

Professional perceptions of participatory practices in green stormwater infrastructure development



Mahsa Adib
Ph.D. Candidate, Penn State



Dr. Hong Wu
Associate Professor, Penn State



Dr. Travis Flohr
Assistant Professor, Penn State



Dr. Timothy Kelsey
Professor, Penn State



Iowa's Living Roadways
community
VISIONING



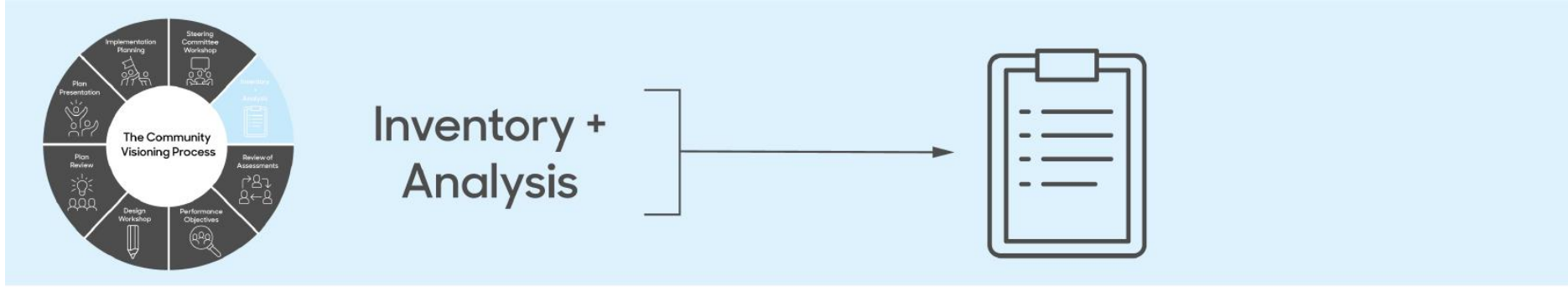


Steering Committee Workshop

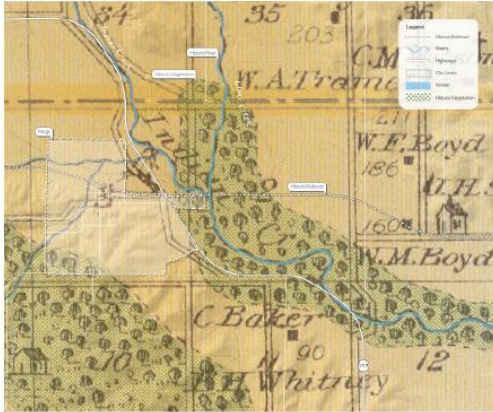
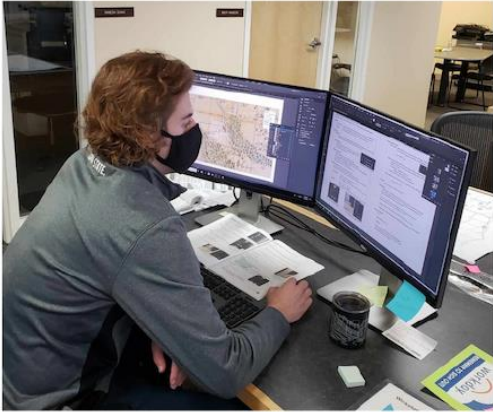


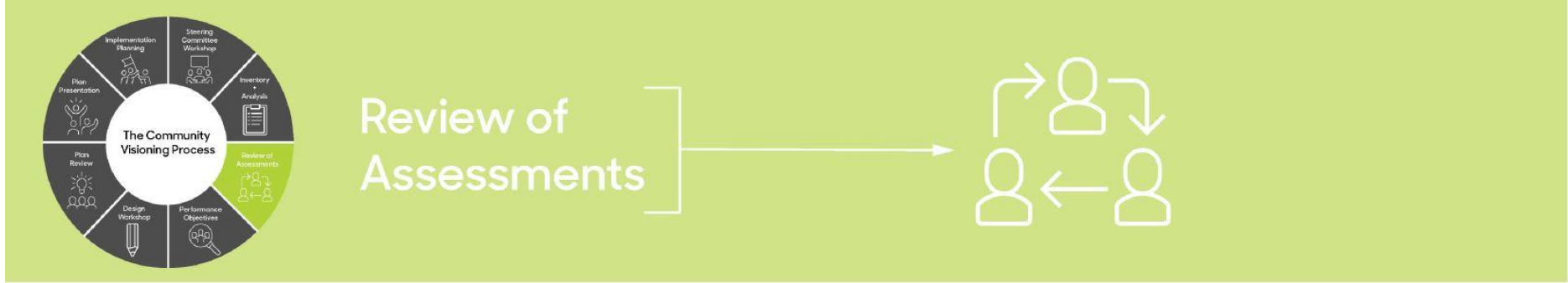
In the Steering Committee Workshop community members will: learn about the program, get ideas and set goals, plan the process, and map local geography.





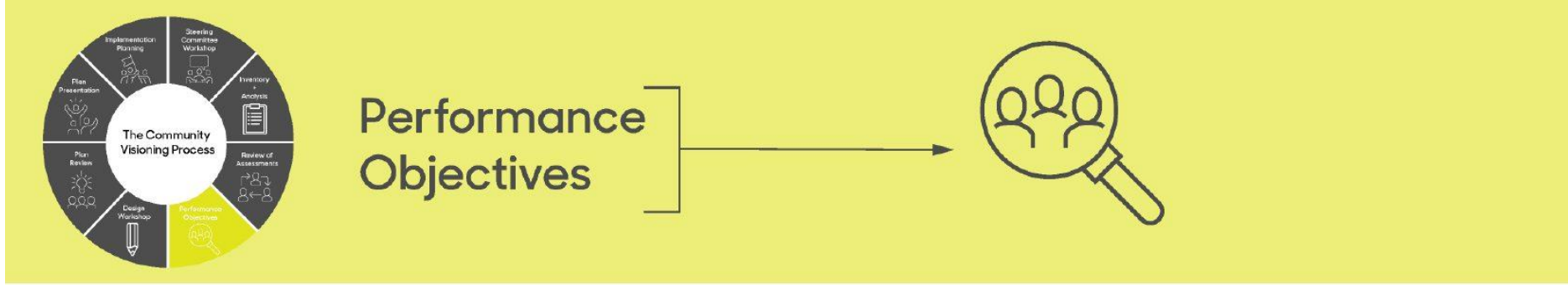
During Inventory & Analysis, the ISU research team analyzes historic & current vegetation, soils, drainage patterns, etc., and identifies transportation use patterns, needs, & priorities through focus groups. The design team documents proposed changes & existing problems in the local transportation system.



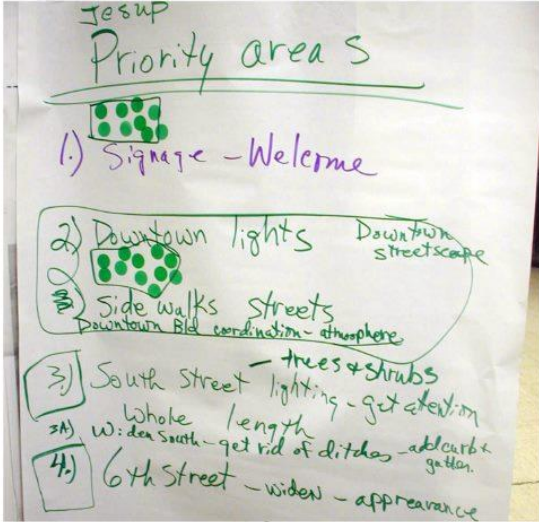


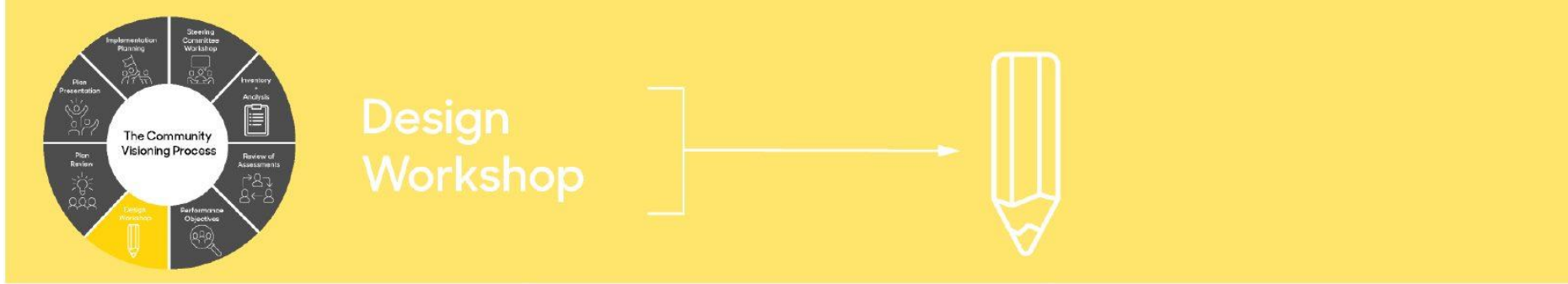
During the Review of Assessments the steering committee interprets the results of the inventory and analysis.



