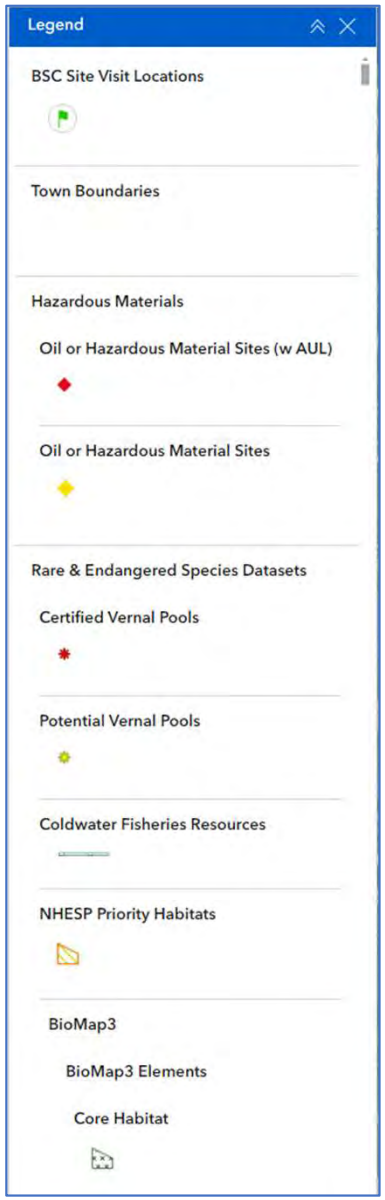
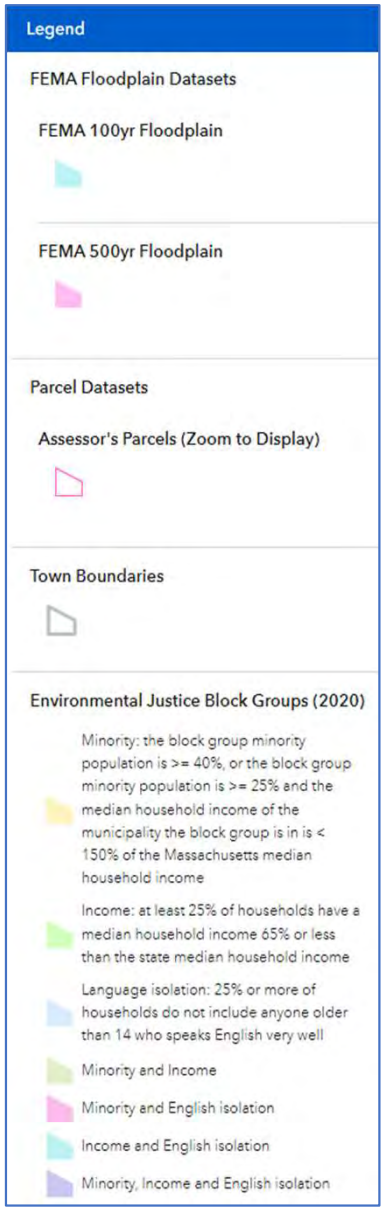
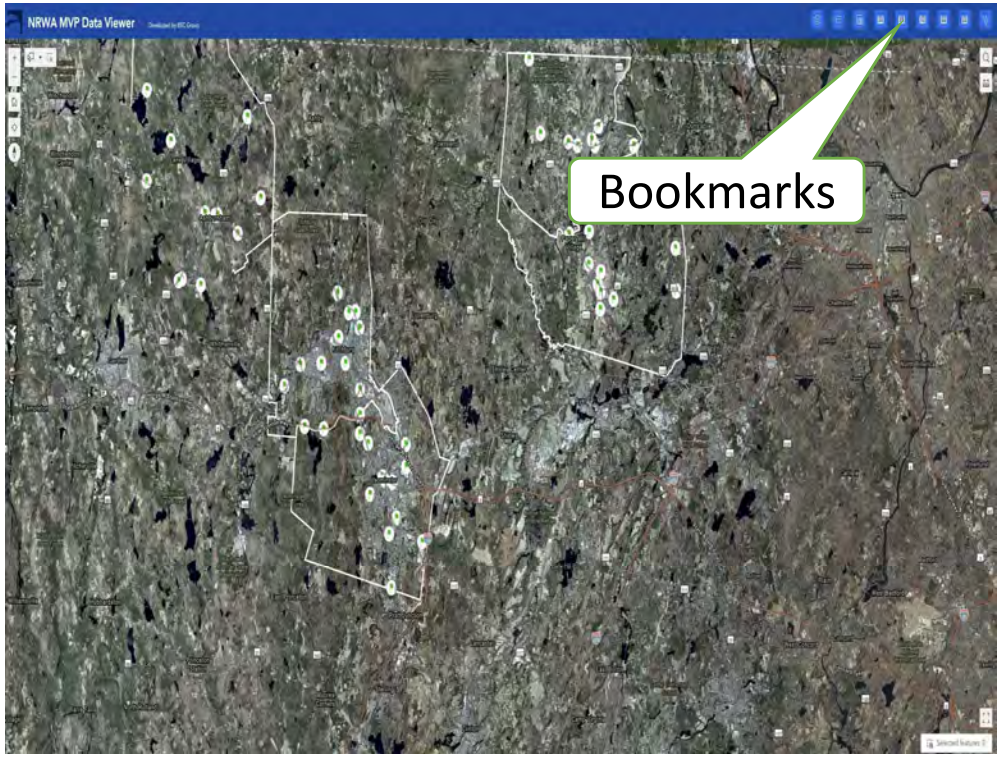
NRWA Natural Climate Solutions Data Viewer Legend (access via NRWA ArcGIS website: Data Viewer | NRWA Towns)







