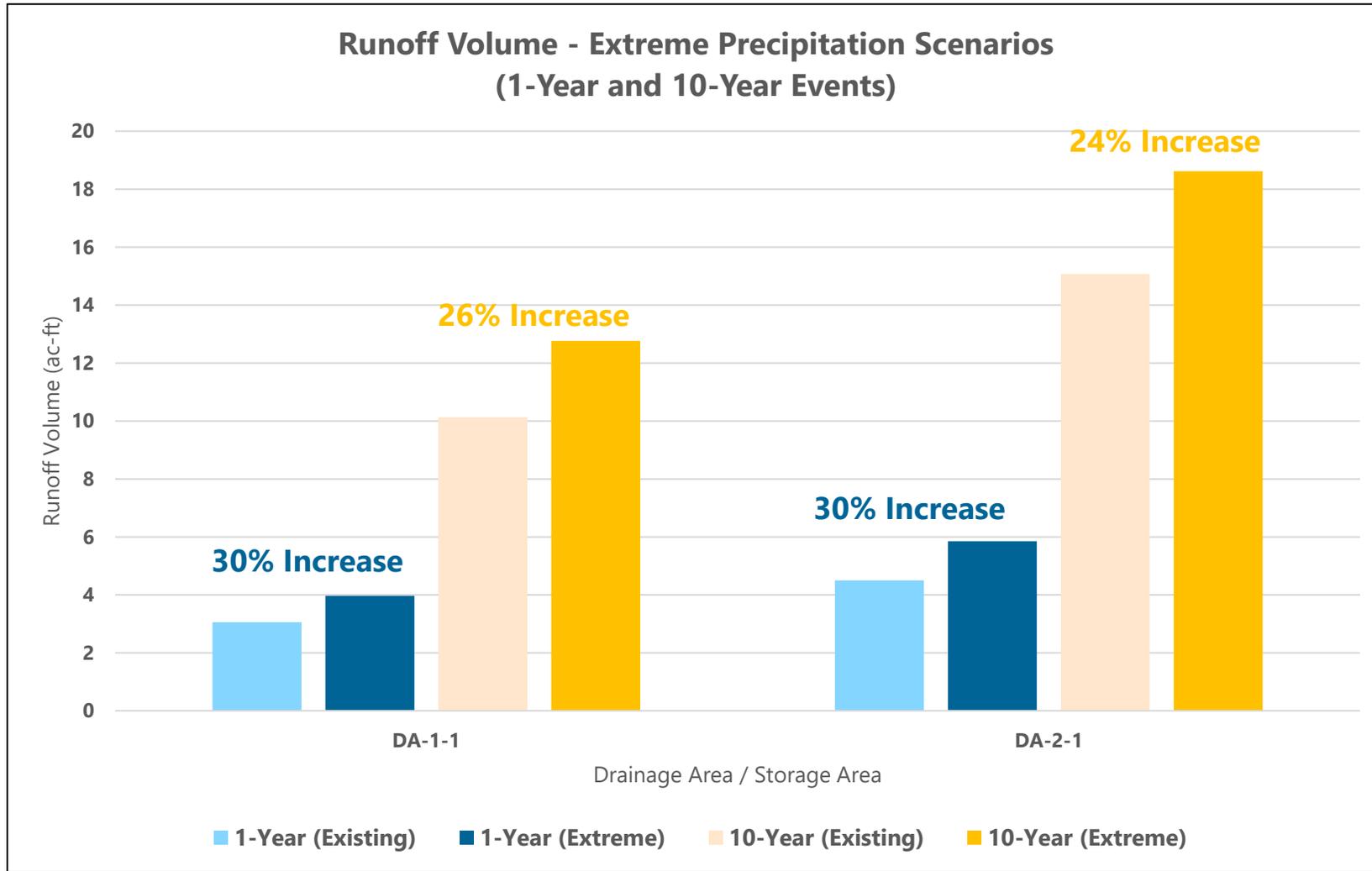




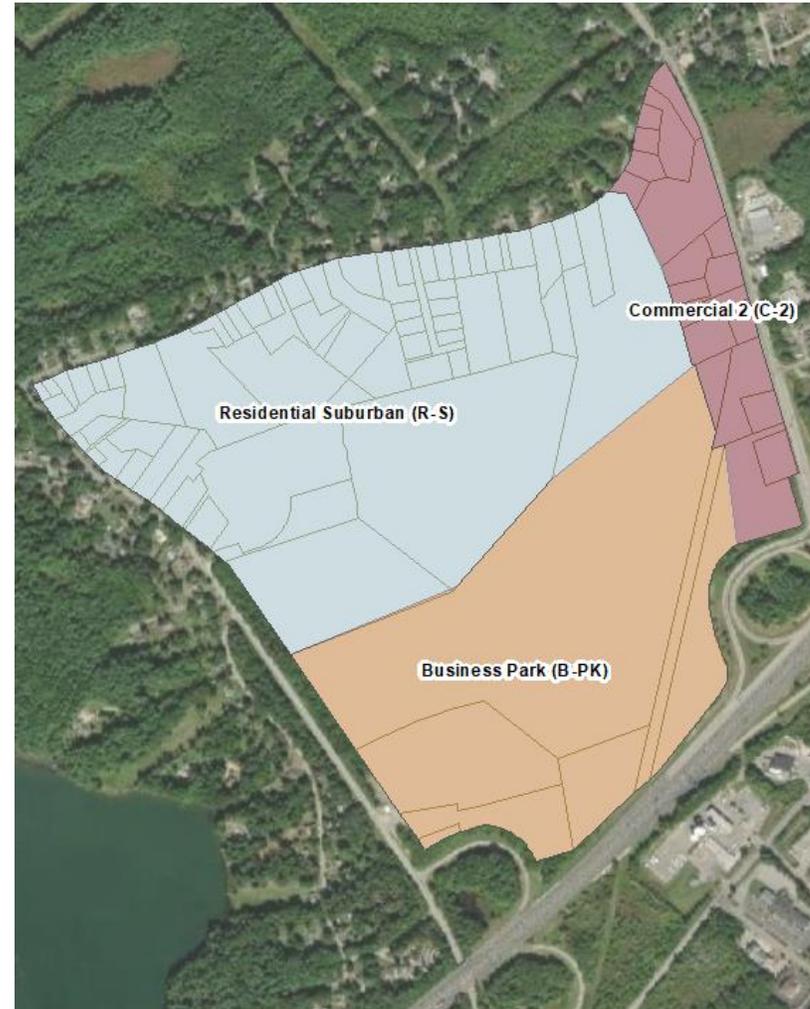
Existing Conditions Modeling Summary

- Largest ***Existing*** Contributors of Runoff
 - DA-1-1
 - DA-1-2
 - DA-2-1
- Function of:
 - Drainage Area Size
 - Slope
 - Cover Type