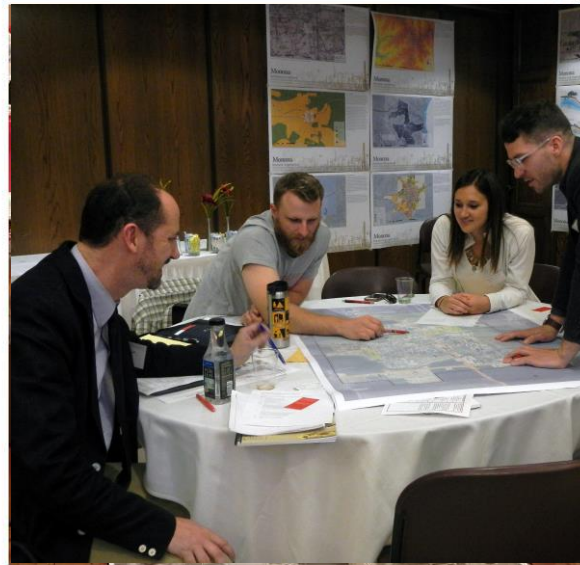


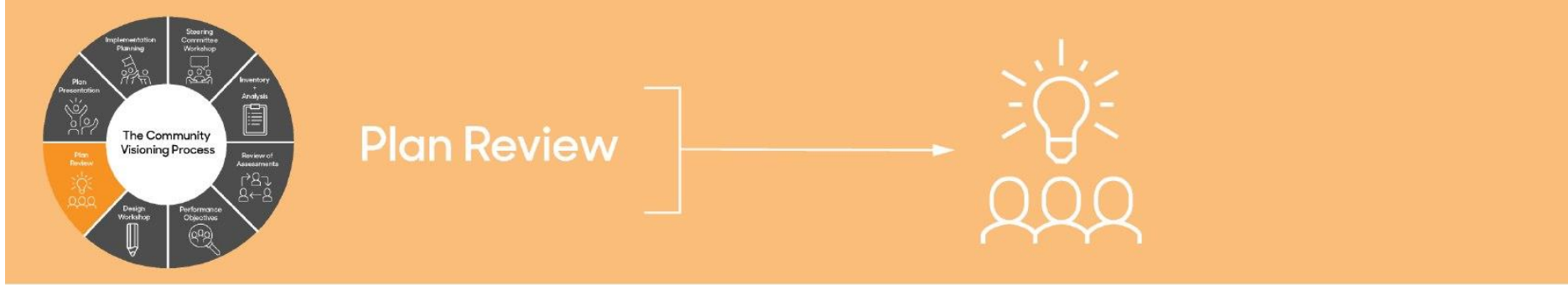
During the Performance Objectives meeting, the steering committee defines project areas in the community.





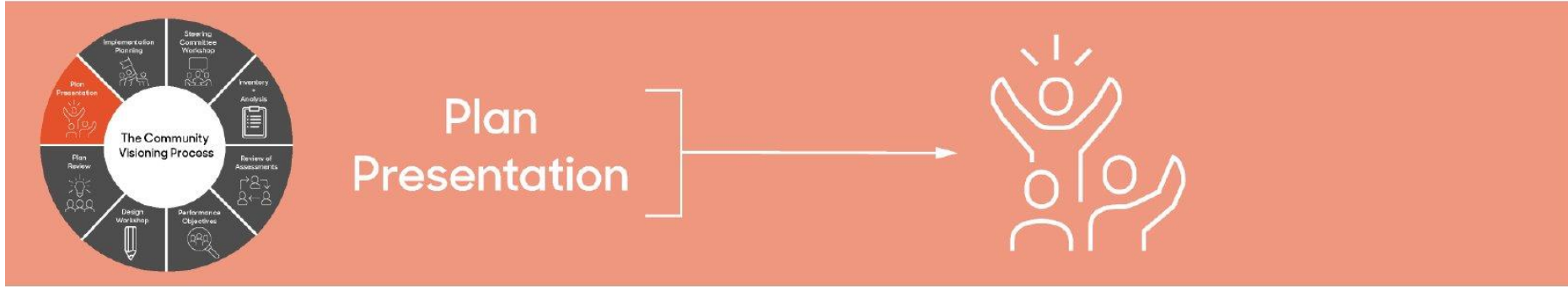
During the Design Workshop the design team will create designs "on the fly" based on the steering committee's performance objectives and public input.



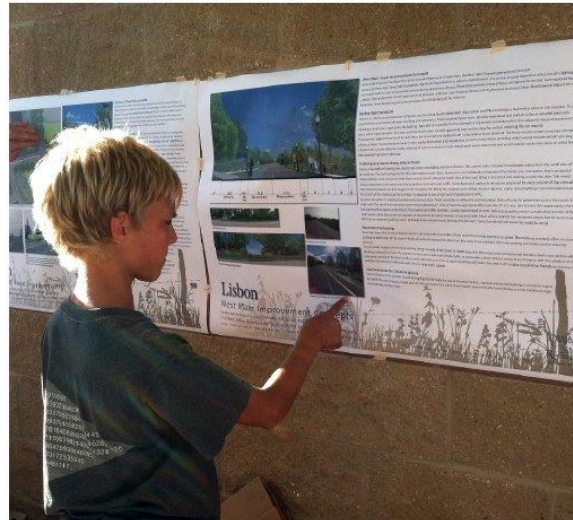


During the Plan Review the steering committee reviews proposed designs and provides feedback to the design team.





During the Plan Presentation the design consultants and steering committee present the final concept plan to the public.





Implementation Planning



During Implementation Planning the design consultants and steering committee decide priorities, identify funding sources, and integrate the proposed designs with the city's official plans.



Participation

Actively involving community members in decision-making processes, programs, and initiatives.

Inclusivity

Ensure that diverse voices are included and represented, including those from marginalized or underrepresented groups.

Collaboration

Encourage building relationships, fostering trust, and working together towards common goals, rather than imposing top-down approaches or one-size-fits-all solutions.

Empowerment

Recognize the expertise and knowledge that community members possess and empower them to be active participants in shaping their own community's future.

Flexibility

Recognize that communities are dynamic and ever-changing. Require flexibility to adapt to the unique needs, characteristics, and priorities of each community, and to evolve over time as the community changes.

Sustainability

Take a long-term perspective. Considers the sustainability of outcomes. Involve building capacity within the community, foster local leadership, and create structures and mechanisms that can continue beyond the duration of a specific project.

Communication

Emphasize clear, transparent, and two-way communication with community members. Involve active listening, effective communication strategies, and regular feedback loops to ensure that information is shared, understood, and acted upon.

Background

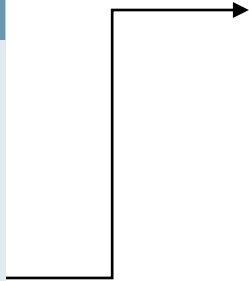
Research gap

Insufficient research into social and cognitive barriers




GSI social and cognitive barriers

- Pro-gray mindset
- Unawareness
- Perceived risk of cost and performance
- Risk aversion attitude
- Reluctance to change
- Hesitation to take maintenance and construction responsibility



Significance

- Engagement of the affected community
- 
- Catalyze GSI implementation
 - Avoid biased decisions
 - Increase GSI acceptance, buy-in, and advocacy

Background

Research gap

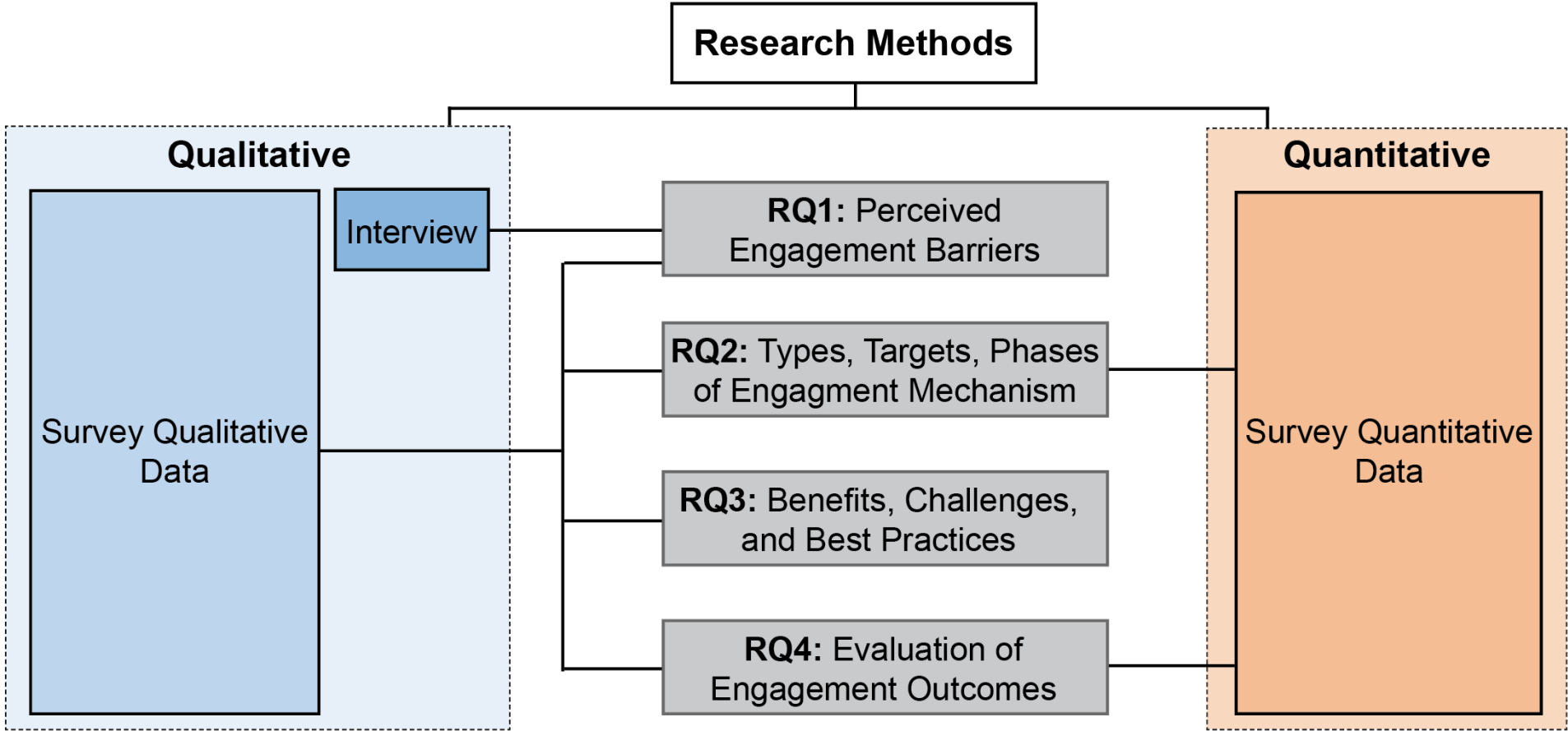
- Few studies investigated the prevalence of community-engaged GSI projects in the first place, although many suggested that top-down decision-making remained the dominant approach. Research **concerning barriers primarily focused on those for GSI development in general rather than specifically for community engagement**
- The current community engagement literature lacks evidence-based guidance specific to GSI development. Investigations of the **target audiences, engagement phases, and types of engagement methods remain lacking**. Guidance on the **advantages, challenges, and best practices of engagement methods for GSI is absent**.
- There is an increasing call for **research that evaluates the community engagement process or outcomes** in GSI development to identify best practices and promote accountability.

