



Financing Natural Infrastructure: The Elizabeth River Project, Chesapeake Bay, VA

By Ellis Kalaidjian, Margaret Kurth, Bari Greenfeld, and Matthew Smith

PURPOSE: Knowledge gaps surrounding natural infrastructure (NI) life cycles and performance thwart widespread implementation of NI in civil works projects. In particular, information about funding or financing the scoping, design, construction, monitoring, and adaptive management of NI projects constitutes a key need as there is no standard process for securing funds. This technical note is part of a series documenting successful examples of funding NI projects and sharing lessons learned about a variety of funding and financing methods to increase the implementation of NI projects. The research effort is a collaboration between the Engineering With Nature® (EWN®) and Systems Approach to Geomorphic Engineering (SAGE) programs of the US Army Corps of Engineers (USACE). This technical note explores how the Elizabeth River Project (ERP), a nonprofit organization based in Norfolk, Virginia, developed a homeowner cost-sharing program to fund NI projects—living shorelines, rain gardens, and riparian buffers—within an urban watershed.

BACKGROUND: The ERP brings together businesses, industry, government, and community members to restore and protect the Elizabeth River, a 40 km long tributary of the Chesapeake Bay in southeastern Virginia (Figure 1).¹ The river runs through four cities: Norfolk, Chesapeake, Portsmouth, and Virginia Beach. The 648 km² watershed of the Elizabeth River, a subwatershed within the larger James River watershed, is 90% developed, is home to 500,000 residents (ERP 2014), and hosts one of the world's busiest military bases and commercial ports, the Port of Virginia. As a result, the Elizabeth River has suffered an extensive history of negative impacts from habitat loss and pollution.

Over the twentieth century, portions of the river's sediments became contaminated with heavy metals, up to 100 times greater concentrations than natural background levels (Gillelan et al. 1983, 22), along with other pollutants like creosote and pentachlorophenol—discharged primarily from wood-treatment facilities. This contamination resulted in biological dead zones, cancer in various fish species, and impairments that diminished waterborne recreation (ERP 2020). A 1983 report from the Environmental Protection Agency (EPA) designated the Elizabeth River as one of the nation's most polluted waterways (Gillelan et al. 1983), and in 1993, the Chesapeake Bay Program Executive Council declared the river one of three regions of concern for known toxic problems (CBP-TS 1994).

1. For a full list of the spelled-out forms of the units of measure used in this document, please refer to *US Government Publishing Office Style Manual*, 31st ed. (Washington, DC: US Government Publishing Office, 2016), 248–52, <https://www.govinfo.gov/content/pkg/GPO-STYLEMANUAL-2016/pdf/GPO-STYLEMANUAL-2016.pdf>.