To visit each site more quickly:
Use the bookmarks per the site names. This will bring you to the location and turn on an applicable set of analysis layers.

Notes for using these maps.

- These recommendations come from community and professional assessment and represent a practical balance of elements identified as feasible and valuable in the accompanying Nature-based Solutions (NbS) Opportunities Matrix that could be combined at the location as a community action project.
- This is a tool for discussing the selected sites and the areas that influence them. Use the data viewer link to explore each in greater detail/ wider context.
- Recommendations listed on the map excerpts are numbered for location identification and include a sub-set of location specific actions numbered per the accompanying NbS Opportunity Matrix. These exclude endemic or regional changes which can't be singularly mapped.
- Other systemic actions that are not location dependent or span multiple micro locations may still be essential to an overall action project. Review the NbS Opportunity Matrix to develop a project program combining these.
- The following maps and lists identify suites of improvement projects for key locations of either high environmental risk or high environmental value or both and are intended to support funding and design of built/ planted improvements.
- There are also town-wide actions that can build resilience through cooling of air and water, stormwater purification and groundwater recharge, support of diverse wildlife as described in the NbS Opportunity Matrix.
- From these starting points resilient design and management is meant to become the standard for both public and private land use throughout the community.

The goal of this section of the report is to locate sites for potential Nature-based Solutions. As you examine the sites think of what opportunities for improvement could be applied that affect local and regional ecological outcomes.

Categories of NbS approaches to consider:

- Ecosystem restoration approaches
- Ecological restoration
- Ecological engineering
- Landscape restoration

Issue-specific ecosystem-related approaches

- Ecosystem-based adaptation
- Ecosystem-based mitigation
- Climate adaptation services
- Ecosystem-based disaster risk reduction

Infrastructure-related approaches

- Natural infrastructure
- Green infrastructure
- Supportive grey infrastructure

Ecosystem-based management approaches

- Integrated water resources management

Ecosystem protection approaches

- Area-based conservation approaches, including protected area management

The following are a list of Nature-based Solution types (NbS) that may be applicable to the locations, or parts there of, identified in the public outreach and analysis.
For a comparison of value and feasibility see the NbS Opportunities Matrix.
For detailed descriptions of these project types see the NbS projects section of the report.

Natural Environment Restructuring and Management
River/ pond bank revegetation (creation of slopes features and preferred vegetation)
Grassland/meadow management restoration (introduction and maintenance practices)
Forest-shrubland heath management restoration (species additions and removals)
Wetland management restoration (erosion control, micro-damming and connectivity)
Hedge row pollinator strip (buffering open areas with high value trees or forbes)
New wetland or floodplain construction/ expansion (micro-damming and channeling)
Pond creation/ alteration (creation expansion or shaping of ponds)
River flow alteration (adding sinuosity, erosion control, planting and aeration features)

Built Environment Restructuring, Best Management Practice (BMP)
Stormwater treatment wetlands (temporary impoundment and treatment of storm water)
Upstream BMPs (rain garden, bio-swale, vegetated buffer, swale, etc.)
Shade-habitat/ infiltration tree plantings (canopy shade trees over lawn and pavement)
MSCS culvert improvement (higher wider culverts with passable banks and channel)
Dam weir smart controls (channel modifications for gradual passage of water)
Pervious parking walking areas (stabilized pervious access and activity surfaces)
Algae/ aquatic invasive species treatment (chemical, cultural, mechanical solutions)
Species crossing protections (signage, light, fences, audible surfacing)
Beaver deceiver/ promoter (structures to prevent flood damage or improve floodplain)