RQ1: What are the barriers to initiating community engagement for GSI development?

RQ2: How have professionals applied existing community engagement mechanisms for GSI development concerning types, target populations, and phases?

RQ3: What are the benefits, challenges, and best practices associated with each type of community engagement mechanism for GSI development?

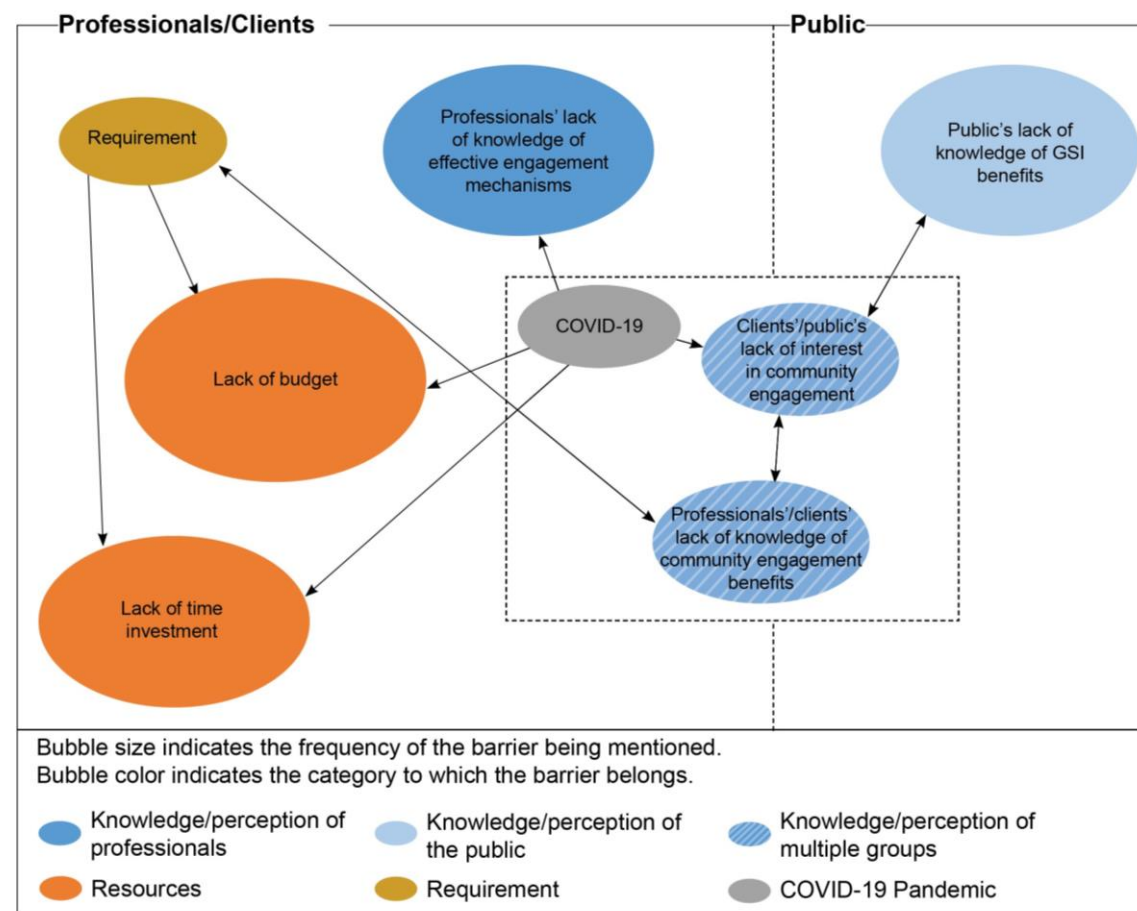
RQ4: How have community engagement outcomes been evaluated, and what are the evaluation outcomes?



Findings

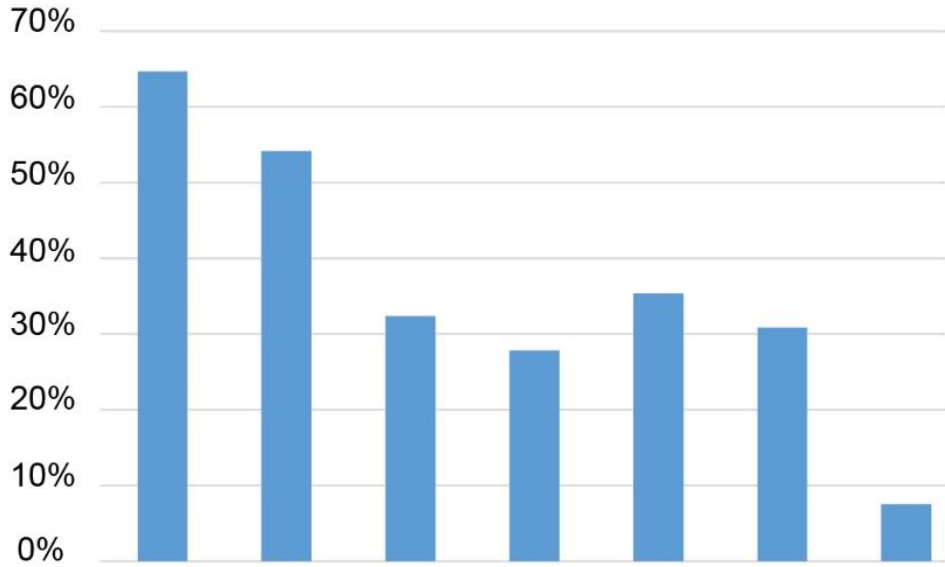
Barriers

Primary categories of barriers	Frequency of being mentioned	Type of barriers	Frequency of being mentioned
Survey (n=48)			Percentage
Resource	52%	Lack of budget (Funding availability and flexibility)	56%
		Lack of time investment	24%
Knowledge and Perception	31%	Lack of knowledge of engagement mechanisms effective at various scales	41%
		Community's lack of knowledge about GSI benefits	35%
		Developers/communities' lack of knowledge about community engagement benefits	17%
		Developers/communities' lack of interest in community engagement	17%
Requirement	19%	Not required by the client	40%
		Lack of regulations/incentives	40%
		Out of project scope (for unspecified reasons)	25%
COVID-19 Pandemic	19%	Health and safety protocols	19%
Interviews (n=17)			Count
COVID-19 Pandemic		Communities' familiarity with and access to new modes of engagement	10
		Available time, budget, and staff resources	9
		Professionals' expertise and familiarity with new modes of engagement	7
		Organizational infrastructure to support new modes of engagement	5
		Capabilities of available tools	4



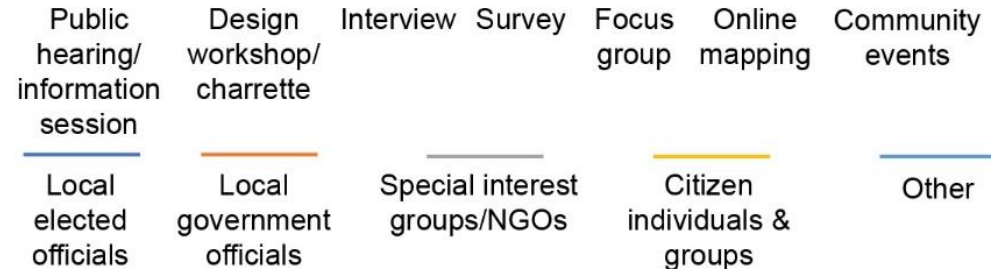
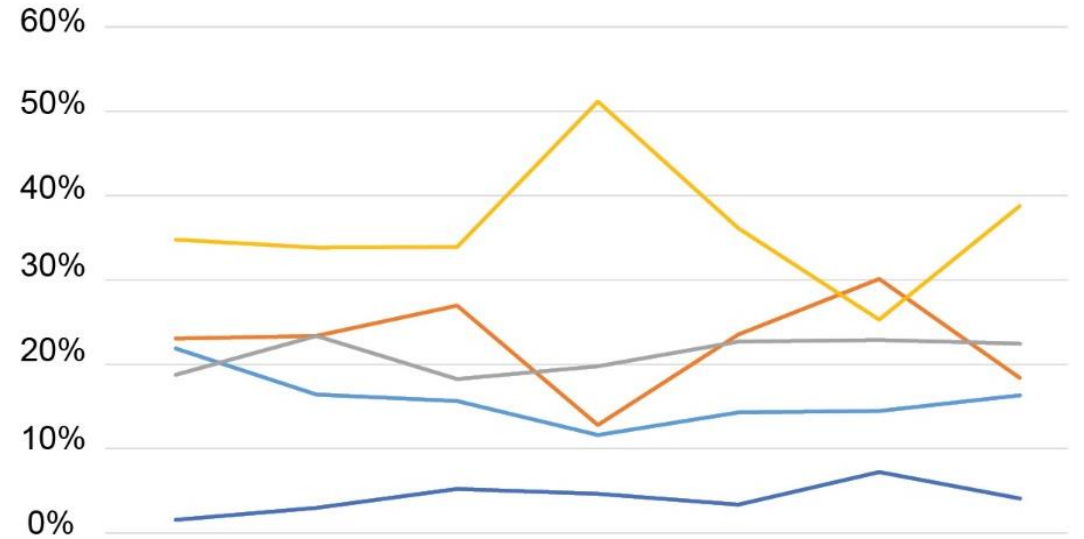
Findings

Types, Targets



Public hearing/information session	Design workshop/charrette	Interview	Survey	Focus group	Online mapping	Community events
65%	54%	32%	28%	35%	31%	8%