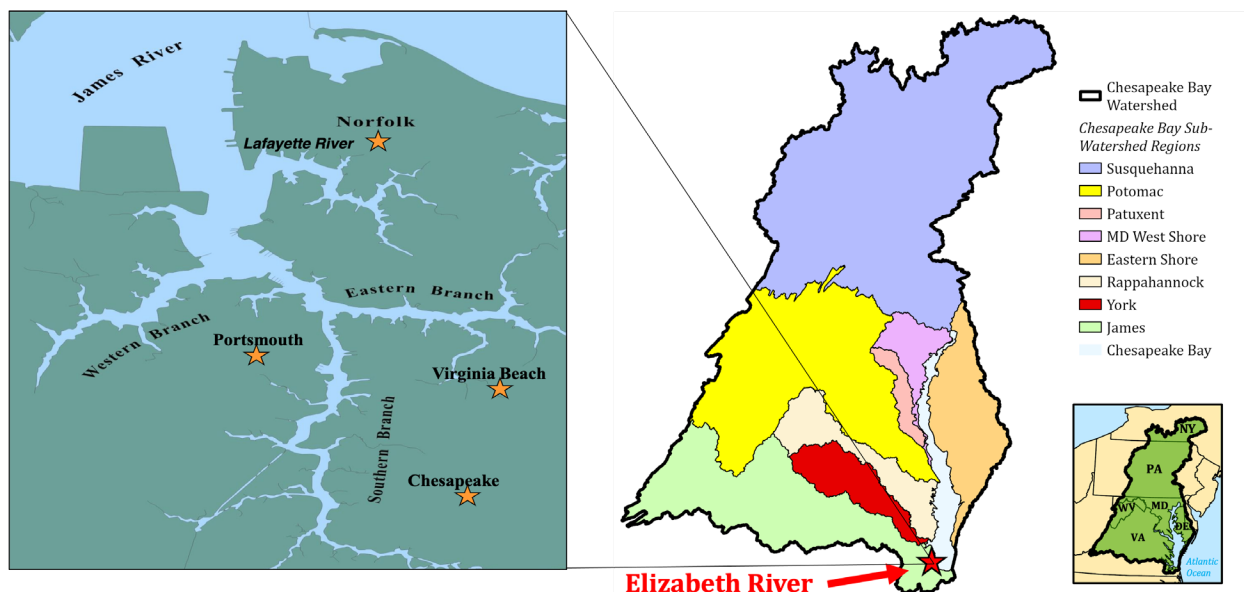


Figure 1. Location of the Elizabeth River within the James River and Chesapeake Bay Watersheds.

After witnessing water-quality and habitat degradation in the Elizabeth, four Hampton Roads community members established the ERP in 1993 to restore the heavily urbanized river. Since its inception, the nonprofit has grown its staff to 25 members and manages an annual budget of \$1–\$2 million, allowing it to pursue ambitious restoration goals. Encouraging and implementing NI projects is central to ERP’s mission of restoring the Elizabeth River (ERP 2023b). The nonprofit oversees a portfolio of work that supports NI projects in various landscape settings and at various scales. For example, its River Stars program targets nutrient and sediment reduction by helping homeowners, schools, and businesses install NI on their properties. ERP has also completed several large-scale NI projects, including living shorelines with the Norfolk Southern Corporation and the City of Norfolk, oyster-reef restoration with the Hampton Roads Sanitation District, and stormwater wetlands with the Port of Virginia and BAE Systems, an aerospace company. ERP’s NI-related work also includes education. Two educational facilities incorporate and promote NI: (1) a nearly 162,000 m² nature park with a restored wetland, where the city of Portsmouth administers programming for underresourced neighborhoods and schools; and (2) a 41 m, solar-powered, steel-deck *learning barge* with living shorelines onboard the vessel. Additionally, ERP participates in the Living Shoreline Collaborative, a group of regional and state partners from academia, government, industry, and nonprofit organizations working together to scale up the installation of living shorelines in the James River watershed (in which the Elizabeth River is located). The River Stars program is featured in this technical note as a model of innovative funding for NI.²

THE RIVER STARS PROGRAM: The River Stars program was developed to reduce non-point-source pollution, which accounts for 80% of pollutants entering the Elizabeth River (ERP 1998). It encourages businesses, schools, and homeowners to take pollution-reducing actions and provides participants with resources (educational and material) to achieve measurable pollution-

2. Readers are also encouraged to learn more about the Living River Restoration Trust—an in lieu fee-mitigation fund established by ERP in 2004 to mobilize funds towards sediment remediation—as it represents another innovative financing mechanism leveraged by the ERP.

prevention goals they set for themselves (ERP 2014). Currently, there are over 6,300 homeowners who participate in the River Star Home program. Participation is free and only requires homeowners to commit to seven best management practices (BMPs), including picking up after dogs; reducing lawn fertilizers; and preventing grease, medication, and other pollutants from entering their sewer systems. ERP rewards participants who implement BMPs with recognition on ERP's communications platforms and in annual events. Importantly, in addition to behavioral BMPs, financial incentives in the form of cost-sharing are offered to property owners to implement NI-based BMPs such as vegetated buffers; rain barrels; infiltration projects (that is, rain gardens); native tree planting; and living shorelines (Figure 2) (ERP 2021).



Figure 2. *Left*, Joe Rieger of the Elizabeth River Project (ERP) helps construct a residential living shoreline made from salt-marsh grass and oyster castles; *right*, River Star Home participant Harry Shock stands proud in his new riparian-buffer and living-shoreline restoration project at his Virginia Beach home on the Elizabeth River (photos reproduced with permission from ERP).

