The Southeast New England Program Network

Prioritizing Nature-based Stormwater Projects to Maximize Community Co-Benefits in the Buttonwood Brook Watershed

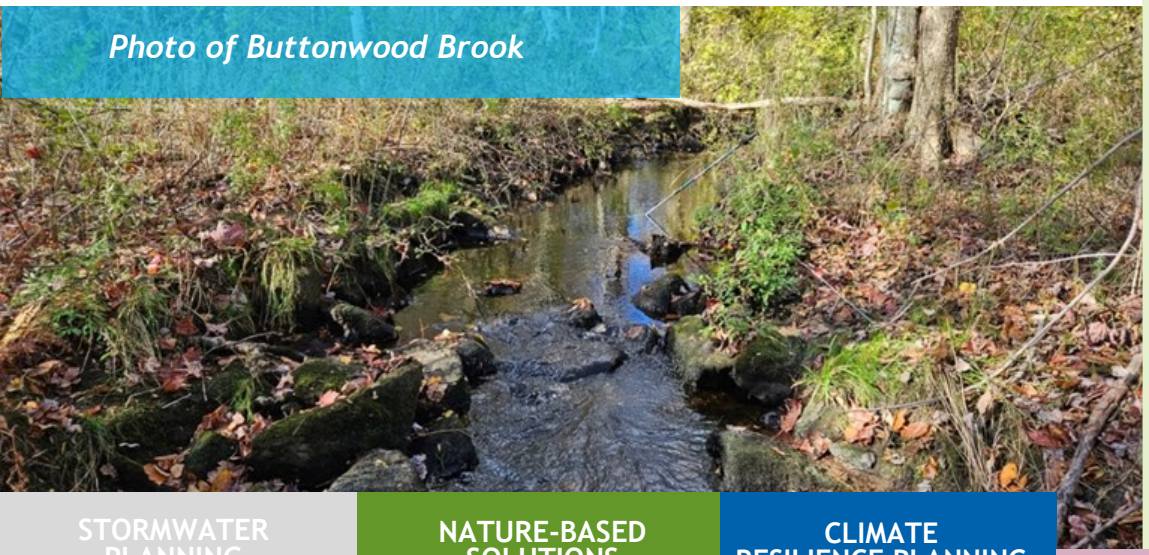
PROJECT SUMMARY

In 2022, Buzzards Bay Coalition (BBC) applied for, and was selected to receive, technical assistance from the SNEP Network to assist with prioritizing stormwater management projects that will protect water quality in the Buttonwood Brook Watershed. Buttonwood Brook is a nutrient and pathogen-impaired, highly modified, urban stream that runs from its headwaters in New Bedford, MA to its mouth at Apponagansett Bay in Dartmouth, MA where water quality consistently ranks in the bottom 10% of all 30 major harbors and coves in the Buzzards Bay watershed. A large portion of the pollution reaching Apponagansett Bay is related to stormwater discharge that enters Buttonwood Brook from point and non-point sources along its entire length.

BBC's ongoing water quality monitoring program, supported by a 2021 Southeast New England Program Pilot Watersheds Initiative Grant, has helped to pinpoint areas of water quality impairments along the Brook. Expansive impervious surfaces and a complicated stormwater sewer system, typical development impacts on an urbanized stream, have made identifying the sources of these pollutants more challenging, however. Alterations to the natural topography and associated flow of water through the watershed complicate the boundaries of drainage areas and make it more difficult to identify where exactly the water that enters the Brook from a particular outfall is coming from.

To address these challenges and make more informed stormwater management decisions, BBC worked with SNEP Network partners on an "urban watershed" mapping project that integrated GIS datasets with on-the-ground stormwater infrastructure mapping to accurately delineate drainage areas for each of the outfalls contributing stormwater runoff to Buttonwood Brook. Next, pollutant loading modeling helped to identify which outfall drainage areas were contributing larger volumes of pollutants to the Brook, so that BBC could better prioritize where to focus stormwater management efforts. Finally, a site ranking prioritization framework was developed to select the top priority stormwater management projects that would not only reduce stormwater and pollutants from entering Buttonwood Brook, but also utilize natural infrastructure to provide co-benefits to the surrounding community.

Photo of Buttonwood Brook



PROJECT HIGHLIGHTS

SNEP NETWORK PARTNERS: Southeastern Regional Planning and Economic Development District (SRPEDD), Kimberly Groff Consulting

LOCAL PARTNERS: Towns of Dartmouth and New Bedford, Buzzards Bay Coalition (BBC; Technical Assistance Recipient)

CONSULTANT: Paradigm Environmental

LOCATION:
Buttonwood Brook Watershed in Dartmouth and New Bedford, MA

SCALE/SIZE:
The Buttonwood Brook Watershed spans two communities and is the largest freshwater stream that feeds Apponagansett Bay, or Padanaram Harbor, in Dartmouth, MA

KEYWORDS:
Nature Based Solutions (NBS), climate resilience, stormwater management, project prioritization, pollutant load modeling

