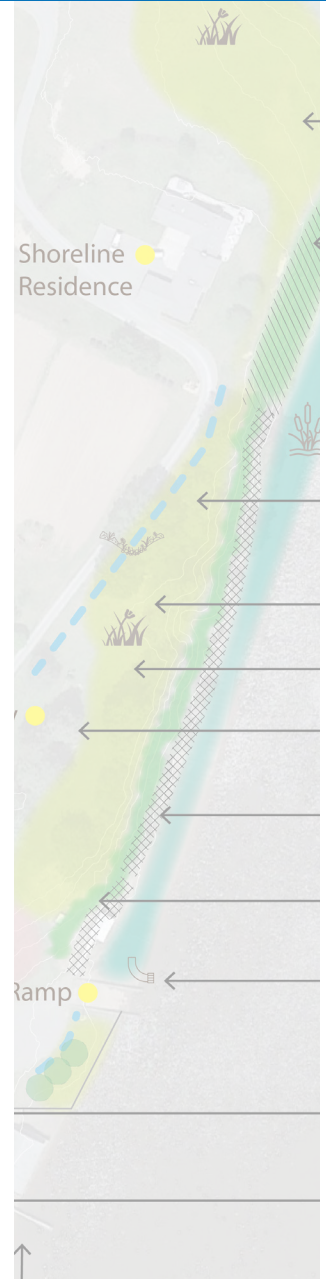
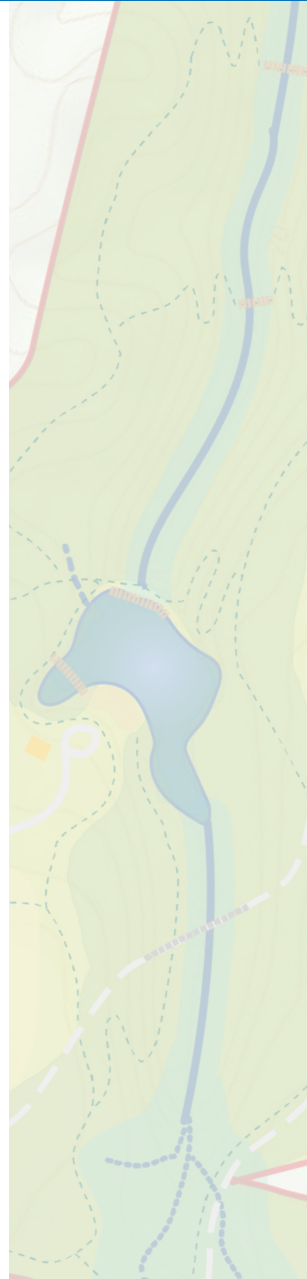


EXECUTIVE SUMMARY

Targeted Outreach for Green Infrastructure in Vulnerable Communities



CONTENTS

Overview	1
Pilot Project Considerations	2
Summary	3

Acknowledgments

The TOGI project team acknowledges the contributions of all those who participated in this planning effort.

TOGI Project Team

- Chris Guy, U.S. Fish and Wildlife Service & Chesapeake Bay Program
- Briana Yancy, U.S. Environmental Protection Agency
- Katlyn Fuentes, Chesapeake Research Consortium
- Alisa Wilson, Skeo Solutions
- Catherine Brown, Skeo Solutions
- Marissa Sperry, Skeo Solutions

This project has been funded wholly or in part by the United States Environmental Protection Agency under assistance agreement CB96341401 to the Chesapeake Bay Trust. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document.



Overview

Many communities are adopting green infrastructure as a strategy to manage stormwater, improve water quality, add habitat, and provide community benefits such as open space, pedestrian safety, shade and beautification. The Chesapeake Bay Program Habitat Goal Implementation Team (GIT) launched a pilot project, Targeted Outreach for Green Infrastructure in Vulnerable Areas (TOGI), to support Chesapeake Bay watershed communities in designing green infrastructure projects that meet community, watershed, and habitat conservation goals. Funded by a grant from the Chesapeake Bay Trust, Skeo Solutions was selected as the contractor to support the GIT lead and provide facilitation and green infrastructure planning services. The goal of the project is to equip local decision makers in Maryland, Virginia and Pennsylvania identify green infrastructure options that provide co-benefits to underserved and underrepresented communities. Skeo facilitated a series of custom listening sessions and workshops with local stakeholders to identify projects and refine concept plans. While the process was not intended to support broad community engagement, the stakeholder-identified project outcomes will provide a springboard for a full community planning process and grant applications for implementation.

Process

The project included several key tasks:

- 1. Community Selection** – The GIT project lead formed an ad hoc TOGI steering committee to determine a selection process and select communities for the project. The steering committee was not a fixed group and included both Chesapeake Bay Program employees and partners with expertise in habitat restoration, climate change, underserved communities, and technical GIS knowledge, as well as partners with specific knowledge of the areas being considered for the project. The selection criteria for communities included areas that are: above the fiftieth percentile nationally for low-income population; at least 20% minority population; considered to be at risk for either sea level rise or climate change driven flooding, encompassed by or adjacent to a terrestrial or aquatic habitat core network. Ultimately areas within the City of Williamsport, Pennsylvania; the Upper Mattaponi Tribe and the Mattaponi Tribes located in Middle Peninsula, Virginia; and Cambridge, Maryland were selected as areas susceptible to climate change and habitat loss that could benefit from green or nature-based Infrastructure projects. These communities also met demographic criteria for diversity, equity, inclusion and justice based on race and income.
- 2. Local Steering Committee** – once the communities were selected, the project team (GIT lead and Skeo) worked to form a steering committee for each community to help guide the process. Depending on the local context, these committees included local, state and federal government staff, Tribal representatives, and representatives from regional and local environmental and community organizations. The committees helped engage local stakeholders and identify resources and opportunities to support refining the design and construct the project.
- 3. Listening Session** – the project team facilitated a listening session in each community to help identify local opportunities where climate change problems can be addressed through green infrastructure options, while also helping to meet community needs. Based on information gathered from the listening session, the project team developed a set of green infrastructure design concepts.
- 4. Green Infrastructure Design Workshop** – following the listening session, participants were invited to a green infrastructure design workshop to review preliminary design concepts and provide feedback. Participants discussed priorities, next steps and implementation funding opportunities.
- 5. Final Report** – the project team incorporated feedback provided during the design workshop to develop a draft and final summary report documenting existing conditions, design goals and revised illustrative design concepts. The report is designed as a tool that can be used by the community to support grant applications and share with the broader community to gather additional ideas and build support for the project.

PLANNING PROCESS

Pilot Project Considerations

Pilot projects offer an opportunity to test a method or approach and reflect on opportunities for conducting the process again. Key considerations for working with vulnerable communities to develop green infrastructure strategies are provided below by key phases of the project.

Community Selection

- Budget time upfront in the project for the community selection process, which includes developing selection criteria, convening a steering committee, conducting community research and then the outreach communication to communities and invitations to participate in the project.
- During community selection process, pair data analysis with community conversations and ground truthing. A range of watershed and community data is available to help identify vulnerable areas for climate change and socio-economic vulnerability. Working directly with community leaders can help refine areas of need and identify where capacity (such as time limitations to commit to the project or lack of community organization or leaders) to participate in a planning process may be a constraint.

Project Coordination

- Establish a primary point of contact for each community to set up calls and share information.
- Convene regular project team meetings (such as weekly) to ensure project stays on track and help address any issues early on.
- Convene regular (such as biweekly) local steering committee meetings to sustain momentum and support for the project.

Local Steering Committee

- Convene local leaders and resource partners as a steering committee to help guide the process and ensure representation that reflects community voices, particularly those that are often under-represented.
- Ensure balance of community, state and federal stakeholders, with priority given to community or Tribal leaders.
- Solicit input from steering committee to help identify and invite participants for listening session and design workshop.
- Recognize that tribes have their own governing bodies and sovereign land and whether a tribe is state or federally recognized can have different implications on land ownership and grant funding opportunities.

Listening Session

- Host a listening session to hear community issues and needs to identify a project area of focus.
- Provide background information on green infrastructure strategies as a foundation for the conversation so that everyone is working from the same basic understanding. Describe how these strategies can also best meet community needs.
- Ensure adequate time for community stakeholders to share their ideas and concerns and practice active listening. Take visual notes to reflect listening and documentation of what is being shared.
- Provide summary notes of listening session and ask what is missing.
- Consider including equity stipends in the budget to compensate community leaders who are volunteering to participate for their expertise and time.

Initial Design Concepts

- Share initial design concepts with community steering committee prior to the workshop. These community and technical experts can help strengthen the concept and identify funding opportunities prior to workshop.
- Identify specific funding opportunities or related initiatives during design development to help tailor what to focus on or prioritize.
- Use plain language to describe the concept and provide examples to illustrate ideas.

Green Infrastructure Design Workshop

- Reconvene listening session participants in a design workshop to share and gather feedback on design concepts.
- Use plain language when describing the design concepts, create easy to read and understand graphics and provide example photos to describe opportunities.
- Pre-identify funding opportunities that best align with project goals and invite funders and resource partners to join the workshop.
- Engage key state and federal partners in the workshop to build support for the project and assist with identifying funding opportunities.
- Clarify how green infrastructure concepts also address community needs. This can help build early support for the concepts and motivate local stakeholders to seek implementation funding.
- Discuss priorities for moving forward and who might be best to lead those activities.

Final Summary Report

- Tailor summary report to assist communities in grant applications by including key information required such as descriptions of community goals and needs, existing conditions and design approach.
- Include visuals to illustrate design concepts and examples or photos to illustrate opportunities.
- Develop and share a spreadsheet of the range of funding opportunities to consider, noting those that are most relevant or nearer term.

Summary

The TOGI pilot project supported the City of Cambridge, the City of Williamsport, the Upper Mattaponi Tribe and the Mattaponi Tribe to design green infrastructure projects that met community, watershed, and habitat conservation goals. As a result, these communities have design concepts that can support grant applications and the next phase of design development. Other outcomes include:

- Developed a range of stormwater management design concepts that provided habitat benefits, including increased tree cover, pollinator habitat, living shorelines, and riparian plantings. The concepts also provided a range of climate resilience strategies.
- Provided technical assistance that was value added and did not create additional strain on communities that may have limited time or resources to spend on this type of planning effort.
- Aligned a planning project without implementation funding with the announcement of funding opportunities. A series of funding opportunities became available as the design concepts were developed and these could be packaged for grant applications.
- Helped communities visualize ideas they already have but lacked the visuals to describe and present as a concept. Workshop discussions helped expand and strengthen the concepts and position the communities to seek funding for implementation.

The final reports for each community are included as attachments to this executive summary.



TARGETED OUTREACH FOR GREEN INFRASTRUCTURE

Cambridge, Maryland



Chesapeake Bay Program
Science. Restoration. Partnership.



CONTENTS

Overview	1
Planning Process.....	2
Property Overview	3
Concept Design.....	4
Green Infrastructure Strategies.....	5
Park Amenities	6
Community Engagement.....	9
Next Steps	9

Acknowledgments

The TOGI project team acknowledges the contributions of all those who participated in this planning effort.

TOGI Project Team

- Chris Guy, U.S. Fish and Wildlife Service & Chesapeake Bay Program
- Briana Yancy, U.S. Environmental Protection Agency
- Katlyn Fuentes, Chesapeake Research Consortium
- Alisa Wilson, Skeo Solutions
- Catherine Brown, Skeo Solutions
- Marissa Sperry, Skeo Solutions

This project has been funded wholly or in part by the United States Environmental Protection Agency under assistance agreement CB96341401 to the Chesapeake Bay Trust. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document.



Targeted Outreach for Green Infrastructure in Vulnerable Areas Project

Overview

Many communities are adopting green infrastructure as a strategy to manage stormwater, improve water quality, add habitat and provide community benefits such as open space, pedestrian safety, shade and beautification. The Targeted Outreach for Green Infrastructure in Vulnerable Areas (TOGI) is a pilot project being led by the Chesapeake Bay Program Habitat Goal Implementation Team. The goal of this pilot project is to work with communities in the Chesapeake Bay watershed to design green infrastructure projects that meet both community and habitat conservation goals.

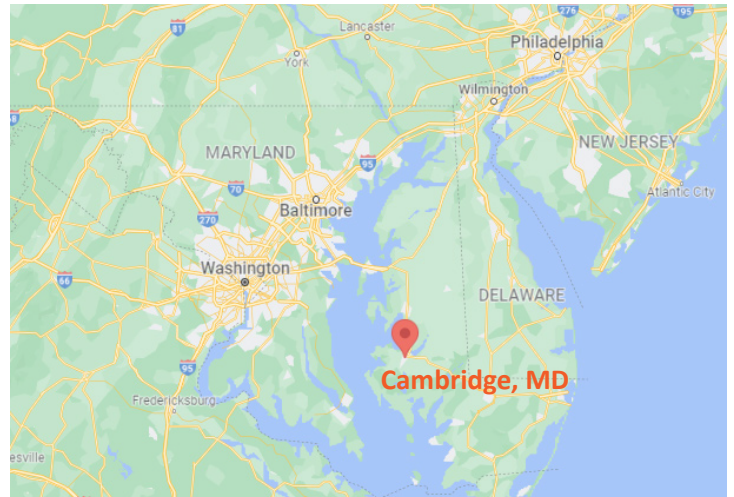
Areas within the City of Williamsport, Pennsylvania; Middle Peninsula, Virginia' and Cambridge, Maryland were selected as areas susceptible to climate change within the Chesapeake Bay watershed that could benefit from green or nature-based Infrastructure projects. These communities also met criteria for diversity, equity, inclusion and justice based on income and demographic data.

The process included listening sessions to help identify local opportunities where climate change problems can be addressed through green infrastructure options, while also helping to meet community needs. Following the listening sessions, a design workshop was held to develop a preliminary design concept for a community-identified project. The outcome is a design concept for the selected project and assistance in identifying implementation funding.

Cambridge, Maryland

A Cambridge Steering Committee was formed to guide the process and included local, state and federal, government staff as well as representatives from regional and local environmental and community organizations. The Steering Committee helped identify and engage local stakeholders and identify resources and opportunities to refine the design and construct the project.

The outcome is a green infrastructure design concept that can serve as a catalyst to help the city move forward with broader community engagement and grant applications for implementation. The design concept is anticipated to evolve as more information becomes available through the site design process and additional community input.



Cambridge is located on the Eastern Shore of Maryland.

CAMBRIDGE STEERING COMMITTEE

- Lejan Cephas - President Commissioner, City of Cambridge
- Pat Escher, Charlene Shaw - City of Cambridge, Planning
- Jermaine Anderson, Adrian Holmes - Alpha Genesis CDC
- Minnie Woods - Cambridge Resident
- Matt Pluta - ShoreRivers
- Bhaskar Subramanian, Carrie Decker, Wesley Gould - MD Department of Natural Resources
- Breck Sullivan - Chesapeake Bay Program
- Wendy O'Sullivan, Britt Slattery - National Park Service, Chesapeake Office
- Dan Murphy, U.S. Fish and Wildlife Services
- Julie Reichert-Nguyen, Lauren Taneyhill - National Oceanic and Atmospheric Administration

PLANNING PROCESS

Listening Sessions and Workshop

At the listening session held on Wednesday, May 5, 2021, participants discussed community needs and priorities, challenges and opportunities, relevant community initiatives, and helped to identify potential areas of collaboration. A range of projects were identified including Leonards Lane; Water, Pine, and Cedar Street neighborhoods; Sailwinds Waterfront, and Cannery Park. A second listening was held to discuss these options in more detail. During the second listening session, participants selected the city owned property on Leonards Lane as the focus for the project. The community's vision for this space is to establish a park for the neighborhood to enjoy.

The listening session helped to establish goals and needs for the proposed park including green infrastructure strategies to help alleviate site stormwater issues and introduce a variety of amenities, recreation opportunities, education and wellness elements. The listening session was followed by a design workshop to develop a design concept for the vacant property and discuss implementation opportunities.



Leonards Lane is city owned property located in a residential area near the intersection of Leonards Lane and Hudson Road.

INVITED STAKEHOLDERS

Many community leaders and organizations shared input about the community's needs, priorities and resources to guide the project. The following people were invited to participate in the listening sessions and design workshop.

- Adrian Green Holmes, Jermaine Anderson, Joseph Manokey - Alpha Genesis CDC
- Alan Girard - Chesapeake Bay Foundation
- Amanda Fenstermaker - Dorchester Tourism
- Ameatria Johnson, Nancy Jackson - Residents of 2nd Ward
- Avis Bell, Karen Lynn Bell - Advanced Resiliency Consultants
- Bhaskar Subramanian, Carrie Decker, Wesley Gould - MD Department of the Environment
- Bobbi Ennels
- Breck Sullivan - Chesapeake Bay Program
- Brent R. Jett
- Charmaine Brown - The Mortgage Bankers Association
- Dan Murphy - US Fish and Wildlife Services
- Jeanne Elliott
- Jennifer Dindinger - UMD Sea Grant Extension
- Jennifer Starr - Alliance for the Chesapeake Bay
- Jerry Burroughs - City Planning Department
- Jody Couser - Maryland Commission of Climate Change Education
- Joe Kelley - Frederik County Trails Coordinator
- Johnny Shockley - Blue Oyster Environmental
- Julie Reichert-Nguyen, Lauren Taneyhill - NOAA
- Kathy Burtman - Waugh Chapel Community Garden
- Katie Walker - Chesapeake Conservancy
- Kimberlee Drake - Maryland Department of the Environment
- Larry White - Consultant Engineer
- La-Shon Foster - Former Commissioner
- Lejan Cephas, President Commissioner and Jameson Harrington, Ward 3 Representative - City of Cambridge
- Linda Harris - Harriet Tubman Museum and Education Center
- Linda Walker
- Lisa Wool - Nanticoke River
- Lynette Wongus - Black Heritage and Culture Group
- Marcos Garcia
- Matt Pluta - Shore Rivers
- Pat Escher, Charlene Shaw, Jeannie Bellina, George Hyde - City of Cambridge
- Rhodana Fields - Habitat Choptank
- Susan Casey - State of Maryland
- Wendy O'Sullivan, Britt Slattery - National Park Service, Chesapeake Office

Site Conditions

The 6.2 acre city-owned property on Leonards Lane is located within a residential area that lacks community park amenities and sidewalks along major pedestrian routes. The property is relatively flat and includes a drainage area that runs diagonally through the property. The primary soil type on the property is Othello Silt Loam and has poor drainage. Addressing stormwater management provides environmental and community benefits.

The area receives full direct sunlight and has an existing parking area and access off Leonards Lane. The property also has a “paper street” (or right of way) on the northern side that connects Greenwood and Leonards Lane.

Previously, the area was used as a dredge disposal site when the city marina was expanded in 2006. Trash and recycling were available on the property until recently.

Leonards Lane lacks sidewalks. Safer access for residents walking to the neighborhood store at Cosby Avenue and Leonards Lane is needed.

During the design workshop, participants reviewed two design options and discussed a preferred alternative which was developed further into a design concept described on the following page.



Leonards Lane (parcel #2342) is a large vacant city-owned property that can help address stormwater management and support a range of amenities.

CONCEPT PLAN

Concept Plan



This concept plan illustrates amenities and green infrastructure features (see numbered features) for Leonards Lane Park

The Leonards Lane Park concept plan includes features and amenities to meet the community's needs for gathering, gardening, and passive and active recreation while enhancing the natural beauty, water quality and ecology of the site.

- Enhanced wetland garden in the drainage area that runs diagonally through the property to provide additional capacity to hold and clean water; plantings that provide habitat and aesthetic appeal; and environmental educational signage.
- Community garden space (such as raised planter boxes) conveniently located near parking with water access.
- Walking paths throughout the large site connecting the various amenities
- Improved connection to surrounding area, including a walking path connecting to Greenwood Avenue and sidewalk along Leonard's Lane to the local convenience store.
- Children's playground area.
- Picnic shelter / pavilion for outdoor gatherings and events.
- Technical bike skills area that can include small ramps and obstacles for children of all ages.
- Skate park skills area with rain garden to address stormwater runoff from paved surface.
- Full size basketball court with rain garden to address stormwater runoff from paved surface.
- Multi-use recreation field for pick up sports and games.
- Memorial space to honor community members who have passed away.
- Parking with stormwater best management features to address stormwater runoff.
- Plantings throughout to provide shade, habitat and stormwater management benefits.
- Educational signage and public art to celebrate local culture and ecology.
- Plantings throughout to provide shade, habitat and stormwater management benefits.
- Educational signage and public art to celebrate local culture and ecology.

Green Infrastructure Strategies

Green infrastructure strategies use vegetation, soils and other natural landscape features to manage and treat stormwater at its source. The site's proximity to the Chesapeake Bay and existing drainage features provide an opportunity to integrate green infrastructure features as integral components of the park. The following green infrastructure strategies are keyed to the concept plan on the previous page.



1. Planted swale along Leonards Lane to capture street runoff and buffer sidewalk



2. Stormwater plantings (small rain gardens) to capture runoff from basketball court and paved skate area



3. Planted swale to capture surface water and oil from parking area



4. Low mow (6-12") areas between paths and programmed areas



5. Parking surface such as gravel (existing) or pervious pavers to reduce runoff



6. Water loving plants to absorb rain water that collects along the low lying drainage area / wetland garden



7. Pollinator and native plantings to infiltrate rain water flowing toward swale

PARK AMENITIES

Concept Plan



This concept plan identifies a range of park amenities for Leonards Lane Park

Park Amenities

1. Community garden space with water access.
2. Walking paths connecting the amenities.
3. Children's playground area.
4. Picnic shelter/pavilion for outdoor gatherings and events.
5. Technical bike skills area that can include small ramps and obstacles for children of all ages.
6. Skate park skills area.
7. Full size basketball court.
8. Multi-use recreation field for pick up sports and games
9. Memorial space to honor community members who have passed away.
10. Educational signage and public art to celebrate local culture and ecology (throughout)
11. Improved connection to surrounding area, including a walking path connecting to Greenwood Avenue and sidewalk along Leonards Lane to local convenience store.