Extreme Storm Event Model Results – Runoff Rates

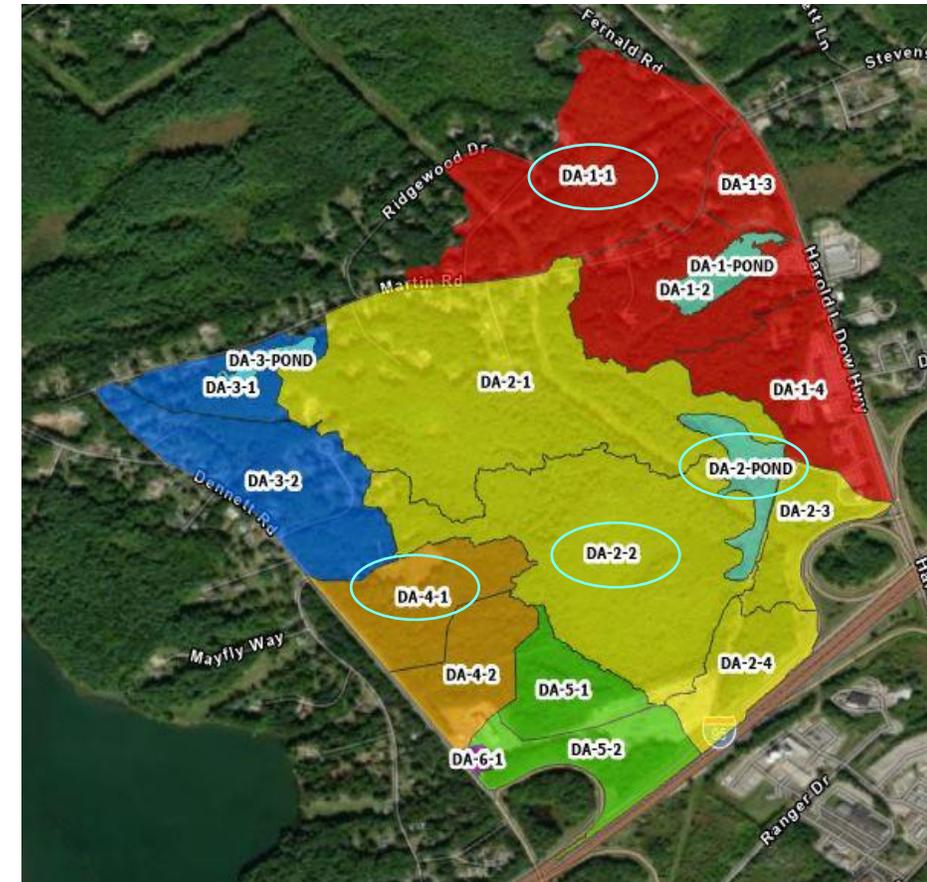
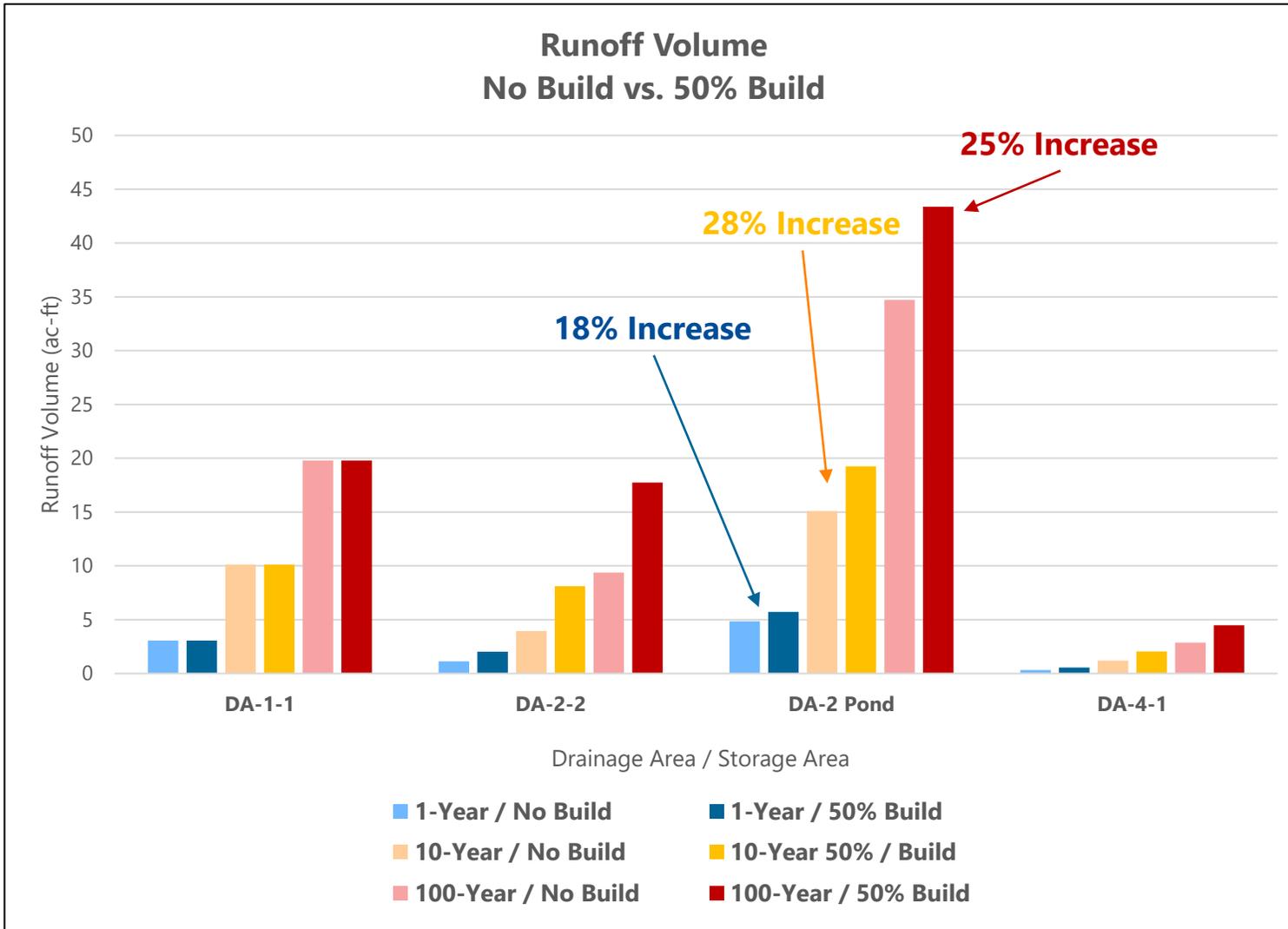