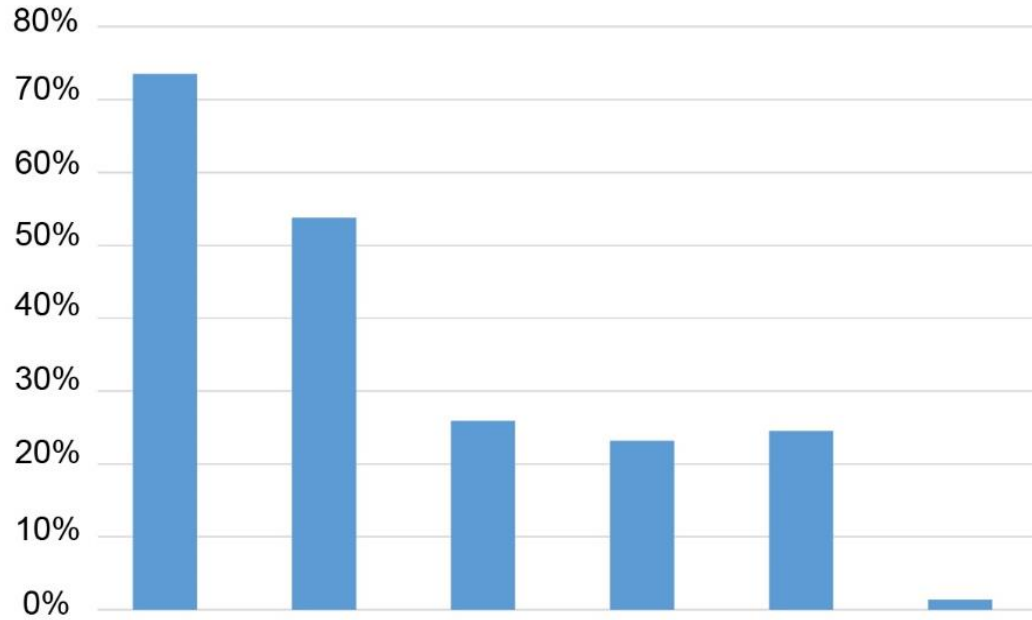
Types of engagement mechanisms (n=130)



Target population & mechanisms (n=130)

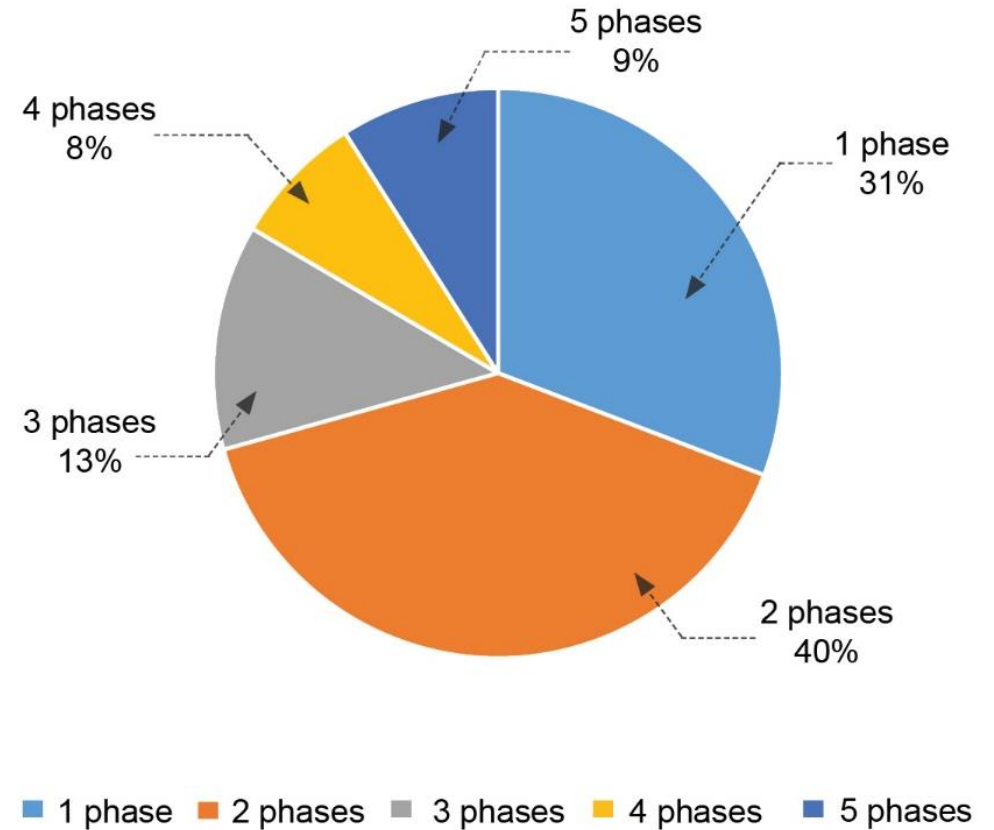
Findings

Phases of engagement



Planning & decision making	Conceptual design	Design development	Construction	Maintenance	Other
73%	54%	32%	28%	24%	1%

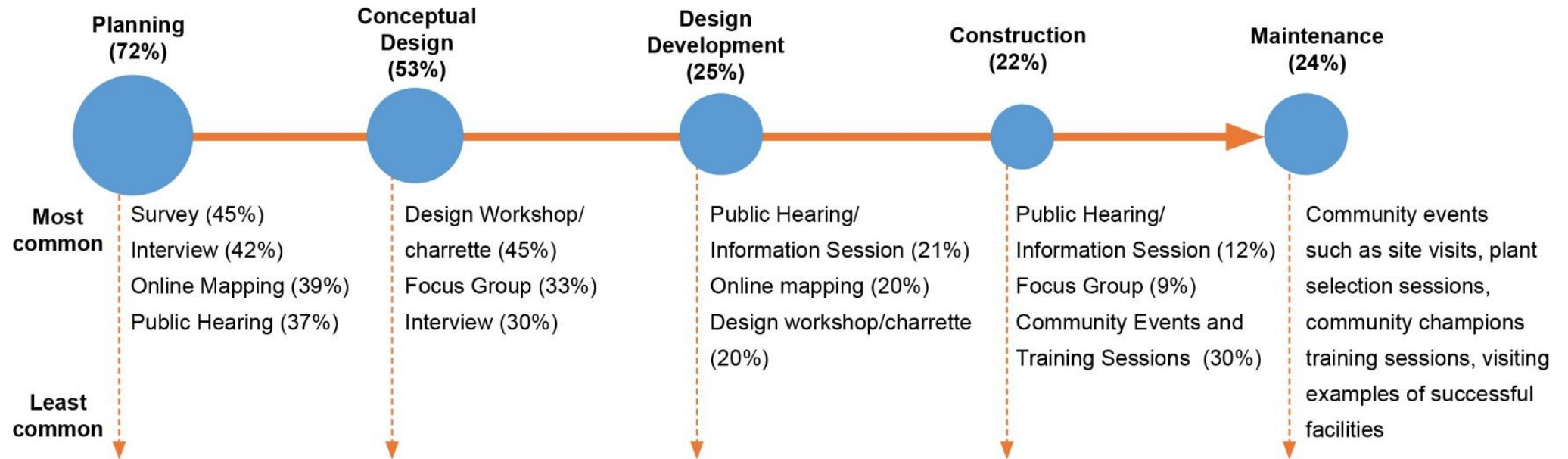
Specific phases with engagement (n=133)



Number of phases with engagement (n=130)

Findings

Phases of engagement



Mechanisms applied for each phase

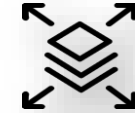
Findings

Benefits, Challenges, and Best Practices



Quality of Input

E.g., Allows immediate validation of input through group discussion and feedback



Flexibility

E.g., Mechanisms are adaptable given the project type, goals, target audience, context, phase, etc.



Inclusivity

E.g., Provides people with opportunities to participate by reducing barriers, creating connections, and engaging in meaningful and supportive ways



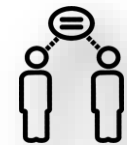
Time/Cost Efficiency

E.g., Time and budget efficient for long-term engagement



Influence

E.g., Fosters a sense of ownership by allowing the public to contribute equally in developing design alternatives



Knowledge Transfer

E.g., Allows building a common vision through communication of the local and scientific knowledge



Interactivity/Transparency

E.g., Allows hands-on and interactive activities and promotes transparency through open group discussions

Findings

Benefits



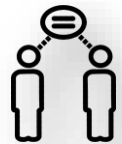
Quality of Input

Mechanisms: Design workshops, Charrettes, Focus Groups



Time/Cost Effectiveness

Mechanisms: Public hearing/information sessions, Interviews, Surveys, Design Workshops/Charrettes

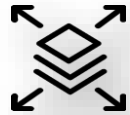


Knowledge Transfer

Mechanisms: Design Workshops/Charrettes, Focus Groups

Findings

Challenges



Flexibility

Mechanisms: Interviews, Focus Groups, Online Mapping



Inclusivity

Mechanisms: Public hearing and information sessions, Surveys, Web-based Mechanisms such as Online Mapping



Interactivity/Transparency

Mechanisms: Survey, Interview, Public Hearing and Information Sessions

Mechanisms:



Inclusivity

- Increase inclusivity by using a combination of engagement mechanisms in communities with limited access to online tools



Flexibility

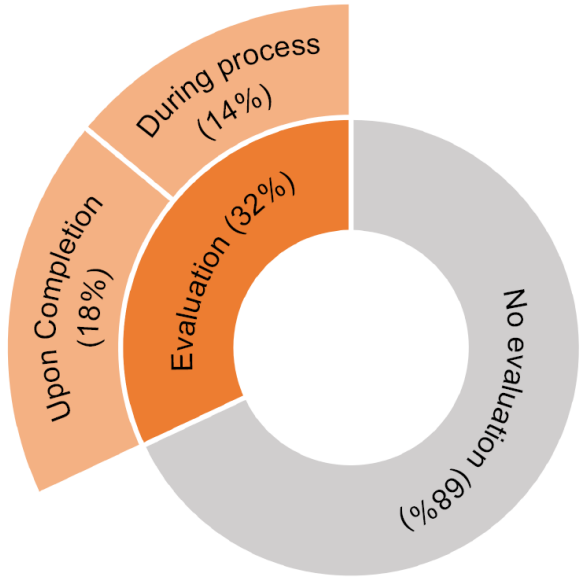
- Use easy-to-use and open-source tools
- Provide funding/technical support to underserved communities to adopt innovative and online engagement tools