ERP develops projects implemented through the River Stars program using extensive stakeholder-engagement efforts. First, ERP identifies priority areas for NI-based restoration through the *collective impact* process (Kania and Kramer 2011), a stakeholder-engagement approach taught to ERP by the EPA. The collective impact approach involves five conditions: (1) all participants have a shared vision for change and (2) a shared system for measuring and reporting progress; (3) participants undertake mutually reinforcing activities to achieve change; (4) participants maintain constant communication to facilitate cohesion and trust; and (5) a separate backbone organization is designated to coordinate the entire initiative and facilitate collaboration (Kania and Kramer 2011, 36–40).

Using these principles, ERP collaborates with an advisory board of diverse stakeholders—including industry leaders, scientists, government officials, military officers, engaged citizens, and environmental activists—to draft the organization's strategic goals and track progress. The nonprofit develops its *Watershed Action Plan*³ every six years, informed by the triennial *State of*

3. The most recent watershed action plan can be found at the following link: <https://elizabethriver.org/wp-content/uploads/2022/05/ERP-WAP-2022.pdf>.

the River report.⁴ The Watershed Action Plan is developed around six critical elements: (1) outreach and education, (2) sediment remediation, (3) water quality, (4) habitat quality (5) sea-level rise, and (6) environmental justice and equity. Each element is addressed by a subcommittee, which identifies priority issues, potential solutions, and stakeholders to champion those solutions. Using the priority properties identified in the plan, which are selected using environmental and social factors (level of flood risk, socioeconomic status), ERP recruit homeowners and businesses into the River Stars program. Prospective participants also approach the ERP directly for guidance, often after discovering ERP's assistance programs through other community members; wetlands board members (citizens appointed by local governance to serve as the regulatory authority for the Virginia tidal wetlands law); and social marketing. Property owners sign an agreement to participate, and then ERP works with them to implement habitat-restoration and pollution-prevention projects at their home or work.

Collectively, this approach allows ERP to enact NI-based restoration efforts in a manner informed by the latest science and a comprehensive range of stakeholder expertise. Thorough stakeholder engagement also ensures community buy-in, often leading to more funding opportunities, both grant- and giftwise, as funders seek prospective awardees who involve their community, follow a strategic approach, and demonstrate that their communities support the project or other effort being funded.

FUNDING NATURAL INFRASTRUCTURE (NI) THROUGH THE RIVER STARS PROGRAM: Conventional funding sources such as federal grants helped initiate the River Stars program and continue to play a role in the NI projects it funds. However, as River Stars expanded, ERP cultivated more unique funding arrangements using municipal- and state-level support (Figure 3). Initial funding for the River Stars program, starting with businesses, came from an EPA grant under the Environmental Justice Through Pollution Prevention program, with matching funds from public and private sources (ERP 1998). In 2009 the program was expanded to schools and homeowners with funds from the Hampton Roads Sanitation District and a National Fish and Wildlife Foundation (NFWF) grant (Joe Rieger of ERP, pers. comm., 2022).

Enabling project cost-sharing for homeowners through local partnerships. Over time, the River Star Homes cost-sharing program became more financially self-sufficient because of partnerships with cities to help meet their state and federally mandated water-quality obligations. These partnerships leverage both ERP's experience enlisting participation of watershed stakeholders and its position as a trustworthy bridge between stakeholders and government. Cities provide funds to ERP's cost-sharing program and in return claim credits for projects that achieve nutrient and sediment reductions on private property. The City of Norfolk was the first to partner with ERP in 2014, resulting in a five-year contract to provide \$100,000 annually. In recent years, ERP's contract with Norfolk provides enough cost sharing for one River Stars Businesses project annually. A similar agreement was made in 2015 with the City of Chesapeake for \$100,000 annually. Soon after, in 2017, the City of Virginia Beach signed a five-year contract for \$110,000 annually. This contract set goals focused on education and outreach and expanded the geography of smaller restoration practices to any property in the watershed (rather than solely waterfront homes). Capital received from the cities has significantly reduced

4. The most recent State of the River report can be found at the following link: <https://elizabethriver.org/wp-content/uploads/2022/05/ERP-State-of-the-River-2020.pdf>.

the ERP's financial dependence on federal grant money, offering a more sustainable NI-financing mechanism.