Park Amenities

A range of park amenities have been identified to support community goals to provide a rich park experience for residents of all ages. The amenities range from community garden space, walking trails with fitness stations to active uses like basketball and skateboard features. Green infrastructure strategies are integrated into built features to capture runoff from paved areas (see previous page).



1. Community garden space with water access



2. Stormwater friendly walking paths connecting the park amenities



3. Children's playground area that incorporates natural play elements



4. Picnic shelter/pavilion for outdoor gatherings and events



5. Technical bike skills area that can include small ramps and obstacles for children of all ages



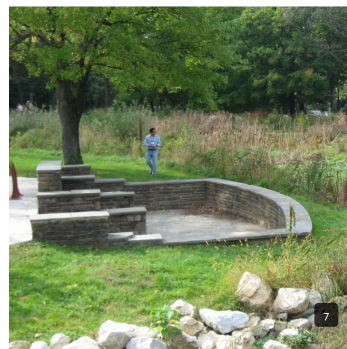
6. Neighborhood scale skate park skills area



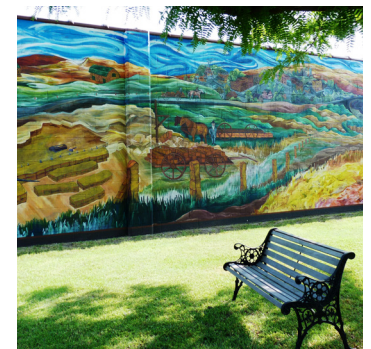
7. Full size basketball court



8. Multit-use recreation field for pick up sports and games



9. Memorial space to honor community members who have passed away.



10. Educational signage and public art to celebrate local culture and ecology.

Preliminary Cost Estimate

The Leonards Lane Park Concept Plan includes a number of features that could be implemented all at once or phased over time. A preliminary budget below provides a range of potential costs associated with the different features and can help guide implementation discussions. Not all the features include a cost, but are included in the budget as a line item as they were noted as important features to the participants. Costs provided below are for planning purposes only. A detailed site plan is a key next step for developing a full cost estimate and phasing strategy.

Feature	Quantity	Unit	Rate (\$) Low	Rate (\$) High	Cost (Low)	Cost (High)
Utilities						
Water line (tap provided by city)	50	LF	\$20.00	\$30.00	\$1,000	\$1,500
Frost free hydrant w/ backflow prevention	1	EA	\$3,500.00	\$5,000.00	\$3,500	\$5,000
Electrical connection					\$0	\$0
Pole Lights					\$0	\$0
Stormwater Management						
Wetland Restoration (low) or Bioretention Swale (high) (500'x75')	37,500	SF	\$2.75	\$15.00	\$103,125	\$562,500
Rain Gardens (for park elements)	2,500	SF	\$3.00	\$4.00	\$7,500	\$10,000
Trails					\$0	\$0
Permeable Paved Path	3,400	LF	\$4.00	\$5.00	\$13,600	\$17,000
Soft Path (3 foot wide soft surface)	1,500	LF	\$2.00	\$3.00	\$3,000	\$4,500
Bridge or Boardwalk	3	EA			\$0	\$0
Park Elements						
Basketball Court (full size)	4,700	SF	\$10.00	\$17.00	\$47,000	\$79,900
Small Skate Park	8,000	SF	\$40.00	\$60.00	\$320,000	\$480,000
Pavilion	1,000	SF	\$40.00	\$50.00	\$40,000	\$50,000
Plaza (paved)	5,000	SF	\$1.50	\$2.00	\$7,500	\$10,000
Community Garden Beds (donated)					\$0	\$0
Bike Skills Area (youth)	1	EA	\$10,000.00	\$25,000.00	\$10,000	\$25,000
Bike Skills Area (teen)	1	EA	\$10,000.00	\$30,000.00	\$10,000	\$30,000
Open Field Area	20,000	SF	\$1.50	\$2.00	\$30,000	\$40,000
Nature Playground	12,000	SF	\$10.00	\$20.00	\$120,000	\$240,000
Parking Lot Improvement		SF			\$0	\$0
Amenities						
Interpretive Signs	10	EA	\$1,000.00	\$2,000.00	\$10,000	\$20,000
Trash Cans	3	EA	\$500.00	\$700.00	\$1,500	\$2,100
Benches	5	EA	\$500.00	\$700.00	\$2,500	\$3,500
Landscape						
Shade Trees	50	EA	\$150.00	\$300.00	\$7,500	\$15,000
Habitat Gardens (Low Mow Areas)	15,000	SF	\$2.00	\$3.00	\$30,000	\$45,000
TOTAL					\$767,725	\$1,641,000

Community Engagement

The TOGI pilot project and initial park concept plan is intended to be a springboard for a full community planning process and support grant applications for implementation. The Cambridge Steering Committee and community stakeholders underscored the importance of broader community engagement to refine the concept plan as the project moves forward. There are a range of ways to reach and engage residents. Participants noted the importance of engaging the neighborhood youth that would use the park.

- Work with nearby schools and Boys and Girls Club to engage students in design development
- Pursue sponsorship and partnership opportunities, such as interest in a Harriet Tubman Museum sponsored garden.
- Coordinate with existing community organizations to engage residents and pursue partnership opportunities. Harriet Tubman Museum at Church Creek could be involved in historic education opportunities
- Work with local faith-based organizations to engage congregations.
- Hold community events or pop-up events like a bike clinic to raise awareness and engage residents. Cambridge Multisport may be a partner to pursue for pop-up bike events.
- Partnering with Habitat for Humanity to build projects (such as raised garden beds)
- Engage educators and schools around environmental aspects and practices for all ages, this could include demonstration features.

Next Steps

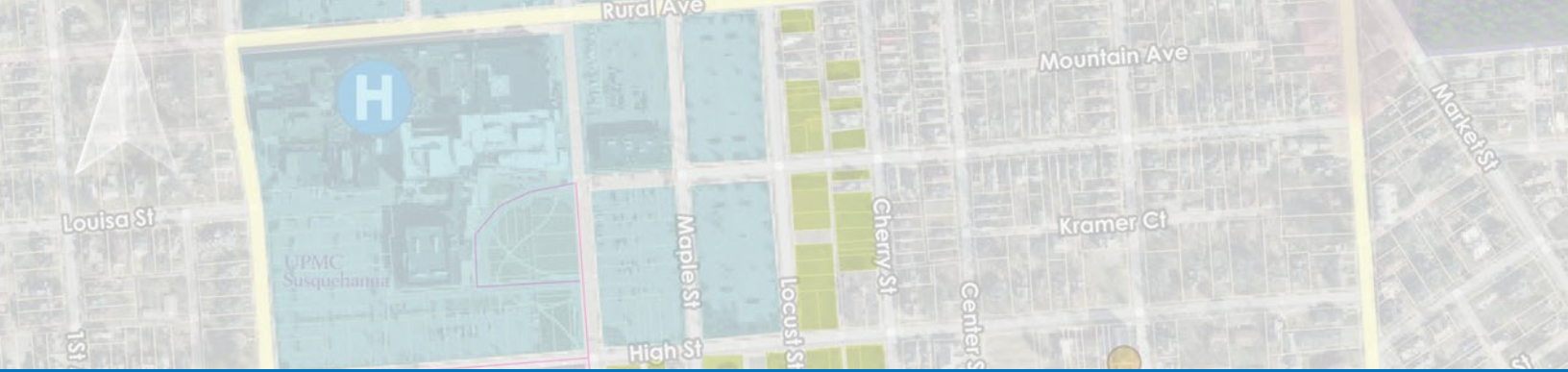
Participants noted that early implementation of a combination of green infrastructure and community amenities could help bolster support for the project and secure additional funding by strengthening partnerships.

The park concept plan can be used to support grant applications and serve as a catalyst to engage and spark community interest in transforming the vacant Leonards Lane property into a community amenity. There are a range of funding opportunities that can support moving this project forward.



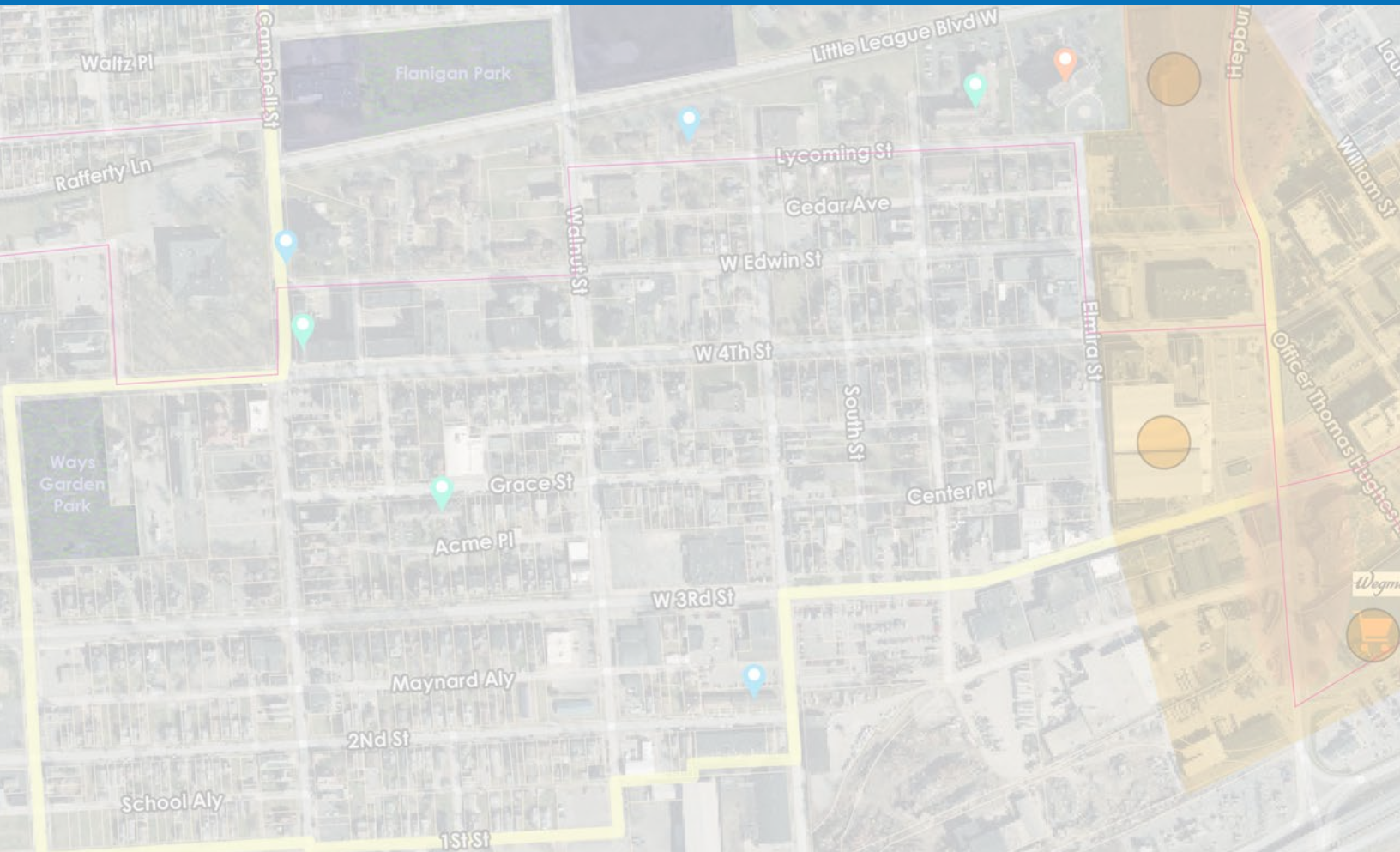


May 2022



TARGETED OUTREACH FOR GREEN INFRASTRUCTURE

Williamsport, Pennsylvania



Chesapeake Bay Program
Science. Restoration. Partnership.



CONTENTS

Overview	1
Planning Process.....	2
Property Overview	3
Concept Design.....	4
Green Infrastructure Strategies.....	5
Amenities	6
Community Engagement.....	7
Next Steps	7

Acknowledgments

The TOGI project team acknowledges the contributions of all those who participated in this planning effort.

TOGI Project Team

- Chris Guy, U.S. Fish and Wildlife Service & Chesapeake Bay Program
- Briana Yancy, U.S. Environmental Protection Agency
- Katlyn Fuentes, Chesapeake Research Consortium
- Alisa Wilson, Skeo Solutions
- Catherine Brown, Skeo Solutions
- Marissa Sperry, Skeo Solutions

This project has been funded wholly or in part by the United States Environmental Protection Agency under assistance agreement CB96341401 to the Chesapeake Bay Trust. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document.



Targeted Outreach for Green Infrastructure in Vulnerable Areas Project

Overview

Many communities are adopting green infrastructure as a strategy to manage stormwater, improve water quality, add habitat and provide community benefits such as open space, pedestrian safety, shade and beautification. The Targeted Outreach for Green Infrastructure in Vulnerable Areas (TOGI) is a pilot project being led by the Chesapeake Bay Program Habitat Goal Implementation Team. The goal of this pilot project is to work with communities in the Chesapeake Bay watershed to design green infrastructure projects that meet both community and habitat conservation goals.

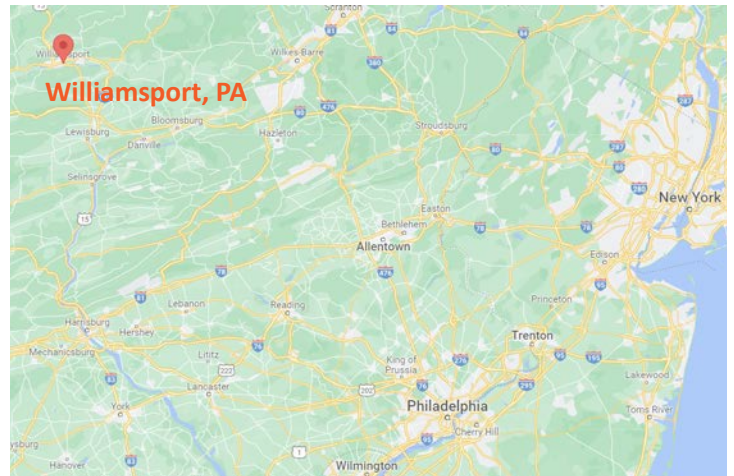
Areas within the City of Williamsport, Pennsylvania; Middle Peninsula, Virginia; and Cambridge, Maryland were selected as areas susceptible to climate change within the Chesapeake Bay watershed that could benefit from green or nature-based Infrastructure projects. These communities also met criteria for diversity, equity, inclusion and justice based on income and demographic data.

The process included a listening session to help identify local opportunities where climate change problems can be addressed through green infrastructure options, while also helping to meet social needs. Following the listening session, a design workshop was held to develop a preliminary design concept for a community-identified project. The outcome is a design concept for the selected project and assistance in identifying implementation funding.

Williamsport, Pennsylvania

A Williamsport Steering Committee was formed to guide the process and included local, state and federal government staff as well as representatives from regional and local environmental and community organizations. The Steering Committee helped identify and engage local stakeholders and identify resources and opportunities to refine the design and construct the project.

The outcome is a green infrastructure design concept that can serve as a catalyst to help the city move forward with broader community engagement and grant applications for implementation. The design concepts is anticipated to evolve as more information becomes available through the site design process and additional community input.



Williamsport is located in central Pennsylvania.

WILLIAMSPORT STEERING COMMITTEE

- Renee Carey, Northcentral Pennsylvania Conservancy
- Stan Carey, University of Pittsburgh Medical Center (UPMC) Community Outreach Specialist
- Billy Clees, Lycoming County
- Wes Fahringer, Pennsylvania Department of Conservation and Natural Resources (PA DCNR)
- Sid Furst, Salvation Army Community Garden
- Kelsey Green, Lycoming County
- Sonja Jahrsdoerfer, United States Fish and Wildlife Service
- Ralph Kisberg, Responsible Drilling Alliance
- Meghan Lehman, Pennsylvania Department of Environmental Protection (PA DEP)
- Alice Trowbridge, Heart of Williamsport
- Scott Williams, Lycoming County
- Lori Yeich, Pennsylvania Department of Conservation and Natural Resources (PA DCNR)
- Mel Zimmerman, Lycoming College Clean Water Institute

PLANNING PROCESS

Listening Sessions and Workshop

A listening session held on Tuesday, October 26, 2021 included 30 participants from across the community for a discussion about community needs, priorities, challenges, opportunities, relevant initiatives, and potential areas and partners for collaboration. A range of projects were identified including:

- Little League Boulevard Streetscape and Safety Improvements
- Improved Connectivity to Downtown
- Expanded Community Garden and Sensory Parks
- Flanigan Park Stormwater and Landscape Improvements
- Round House Multi-use Field Stormwater Improvements
- Street Tree Plantings

Listening session participants were polled to prioritize projects to focus on during a design workshop held on January 19, 2022. The workshop focused on design concepts for

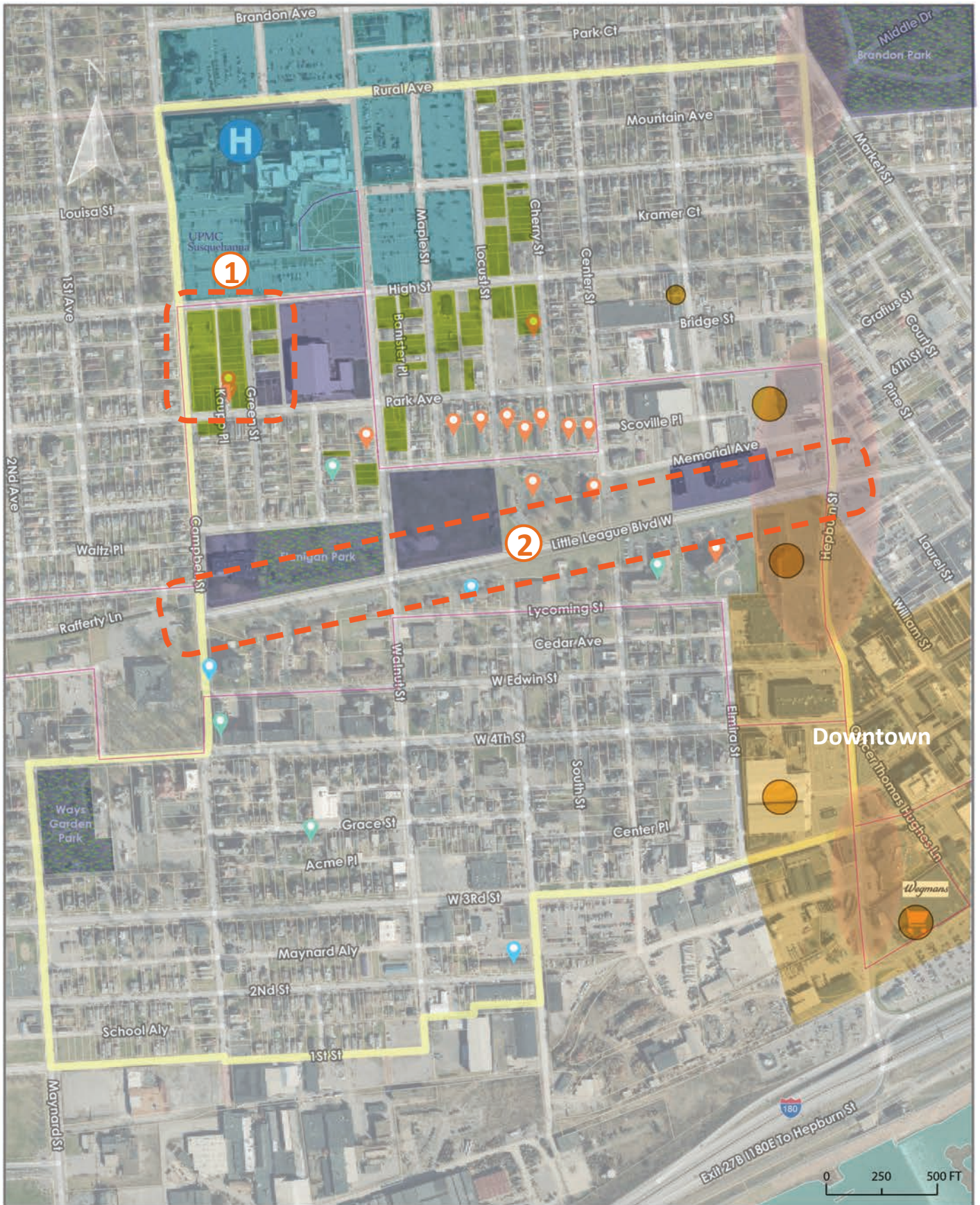
- ① Expanded community garden and park space on vacant lots owned by University of Pittsburgh Medical Center (UPMC) along Greene Street and Kauppe Place, and
- ② Little League Boulevard streetscape enhancements and improved connectivity to downtown.

INVITED STAKEHOLDERS

Many community leaders and organizations shared input about the community's needs, priorities and resources to guide the project. The following people were invited to participate in the listening sessions and design workshop.