Build Out Scenarios

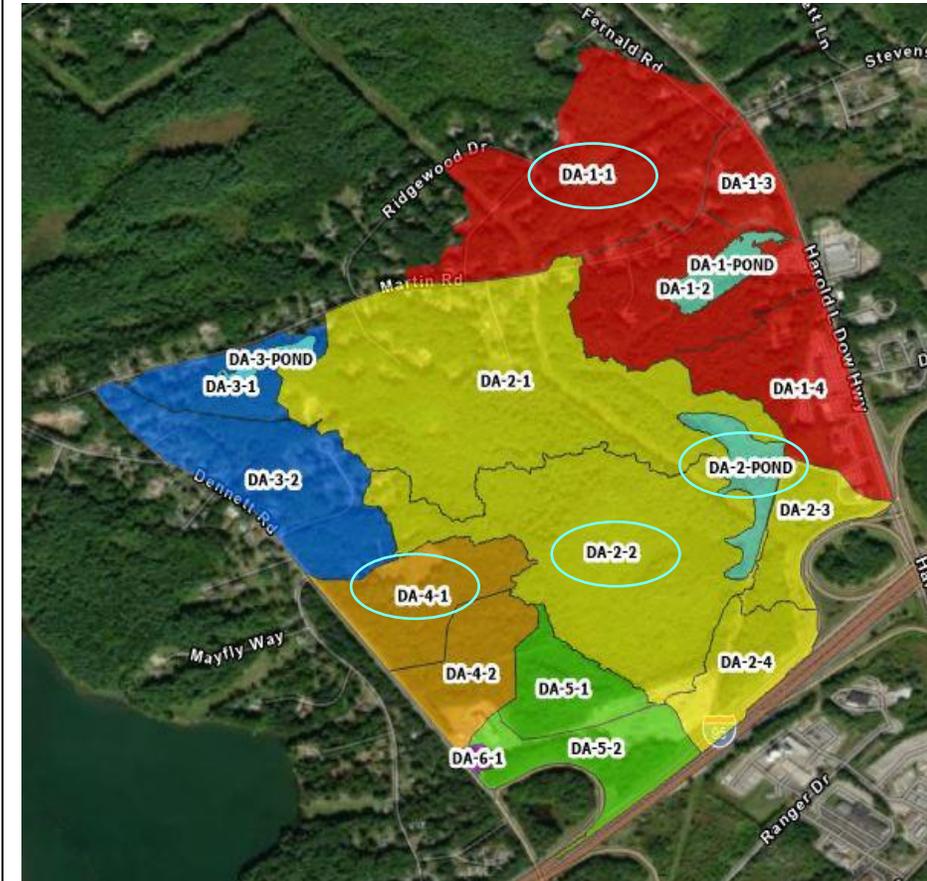
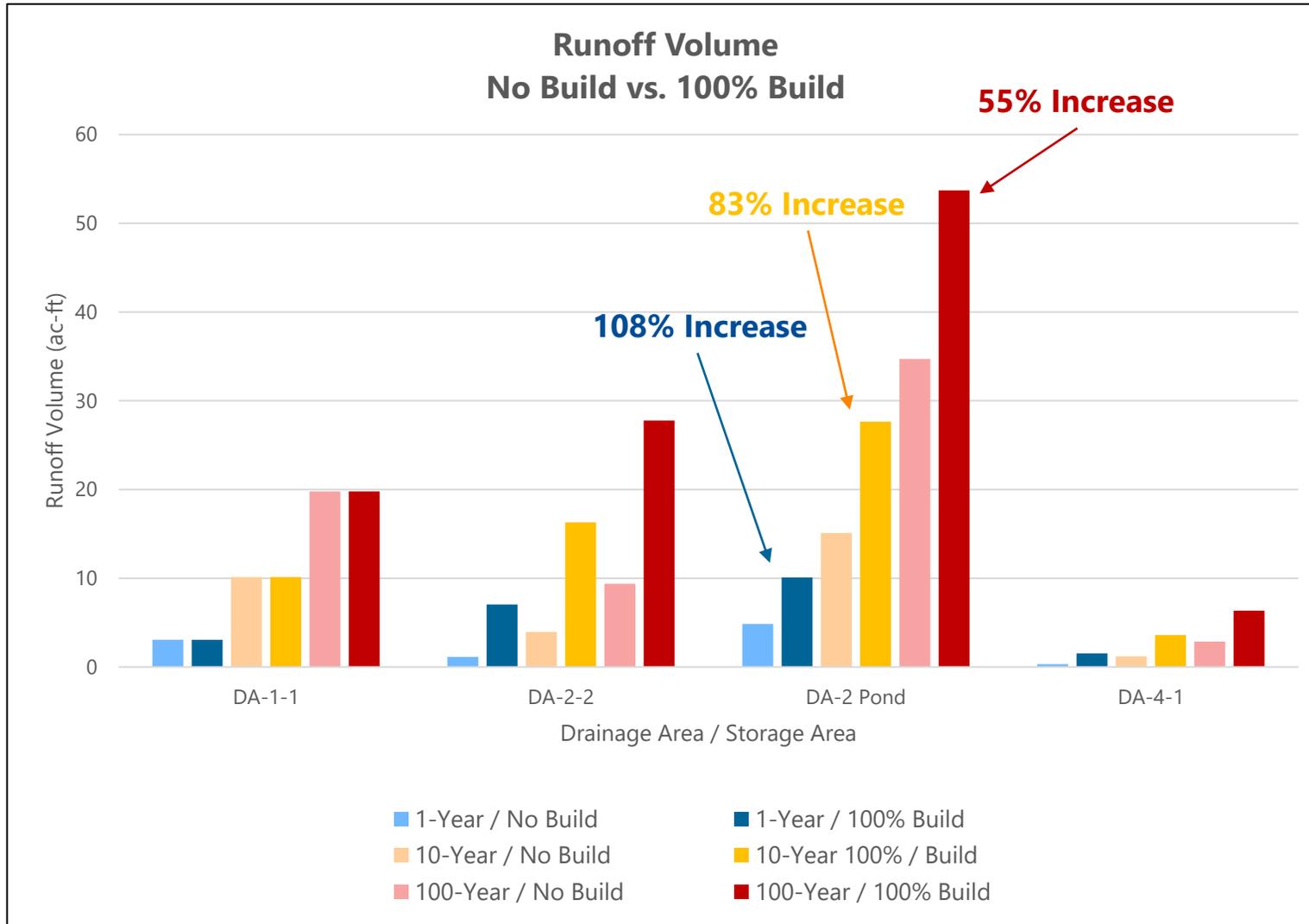