Through the River Star Homes program, capital obtained from the cities is used to cost share 50% of a NI project up to a certain limit, which is set according to the project type. For example, rain gardens are cost shared 50% up to \$2,000 and living shorelines 50% up to \$5,000. For all BMP implementations, ERP helps homeowners through the design, permitting, and construction processes. In return, community members of the Elizabeth River watershed build coastal resilience and improve water and habitat quality. There are currently over 1,400 BMPs implemented on 1,000 River Star Homes properties (many properties have multiple projects installed). In 2021 the River Star Homes program reduced sediment pollution by 49,442 kg, nitrogen by 36 kg, and phosphorous by 11 kg (ERP 2023a). By leveraging the homeowner cost-sharing program, ERP has successfully incentivized NI-based pollutant reductions on private properties—which represent most of the Elizabeth River Watershed (and greater Chesapeake Bay in which it is situated)—adding benefit to state and federal nutrient reduction programs that often target pollutant inputs from public lands.

Elizabeth River watershed cities are interested in funding the cost-sharing program because projects generate credit that can be used to meet their Chesapeake Bay total maximum daily load (TMDL) targets for nitrogen, phosphorous, and sediment. TMDLs are set according to the quantity of pollutants that can enter a waterbody without impairing it (EPA 2022), and each jurisdiction within the Chesapeake Bay has developed watershed implementation plans for how they will meet the TMDL. The required pollution reductions set forth in Virginia's watershed implementation plan serve as the limits for discharges of nitrogen and phosphorus as part of the municipal separate storm sewer system (MS4) permits issued to localities by the Virginia Department of Environmental Quality. In effect, the cities contract ERP to reduce a given level of nutrients and sediments; the cities pay ERP to implement BMPs on private property; ERP drafts an annual report for each city with the quantity of BMPs completed, their location and size, and their pollution-reduction value; and then the cities can take the associated nutrient reduction credit (summarized in Figure 4).