- Alice Trowbridge, Heart of Williamsport
- Andrew Leidich, Susquehanna State Park
- Angelique Labadie-Cihanowyz, Sojourner Truth Ministries
- Bill O'Connell, Brandon Park Commission
- Billy Dayton, Firetree Place
- Carey Entz-Rine, Lycoming County Conservation District
- Chris Kemmerer, DCNR PA State Parks
- Connie Robinson, Bethel A.M.E. Church
- Corinne Stammel, Lycoming Habitat for Humanity
- David Banks, City Council
- Dawn Linn, YWCA Williamsport
- Drew Leidich, Susquehanna State Park
- Eric Ryder, Williamsport Manor
- Eric Smithgall, Williamsport Water and Sewer Authority
- Wendy Walter, Williamsport Water and Sewer Authority
- Drew Zimmerman, Williamsport Water and Sewer Authority
- Father David Bechtell, St. Joseph Worker's Parish
- Jackie Oliva-Strus, River Valley Health and Dental Center
- Jared Fencil, Assistant Regional Manager
- Jenny Hull, Family Promise Center
- Jo Jo Potts, Community Advocate
- John Breakeall, PA DEP
- Kelsey Green, Lycoming County
- Billy Clees, Lycoming County
- Scott Williams, Lycoming County
- Kendra Park, American Rescue Workers
- Laura Templeton, Salvation Army
- Lori Yeich, PA DCNR
- Wes Fahringer, PA DCNR
- Megan Lehman, PA DEP
- Mel Zimmerman, Lycoming College Clean Water Institute
- Merilyn Severson, Lycoming County Housing Authority
- Mike Davis, Williamsport YMCA
- Mike Strunk, Hiawatha Paddlewheel Boat Concession
- Nicole Miller, Transitional Living Center
- Pastor Marwin Reeves, Christ Community Worship Center
- Pastor Washington, Antioch Baptist Church
- Rachelle A. Abbott, STEP, Inc.
- Ralph Kisberg, Responsible Drilling Alliance
- Renee Carey, Northcentral Pennsylvania Conservancy
- Ron Frick, Lycoming County United Way
- Sid Furst, Salvation Army Community Garden
- Sonja Jahrsdoerfer, U.S. Fish and Wildlife Service
- Stan Carey, UPMC Community Outreach
- Tim Mahoney, Lycoming Health Improvement Coalition
- Todd Wright, Hiawatha Paddlewheel Boat Concession
- Travis Berg, Central Pennsylvania Food Bank
- Valerie Fessler, American Rescue Workers

COMMUNITY PROJECTS



- Project Area
- UPMC Campus
- UPMC owned vacant lots
- Community Amenities
- Commercial Areas
- HUD Properties
- Bus Route
- TOGI Design Projects

GREEN INFRASTRUCTURE

Green Infrastructure Strategies

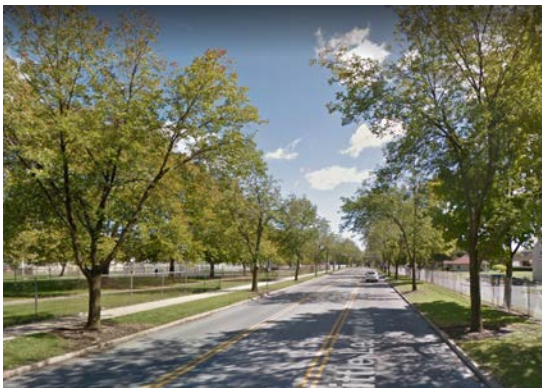
Green Infrastructure uses vegetation, soils and other natural landscape features to manage precipitation, reduce and treat stormwater at its source and create sustainable and healthy communities. Strategies can include rain gardens, bioswales, urban tree canopies, permeable pavement as well as techniques to redirect and capture stormwater. The photos below are examples of green infrastructure elements that may be incorporated into community projects.



Conservation landscaping including native plantings, pollinator gardens and edible landscapes provide shade, habitat and stormwater management benefits.



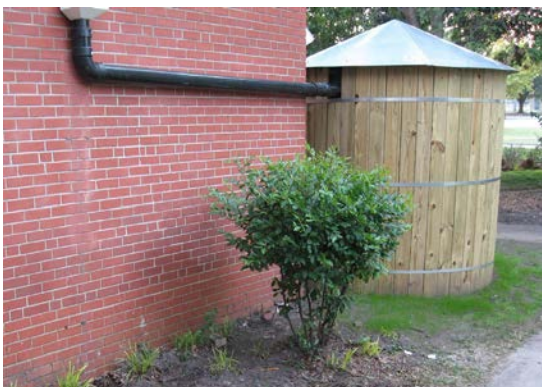
Low-mow meadow zones around high traffic and programmed areas provide wildlife habitat and infiltrate stormwater.



Urban tree canopy including street trees, groves, and shade trees provide cooling, water quality and habitat benefits.



Permeable parking areas including trees and planted swales reduce stormwater runoff.



Rainwater storage including rain barrels or cisterns can hold water for irrigation or maintenance use, like washing vehicles.



Rain gardens and swales planted with grasses, flowering perennials and shrubs detain and clean water that pools in low lying areas.

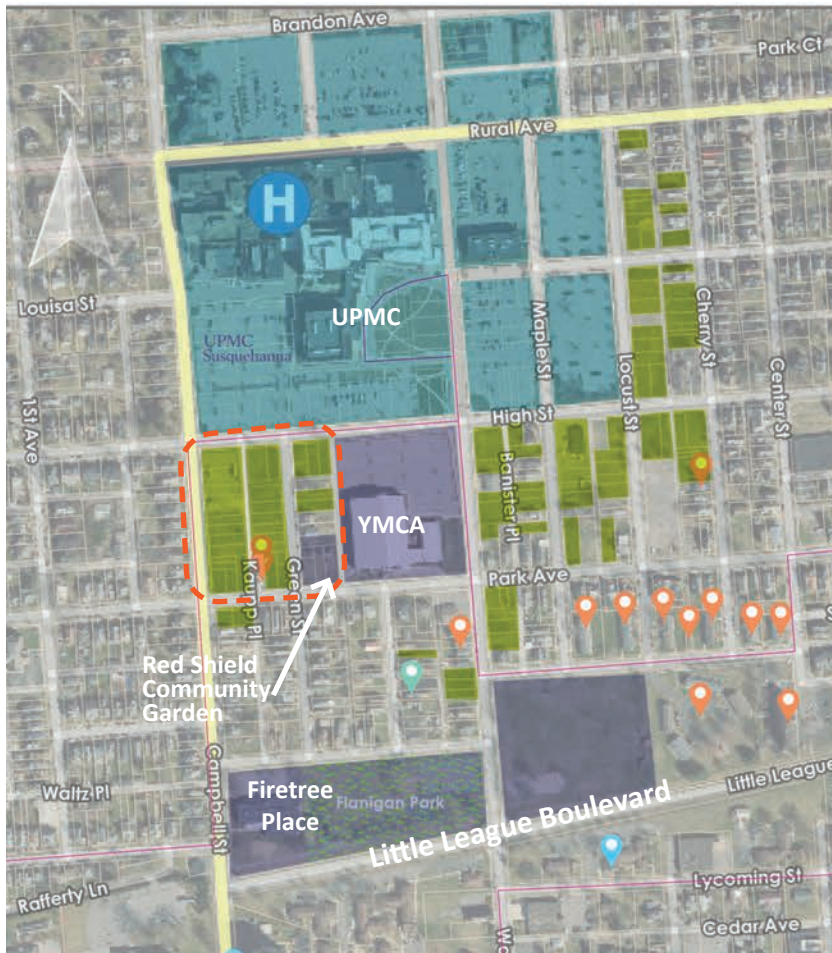
Pocket Park and Expanded Community Gardens

One of the major daily issues faced by community members is food-insecurity. The vacant lots owned by UPMC may provide an opportunity to expand the existing Red Shield Community Garden to include fruit and nut trees as well as expanded pollinator habitat to help with food production and planted areas designed to absorb and clean stormwater.

The series of vacant lots on Green Street between Park Avenue and High Street may be a prime location for an expanded community garden and a community pocket park with amenities for residents and hospital patients. These improvements could also provide better connections to the hospital, YMCA, Firetree Place and residents along Little League Boulevard. Added benefits include bolstering a sense of community, supporting community health, youth education and outreach opportunities, and an added sense of safety as more people are outside in public spaces.



Red Shield Salvation Army Community Garden



Existing vacant UPMC-owned lots along Green Street



Community garden example

COMMUNITY GARDEN

Community Amenities

Several park and community amenities have been identified to support community goals to provide access to open spaces and restorative spaces for residents. The amenities include expanded community gardens, gathering spaces, and walking paths. Green infrastructure strategies are integrated into the concept to capture runoff from paved areas and provide pollinator habitat areas. Below are examples of these amenities.



Lawn/flexible use area provides space for play and gathering.



Educational signage and public art features celebrate local culture and ecology.



Sensory and healing gardens enhance health and wellness.



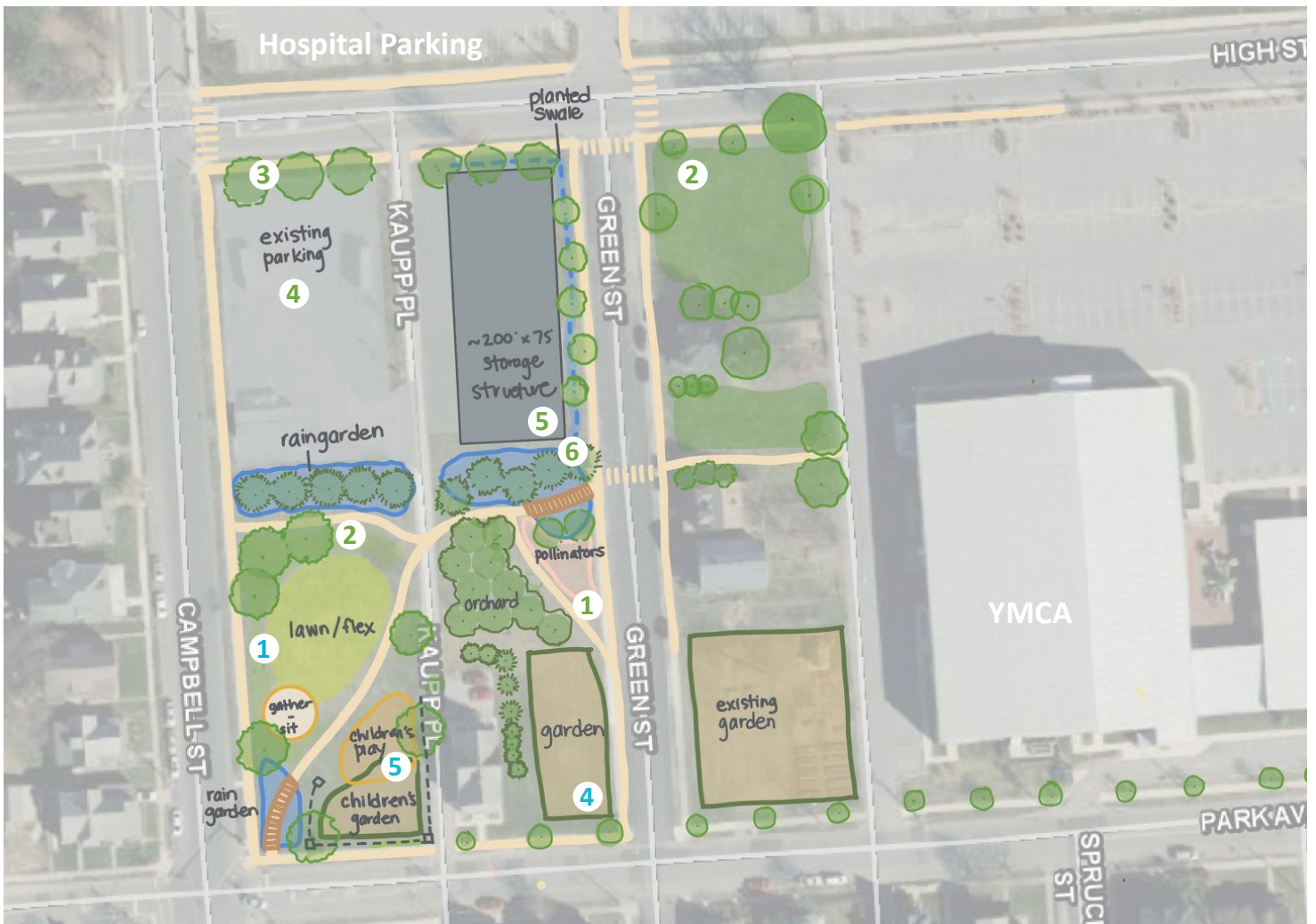
Community garden provides a place to work, learn and grow with neighbors.



Children's play area using natural materials provides connection to nature and opportunity for free play.



Contemplative gardens offer respite in urban environment.



This concept plan illustrates amenities and green infrastructure features.

The Expanded Community Gardens concept plan includes features and amenities to meet the community's needs for gathering, gardening, and passive and active recreation while enhancing the natural beauty, water quality and ecology of the site.

Community Amenities

- ① Lawn area for gathering and play
- ② Educational signage and art (across site)
- ③ Sensory/Healing Garden (location TBD)
- ④ Community garden
- ⑤ Children's play area
- ⑥ Contemplative garden (location TBD)

Green Infrastructure Strategies

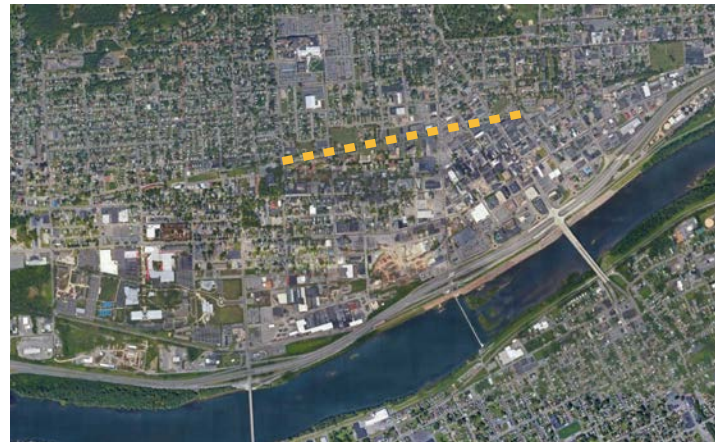
- ① Conservation landscaping
- ② Low mow and meadow area
- ③ Urban tree canopy
- ④ Permeable parking areas
- ⑤ Rainwater storage
- ⑥ Rain gardens and swales

LITTLE LEAGUE BOULEVARD

Little League Boulevard

Existing Conditions

Little League Boulevard is a main east-west corridor in Williamsport, with wide lanes and limited intersections, which encourages high speed traffic. Chain link fencing lines long sections of the street. Past development combined city blocks into megablock higher density residential, which interrupts the city street grid and limits north-south pedestrian movement to and across Little League Boulevard. Street trees were recently removed along sections of Little League Boulevard to install street lighting. The available median between the sidewalk and curb is too narrow for street trees. New street trees will likely need to be planted between sidewalk and private property or on private property.



Little League Boulevard

Potential Opportunities

The community's vision for Little League Boulevard is to establish a safer pedestrian corridor that integrates traffic calming features and stormwater management best practices. The listening session helped to establish goals and needs for the corridor including:

- Traffic calming
- Crosswalks
- Bike lanes
- Greening with street trees
- Green stormwater infrastructure to manage runoff
- Safer and easier connection to community amenities
- Street enhancement and beautification

The following strategies are described in more detail on the following pages.

- **Planted Median.** A planted median on the western end of Little League Boulevard could help slow traffic, provide a safe space for pedestrians and serve as a stormwater feature.

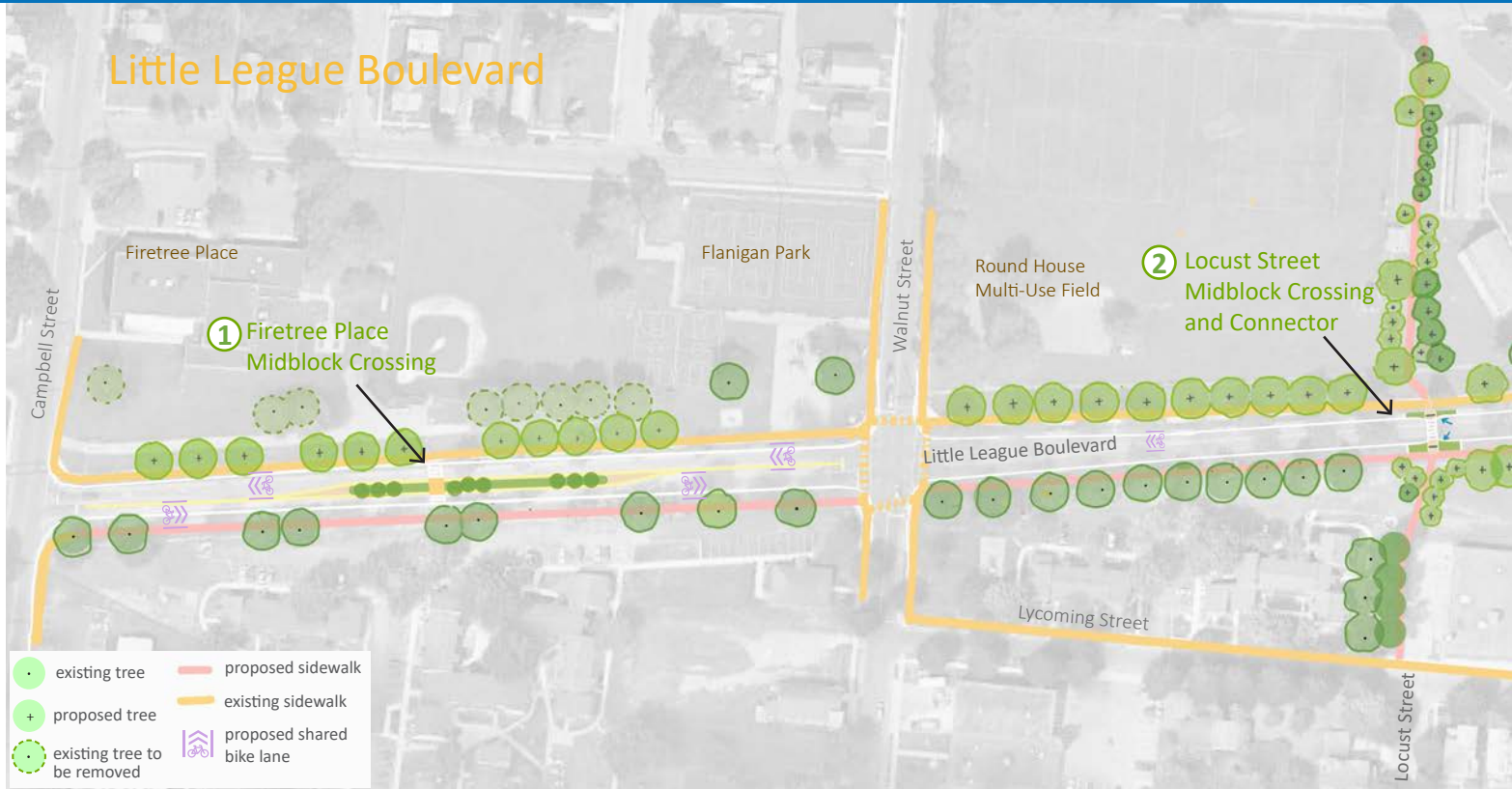
- **Midblock Crossings.** The concept proposes three midblock pedestrian crossings along the boulevard to improve connectivity and walkability. The proposed Locust Street midblock crossing features a curb cut and bioswale that ties into the existing street storm drain. Flashing lights can alert cars of pedestrians crossing for additional visibility. This midblock crossing can connect to a walkway along Round House field that extends to Locust Avenue. Another midblock crossing can reconnect Center Street to Little League Boulevard and include bumpouts at pedestrian crosswalks to slow traffic.
- **Intersection Improvement.** The wide intersection at Hepburn Street and Little League Boulevard creates a long pedestrian crosswalk. Tightening the intersection on the Hepburn Plaza side of the street by extending the curb along the southwest corner can decrease traffic speed and shorten the crosswalk for pedestrian safety.
- There is also an opportunity to enhance the pedestrian experience by removing the chain-link and implementing a barrier, if needed, using natural materials such as trees and shrubs. This concept is discussed further on pages 14-15.

PROJECT OVERVIEW



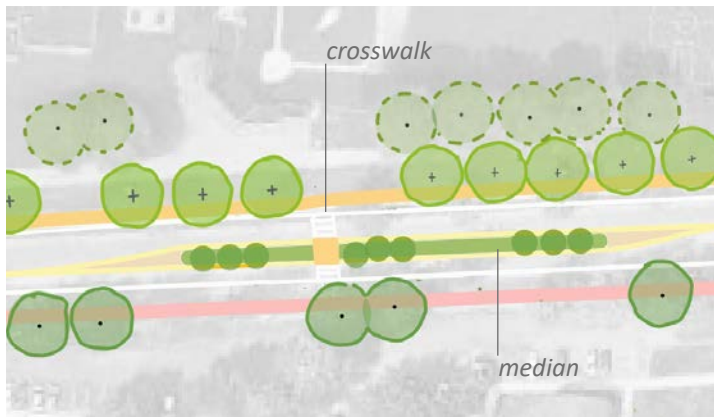
Diagram showing how the urban street grid can be restored with midblock crossings to provide additional pedestrian crossings and access to Little League Boulevard and help reduce speed of traffic.

CONCEPT PLAN



The concept design for Little League Boulevard includes street trees north of the sidewalk, midblock crossings to slow traffic and manage stormwater, new sidewalks on south side of the street, bike lanes and fence removal alternatives.