NOTE: Build out scenarios do NOT currently incorporate stormwater mitigation associated with future development

50% Build-Out Scenario - Runoff Volume



100% Build-Out Scenario - Runoff Volume



- **Existing Conditions**

- Indicators of localized stormwater-related flood risk during 1-year storm event
- Moderate risk of stormwater-related flooding during 10- and 100-year storm events
- Eastern and southern extents of project area most vulnerable during high intensity rain events

- **50% Build Out Scenario**

- Increased flood risk potential along Dennett Road and Highway 236 / Martin Road intersection

- **100% Build Out Scenario**

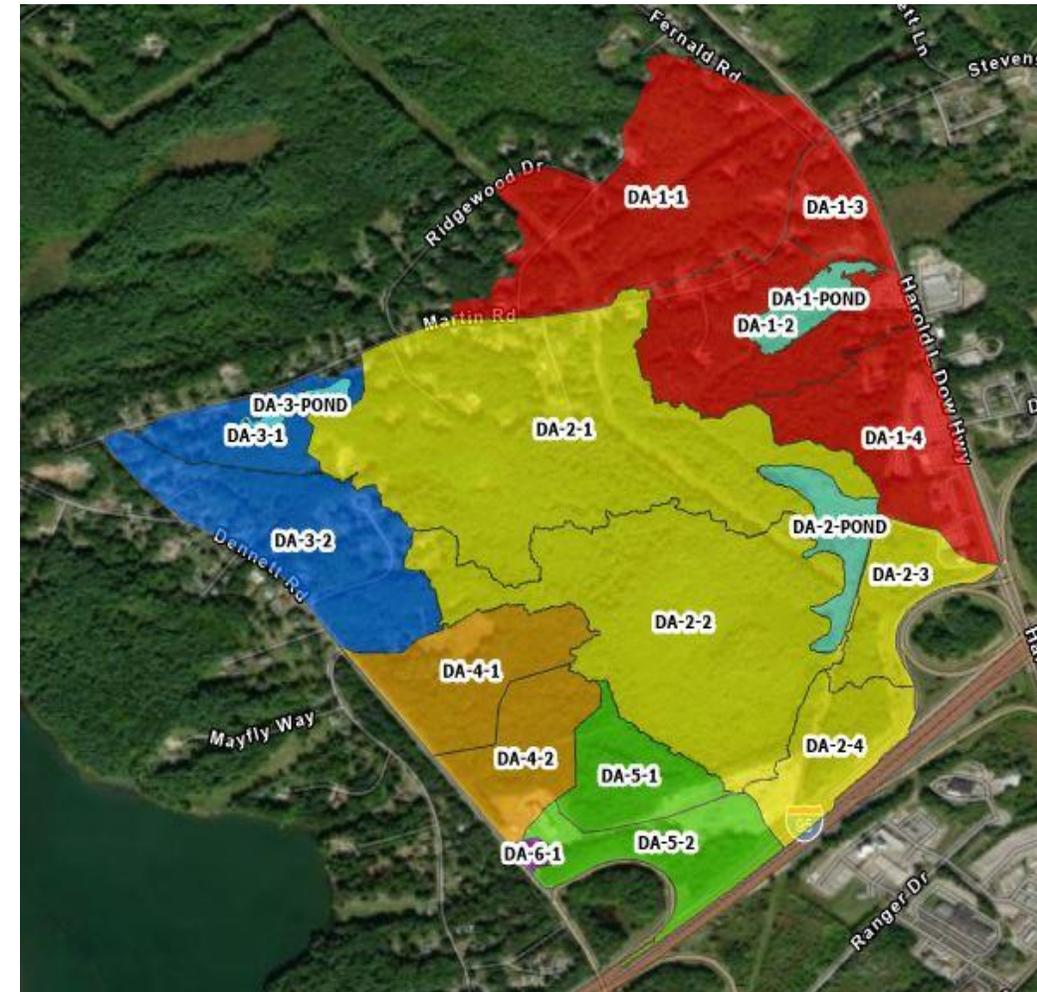
- Increased indicators of flood risk at discharge points along I-95 and Highway 236