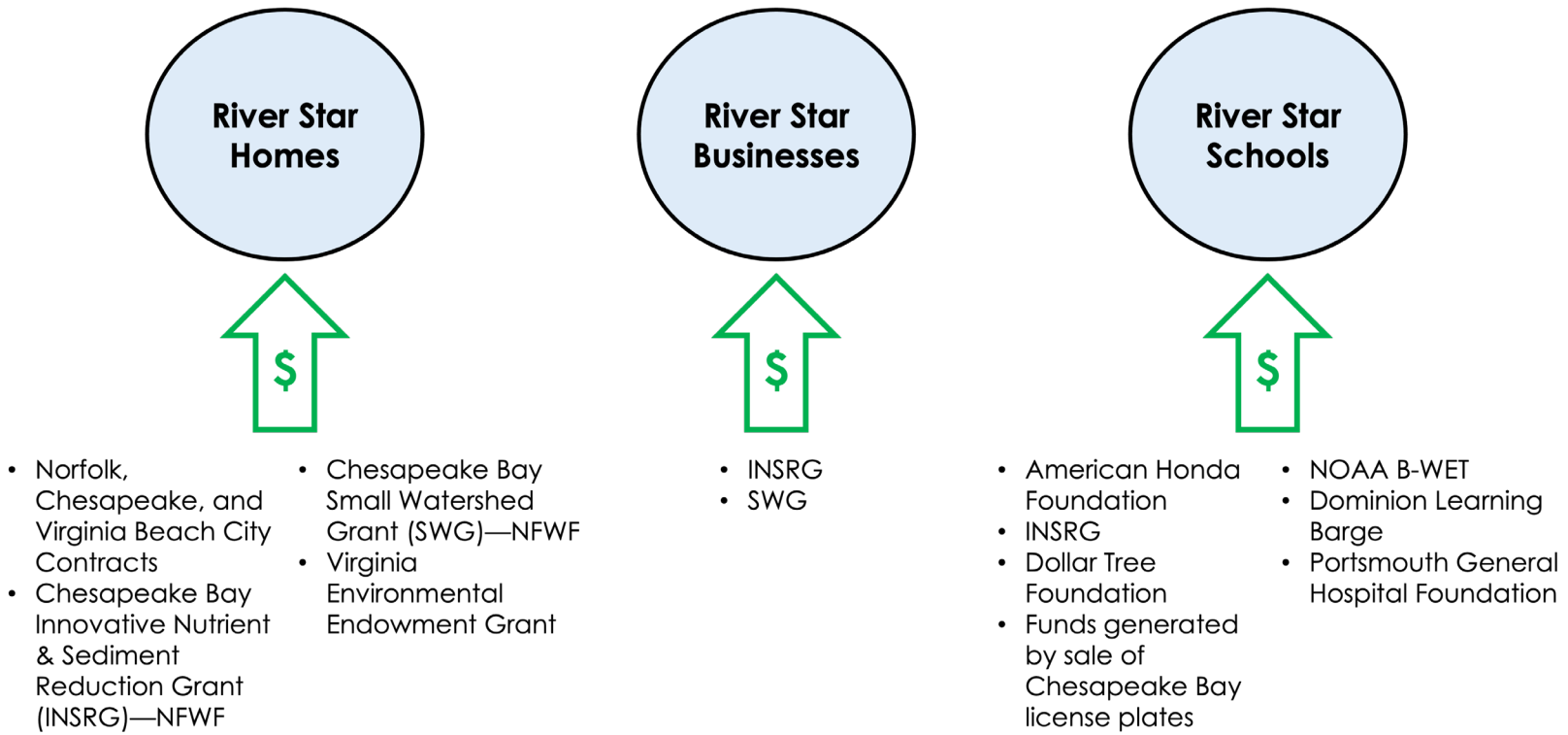


Figure 3. Funding sources of the River Stars program branches (from ERP 2014; NFWF—National Fish and Wildlife Foundation; B-WET—Bay Watershed Education and Training). (Accessible version available in Appendix A.)