① Firetree Place Midblock Crossing



View of existing conditions near Firetree Place on Little League Boulevard



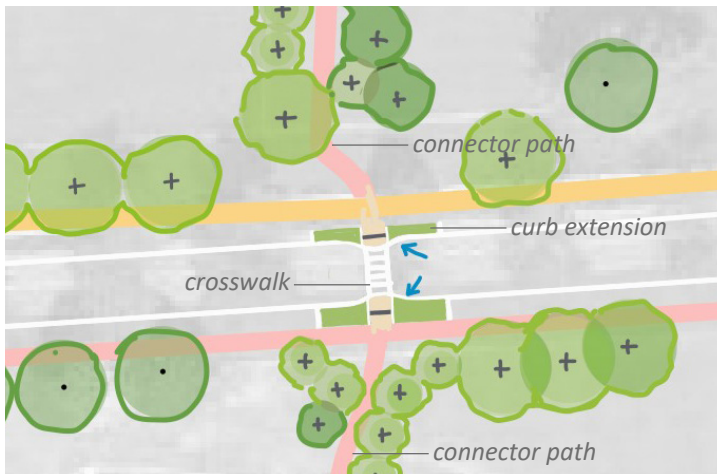
Example of proposed mid-block crossing

Proposed features:

- Planted median to slow traffic and provide safe space for pedestrians
- Median to capture and infiltrate stormwater
- Crosswalk and flashing lights to improve pedestrian safety
- Plant new trees to replace trees along sidewalk



② Locust Street Midblock Crossing and Connector



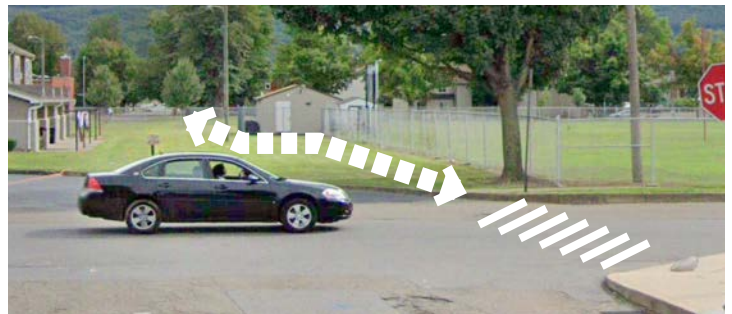
Proposed features:

- Curb extension (or bumpout) with integrated sidewalk connection and bioswale* at midblock
- New sidewalk along fence line with plantings
- Extended walking paths north and south of Little League Boulevard to connect to Locust Street
- Plant new trees for shade and wayfinding along new sidewalk and connecting path

*aligns with existing street storm drains for connection to existing drainage network



View of existing conditions near Round House Field

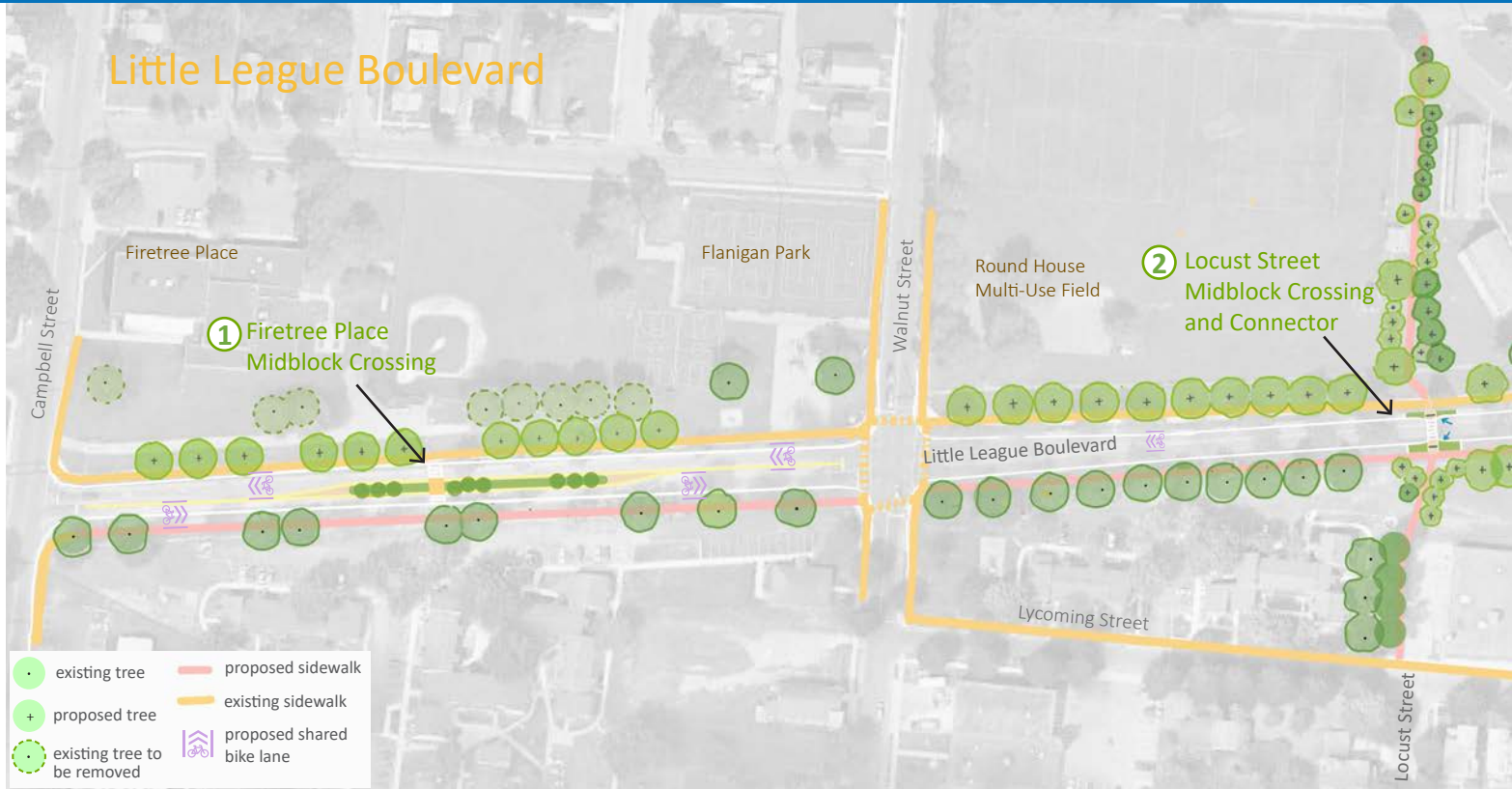


Proposed connection along Round House Field to Locust Street



Example of curb extension with integrated sidewalk connection and bioswale

CONCEPT PLAN



The concept design for Little League Boulevard includes street trees north of the sidewalk, midblock crossings to slow traffic and manage stormwater, new sidewalks on south side of the street, bike lanes and fence removal alternatives.

③ Center Street Midblock Crossing and Connector



Example of proposed mid-block crossing



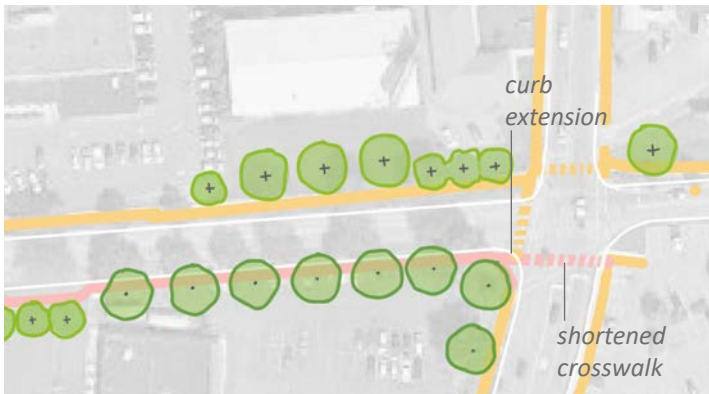
Proposed connection to Center Street and Lycoming Street

Proposed features:

- Add traffic calming curb extension (or bumpout) with crosswalk and sidewalk connection
- Consider integrating green infrastructure by including a curb cut inlet and bioswale in curb extension
- Extended sidewalk to connect Center Street to Lycoming Street
- Plant street trees and shrubs along new sidewalk



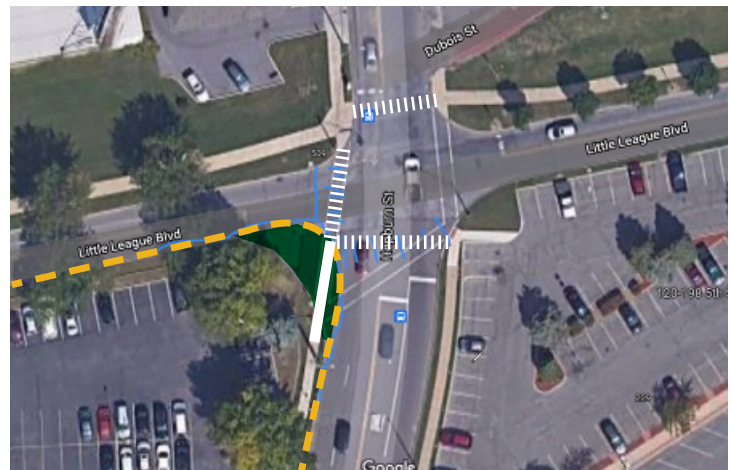
④ Hepburn Plaza Intersection



View of existing conditions at intersection of Little League Boulevard and Hepburn Street

Proposed features:

- Extend curb to create shorter crosswalk distance and improve pedestrian safety
- Plant street trees for shade and natural buffer between properties and sidewalk



Proposed curb extension and sidewalk to shorten crosswalk

LITTLE LEAGUE BOULEVARD

Natural Fencing Options

Currently, Little League Boulevard has chain link fencing on both sides from Campbell Street to Heburn Street. The chain link fencing may only be necessary in specific areas, such as playgrounds and residential yards, and some sections could be replaced with natural materials or alternative barriers.

Natural buffers or barriers along Little League Boulevard could include street trees, boulders, evergreen hedges and plantings. Increasing planting areas can provide more pervious surfaces to catch and filter stormwater, create urban habitat areas, and enhance streetscapes.

There is an inequity throughout the city with regards to where the trees have been planted. Lower income neighborhoods tend to have less trees. Increasing shade trees can reduce heat island effects, manage stormwater, increase habitat and contribute to beautification efforts in the community.

The plan below proposes areas for fence removal and replacement to improve the streetscape and pedestrian experience.



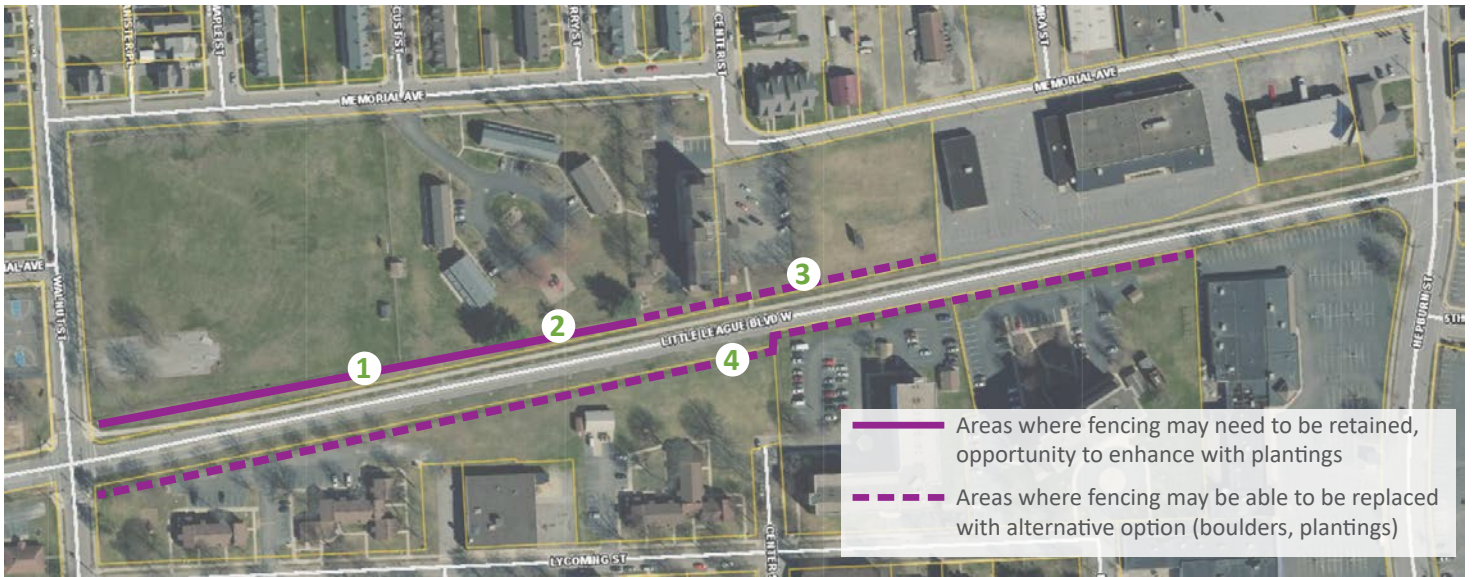
The concept plan proposes areas for fence removal and replacement with alternative buffer materials.

① FireTree Place

- Install fencing for safety.
- Plant trees and shrubs for shade and beautification.

② Timberland Apartments

- Retain existing fencing to comply with operations requirements.
- Reduce fencing to areas where access restriction is needed.
- Install boulders and screening plants in areas where access or sightlines need to be limited.



① Round House Field

- Fencing needed for safety
- Trees and other plantings could be added to provide shade and beautification.

② Memorial Townhouses

- Fencing needed for safety around playground and residential backyards.
- Trees and other plantings could be added to provide shade and beautification.

③ Senior and Elderly Housing

- Reduce fencing to areas where access restriction is needed.

④ Housing Along South Little League Boulevard

- Consider reducing fencing to areas where access restriction is needed.
- Trees and other plantings could be added to provide shade and beautification.

Alternative Fencing Illustration

The illustration below shows how a combination of shade trees, hedge row, and boulders to prevent vehicular access can achieve safety, access and neighborhood beautification goals.



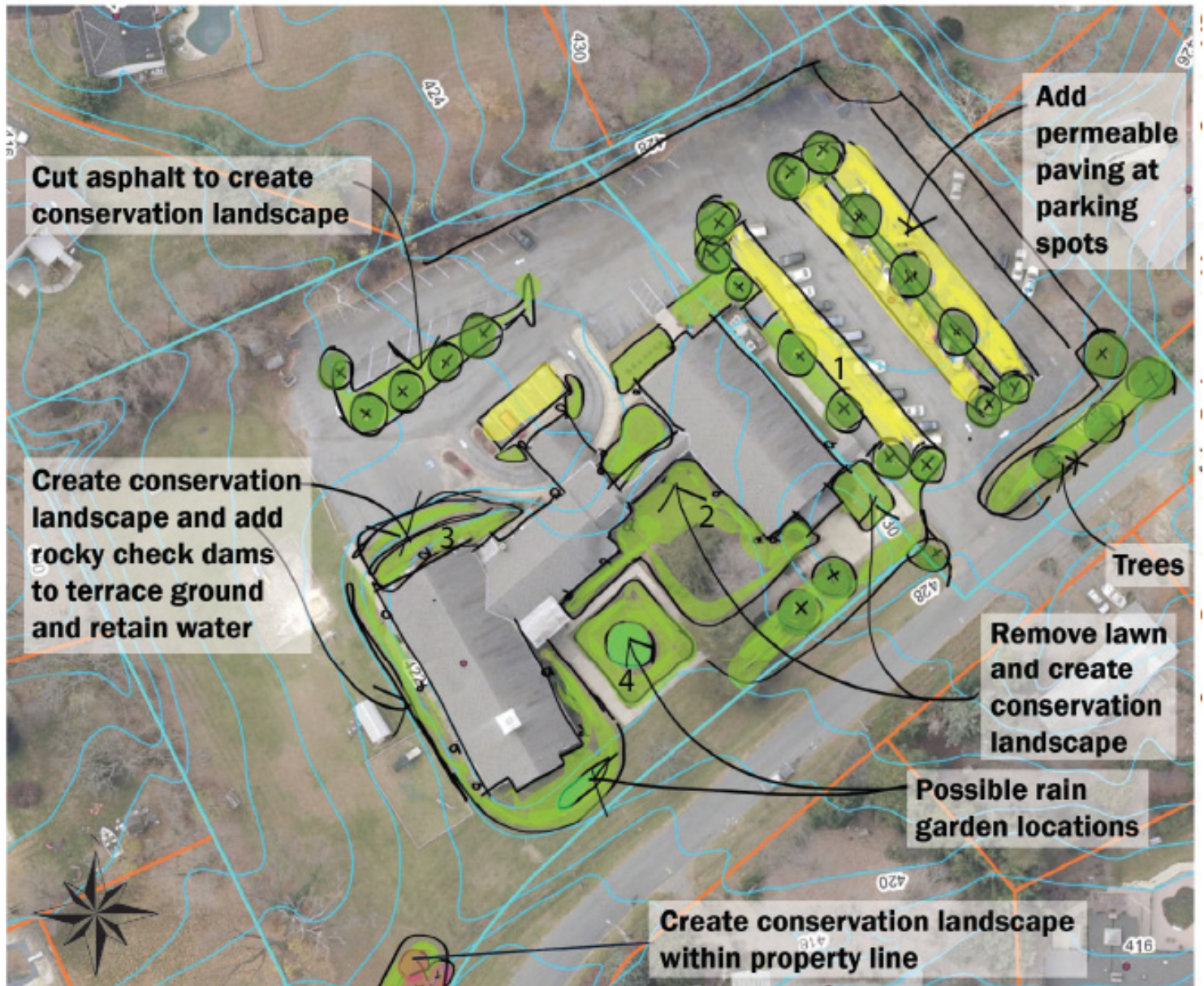
Existing



Illustrative rendering of alternative fencing options

Parking Lot Retrofits

The existing parking lots at the apartment complexes, churches and businesses provide an opportunity to improve stormwater management. The diagram below illustrates how an existing church parking lot could be retrofitted to include features for improved stormwater management, additional shade trees to reduce urban heat and planting areas that reduce mowing requirements and support urban habitat.



Parking Lot Retrofits. Image source: *Saving the Rain: Green Stormwater Solutions for Congregations*, EPA. Available at: www.epa.gov/nps/saving-rain-green-stormwater-solutions-congregations

Community Engagement

The TOGI pilot project and initial designs are intended to be a springboard for a full community planning process and a means to organize partners to support efforts to secure funding for implementation, through grants and other resources. The Williamsport Steering Committee and community stakeholders underscored the importance of broader community engagement to refine the concepts as any of the projects move forward. There are a range of ways to reach and engage residents, especially those living in this area. Examples of community engagement opportunities include the following:

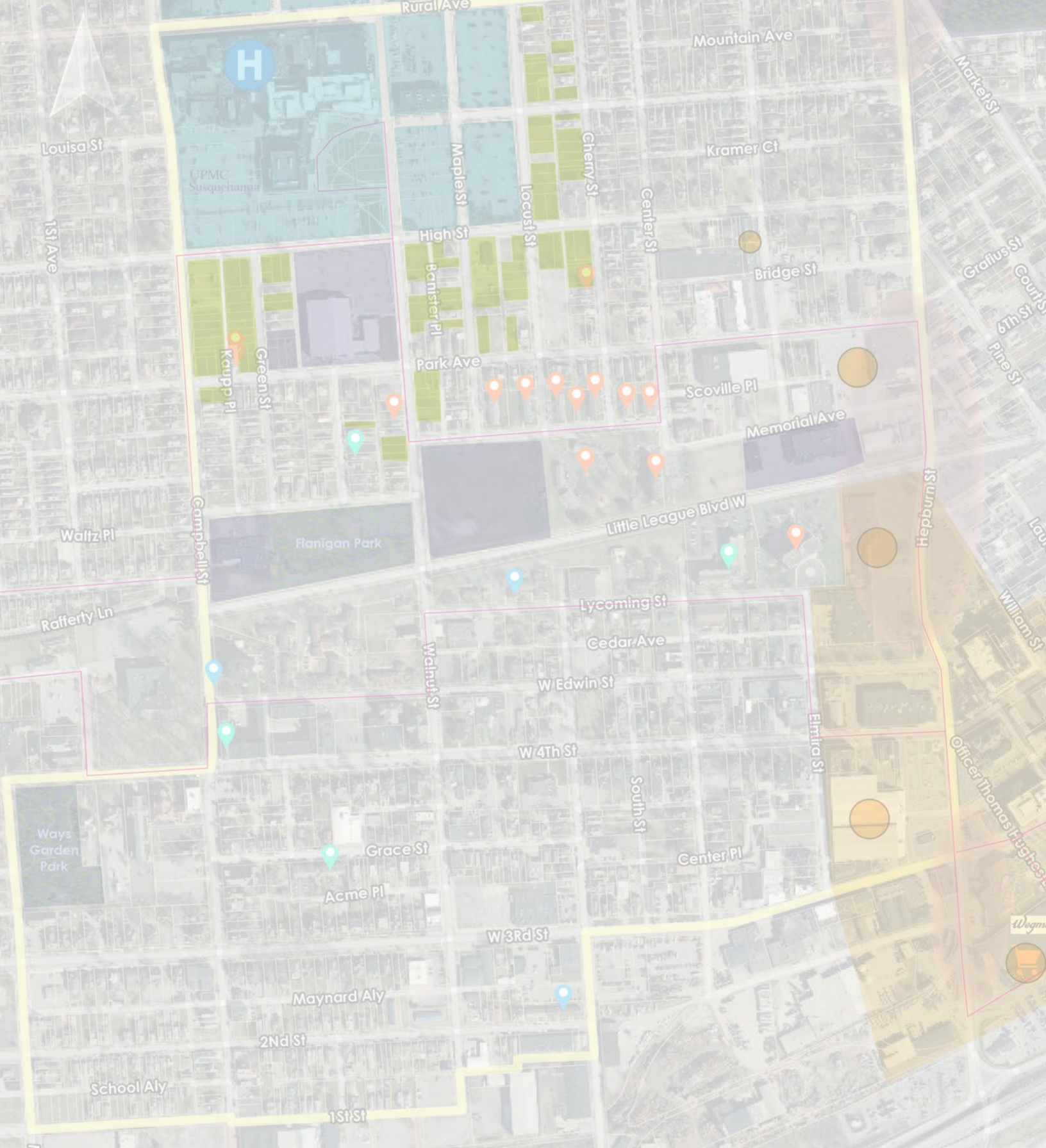
- Coordinate with existing community organizations on community outreach to involve residents in planning and volunteer opportunities, such as planting and maintenance.
- Work with local faith-based organizations to engage congregations in planning, implementation and volunteer opportunities.
- Pursue sponsorship and partnership opportunities, such as interest in job training opportunities through the Pennsylvania Recreation and Parks Society.
- Work with Pennsylvania DCNR on green infrastructure in parks and green space along Little League Boulevard.
- Work with educators and schools around environmental aspects and practices for all ages, this could include demonstration features.
- Hold community events or pop-up events to raise awareness and build support for the park project.
- Convene property owners along Little League Boulevard to discuss a strategic fencing plan.