Ecological Awareness & Access Projects
Educational interpretation (signage, events, digital media, arts and other ecological info)
Furnishings/ gathering space (public gathering spaces for environmental appreciation)
Soft trail (stabilized natural surface and terrain trails)
Paved trail (durable universal access surface trails or other access)

Related Regulatory Actions
Conservation purchase/ restriction (conservation trust, direct purchase)
Public - private partnership (sponsored managed private plantings)
Land swap/ land bank (development rights transfer use deferral)
Zoning overlay/ other regulations (development limits, activity limits)
Resilient redevelopment incentive (loans, grants, technical support, regulatory support)

Architectural Enhancement Projects
Green architectural enhancements (green wall, green roof, white roof, water harvesting, etc.)
Green energy features (solar, wind, hydroelectric, geo/hydrothermal)

Value Added Features on Projects
Invasive species management (identification, removal and replacement of harmful species)
Species monitoring protocol (staffing and technical support for inventory and monitoring)
Habitat enhancements (nesting foraging and hunting features)

PEPPERELL, MA

Bermis Wellhead Protection/Gulf Brook

Map Link

https://arcg.is/iKKTq0

1. Forest along Bemis Road
    - #3 Forest/shrubland health management or restoration
    - #8 Pollinator hedgerow buffer
    - #40 Tree protection bylaw
    - #50 Analysis and study projects
2. Driveway
    - #17 Pervious parking and walking areas
3. Unused Structure
    - #60 Habitat enhancements
    - #58 Invasive species management

Heald Orchard/Heald Pond

Map Link

https://arcg.is/101WK00

1. Trail through Heald Orchard
    - #14 Soil protection- puncheon boardwalk
    - #52 Educational interpretation
2. Heald Street
    - #30 Pedestrian safety and bike access
3. Upper Orchard
    - #26 Apply indigenous knowledge
    - #58 Invasive species management
    - #60 Habitat enhancements
    - #2 Grassland meadow management restoration
4. Lower Orchard
    - #25 Food production forage
    - #24 Outdoor classroom/nature-play
    - #28 Paved pervious trail UANT

Unkety Brook

Map Link

https://arcg.is/1b0HHm0

1. Unkety Brook under Lowell Road
    - #15 MSCS culvert improvement
    - #20 Species crossing protections
2. Unkety Brook
    - #21 Beaver deceiver/promoter
    - #58 Invasive species management
    - #60 Habitat enhancements
    - #1 River/pond revegetation
    - #4 Wetland management restoration
3. Lowell Rd
    - #30 Pedestrian safety and bike access