GSI Engagement:

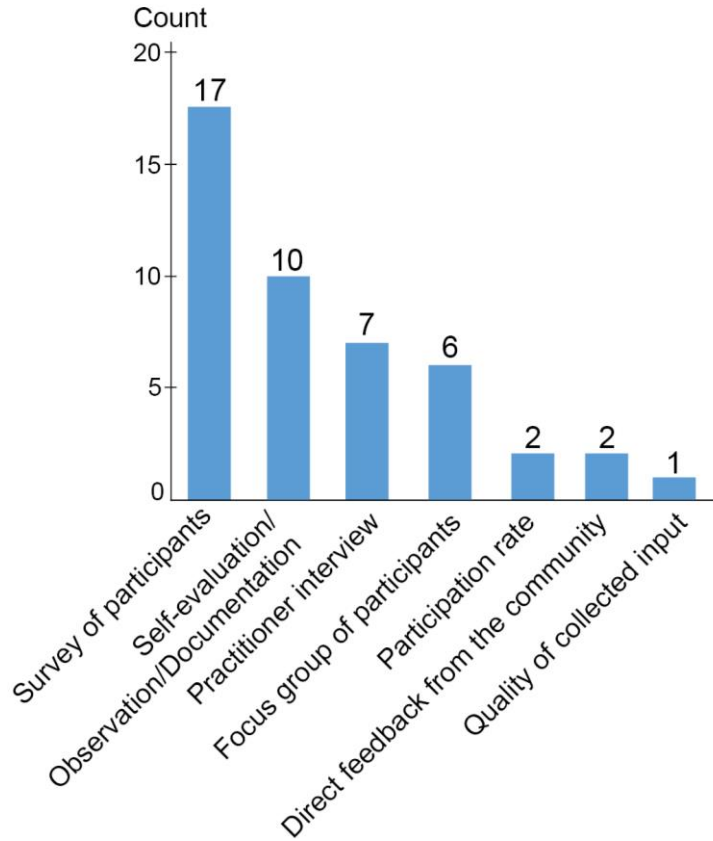
- 1) Performing and presenting analyses to quantify the projects' stormwater issues
- 2) Engaging city regulatory review staff and approval agencies in the early design stage
- 3) Hands-on design activities such as breaking down precedent projects by components and allowing participants to select individual elements
- 4) Keeping the community engaged during installation
- 5) Conducting maintenance training sessions and funding multi-year follow-up tasks to keep the community involved in maintenance
- 6) Promoting the project in the entire community to raise awareness of GSI benefits and broaden GSI implementation in other areas of the community.

Findings

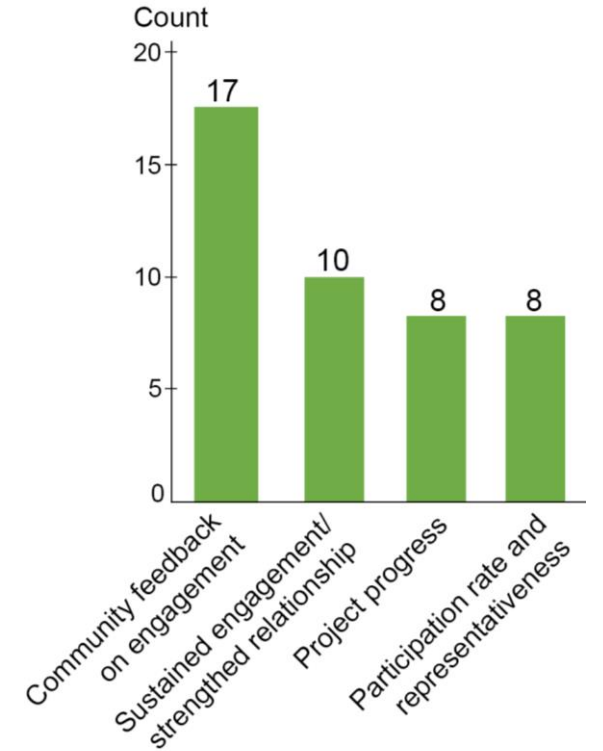
Evaluation of engagement outcomes



Evaluation of engagement mechanisms (n=121)



Evaluation indicators (n=36)



Evaluation measures (n=21)

Conclusion and future directions

1

Addressing the lack of requirements/incentives

2

Extending participation into the most underserved construction and maintenance phases

3

Need for additional GSI-specific guidelines

4

Urgent need to allocate adequate resources for assessment and facilitate researcher-practitioner collaborations to develop appropriate evaluative methods based on project type, community context, and evaluation purpose

THANK YOU!

Mahsa Adib

Mva5844@psu.edu





Community Engagement Strategies

The St. Mark UMC
Restoration Project





WSA Diversity, Equity, Inclusion and Justice Strategic Plan

**1. Data and
Reporting**

2. Development

**3. Communication,
Outreach, and
Partnerships**

**4. Education
Programs**

**5. Restoration
Projects**

**6. Retention and
Internal Policies**

Project Context

- In 2019, our partners at the Anne Arundel Bureau of Watershed Protection and Restoration (BWPR) reached out to WSA about the stormwater issue this church was facing
- The Church was facing an increase in stormwater issue due to:
 - Development in the surrounding area from a new casino
 - Failing and outdated culverts
 - Overall increase in severe storm events
- This caused massive amounts of flooding , sinkholes throughout the property, and even causing the destabilization of trees on the grounds
- Arundel Rivers Federation and WSA partnered to help the church tackle this project.

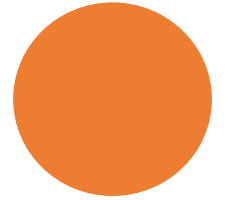


Tackling Injustice

- Let's put this situation into perspective:
 - A historically black congregation that has been a staple community resource hub for decades is facing increased stormwater issues due to development outside of their control with failing outdated stormwater infrastructure
 - Challenges funding the project arose with the first application to one of the county's stormwater grant program was denied due to the project not having enough stormwater credits with it
- Solutions:
 - The Anne Arundel Develop Council had grants to support communities impacted by the casino's development
 - Reframed the application with the environmental injustice lens to justify some of the smaller number in addition to some design adjustments

Fall 2020 Stormwater Tour

- Visiting other congregations in Anne Arundel county that received restoration projects, many who WSA has worked with
- Showed the congregations possibilities and helped to instill confidence in our ability to assist with these types of projects in similar communities



Community Driven Project Design

- There was concern over how the project would look
- WSA's Restoration Coordinator at the time worked with the church to create a resource for them to select which native plants they wanted in their project
 - From an approved list based on project restrictions

EUPATORIUM MACULATUM

Common name: Joe-Pye
Weed

Height: 5-8 ft tall

Bloom Time: July-
September



Tailor Outreach to what the community needs

The Restoration Project at St. Mark United Methodist Church

What is happening and when?

Timeline: We anticipate construction of the project will begin near the end of October, and estimate it will take approximately 9 weeks to complete, based on a 4-day work week.

Equipment on Site: During this time, there will be construction equipment and vehicles on site. Arundel Rivers Federation will work closely with the construction crew to ensure they are respectful of your property. Meadville Land Service will likely be the team working on this project.

Plantings: Plantings will happen in Spring 2023. All the plants were selected from an approved list by the St. Mark United Methodist Church Board of Trustees.

Site Stabilization: Since planting will not happen in the fall, the site will stay in its stabilized state from December 2022 through Spring 2023.* Stabilization will happen at the end of construction in December to prevent further erosion. (See Image 1 for an example of what this will look like.) During this period, construction crews do not plan to be on site.

* Note that plantings cannot happen until Spring 2023 when it will be warm enough for new plants to survive.



Image 1. Post Construction Example: Rye grass stabilization at a restoration project.



Image 2. An aerial view of the property highlighting access points during construction.

What do I need to know?

The Parker Family will always have access to their properties, but there will be some temporary changes. A small section of the driveway that leads to Dorsey Rd will be removed to access the storm drain. After the storm drain is removed and replaced, a steel plate will be installed to maintain access to the residents.

This process will take approximately 3 days to complete. During this time, the residents will need to use the access point from the church parking lot during this time. This will be completed during the work week to ensure that this is a short adjustment to make. This will happen near the end of the construction phase, likely in late November, early December.

Image 2 shows access points that are available. The red rectangle shows where the construction team will dig to access the storm drain pipe. The yellow circle shows where there will always be access to the properties.



Image 3. An aerial view of the parking spots that will be removed for the project.

3 Changes to Expect

1. **Construction vehicles on site** during the week. A large portion of this will be the removal of excavation sediment. Expect to see trucks hauling away sediment and bringing in some materials for the project.

2. **Five parking spots will be permanently removed** for the construction of the project. This was approved by the church leadership during the design of the project back in 2020-2021. See Image 3 for the specific spots that will be removed.

3. **The trees lining the parking lot near the storm drain will be removed** in order for the construction crew to access the failing storm drain. These trees will be replaced with new trees, which will be planted in Spring 2023. The new trees will be much younger and significantly smaller than the trees that are currently there, but they will eventually grow much larger.

Hosting Community Meetings

- To prepare the church and surrounding community for the beginning of the construction process, we hosted a meeting at the church to go over what to expect when construction begins
 - This is a very busy church that provides lots of services to the surrounding community, with construction possibly impacting events
 - Setting expectations on what the site looks like and for any permanent changes to the congregation at large.