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STORMWATER PLANNING

NATURE-BASED SOLUTIONS

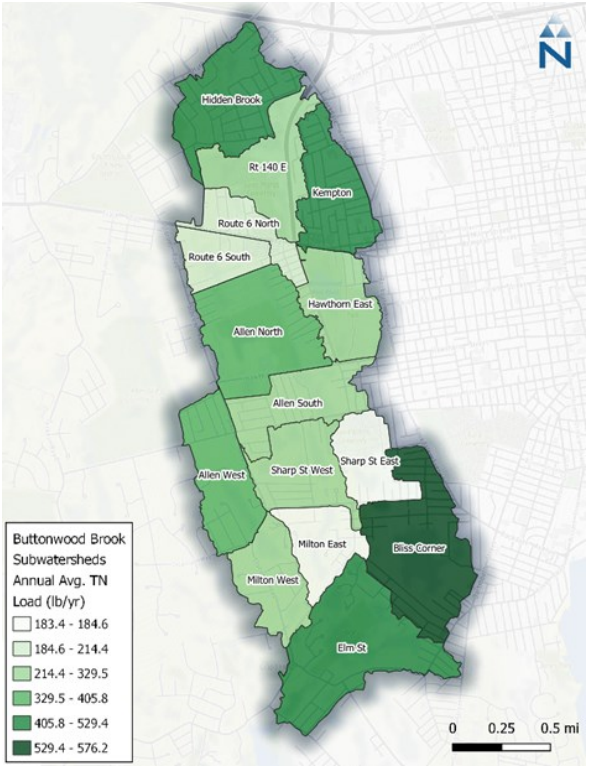
CLIMATE RESILIENCE PLANNING

FUNDING AND FINANCING

LID/BYLAW REVIEW

POLLUTANT MAPPING

Paradigm Environmental provided drainage area mapping and stormwater runoff modeling technical assistance to BBC to help better understand which portions of the Buttonwood Brook Watershed were contributing most significantly to water quality impairments. Paradigm delineated the sub-watersheds that drain into each outfall discharging into Buttonwood Brook in ArcGIS, and BBC verified stormwater drainage patterns on the ground. Paradigm then characterized each sub-watershed into areas of similar physical characteristics, such as land use and soil type, that influence stormwater runoff. These hydrologic response units, or HRUs, were then entered into EPA's Opti-Tool Stormwater Management Model to simulate stormwater runoff and pollutant loading into Buttonwood Brook from each sub-watershed. The results provide insight into which sub-watersheds are contributing most to pollution, which can help target areas where management efforts would have the greatest impact on water quality.



PRIORITIZING COMMUNITY CO-BENEFITS

BBC identified potential sites where various types of green and grey stormwater mitigation projects could be constructed to help capture and treat stormwater runoff before it flows into Buttonwood Brook. BBC and SRPEDD worked together to develop a framework for prioritizing the more than 75 projects and sites identified with local stakeholders. Nature-based stormwater management projects (for example, wetland restoration, rain gardens and vegetated infiltration trenches) that not only had the greatest potential to improve water quality, but that would provide additional co-benefits to the surrounding community by creating urban green space, providing wildlife habitat and mitigating the impacts of extreme heat and storms were favored. SRPEDD created an excel-based scoring tool to rank projects against each other based on project feasibility and potential to provide the most co-benefits.

Co-Benefits Provided by Nature-Based Stormwater Management Projects:

- Urban green space creation
- Traffic calming streetscape improvements
- Pollinator and wildlife habitat
- Neighborhood cooling & reduced energy costs
- Flood reduction & groundwater recharge
- Water quality & habitat protection

OUTCOMES

SNEP Network's pre-approved consultant pool improved local stormwater management planning efforts by providing a framework and analysis assistance to identify and prioritize the most effective projects for implementation. BBC utilized the sub-watershed mapping, modeling and prioritization framework provided by the SNEP Network to select 10 priority stormwater mitigation projects throughout the watershed that would provide the greatest benefits to water quality, wildlife and the community, alike. This planning assistance enabled BBC to leverage separate funding to advance these 10 priority projects to conceptual design, and the top 3 were selected with stakeholders for implementation.

ABOUT THE NETWORK

The SNEP Network provides free training and assistance to municipalities, organizations, and tribes in Rhode Island and Massachusetts to achieve healthy watersheds, sustainable financing, and climate resilience The SNEP Network is a project of the New England Environmental Finance Center and is funded by the U.S. Environmental Protection Agency's Southeast New England Program. To learn more about or request network services, SNEP communities can visit www.snepnetwork.org

ADDITIONAL RESOURCES:

EPA Opti-Tool: https://www.epa.gov/tmdl/opti-tool-epa-region-1s-stormwater-management-optimization-tool

New England Stormwater Retrofit Manual: https://snepnetwork.org/stormwater-retrofit-manual/

Stormwater Project Prioritization Tool & additional stormwater planning resources: https://snepnetwork.org/network-resources/

Nature Based Solutions StoryMap: https://storymaps.arcgis.com/

PARADIGM ENVIRONMENTAL

SRPEDD Southeastern Regional Planning & Economic Development District

buzzards BAY COALITION