Railroad Square

Map Link

https://arcg.is/9eD0W

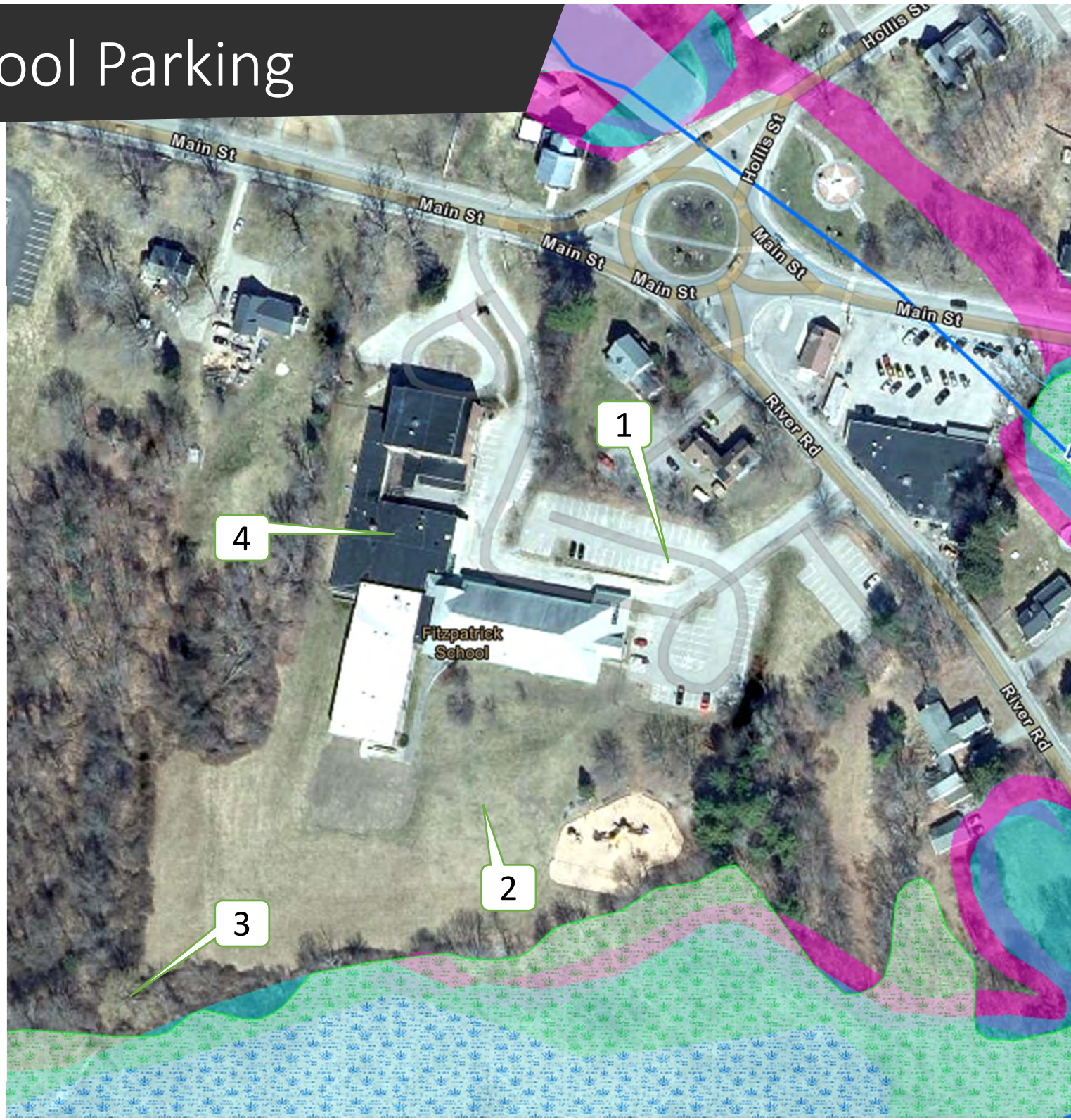
1. Existing Rain Garden
    - #58 Invasive species management
    - #52 Educational Interpretation
    - #56 Volunteer opportunities
2. Main Street along Storefronts
    - #14 Shade-habitat/infiltration tree planting
    - #17 Pervious parking and walking areas
    - #19 Lighting modifications/upgrades
    - #8 Pollinator hedgerow buffer
3. Access Road to Nashua River
    - #11 Stormwater treatment wetlands

Fitzpatrick School Parking

Map Link

https://arcg.is/11PiLa0

1. Fitzpatrick School Parking Lot
   - #17 Pervious parking walking areas
2. Field
   - #24 Outdoor classroom/nature play
   - #2 Grassland meadow management
   - #25 Food production and forage
3. Forest
   - #27 Soft trail
   - #29 Soil protection- puncheon boardwalk
   - #21 Beaver deceiver
   - #58 Invasive species management
4. Fitzpatrick School
   - #23 PV parking awnings and rooftops



Mill Street/Varnum Brook

Map Link

https://arcg.is/1PS9qm

1. Varnum Brook
    - #12 Daylighting of stream
    - #15 MSCS culvert improvement
    - #1 River/pond bank revegetation
    - #20 Species crossing protections
2. Pavement with Floodplain
    - #5 New wetland or floodplain construction/expansion
    - #10 Soil management or restoration
    - #60 Habitat enhancements
    - #58 Invasive species management
3. Mill Street Parking Lot
    - #17 Pervious parking walking areas

Reedy Meadow off Lowell Rd

Map Link

https://arcg.is/zm4bW0

1. Ready Meadow Brook Culverts under Lowell Rd. and Leighton St.
    - #15 MSCS culvert improvement
    - #20 Species crossing protections
2. Ready Meadow Brook
    - #5 New wetland or floodplain construction/expansion
    - #58 Invasive species management
    - #7 Stream flow alteration
    - #13 Upstream BMPs rain-garden, bio-swale, etc.
3. Ready Meadow Pond
    - #21 Beaver deceiver/promoter