Communicating and being a resource

- We had an open line of communication between the neighboring homeowners, the church board, and the general congregation
- Use methods of communication that work best for the audience you are engaging
 - Sometimes we could communicate things over email and other times meeting in person was better, even if the meeting was shorter



Be flexible and respond to what the community expresses

- Strategies change as you learn more about your community and how the project develops
- Originally, we planned on having a small portion of the project be volunteer planted. However, after many surprises that dramatically extended the timeline of the project, we decided that a volunteer planting was not the best fit for the church at this time
 - A combination of “project fatigue” and ability to volunteer
 - Never force a community into doing something, especially as an outsider to their space

Post-Project Engagement

Youth Ministry

Connecting the church to other churches that received large restoration projects for maintenance support

Long-term support for the project's longevity

- Setting up the church to be able to maintain the project and being able to provide support after it's installation
- This is done through our congregational programs and our partnership with Interfaith Partners of the Chesapeake.

Main Takeaways



UNDERSTAND
YOUR
COMMUNITY



COMMUNITY
INVOLVEMENT
LEADS TO
PROUD
OWNERSHIP



BE DIRECT AND
INSPIRING WITH
YOUR OUTREACH



BE FLEXIBLE AND
OPEN TO NEW
IDEAS



THINK LONG-
TERM

Terryl Acker-Carter
Community Engagement
Specialist

terryl@aawsa.org



Community Engagement: Paul Spring Branch @ Hollin Hills Stream Restoration Project

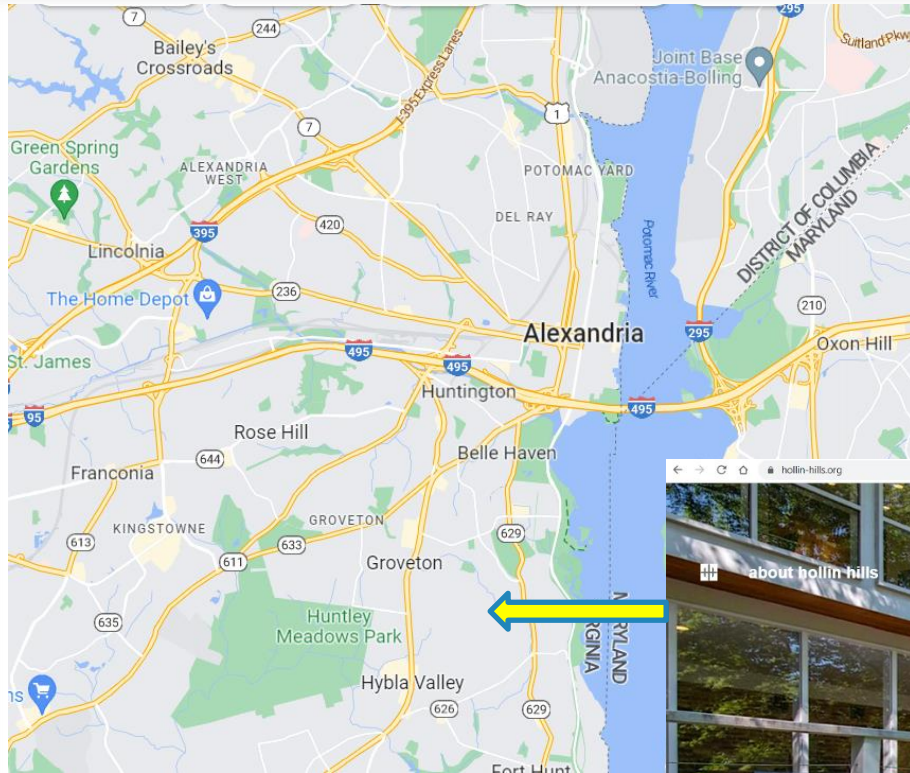
2023 Bay-wide Stormwater Partner's Retreat

Department of Public Works and Environmental Services
Working for You!



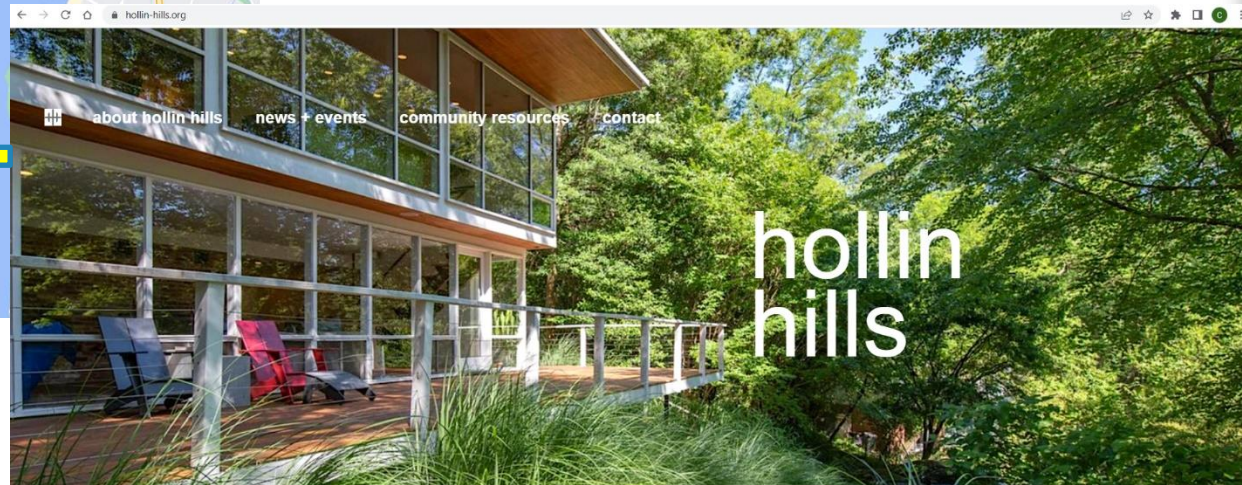
A Fairfax County, VA, publication
April 13, 2023

Project Location



Hollin Hills is a nationally recognized planned community in Fairfax County south of Alexandria, VA

<https://www.hollin-hills.org/>



welcome to hollin hills
a mid-century modern community in alexandria virginia

Project Timeline

- Community approaches county ~2011 to restore eroding stream channels
- 2013 – project abandoned due to land rights and private sanitary sewer issues
- 2015 – community comes back to county due to worsening erosion
- 2017-2018 – new project begins & civic association conveys land rights
- 2019 – opposition group forms
- 2021 – opposition group files lawsuit
- 2021-2022 – project constructed
- 2022-2025 – joint caretaking between community & county

Elements for Project Success

- Strong civic association leadership
- 89% community member support by survey
- Four community members on project design team
- Monthly community updates
- Saturday community walks
- Four public meetings throughout project
- Support from local environmental leaders
- Support from local county supervisor
- Social goals shared from outset:
 1. Maintain open dialog and share information.
 2. Coordinate with all the stakeholders and the community.
 3. Build partnerships with local organizations.

Folks Opposed to Project

- Formed initially of community residents
- Primary concern was tree loss
- Enlisted local botanic and arborist experts to characterize existing conditions & potential impacts
- Enlisted former community resident to assess stream condition & restoration plans
- Joined larger group opposed to stream restoration in Virginia, DC and Maryland



Paul Springs @ Hollin Hills Segment 1 - May 2018 draft



1 inch = 200 feet
for information purposes only, not an official map

Disagreement & Outcomes

- Opposition group alienated neighbors
- Claims of significant opposition to project never surfaced – majority of community remained supportive
- Differing perspectives on site condition and solutions
- Differing visions of good outcomes



Going Forward

- Co-management of plantings and invasives between community and county for next three years
- Continued community engagement
- Long term: Civic Association Parks Committee to oversee vegetation and county to maintain stream



Goodman and Brickelmaier Parks are open again! Photo: Christine Kelly



- Project complete August 2022
- Ribbon cutting December 2022

Applying Lessons Learned

Public Engagement Template:

- When to reach out – project initiation
- How to reach out – letter for first correspondence and postcards for rest of project
- Who to reach out to – properties adjacent to project site, construction entrance/route
- Create and update project website at every stage including virtual meeting link or physical location
- Use story maps, et al, to communicate project information and solicit input/feedback
- Work with community leaders/liaisons, NGOs, elected officials and other to communicate project information

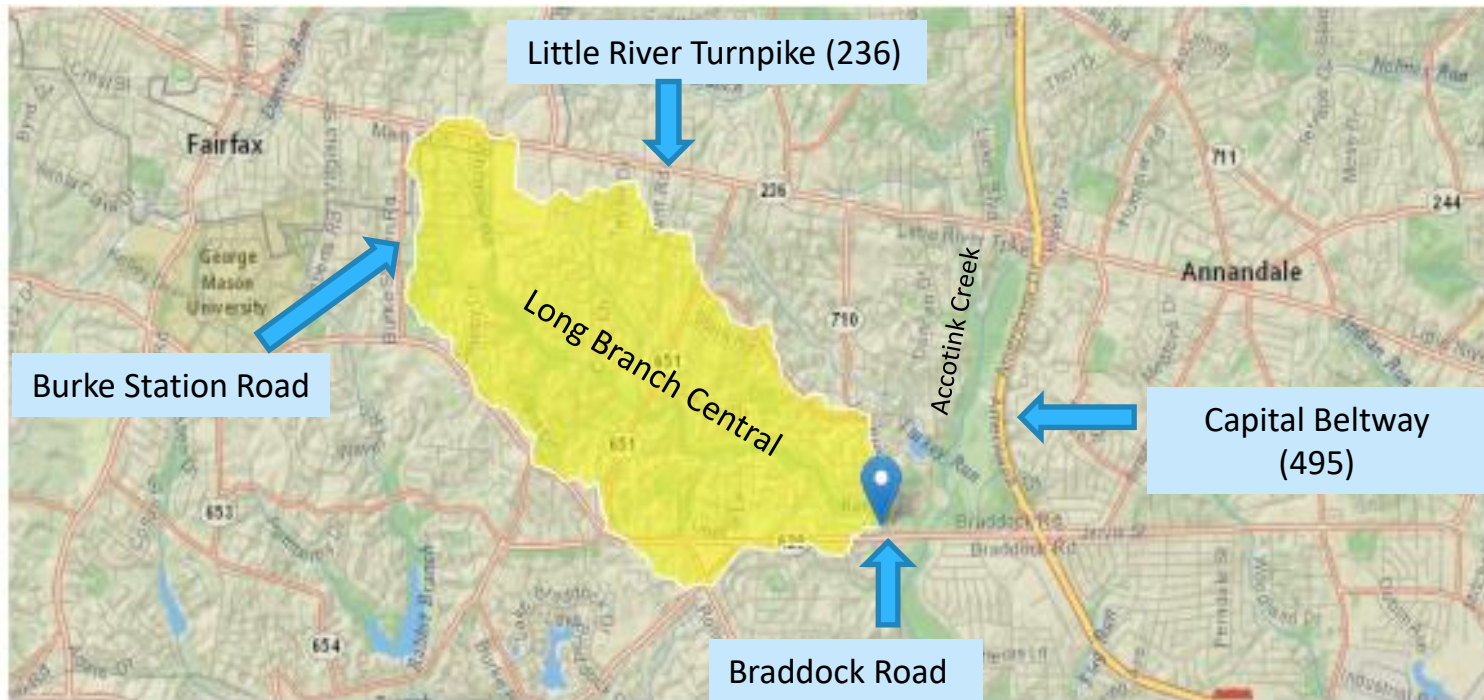
When to meet:

- 1st meeting – project initiation
 - Recruit community members to serve on project team
 - Include local NGOs, civic associations, communities of faith
 - Include elected officials/staff
 - Include other public entities (park authority, urban forestry, wastewater, etc.)
- 2nd meeting – 35% design
- 3rd meeting – 65% design
- Pardon our dust

Case Study – Long Branch Central Watershed Management Area

Long Branch Central Watershed

3.71 Square Miles - 12 Miles of Streams



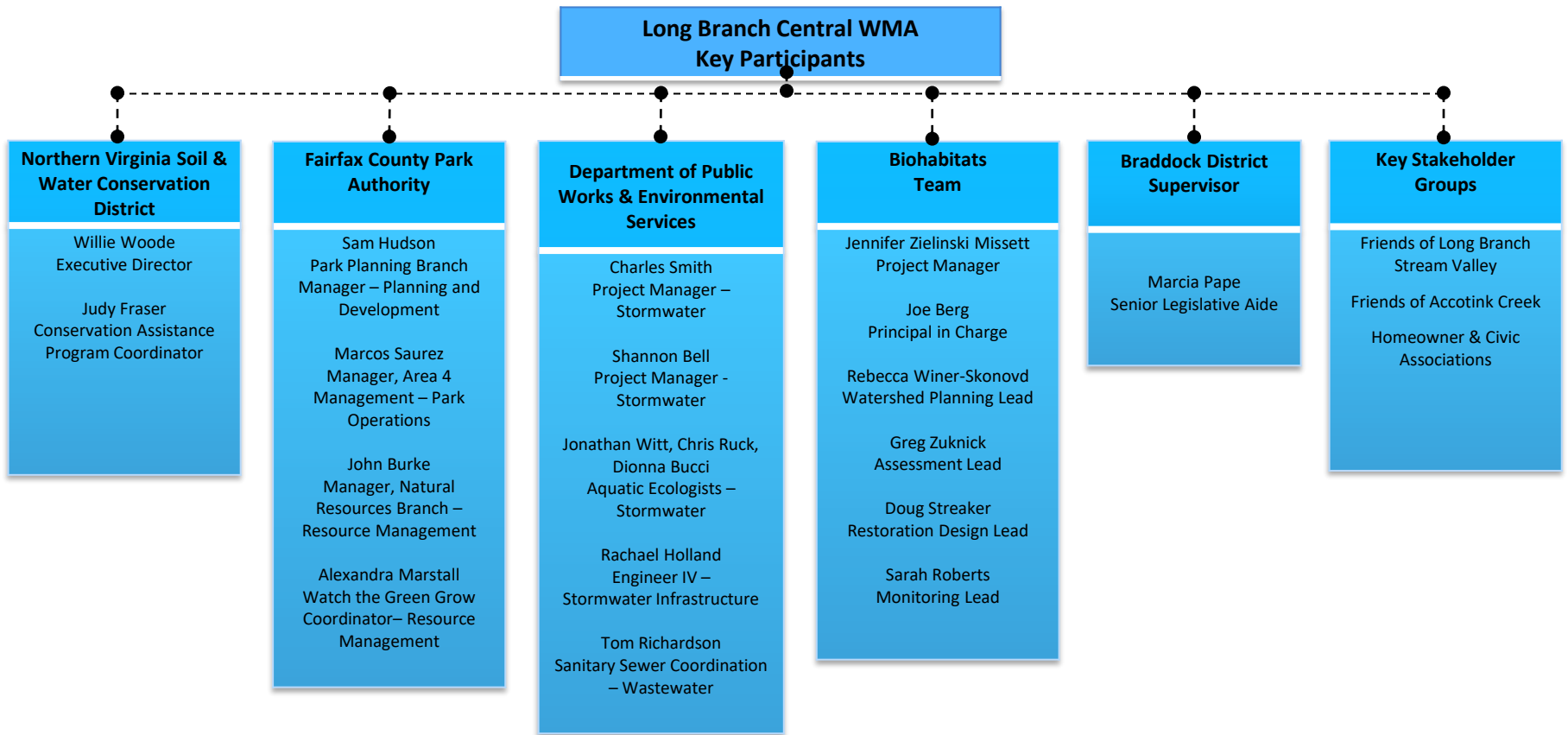
Who's Involved

- **County Agencies**
 - DPWES
 - FCPA
 - NVSWCD
 - FCPS
- **Design Consultant: Biohabitats, Inc.**
- **Braddock District Supervisor's Office**
- **Identified Stakeholder Groups:**
 - Friends of Long Branch Stream Valley
 - Friends of Accotink Creek
 - Earth Sangha
 - Stone Haven Civic Association
 - Canterbury Woods Civic Association
 - Red Fox Civic Association
 - Rutherford Civic Association
 - Olde Forge – Surrey Square Civic Association
 - Friends of Smokewood Park
- **Residents**

Eroded channel and exposed sewer line at Trapp Rd outfall.



Project Team



20 Proposed Restoration Projects

20 Proposed Projects

- Grouped by location
- Range from upstream to downstream
- Focused on outfalls and stream channels
- Include three (3) optional stormwater pond renovations
- Phased in over 8 years
- Each project will have a unique design team



Contact Information

Contact Information

Charles Smith

703-324-2467

charles.smith@fairfaxcounty.gov

Fairfax County Stormwater Planning Division

703-324-5500 TTY 711

12000 Government Center Parkway

Suite 449

Fairfax, Virginia 22035

www.fairfaxcounty.gov/dpwes/stormwater

To request this information in an alternate format call 703-324-5500, TTY 711

Equity-Based Restoration in the Urban Elizabeth River

Joe Rieger

Deputy Director - Restoration

April 13, 2023

Presentation to - 2023 Bay-Wide Stormwater Partners Retreat





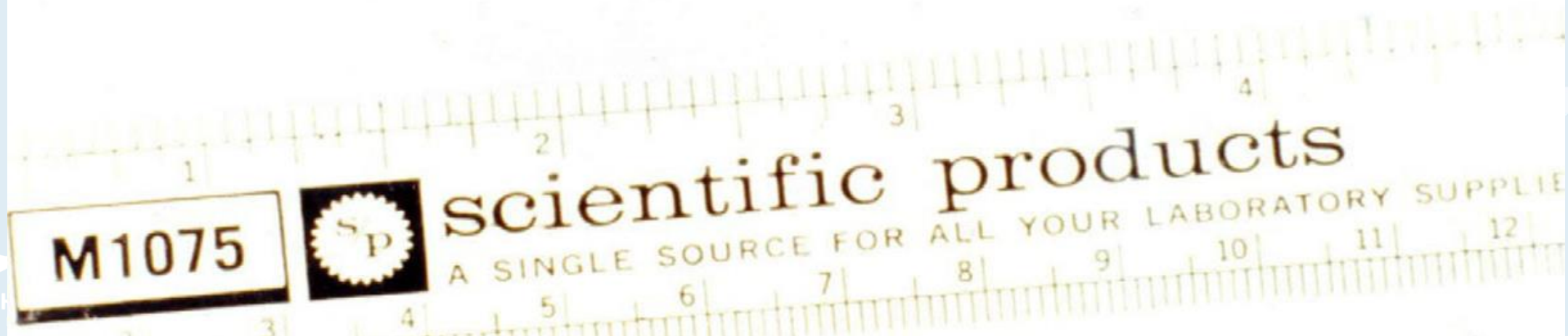
Elizabeth River Project Mission:

To restore the Elizabeth River through equitable collaboration with diverse communities, businesses and governments.



ELIZABETH RIVER
PROJECT

RIVER STAR HOMES



M1075



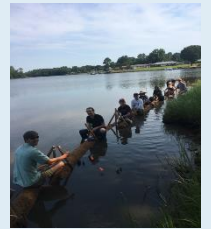
scientific products

A SINGLE SOURCE FOR ALL YOUR LABORATORY SUPPLIES



Collective Impact Model (Stanford Social Innovation Review)

- Common Agenda – Watershed Plan
- Shared Measurement Systems – State of the River
- Mutually Reinforcing Activities – One the ground projects carried out by stakeholders
- Continuous Communication – Stakeholders track progress and address concerns
- Backbone Support Organizations – Elizabeth River Project



Clean Up Of Money Point – One of the most contaminated sites in the Bay



Paradise Creek Nature Park –
Creek had 4 Superfund Sites, recent
sediment clean up project, and Park was a
Brownfield.