NOTE: Build out scenarios do NOT currently incorporate stormwater mitigation associated with future development

Pollutant Loading Summary Tables

Annual Sediment Loading Summary

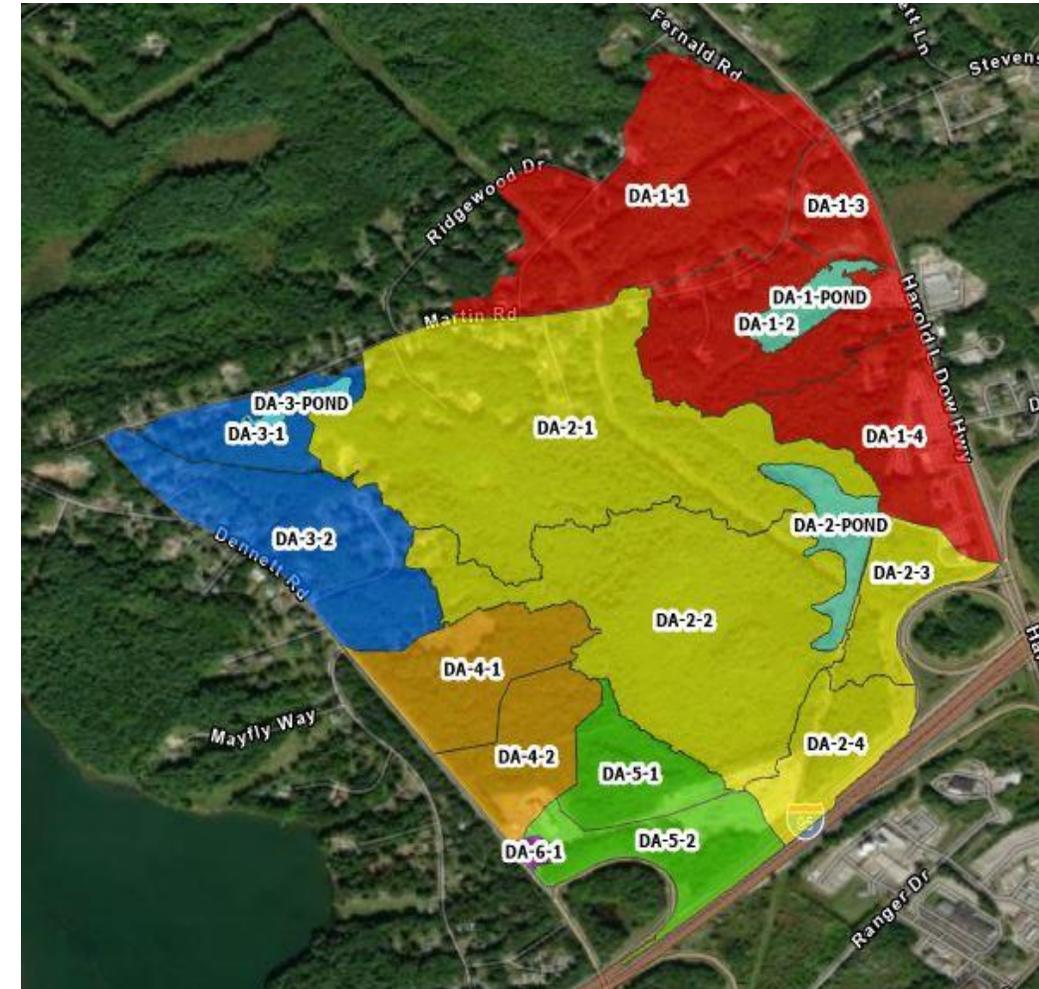
Drainage Area	Area (ac)	Sediment Loading Rates (lb./ac)	Sediment Loading (lbs.)	Percent of Total Sediment Loading (%)
DA-1	95.2	29.13	2,771.3	42.5%
DA-2	146.97	19.87	2,921.6	44.9%
DA-3	35.98	12.74	459.5	7.1%
DA-4	27.87	3.92	110.4	1.7%
DA-5	23.57	9.11	231.8	3.6%
DA-6	0.74	26.21	19.4	0.2%
Total	330.3	-	6,514	100%