Next Steps

The concept plans can be used to support grant applications and serve as a catalyst to engage and spark community interest in transforming the vacant lots into a community amenity and improve safety and access along Little League Boulevard. There are a range of funding opportunities that can support moving this project forward.

Participants noted that local champions are needed to seek funding for grant applications and that projects identified during this planning process could be considered as part of the citywide green infrastructure plan that is expected to launch soon. Early implementation of smaller projects could help bolster support for the larger projects and secure additional funding by strengthening partnerships.



May 2022

TARGETED OUTREACH FOR GREEN INFRASTRUCTURE

Upper Mattaponi Tribe



Chesapeake Bay Program
Science. Restoration. Partnership.



CONTENTS

Overview	1
Planning Process.....	2
Property Overview	3
Tribal Center Concept Design	4
Tribal Center Precedents	12
Riverfront Property Overview	14
Riverfront Property Concept Plan	15
River Access and Camping Precedents	16
Next Steps	17

Acknowledgments

The TOGI project team acknowledges the contributions of all those who participated in this planning effort.

TOGI Project Team

- Chris Guy, U.S. Fish and Wildlife Service & Chesapeake Bay Program
- Briana Yancy, U.S. Environmental Protection Agency
- Katlyn Fuentes, Chesapeake Research Consortium
- Alisa Wilson, Skeo Solutions
- Catherine Brown, Skeo Solutions
- Marissa Sperry, Skeo Solutions

Targeted Outreach for Green Infrastructure in Vulnerable Areas Project

Overview

Many communities are adopting green infrastructure as a strategy to manage stormwater, improve water quality, add habitat and provide community benefits such as open space, pedestrian safety, shade and beautification. The Targeted Outreach for Green Infrastructure in Vulnerable Areas (TOGI) is a pilot project being led by the Chesapeake Bay Program Habitat Goal Implementation Team. The goal of this pilot project is to work with communities in the Chesapeake Bay watershed to design green infrastructure projects that meet both community and habitat conservation goals.

Areas within the City of Williamsport, Pennsylvania; Middle Peninsula, Virginia (includes Upper Mattaponi Tribe property and Mattaponi Tribe property) and Cambridge, Maryland were selected as areas susceptible to climate change within the Chesapeake Bay watershed that could benefit from green or nature-based infrastructure projects. These communities also met criteria for diversity, equity, inclusion and justice based on income and demographic data.

The process for each community included a listening session to help identify local opportunities where climate change problems can be addressed through green infrastructure options, while also helping to meet community needs. Following the listening session, a design workshop was held to develop a preliminary design concept for a community-identified project. The outcome is a design concept for the selected project and assistance in identifying implementation funding.

Upper Mattaponi Tribe

An Upper Mattaponi Steering Committee was formed to guide the process and included Upper Mattaponi Tribal leaders, state and federal agencies, and a local university. The Steering Committee helped identify and engage local stakeholders and identify resources and opportunities to refine the design and construct the project.

The outcome is a green infrastructure design concept that can serve as a catalyst to help the city move forward with broader community engagement and grant applications for implementation. The design concepts is anticipated to evolve as more information becomes available through the site design process and additional community input.



The Upper Mattaponi Tribe is located in King William, Virginia.

UPPER MATTAPONI STEERING COMMITTEE

- Frank Adams, Chief of Upper Mattaponi Tribe
- Tommy Tupponce, Assistant Chief of the Upper Mattaponi Tribe
- Reggie Tupponce, Upper Mattaponi Tribal Administrator
- Leigh Mitchell, Environmental and Cultural Director
- Aaron Wendt, Virginia Department of Conservation and Recreation and Recreation Shoreline Erosion Advisory Service (VA DCR-SEAS)
- Elizabeth Andrews, William & Mary Law School Virginia Coastal Policy Center
- Andrew Larkin, National Oceanic and Atmospheric Administration (NOAA)
- Julie Reichert-Nguyen, NOAA
- Lauren Taneyhill, NOAA
- Renee Thompson, USGS & Chesapeake Bay Program

PLANNING PROCESS

Listening Session and Workshop

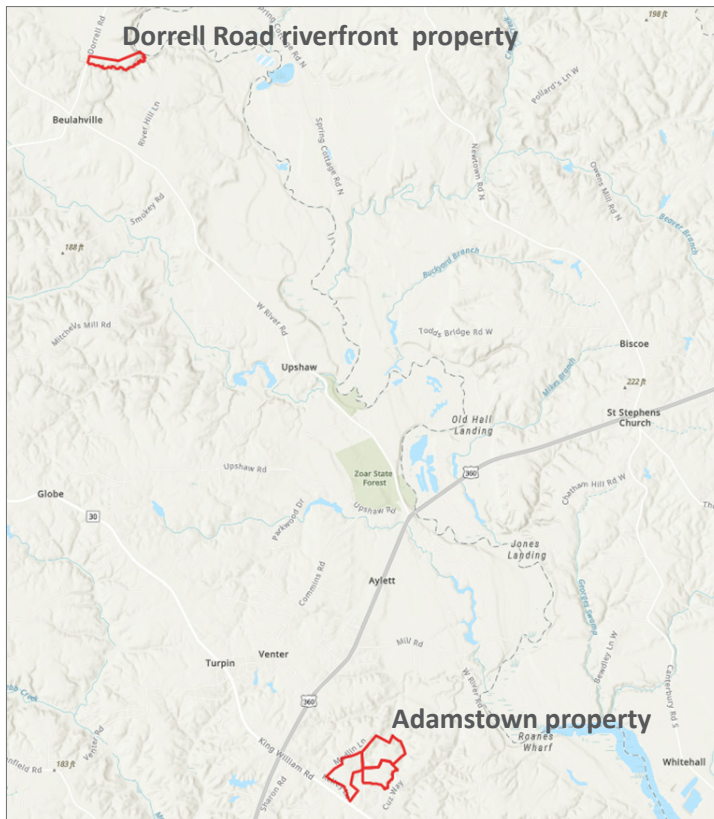
A listening session held on Thursday, December 9, 2021, included Upper Mattaponi Tribal Council members and steering committee members for a discussion about community needs and priorities, challenges, opportunities, relevant initiatives, potential project locations, and partners for collaboration.

Participants identified two priority projects: 1) the development of the Adamstown property for a tribal center, housing and recreation, and 2) river access and recreation amenities for property acquired between Dorrell Road and the Mattaponi River.

The Tribe's vision for the historic Adamstown property is to create an Upper Mattaponi Tribal Center for tribal members that includes administrative, community, recreation and housing facilities using sustainable and ecologically restorative practices. On the riverfront property on Dorrell Road, the Tribe would like to establish outdoor recreation amenities for tribal members to enjoy.



View of the Mattaponi River from the Dorrell Road property



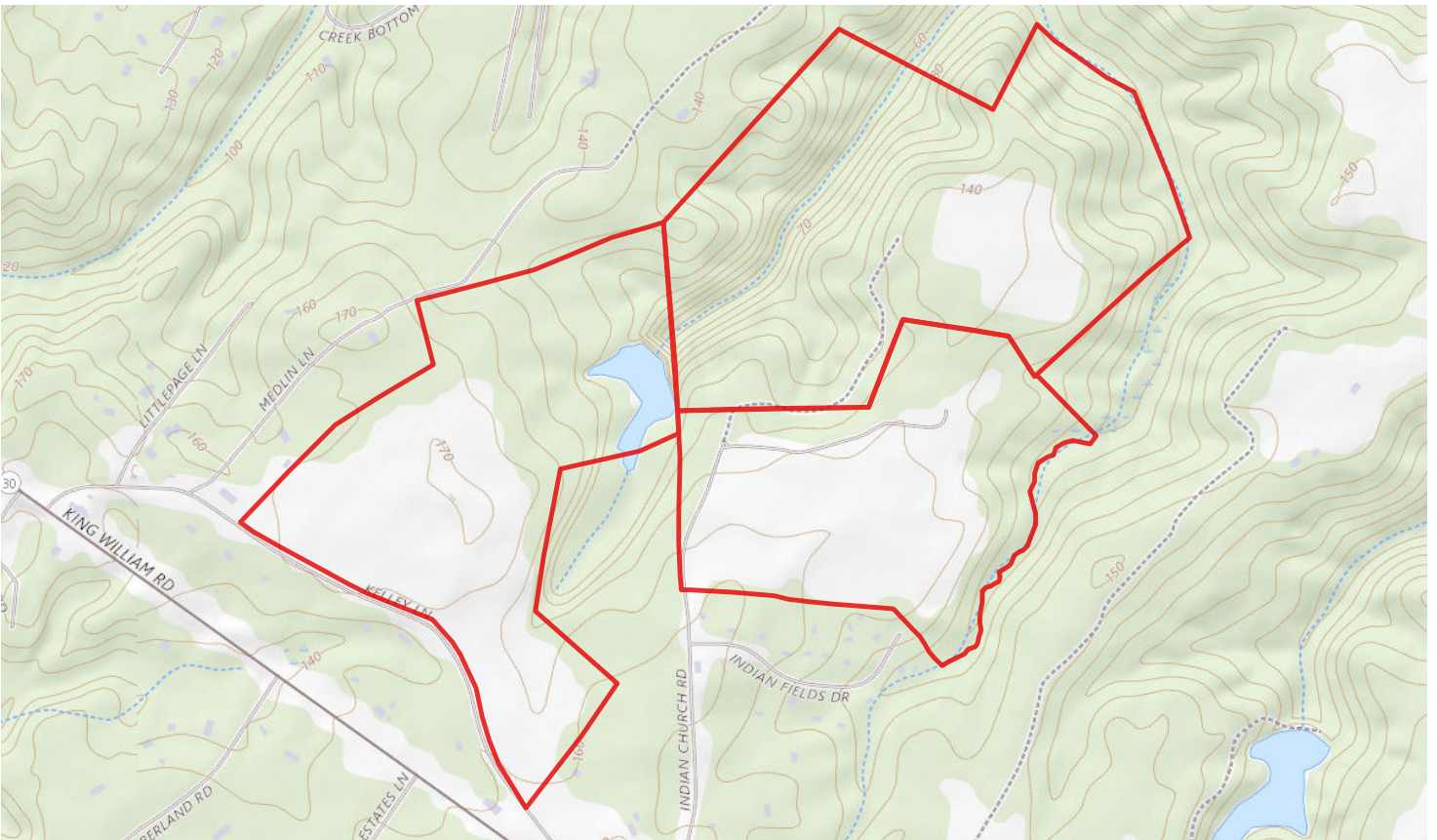
The two Upper Mattaponi properties are located approximately 10 miles apart.

INVITED STAKEHOLDERS

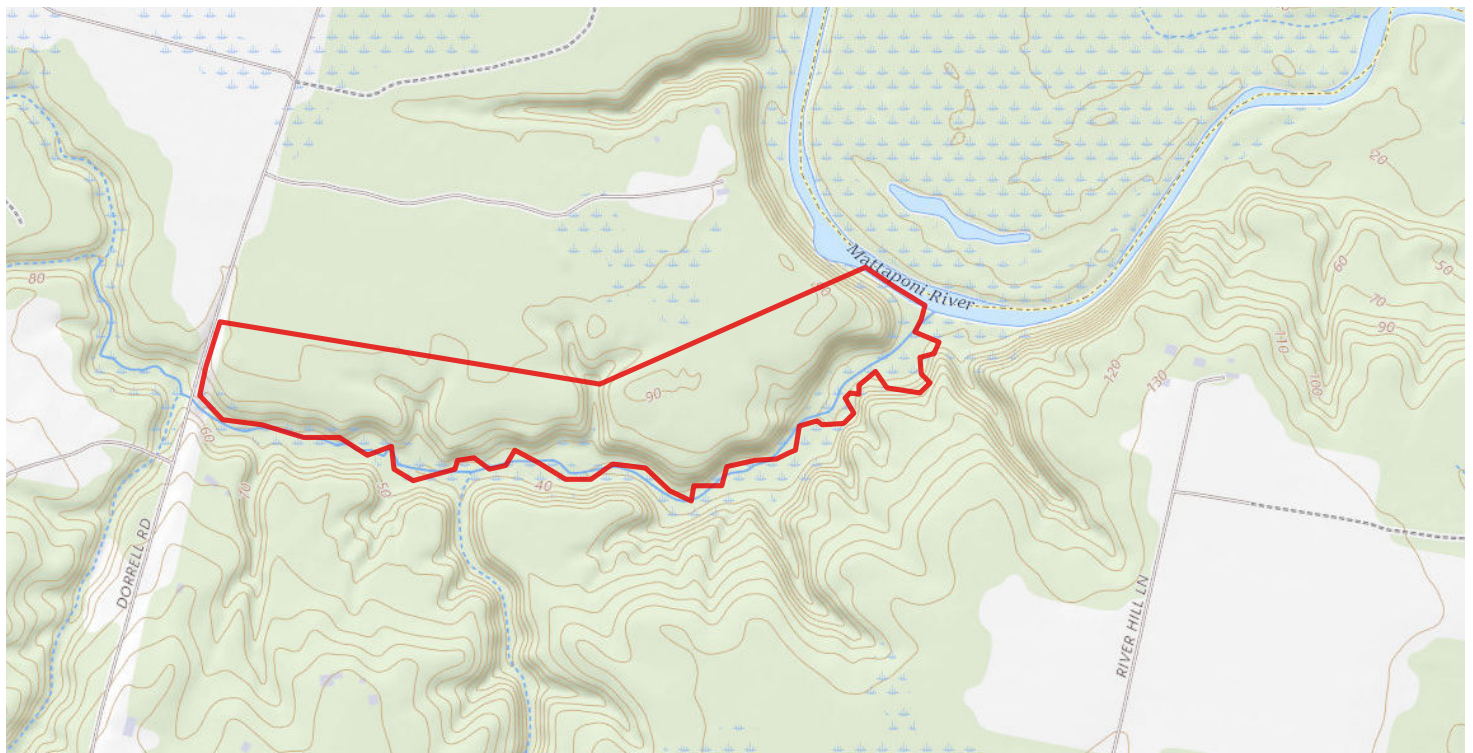
Tribal members and organizations shared input about the Tribe's needs, priorities and resources to guide the project. The following people were invited to participate in the listening session and design workshop.

- Frank Adams, Chief of Upper Mattaponi Tribe
- Tommy Tupponce, Assistant Chief of the Upper Mattaponi Tribe
- Reggie Tupponce, Upper Mattaponi Tribal Administrator
- Kyle McLemore, Environmental Technician
- Leigh Mitchell, Environmental and Cultural Representative
- Aaron Wendt, VA DCR-SEAS
- Elizabeth Andrews, William & Mary Law School Virginia Coastal Policy Center
- Andrew Larkin, NOAA
- Julie Reichert-Nguyen, NOAA
- Lauren Taneyhill, NOAA
- Renee Thompson, USGS and Chesapeake Bay Program

PROPERTY OVERVIEW



Historic Adamstown is a 300-acre property proposed for tribal center development, housing, conservation, farming and recreation.



The Dorrell Road riverfront property is 44 acres and borders the Mattaponi River on the east side. The Tribe would like to use this property for hiking and riverfront recreation.

TRIBAL CENTER CONCEPT PLAN

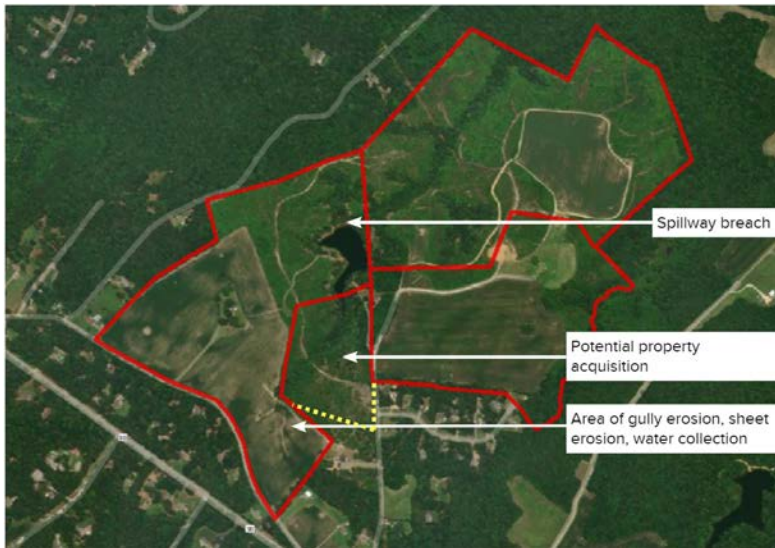
Existing Conditions

The Upper Mattaponi Tribe plans to develop a tribal center on the historic Adamstown property, which includes land that has been inhabited and farmed by members of the tribe for many years. A stream flows through the middle of the site, creating a small pond, shored up by a small dam and spillway. Elevation varies across the property, creating some areas with steep grades, particularly along the stream. Agricultural practices on the site have compromised natural drainage, causing severe flooding and erosion including gullies, steep banks and damage to the pond's spillway.

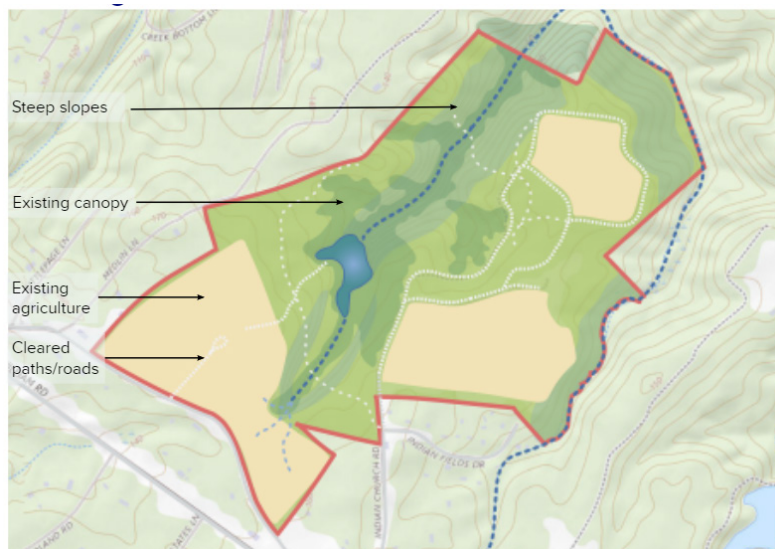
A listening session helped to establish overarching goals for developing the site. The Upper Mattaponi Tribe's vision

for Historic Adamstown is to establish a tribal center that includes facilities for government and administration, recreation, gathering and housing. The Tribe plans to build the project to minimize ecological impact, and members identified the following strategies to guide development planning:

- enhance biodiversity and ecological health
- design tribal structures that minimize impacts to the natural environment during construction and operation
- minimize water use
- manage stormwater on site



Site conditions: parcels and stream features



Site conditions: ground cover and topography



Pond



Proposed site for tribal center in current agricultural use



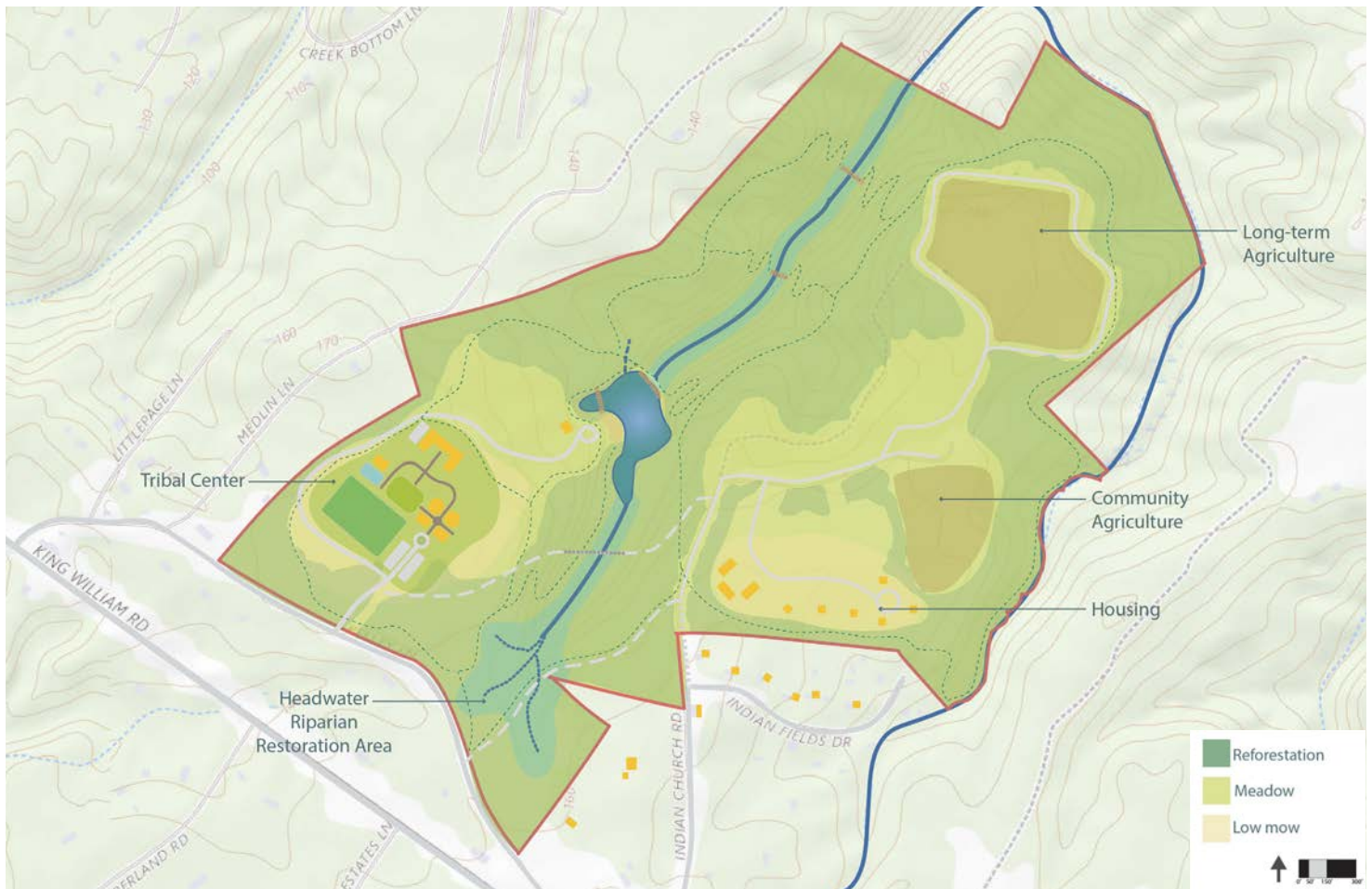
Gullies formed by erosion in headwater area

Concept Plan

Based on the Tribal goals and site conditions, the concept plan proposes features and best management practices for low impact development that organizes structures for tribal community use and a landscape that promotes recreation and ecosystem restoration.