Community Planning & On-the-Ground Restoration

- Community planning “col-laboratories” with Wetlands Watch, UVA, and VA Tech: Plans in place when funding opportunities become available.
- Ohio Creek in Chesterfield Heights, Rain Gardens and Ditch Retrofits in Ingleside, and River Star Homes projects in Poplar Hall



Start of Elizabeth River Project and Norfolk State University Partnership

- The Howard Hughes Medical Institute - Inclusive Excellence grant program is focused on **Institutional Transformation** that leads to improved inclusion of under-represented people in STEM.
- The numbers:
 - Years: ~2018-2023
 - Amount: \$1M total
 - People: ~10 people on the team, from Biology, Chemistry and Math, plus others from outside CSET and in the administration
 - Students: currently 300+ undergraduate biology majors

Growing the Partnership

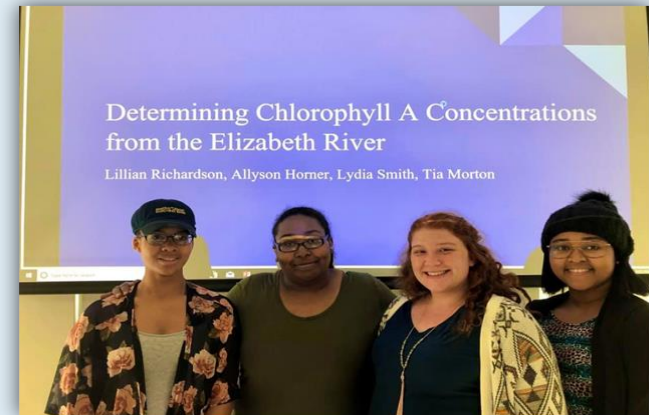
Funding from National Fish and Wildlife Foundation -
Five Star and Urban Waters Grant and Innovative Nutrient and Sediment Reduction



On-the-ground restoration



Summer internships



Research on the Elizabeth



Projects on campus



Community outreach



Chimney Swift Research

Growing the Partnership

Funding from National Fish and Wildlife Foundation -
Five Star and Urban Waters Grant and Innovative Nutrient and Sediment Reduction



Water Quality Monitoring



Microplastics in oysters



Impacts of contaminants on marshes

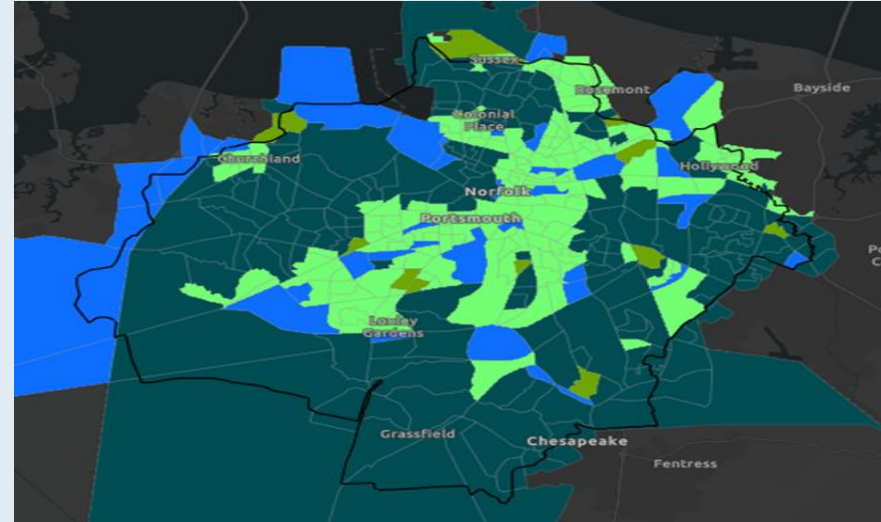


ELIZABETH RIVER
PROJECT

RIVER STAR HOMES

Environmental Justice and Equity- 5 Year Goals

- Utilize the Virginia Institute of Marine Science and Elizabeth River Project's Environmental Justice tool to focus efforts in under-resourced communities.
- Engage at least two frontline communities to address environmental justice issues.
- Develop replicable, bay-wide model for engaging underserved communities to take part in environmental restoration.



Elizabeth River Environmental Justice Mapping Tool

Elizabeth River Project Elizabeth River Environmental Justice Tool **VIMS** WILLIAM & MARY VIRGINIA INSTITUTE OF MARINE SCIENCE

Map Viewer Dashboards

Switch between the Mapper Viewer (this page) and Dashboards (page 2) by clicking on the large buttons above.

The Elizabeth River Environmental Justice map viewer contains a variety of layers that will help planners target vulnerable locations and populations within the Elizabeth River Watershed.

The map opens with the watershed boundary and the Low Income Demographic layer displayed. The Legend (on left) and the Layer List (right) are open by default. They can be collapsed or expanded by clicking on the double arrow buttons.

Many layers are available for exploration. Scroll down in the layer list to reveal other layers. Click the triangular arrow buttons to the left of the check boxes to expand group layers.

Please be patient. The map viewer is ready when the demographic layer is visible on the map. For best viewing, use the most recent version browser version.

- Information button will provide a brief description of data layer.
- Home button will return map to default extent.
- Ellipsis button in Layer List will reveal more actions (transparency changer, information button)
- Search button opens a text box for the entry of an address or place. The map will zoom to the location.

Explore the map by checking layers on/off, panning and zooming, and clicking the map to view more information within the layer popups.

Elizabeth River Watershed Boundary

Demographics

Percent Low Income

% Low Income: the percent of a census block group's population in households where the household income is less than or equal to twice the federal 'poverty level'.

- > 80%
- 61 - 80%

Layer List:

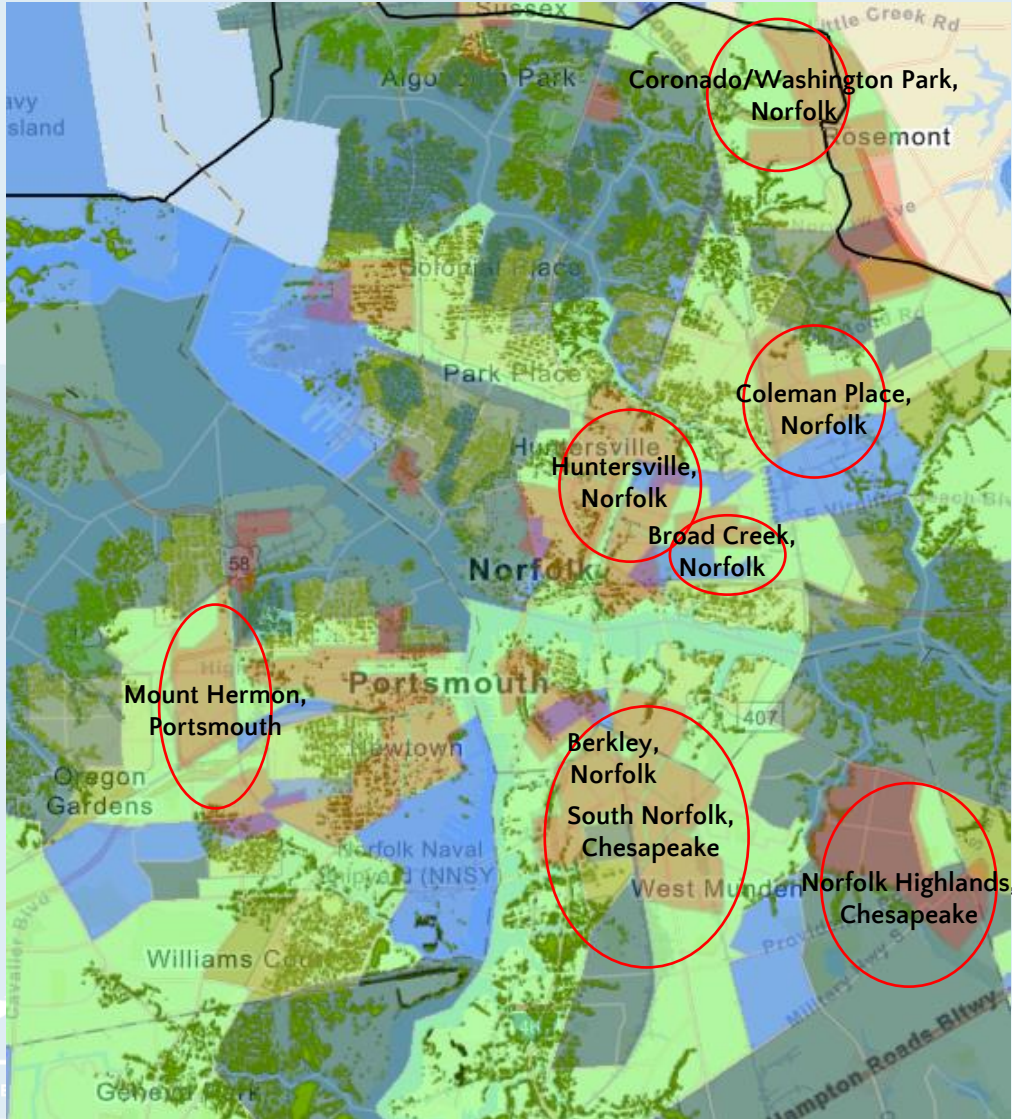
- Elizabeth River Watershed Boundary
- Infrastructure
- Public/Private Access and Existing Shoreline Protection
- Parcels
- Virginia Pollutant Discharge Elimination System (VPDES) Permit Outfalls



ELIZABETH RIVER PROJECT

RIVER STAR HOMES

Environmental Justice & Equity –



Combined Demographic & Environmental Vulnerability + Tree Canopy + Historic Redlining

- Mount Hermon, Portsmouth
- Berkley, Norfolk
- South Norfolk, Chesapeake
- Huntersville, Norfolk
- Broad Creek, Norfolk
- Norfolk Highlands, Chesapeake
- Coleman Place, Norfolk
- Coronado/Washington Park, Norfolk

Lessons Learned

- Continually work on building trust, without community trust you will not succeed. Best way to do this is to listen.
- Your stakeholders and partners are your most important asset in urban restoration, be inclusive and empower your stakeholders.
- Develop a community plan, you might think you know what the community wants or needs, but a plan developed by the community has a great likelihood of being implemented.
- Celebrate successes with the community, and also acknowledge and learn from mistakes.

Special Thanks To



Howard Hughes
Medical Institute



NFWF



Chesapeake Bay Program
Science. Restoration. Partnership.

Chesapeake Bay Stewardship Fund



COASTLINES AND PEOPLE

Joe Rieger

Deputy Director, Restoration

jrieger@elizabethriver.org

757-399-7487