Pollutant Loading Summary Tables

Annual Phosphorus Loading Summary

Drainage Area	Area (ac)	Phosphorus Loading Rates (lb./ac)	Phosphorus Loading (lbs.)	Percent of Total Phosphorus Loading (%)
DA-1	95.2	0.06	5.7	30.5%
DA-2	146.97	0.05	8	42.7%
DA-3	35.98	0.06	2.2	11.8%
DA-4	27.87	0.05	1.4	7.5%
DA-5	23.57	0.06	1.3	7%
DA-6	0.74	0.09	0.1	0.5%
Total	330.3	-	18.7	100%



Priority Area Findings

Priority Area Findings

- Soils are key
- Role of, and interaction between, surface runoff and groundwater
- Herb Parsons Pond – Former gravel pit with water levels driven by groundwater
- Evaluation of Critical Drainage Infrastructure
 - Culvert Sizing
- Flood indicators from drainage modeling:
 - Corner of Martin Road / Highway 236 – greatest potential need for mitigation **under no build scenario**
 - Build out scenarios indicate increased flood risk without incorporation of stormwater mitigation practices



Stormwater Opportunities Matrix & Initial Recommendations

Project Type	Location	Stormwater Benefits Total	Constructability Total	Cost Total	Co-Benefits Total	Project Ranking Total
Expanding Stormwater Storage	98 Dennett Parcel	50	11	18	10	89
Expanding Stormwater Storage	East side of Dennett Road	50	9	18	10	87
Upstream Detention/Wetland Expansion	Above Martin Rd.	50	7	16	10	83
Low-Impact Development Considerations	Areas currently zoned B-PK and C-2	30	20	15	10	75
Sizing of Critical Infrastructure - Culvert and Drainage Modifications	Martin Rd., Rt-236, Dennett and Old Dennett Rds., I-95	30	16	15	5	66
Land Conservation	Areas currently zoned B-PK and C-2	30	15	10	10	65
Wetland Restoration	41 Rt. 236	20	9	16	10	55
Tree Planting/Slope Stabilization	Behind residential properties on South side of Martin Rd.	20	15	8	9	52
Homeowner Floodproofing	All Residential	10	20	10	10	50
Installation of Sewer Line Seep Collars	Martin Rd.	10	18	10	1	39
Drainage Infrastructure Modifications	Roseberry Lane	10	16	10	1	37
Culvert Modifications	Old Dennett Road	10	16	10	1	37
Access Road Culvert Improvements	Happy Avenue	10	13	10	1	34
Drainage Improvements	Summer Lane	10	11	10	1	32
OTHERS.....						

Projects Recommended for Additional Evaluation

1. Right-Sizing Critical Infrastructure – culvert and drainage system modifications
2. Seep Collars along Martin Road Sewer Line
3. Upstream Detention/Wetland Expansion (above Martin Rd.)
4. Identification of potential conservation areas (requires easements or land acquisition)
5. Expanding stormwater storage at “98 Dennett” Parcel
6. Providing Low Impact Development considerations for future Build-Out scenarios

The Report also includes recommendations for Homeowner Flood Protection Considerations.

Project Schedule & Next Steps

Next Steps

- Evaluation of Recommended Mitigation Alternatives
 - Flood Protection & Water Quality Benefits
 - Implementation and Maintenance Cost Estimates
 - Land Use and Permitting Considerations
 - Funding Opportunities

- Draft Report

- Final Report Presentation Meeting

Project Schedule



- Project Status Meeting
- Selection of 6 Recommended Alternatives

- Evaluation of Recommended Alternatives
- Draft Report

- Final Report
- Presentation of Findings
- Steps for Implementation

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Project Information



Project Information (Survey and Interactive Mapper)

www.kitteryme.gov/watershedinputsession

Questions & Open Discussion?



Project Information

(Survey and Interactive Mapper)

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