On the following pages, the concept design is shown in more detail to focus on three goals:

- Ecosystem Restoration of Tribal Land and Waters
- Sustainable Tribal Center and Residential Development
- Recreation and Access with Low Impact



Design Concept for Upper Mattaponi Adamstown property

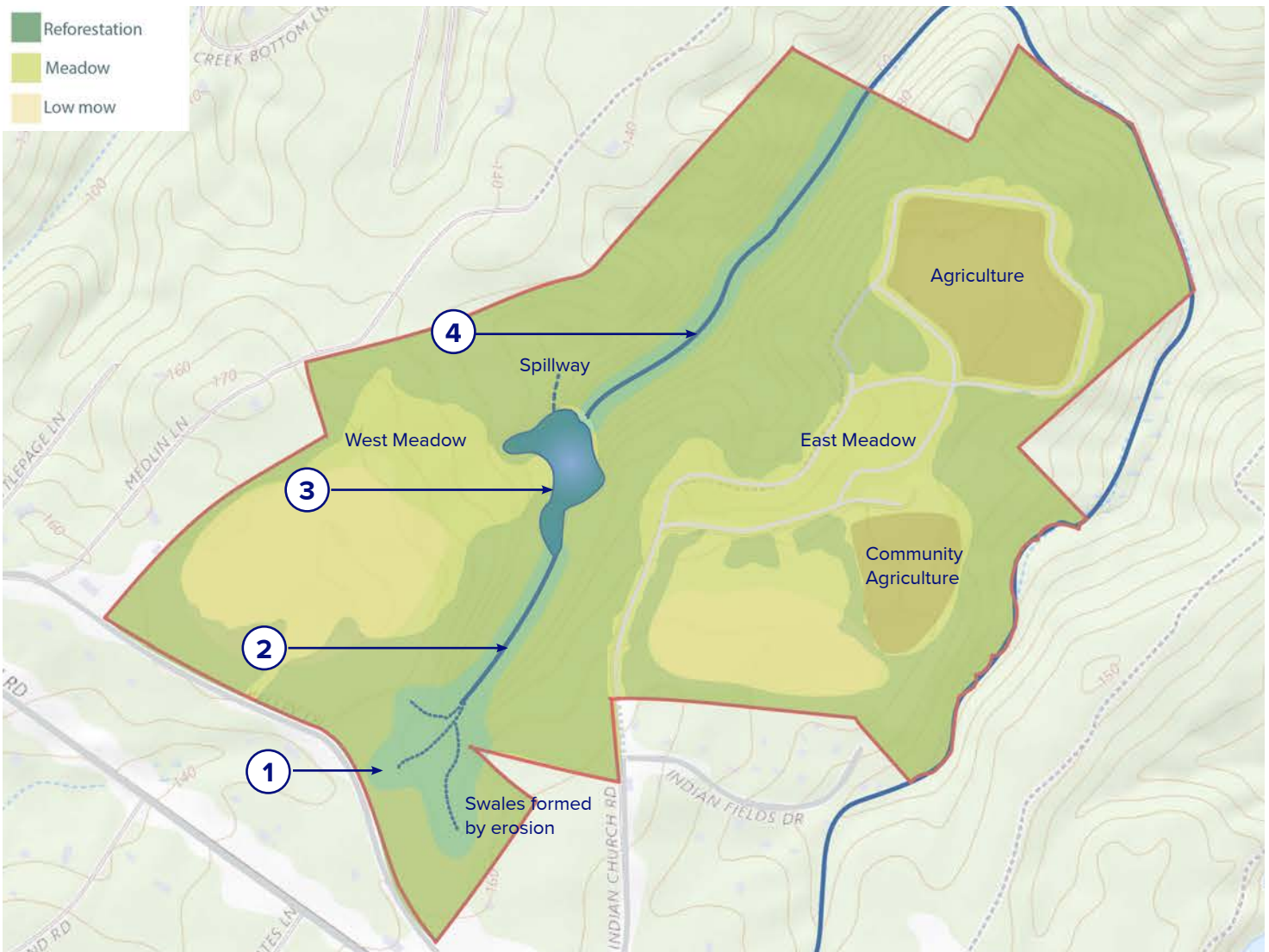
TRIBAL CENTER CONCEPT PLAN

Ecosystem Restoration of Tribal Land and Waters

Land clearing and long-term agricultural use has contributed to the degradation of soil and riparian system across the property, which slopes gently from Kelly Lane toward the stream flowing north on site.

Implementing best management practices for farming and stormwater management, and installing features such as plantings and checkdams can help restore the ecological health of the soil and water systems on the property.

Ecosystem restoration components of the concept include features and practices for the landscape and water system, detailed on the next page.



Key ecosystem restoration features of the concept plan

Water

① Headwaters*

Priorities: Control erosion and increase infiltration

Proposed steps:

- Replant groundcover and shrub layers in immediate area
- Install check dams in swales to stabilize soil and slow waterflow during regrowth
- Reforest surrounding area
- Install wetland planting at convergence/basin area

② Upstream

Priorities: Preserve and protect

Proposed steps:

- Retain existing riparian buffer
- Widen riparian buffer

③ Downstream area

Priorities: Reduce flow by increasing plantings and drainage features in the headwater area. Repair spillway breach and channel cuts and restore riparian system.

Proposed steps:

- Identify priority locations for repair
- Restore surrounding groundcover and tree canopy
- Conduct hydrologic study for large scale stream restoration (reshaping, regrading, planting, stabilization)

④ Pond

Priorities: Preserve and protect

Proposed steps:

- Habitat enhancement for wildlife (fish, birds)
- Widen riparian buffer

** recommended for first phase*

Land

Agriculture practices

Promote low impact growing methods, including:

- Erosion control
- Mechanical pest control
- Crop cover selection
- Crop rotation

Landscape restoration

Install plantings to restore ecosystem functions

- Re-establish tree canopy in sloped and riparian areas
- Establish native meadow areas for habitat diversity



No till farming can improve soil health and reduce erosion.



Check dams made of stone or gabion baskets slow water flow and stabilize soil while allowing water to soak into the soil and support vegetation..



Native meadows provide habitat diversity and support riparian health.

TRIBAL CENTER CONCEPT PLAN

Sustainable Tribal Center and Residential Development

The Upper Mattaponi Tribe is committed to developing a tribal center that includes community and administrative facilities, recreation amenities, and housing with minimal impact on the environment. The proposed concept plan includes recommendations for site planning, design, construction and features to support sustainable development.



Concept design for tribal center and housing

Construction and Materials

Design tribal structures and codes that eliminate negative impacts to natural environment during construction and operation.

- Green building materials
- Energy and water saving products and appliances
- Integrate solar



Parking lot integrates solar structures that provide multiple benefits including power, cooling and stormwater conveyance.

Architecture and Design

Design structures and landscape to reflect tribal heritage.



The Yocha Dehe Tribe sought an architectural design that was modern and expressive of their forward momentum, while being strongly related to both their cultural history and that of the Capay Valley. The resulting work attempts to articulate the Tribe's culture with a contemporary architecture that does not trivialize or mimic.



Colusa Indian Community, Colusa Rancheria. The architects worked closely with the Tribal Council to incorporate cultural significance and elements that reflect the tribe's history, core values and symbols in the design.

Site Planning

Minimize water use, manage stormwater on site (reuse/treat/infiltrate), and enhance biodiversity to improve ecological health.

Placement

- Cluster structures to minimize footprint
- Consider housing location in context of septic requirements (housing might have to shift north to higher elevation)

Parking Lots

- Use pervious materials (permeable pavers, gravel)
- Integrate plantings to reduce heat and absorb stormwater
- Planted swales to capture runoff (if paved or limited permeability)
- Consider solar panels over parking area

Landscape

- Utilize drought tolerant native plants, grasses and trees
- Designate low mow or no mow zones in low traffic areas planted as lawn
- Include energy efficient outdoor lighting

Stormwater management

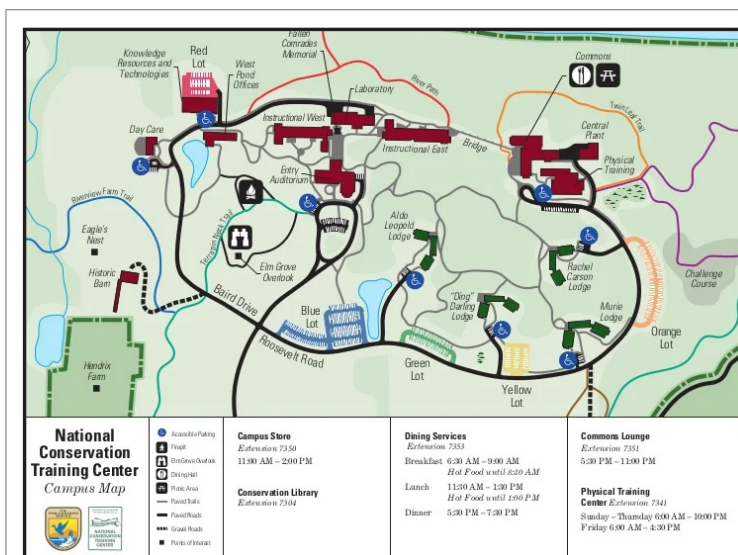
- Capture stormwater in cistern for irrigation or other reuse
- Install planted swales and/or rain gardens to capture runoff from buildings and other impervious surfaces (i.e., sport court, sidewalks/hardscape)



Planted swales in the parking lot capture and treat stormwater runoff.



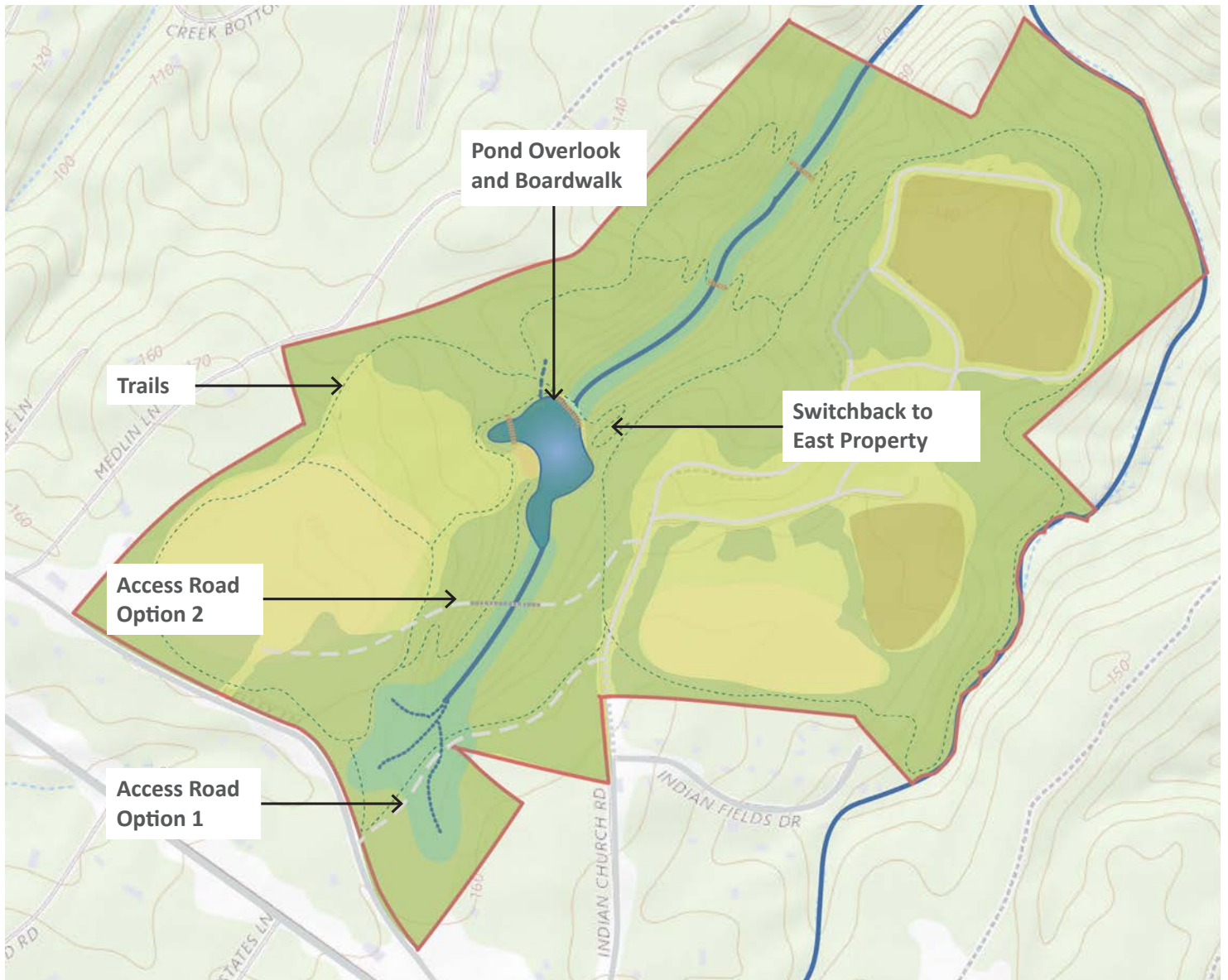
The design of the Skokomish Community Center provides a new gathering and recreation place for the Skokomish Tribe that expresses and celebrates the culture and traditions of the Tribe. The building was designed to be as "green" and sustainable as possible within the constraints of budget and the site conditions.



The National Conservation Training Center in West Virginia provides a strong example for low impact development of a lodging/learning complex.

TRIBAL CENTER CONCEPT PLAN

Recreation and Access with Low Impact



Recreational trail and vehicular access components of concept plan

The Upper Mattaponi Tribe plans to designate an area by the pond for gathering and to improve access along the pond's western edge for fishing and seating.

The tribe also plans to create and maintain a network of trails for access across the property. Some of the trails, including those immediately around the complex and connecting to the pond, need to be accessible for members with mobility limitations.

The tribe also requires a road for vehicular use that connects the tribal center directly to the property east of Indian Church Road. The road should include access to Kelley Lane, using a separate entrance or by tying into the main (existing) entry road on Kelley Lane.



View of the pond from the northwest bank

The proposed concept shows trail and road routes and design recommendations to meet the tribe's connectivity needs while limiting disturbance in riparian areas, minimizing runoff and erosion, and minimizing slope.

Waterfront gathering and access

- Use sturdy permeable material for surface of gathering area
- Install elevated walkway and platform along segment of pond edge for fishing and seating
- Retain and protect trees, shrubs and perennials along pond edge

Mobility and accessibility

- Identify trails and recreation areas where accessible design and materials are needed to accommodate wheelchairs, walkers, strollers and other mobility support devices.
- Design accessible paths and trails to minimize slope and select sturdy material for trail surface.

Trails

- Use permeable, natural materials for surface, if needed in addition to cleared path (mulch, gravel).
- Install elevated boardwalks in riparian areas to minimize stream impact.
- Install water bars using on site materials such as fallen trunks or stones to reduce erosion.

Vehicular access to Tribal Center and Kelley Lane

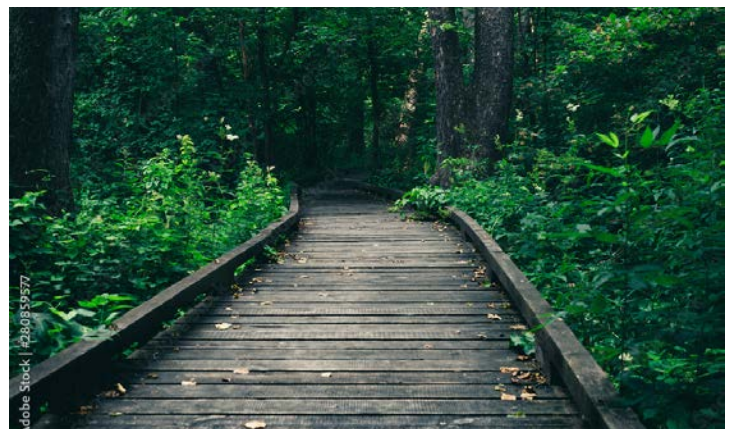
- Option 1: Road extends along property line to Kelley Lane, avoiding stream crossing. Integrate planted swales and a drainage grate or culvert to minimize downstream effects.
- Option 2: Road extends over stream to connect to Tribal Center and Kelley Lane. This option requires an elevated structure to cross the stream.



Mowed path through meadow.



Water bars along cleared trail.



Elevated boardwalks minimize disturbance and help traverse steep grade in riparian areas.

TRIBAL CENTER PRECEDENTS

Tribal Center Complex Examples

The following are examples of other tribal complexes that incorporate green building and sustainability components.

Skokomish Tribe - Skokomish, WA



The design of the Skokomish Community Center is intended to provide a vital new gathering and recreation place for the Skokomish Tribe as well as express and celebrate the culture and traditions of the Tribe. The building was designed to be as “green” and sustainable as possible within the constraints of budget and the site conditions.

Source: <https://www.7directionsarchitects.com/project/skokomish-tribal-master-plan-community-center/>

Yocha Dehe Tribe - Brooks, CA



The Yocha Dehe Tribe sought an architectural design that was modern and expressive of their forward momentum, while being strongly related to both their cultural history and that of the Capay Valley. The resulting work attempts to articulate the Tribe’s culture with a contemporary architecture that does not trivialize or mimic.

Source: <https://www.wrnsstudio.com/project/yocha-dehe-tribal-community-center-and-school/>

Potawatomi Tribe - Crandon, WI



The Forest County Potawatomi Community Center provides a broad program of sport, recreation, and fitness activities for tribal youth, adults, and families. The goal is to enhance personal lifestyles and improve the quality of life on the Forest County Potawatomi Reservation.

Source: <https://community.fcpotawatomi.com/Default.aspx?id=28>

Colusa Indian Community - Colusa, CA



Paskenta Tribe - Corning, CA



For both of these tribes, the architects worked closely with the Tribal Council to incorporate cultural significance and elements that reflect the tribe’s history, core values and symbols in the design.

Sources: <https://www.colusa-nsn.gov/> and <https://travois.com/developments/paskenta-community-complex/>

Tribal Center Housing Examples

The following are examples of tribal single and multifamily housing that incorporate green building and sustainability components.

Puyallup Tribe - Tacoma, Washington



Source: <https://ecotope.com/project/place-of-hidden-waters/>



Traditionally, Coast Salish tribes lived in longhouses with a shared central space and dwelling units off to the side. Architect Environmental Works used this living tradition as an inspiration and created a structure with ten town-homes that are separated from each other by a courtyard with an open, slanted shed roof. This example was designed to resemble a traditional shed roofed Coast Salish longhouse with a modern townhouse courtyard layout.

Santa Carlos Apache Tribe - Arizona



Source: <https://www.premiersips.com/native-american-communities-on-a-sustainable-course/>



New homes were built on the San Carlos Apache Indian Reservation with funds from Indian Housing Block Grants (IHBG). By using Premier Structural Insulated Panels (SIPs), this project took advantage of cost effective SIPs designs resulting in almost zero waste material.

Tagiugmiullu Nunamiullu Housing Authority - Alaska



Source: <http://cchrc.org/anaktuvuk-pass-prototype/>

Tagiugmiullu Nunamiullu Housing Authority (TNHA) and the village of Anaktuvuk Pass collaborated to design and construct an affordable, energy efficient, healthy home that incorporated indigenous qualities like earth-berming and a sod roof.

Penobscot Nation - Indian Island, Maine



Source: <http://cchrc.org/anaktuvuk-pass-prototype/>



The Penobscot Nation housing includes LEED Gold certified homes. LEED (Leadership in Energy and Environmental Design) is a green building rating system and provides a framework for healthy, highly efficient, and cost-saving green buildings.

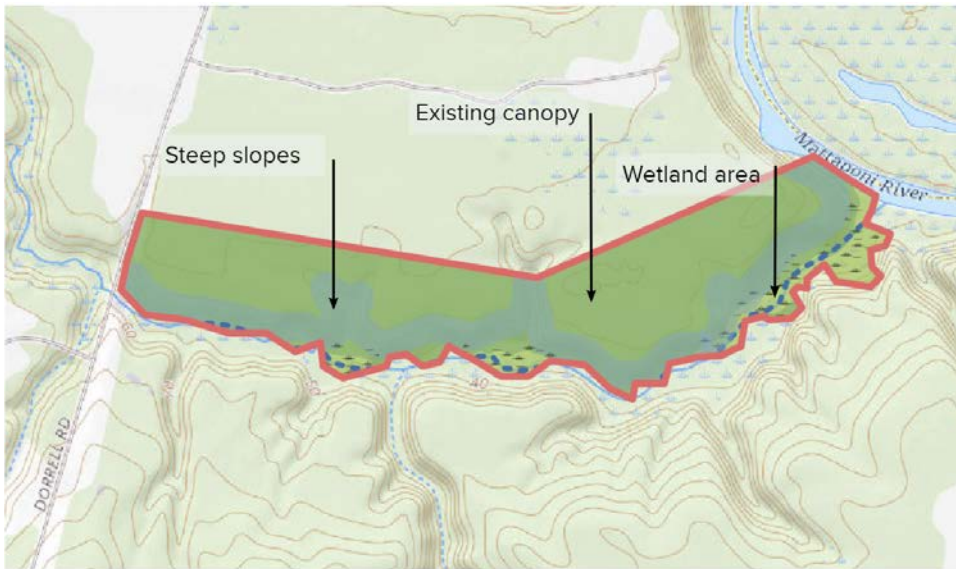
RIVERFRONT PROPERTY

Overview

The Upper Mattaponi Tribe acquired a 44-acre property located about 10 miles from the Adamstown property to gain waterfront access to the Mattaponi River, a significant part of the tribe's cultural heritage. The tribe plans to develop trails and vehicular access to the river to create opportunities for camping, kayaking, fishing, and hiking.

The site's location on the Mattaponi River is close to upstream and downstream non-motorized boat access areas, making it ideal as a destination or starting point for paddle trips in the area.

The site includes wooded and riparian areas with varied slope which create microclimates and a variety of natural areas. Steep slopes where runoff flows toward the tributary along the southern site boundary create challenges for crossing the site. An easement on the adjoining property can be used to reach the portion of the property east of a ravine that prohibits vehicular access to the river.



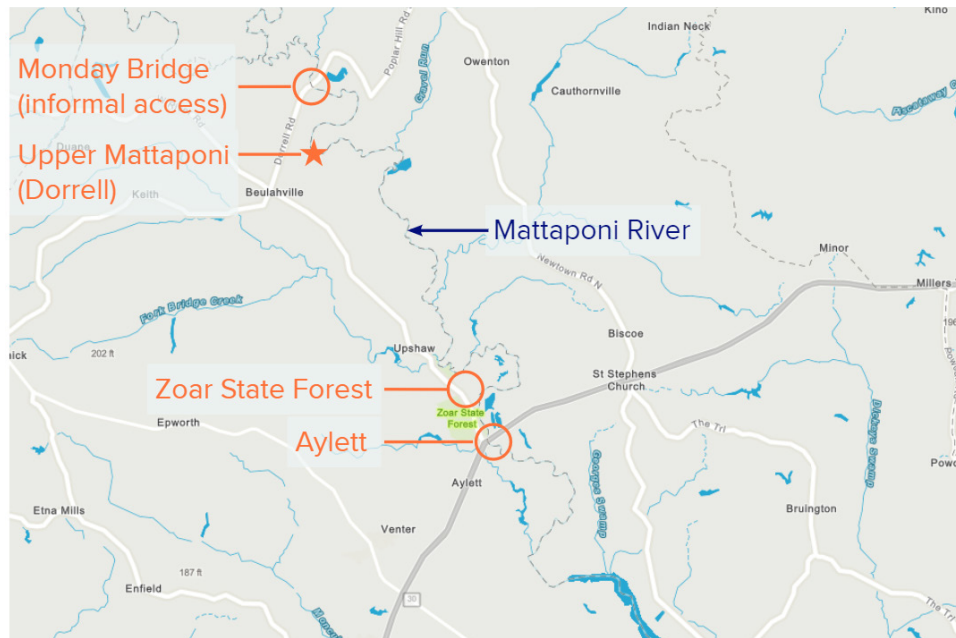
Existing conditions



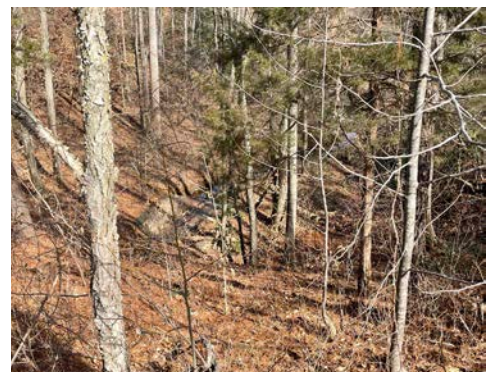
Mattaponi River



Tributary along south site boundary



Nearby river access points

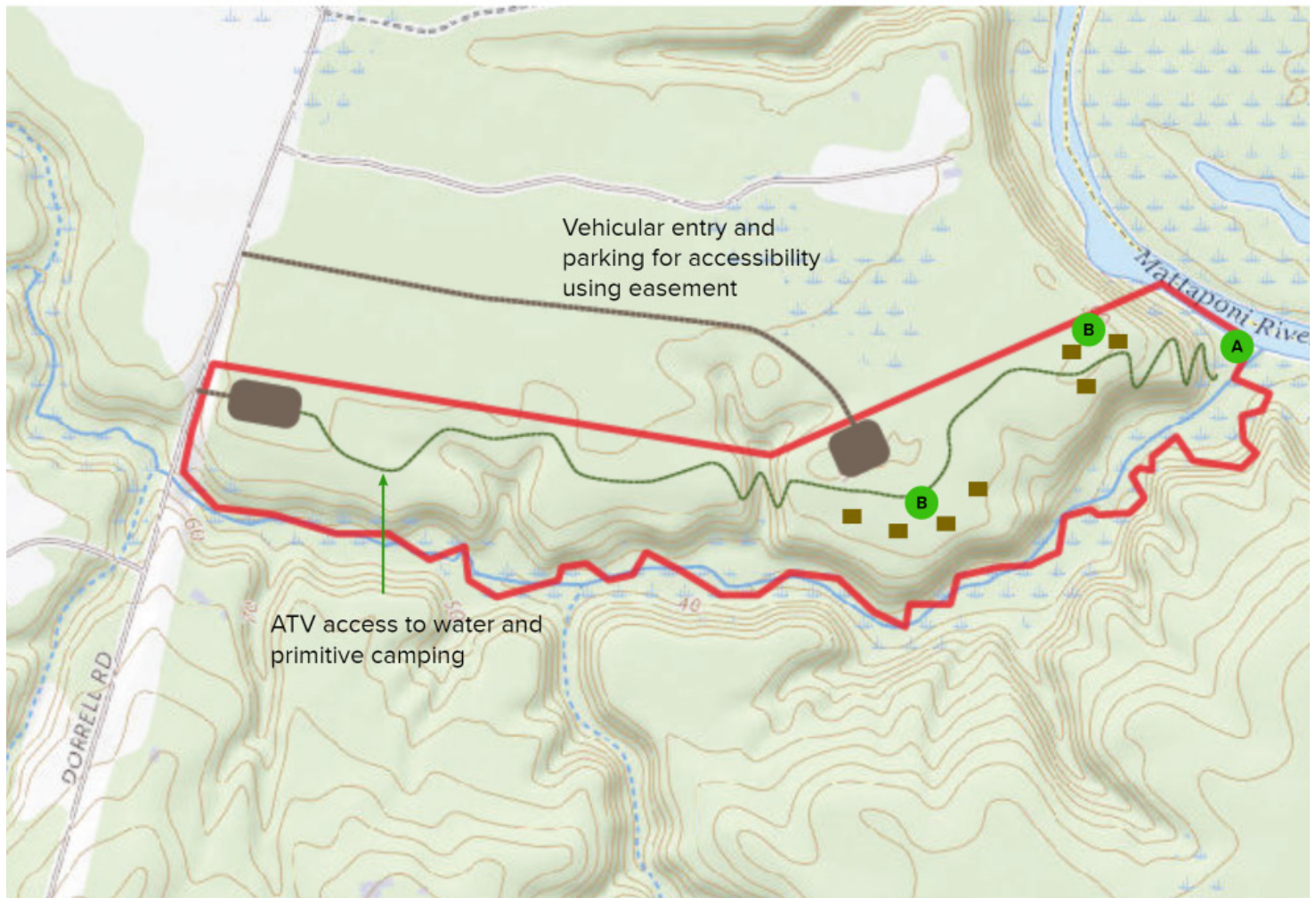


Steep grade area

RIVERFRONT PROPERTY CONCEPT PLAN

Concept Plan

The Dorrell River Property concept plan includes features and amenities to meet the community's vision for gathering, river access, and passive and active recreation while enhancing the natural beauty, water quality and ecology of the site.



Dorrell Road property concept plan

A Kayak Access / Tie Up Option

- The steep river bank may limit adding a boat launch, but boat tie ups could be added to allow the property to be accessible by boat.
- Stairs along steep slopes to provide access to the property from the river could provide access while limiting erosion.

B Primitive Camping Options

- Options could include tent platforms and primitive cabins.
- Compost toilets could also provide an environmentally friendly amenity.

RIVER ACCESS AND CAMPING PRECEDENTS

Ecotourism Examples

Primitive Camping Options



Compost Toilet Options



Gathering/Viewing Platform



Kayak Access/Tie Up Options



Moving Forward

These initial concepts are intended to be a springboard for a full community planning process and support grant applications for implementation. The Upper Mattaponi Steering Committee and community stakeholders underscored the importance of broader community engagement to refine the concept plans as the project moves forward. There are a range of ways to reach and engage tribal members.

The concept plans can also be used to support grant applications and serve as a catalyst to engage and spark community interest in transforming the Adamstown property and Dorrell Road River Property into a Tribal Center and Tribal ecotourism amenity. There are a range of state and federal funding opportunities that can support community engagement, design and construction. Key grants that might be able to support these efforts moving forward are listed below.



National Fish & Wildlife Foundation (NFWF) Chesapeake Bay Stewardship Fund

Small Watershed Grants Program includes awards each year through two distinct funding opportunities: SWG-Implementation (SWG-I) and SWG-Planning and Technical Assistance (SWG-PTA).

- SWG-I grants are awarded to projects within the Chesapeake Bay watershed that promote on-the-ground community-based efforts to protect and restore the diverse natural resources of the bay and its tributary rivers and streams. Projects result in measurable improvements to local stream health and habitat, and/or the water quality of the Chesapeake Bay. SWG-I grants range from \$75,000 to \$500,000.
- SWG-PTA grants are awarded to projects that enhance local capacity to more efficiently and effectively implement on-the-ground conservation efforts through assessment, planning and design, and other technical assistance-oriented activities. Potential SWG-PTA grants can be assisted or enhanced through the use of Technical Assistance Providers. SWG-PTA grants are a maximum of \$75,000.

For more information: <https://www.nfwf.org/programs/chesapeake-bay-stewardship-fund/small-watershed-grants>

The Innovative Nutrient and Sediment Reduction Grants (INSR) is a program to accelerate the rate and scale of water quality improvements specifically through the coordinated and collaborative efforts of sustainable, regional-scale1 partnerships in implementing proven water quality improvement practices more cost-effectively. For more information: <https://www.nfwf.org/programs/chesapeake-bay-stewardship-fund/innovative-nutrient-and-sediment-reduction-grants-2022-request-proposals>

New America the Beautiful Challenge, is a streamlined grant funding opportunity for new conservation and restoration projects around the U.S. that consolidates funding from multiple federal agencies and the private sector to enable applicants to conceive and develop large-scale projects that address shared funder priorities and span public and private lands. For more information: <https://www.nfwf.org/programs/america-beautiful-challenge>

U.S. Fish and Wildlife Service

2023 Grant Opportunity - the Chesapeake WILD Act puts \$15 million into helping local partners with on-the-ground work in the 64,000-square-mile watershed. Goals include improving stream health and fish habitat, restoring riparian forest buffers and wetlands, expanding black duck populations, protecting eastern brook trout, and removing barriers to fish migration in fresh water. For more information: <https://www.chesapeakeconservation.org/wp-content/uploads/2021/03/Chesapeake-WILD-Program-Fact-Sheet.pdf>



May 2022

TARGETED OUTREACH FOR GREEN INFRASTRUCTURE

Mattaponi Tribe



Chesapeake Bay Program
Science. Restoration. Partnership.



CONTENTS

Overview	1
Planning Process.....	2
Riverbank Opportunities	3
Green Infrastructure Strategies.....	4
Concept Design.....	5
Riverbank Strategies.....	6

Acknowledgments

The TOGI project team acknowledges the contributions of all those who participated in this planning effort.

TOGI Project Team

- Chris Guy, U.S. Fish and Wildlife Service & Chesapeake Bay Program
- Briana Yancy, U.S. Environmental Protection Agency
- Katlyn Fuentes, Chesapeake Research Consortium
- Alisa Wilson, Skeo Solutions
- Catherine Brown, Skeo Solutions
- Marissa Sperry, Skeo Solutions

This project has been funded wholly or in part by the United States Environmental Protection Agency under assistance agreement CB96341401 to the Chesapeake Bay Trust. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document.



Targeted Outreach for Green Infrastructure in Vulnerable Areas Project

Overview

Many communities are adopting green infrastructure as a strategy to manage stormwater, improve water quality, add habitat and provide community benefits such as open space, pedestrian safety, shade and beautification. The Targeted Outreach for Green Infrastructure in Vulnerable Areas (TOGI) is a pilot project being led by the Chesapeake Bay Program Habitat Goal Implementation Team. The goal of this pilot project is to work with communities in the Chesapeake Bay watershed to design green infrastructure projects that meet both community and habitat conservation goals.

Areas within the City of Williamsport, Pennsylvania; Middle Peninsula, Virginia (includes Upper Mattaponi Tribe property and Mattaponi Tribe property); and Cambridge, Maryland were selected as areas susceptible to climate change within the Chesapeake Bay watershed that could benefit from green or nature-based Infrastructure projects. These communities also met criteria for diversity, equity, inclusion and justice based on income and demographic data.

For the Mattaponi Tribe, the process included a listening session to help identify local opportunities where climate change problems can be addressed through green infrastructure options, while also helping to meet community needs. Following the listening session, a design workshop was held to develop a preliminary design concept for a community-identified project. The outcome is a design concept for the selected project and assistance in identifying implementation funding.

Mattaponi Tribe

A Mattaponi Steering Committee was formed to guide the process and included Tribal leaders as well as local, state and federal government staff. The Steering Committee helped identify and engage local stakeholders and identify resources and opportunities to refine the design and construct the project.

The outcome is a green infrastructure design concept that can serve as a catalyst to help the Tribe move forward with broader community engagement and grant applications for implementation. The design concepts are anticipated to evolve as more information becomes available through the site design process and additional community input.



The Mattaponi Tribe is located in King William, Virginia.

MATTAPONI STEERING COMMITTEE

- Mark Custalow - Chief of the Mattaponi Tribe
- Brandon Custalow - Mattaponi Council Member
- Lois Carter - Mattaponi Petition Office, Project Director
- Aaron Wendt, Virginia Department of Conservation and Recreation and Recreation Shoreline Erosion Advisory Service (VA DCR-SEAS)
- Elizabeth Andrews, William & Mary Law School Virginia Coastal Policy Center
- Katherine Filippino - Hampton Roads Planning District Commission
- Andrew Larkin, National Oceanic and Atmospheric Administration (NOAA)
- Julie Reichert-Nguyen, NOAA
- Lauren Taneyhill, NOAA
- Renee Thompson, United States Geological Survey (USGS) & Chesapeake Bay Program

PLANNING PROCESS

Listening Session and Workshop

A listening session held on Monday, February 28, 2022, included Mattaponi Tribal Council members and steering committee members for a discussion about community needs and priorities, challenges, opportunities, relevant community initiatives, potential areas and partners for collaboration. Participants identified the need for riverbank stabilization to address the instability of the bank and provide habitat, particularly to support species of importance to the Mattaponi Tribe, such as shad.

The listening session helped to establish goals and needs for river bank stabilization, including green infrastructure strategies to help alleviate erosion and provide habitat. The listening session was followed by a site visit on April 2, 2022 and a design workshop on May 6, 2022 to review the design concepts and discuss implementation opportunities.

Next Steps

The initial design concepts are intended to be a springboard for a full community planning process and a means to organize partners to support efforts to secure funding for implementation, through grants and other resources. There are a range of federal and state funding opportunities that can support moving this project forward. The design concepts can be used to support grant applications and serve as a catalyst to engage and spark community interest in restoring the riverbank.



Large trees are at risk of falling and destabilizing the river bank.



Erosion and wave action is destabilizing portions of the river bank.

INVITED STAKEHOLDERS

Tribal leaders and organizations shared input about the community's needs, priorities and resources to guide the project. The following people were invited to participate in the listening session and design workshop.

- Mark Custalow, Chief of the Mattaponi Tribe
- Leon Custalow, Assistant Chief of the Mattaponi Tribe
- Brandon Custalow, Mattaponi Council Member
- Lois Carter, Mattaponi Petition Office, Project Director
- Lee Custalow, Mattaponi Council Member
- Malcolm Custalow, Mattaponi Council Member
- Rick McAllen, Mattaponi Council Member
- Tony Waldrop, Mattaponi Council Member
- Jack Custalow - Mattaponi Council Member
- Aaron Wendt, DCR-SEAS
- Elizabeth Andrews, William and Mary
- Jake Reilly, National Fish and Wildlife Foundation
- Katherine Filippino, Hampton Roads Planning District Commission
- Andrew Larkin, NOAA
- Julie Reichert-Nguyen, NOAA
- Lauren Taneyhill, NOAA
- Mike Slattery, U.S. Fish and Wildlife Service
- Renee Thompson, USGS & Chesapeake Bay Program

Riverbank Stabilization

Existing Conditions

The Mattaponi Tribe Reservation is located on a bluff along the Mattaponi River. The riverbank conditions vary along the river corridor and are described in detail below and identified on the map to the right.

1 Riverfront Residential Property

- Failing wooden bulkhead
- Severe erosion and loss of riverbank
- Limited space to pull back riverbank to create a more gradual slope
- Grass slope

2 Riprap Bank and Forested River Bank (Cemetery)

- Large trees on riverbank at risk of falling and damaging riverbank
- Eroding slope from upland stormwater runoff and saturated soils (revealing buried trash in some areas)
- Natural springs / former gullies that outfall to the river
- Riprap revetment installed along toe of slope to help address shoreline erosion
- Cemetery at top of slope limits space to pull back riverbank to create a more gradual slope

3 Hatchery

- During storms, river will rise above boat launch bulkhead
- Natural springs located in this area
- Stormwater inlets and drains may be undersized to handle rainfall amounts
- Area is mowed regularly

4 Forested Riverbank (Road)

- Large trees on riverbank at risk of falling and damaging bank
- Eroding slope and gullies from upland stormwater runoff
- Stairways and docks to river damaged or inaccessible due to riverbank erosion and storm damage
- Erosion is close to the main road. Virginia Department of Transportation (VDOT) maintains the road and could be a potential partner for implementation to address road stormwater runoff

Potential Opportunities

There are several riverbank stabilization strategies that can be utilized to address erosion and failing bank conditions while also protecting habitat and providing river access. The overall approach uses a combination of living shoreline and engineered strategies to achieve riverbank stabilization. A living shoreline uses natural materials such as plants, sand, or rock to protect and stabilize a shoreline. An engineered approach uses built structures or materials like bulkheads or riprap to stabilize a shoreline. These strategies proposed for the Mattaponi River are outlined on the map below and described in more detail on the following pages.

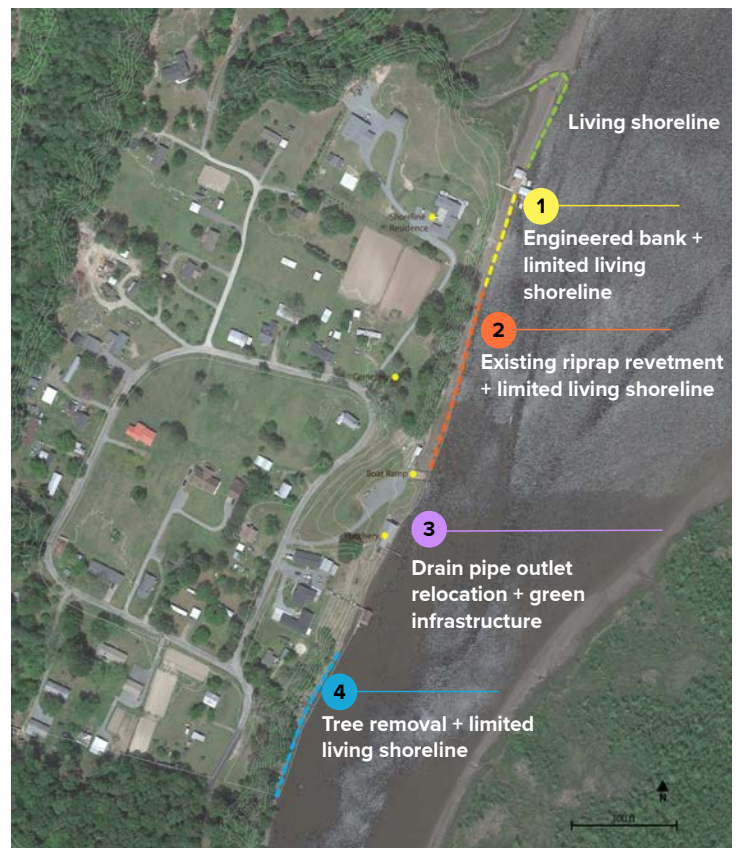


Diagram showing the proposed riverbank stabilization techniques along the Mattaponi River.

GREEN INFRASTRUCTURE

Green Infrastructure Strategies

Green Infrastructure uses vegetation, soils and other natural landscape features to manage precipitation, reduce and treat stormwater at its source and create sustainable and healthy communities. Strategies can include rain gardens, bioswales, urban tree canopies, permeable pavement as well as techniques to redirect and capture stormwater. The photos below are examples of green infrastructure elements that may be incorporated into the strategies identified in the concept plan.

Stabilize bank and provide habitat

Living Shoreline

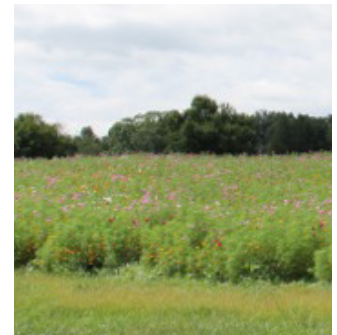


Reduce overland water flow

Native grass and low mow areas

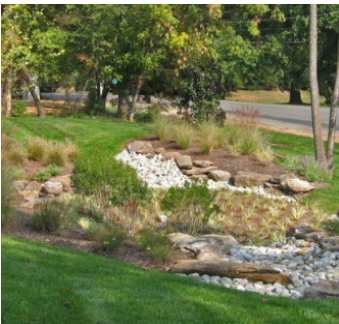


Pollinator or wildflower meadow



Infiltrate stormwater runoff from roads and drains

Raingarden and bioretention



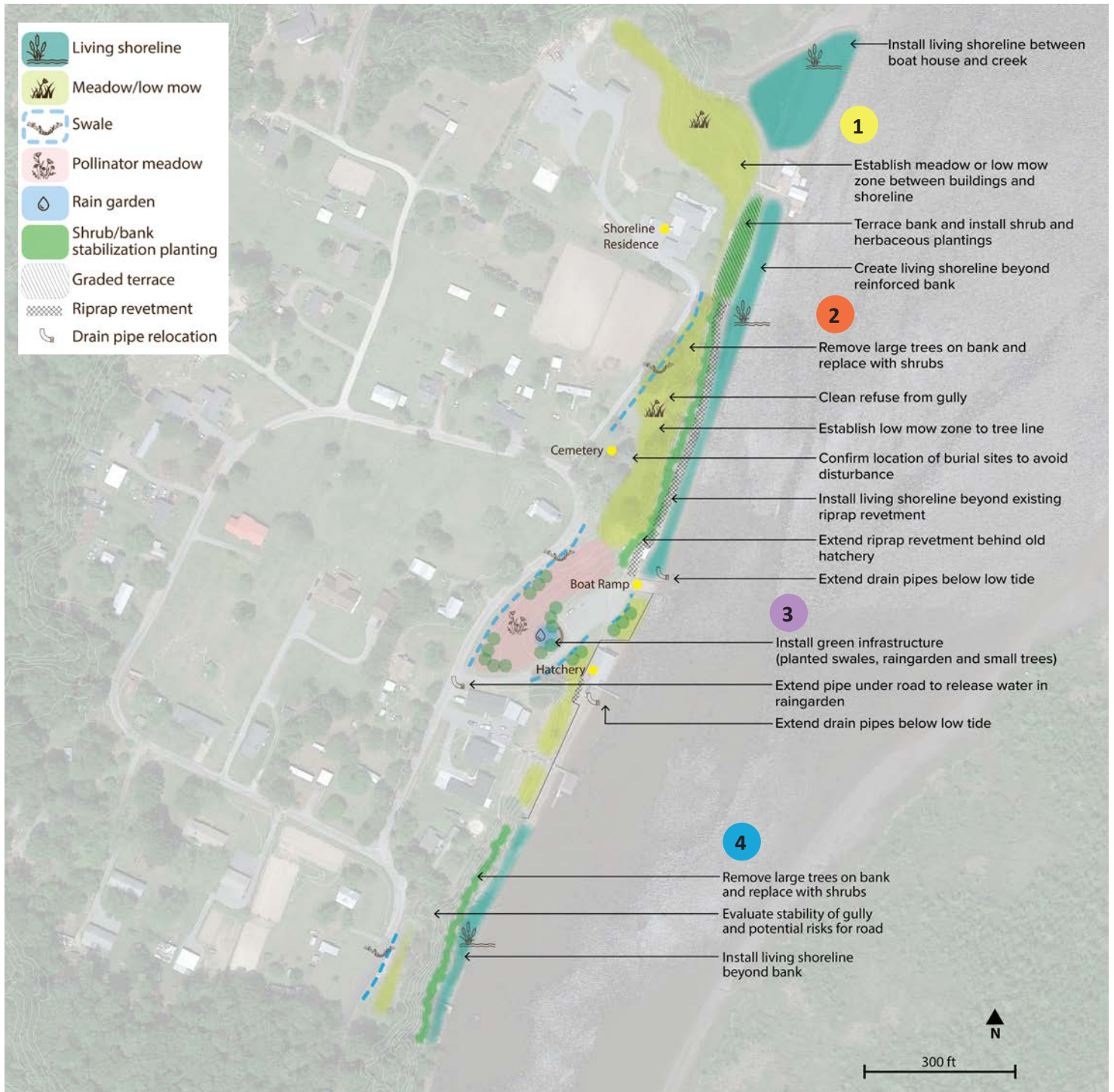
Grass swales and planted swales



Concept Plan

The concept plan focuses on restoring the shoreline and bolstering resilience to erosive forces such as surface stormwater runoff, storms, and wake.

The plan proposes landscape features such as new tree, shrub and meadow plantings, as well as rain gardens and roadside swales, to reduce surface flow toward the riverbank. The plan also proposes shoreline restoration projects along the river that include regrading, extending and planting the banks to restore and stabilize the riverfront property.



Concept Plan

RIVERBANK STRATEGIES







1 Riverfront Residential

The concept for this section focuses on extending and stabilizing the shoreline to protect the existing residence.



Existing conditions (red line indicates location for sections shown below)



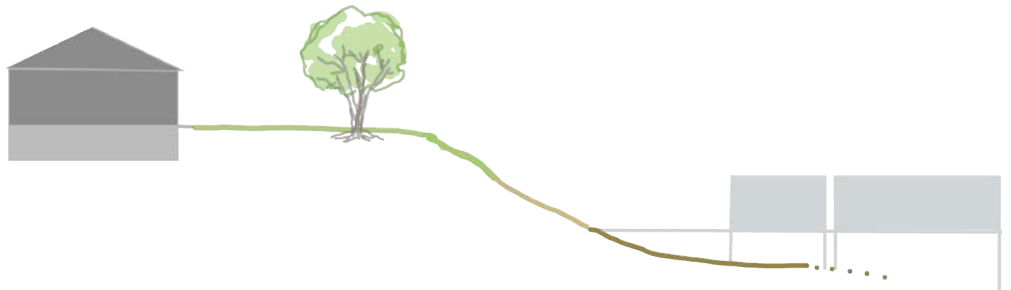
-  Living shoreline
-  Meadow/low mow
-  Swale
-  Rain garden
-  Shrub/bank stabilization planting
-  Graded terrace

Examples

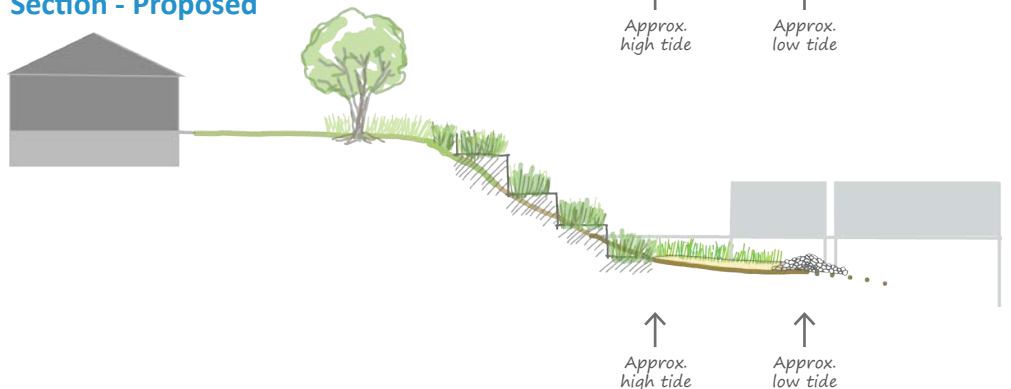
Living shoreline by residence



Section - Existing



Section - Proposed



Native grass meadow/low mow area



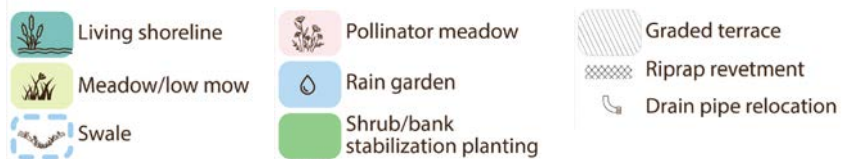
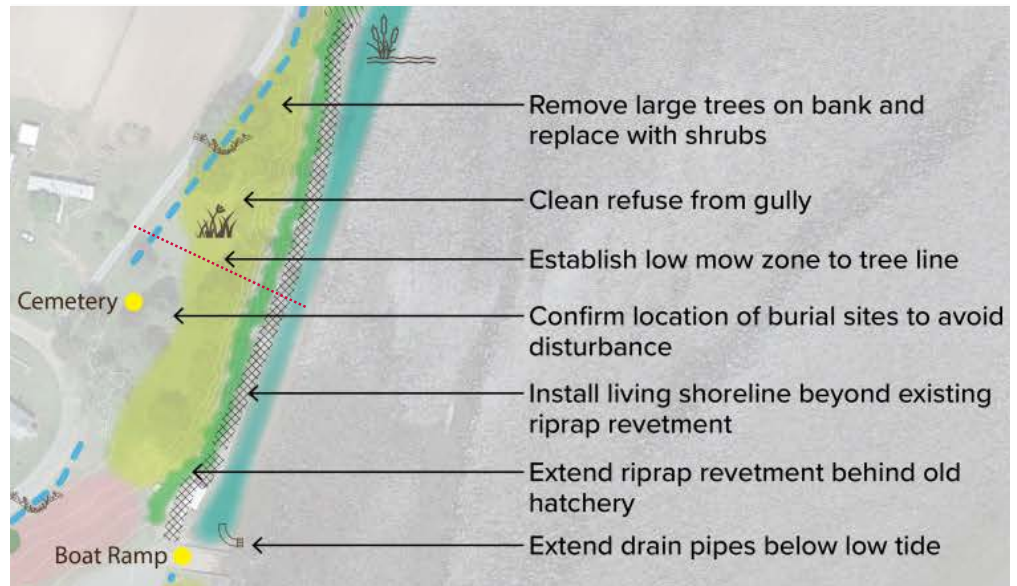
This section view illustrates the proposed living shoreline, grading and restoration landscape features. The location of the section is indicated with a red line in the concept plan.

2 Rip Rap Bank and Forested Riverbank Concept

The concept for this section focuses on extending and protecting the shoreline by bolstering the riprap revetment and reducing surface flow.



Existing conditions (red line indicates location for sections shown below)



Examples

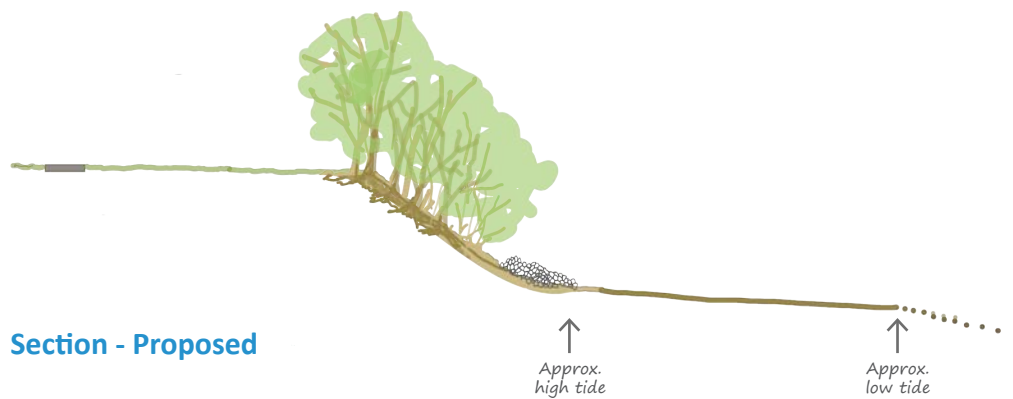
Living shoreline



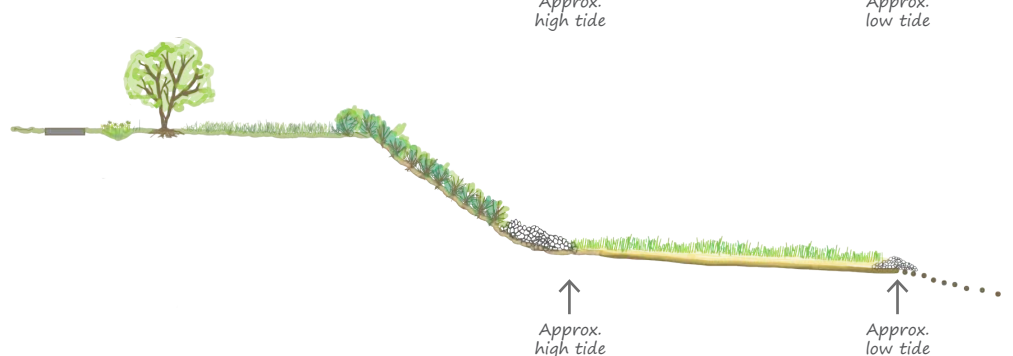
Grass swales and planted swales



Section - Existing



Section - Proposed

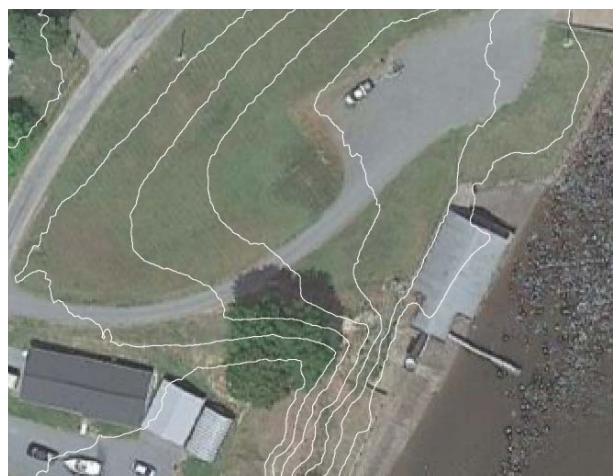
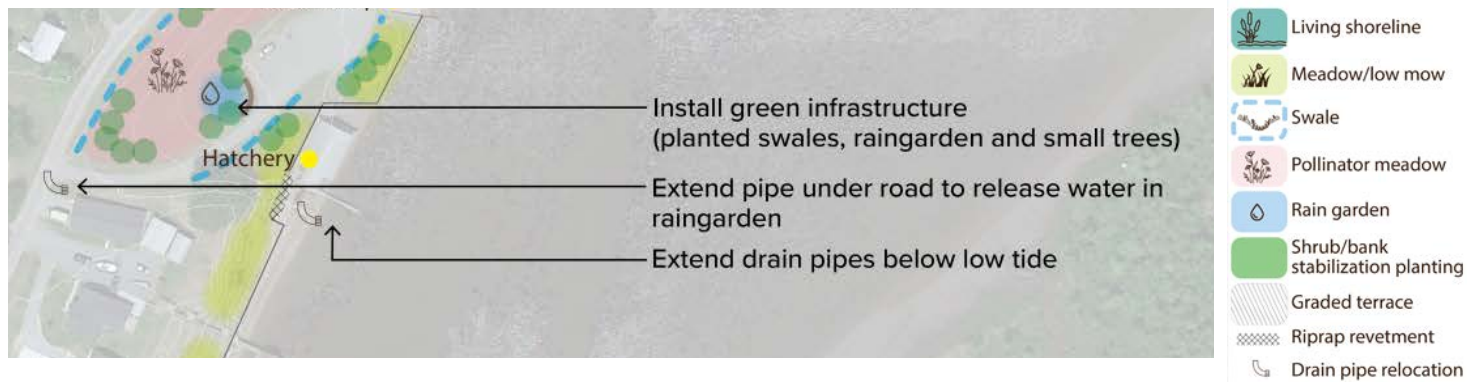


This section view illustrates the proposed living shoreline and restoration landscape features. The location of the section is indicated with a red line in the concept plan.

RIVERBANK STRATEGIES

3 Hatchery and Boat Ramp Area

The concept design for the Hatchery and Boat Ramp area focuses on landscape features to direct water flow to planted retention areas and reduce surface runoff.



Existing conditions

Examples

Rain garden and bioretention



Pollinator wildflower meadow



Tree and shrub plantings



Grass and planted swales












4 Forested Riverbank and Road Concept

The concept for this section focuses on extending the shoreline to prevent further erosion of the river bank by the entry road.



Existing conditions (red line indicates location for sections shown below)



-  Living shoreline
-  Pollinator meadow
-  Graded terrace
-  Meadow/low mow
-  Rain garden
-  Riprap revetment
-  Swale
-  Shrub/bank stabilization planting
-  Drain pipe relocation

Examples

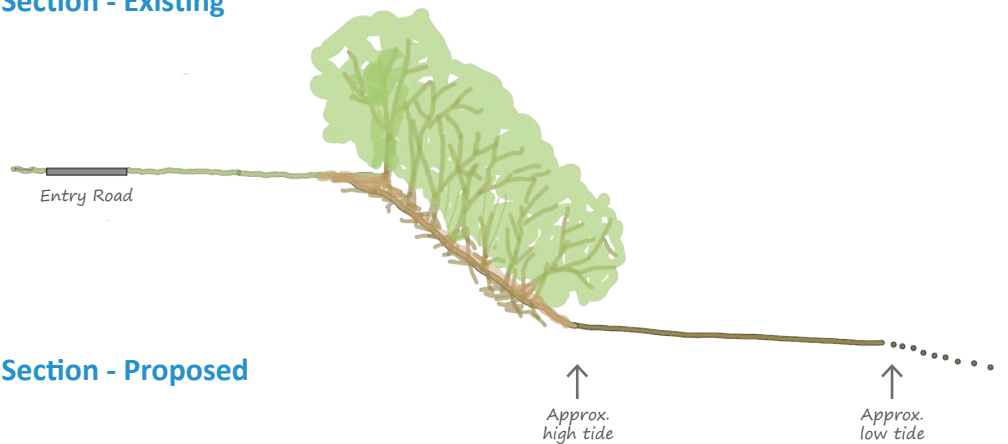
Living shoreline



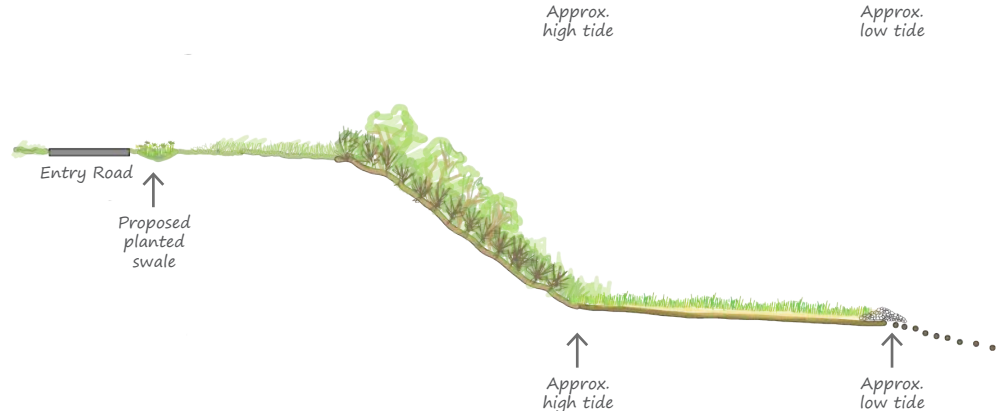
Grass swales and planted swales



Section - Existing



Section - Proposed



This section view illustrates the proposed living shoreline and restoration landscape features. The location of the section is indicated with a red line in the concept plan.



May 2022