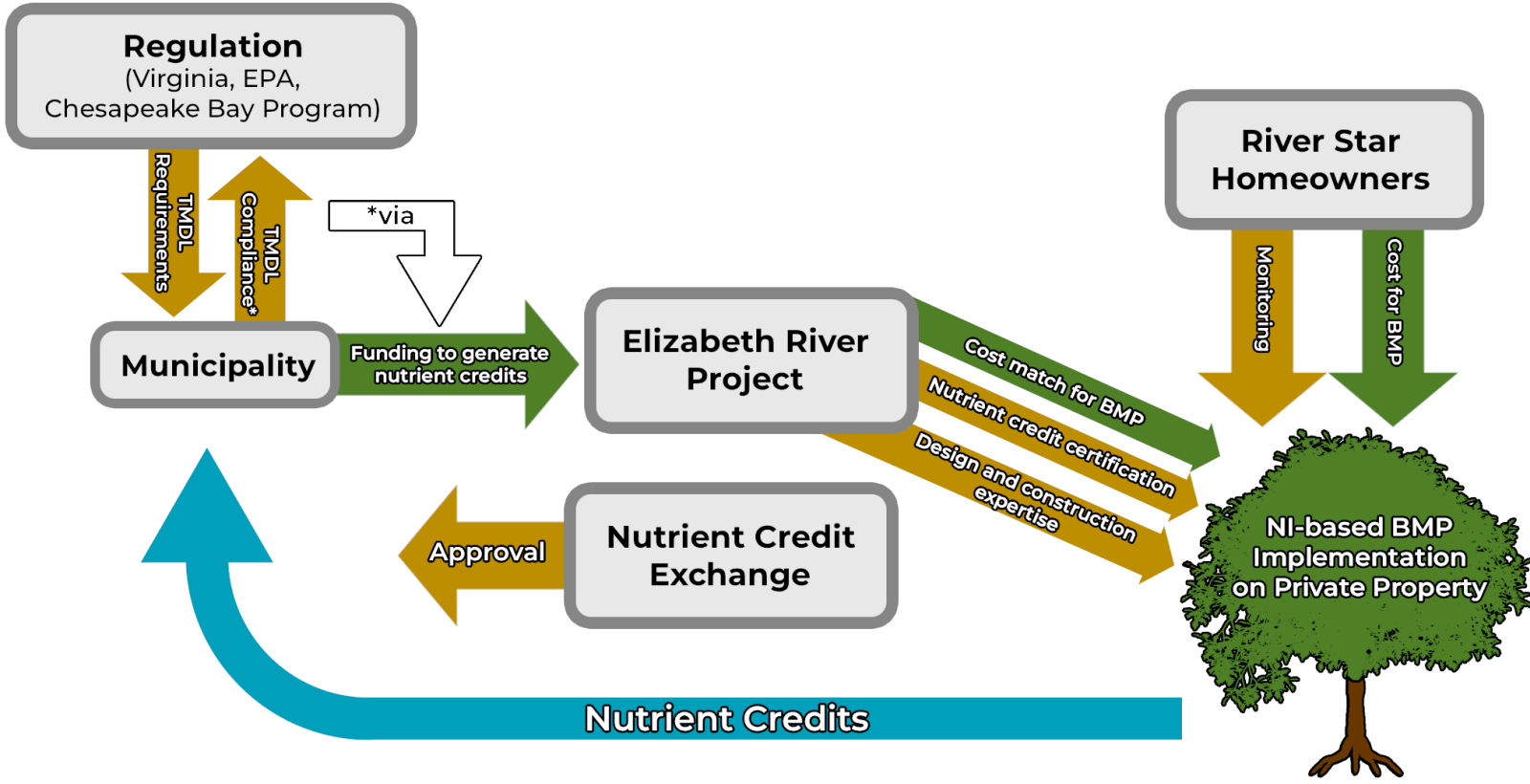


Figure 4. The ERP and cities comply with environmental regulations via the implementation of natural infrastructure (NI) best management practices (BMPs) and, in doing so, generate nutrient credits for the cities that they can use to offset their allocated nutrient loadings (TMDL—total maximum daily load). *Brown arrows* indicate regulation-satisfying exchanges. *Green arrows* indicate monetary exchanges. (Accessible version available in Appendix A.)

Funding the monitoring and maintenance of River Stars Homes best management practices (BMPs). Funding the postconstruction phases of monitoring and adaptive management is often cited as the most challenging process within NI project life cycles, and so ERP's funding networks inclusion of monitoring represents another BMP. For private property installations intending to reduce nutrient and sediment loads, the ERP created reverification protocols to systematically evaluate projects every three to five years and ensure their pollutant-reduction functionality will continue. The Chesapeake Bay TMDL BMPs require verification monitoring for the load-reduction credits to remain on the ledger—a critical driver of the cities' interest in verification and monitoring. At the time of installation, the homeowner signs a maintenance agreement noting the life span of the project, requirements for maintenance by the homeowner, and requirements for reverification (ERP 2021). During the winter and spring months, ERP staff review the River Star Homes project database to determine which residential NI installations are due for reverification in the coming year. Staff prepare for upcoming site evaluations by creating and distributing project-evaluation surveys to homeowners that ask homeowners about the physical status of their NI installations and their perceptions of project success or failure. Then, during annual site evaluations made in the summer, ERP staff assess the efficacy of a given NI installation by evaluating, for example, the degree of plant mortality, presence of invasive species, severity of active erosion, and signs of neglect, while referencing original project designs and photos, project drawings, or plant lists and quantities to help guide their evaluations (ERP 2021). The localities provide funding through city contracts for regular ERP staff monitoring of BMPs, and the creation of the reverification protocols, surveys, and materials was funded by a Chesapeake Bay Small Watershed Grant in 2019. ERP's larger NI projects, such as those built for waterfront shipping businesses and sediment remediation, also receive monitoring and maintenance on a project-by-project basis. For these projects, the ERP often outsources functional modeling work and contaminant monitoring to academic institutions, such as the Virginia Institute of Marine Science (VIMS) or outside consultants, while the ERP conducts visual monitoring.

LESSONS LEARNED—ENABLING FACTORS: The ERP story highlights several factors that strongly contributed to its success in financing NI projects and expanding their implementation throughout the Elizabeth River watershed. These factors include legislation passed by Virginia to tackle issues related to climate change and coastal hazards, the ERP's relationship-building efforts, and the capacities of its staff to secure funding for NI projects.

State-level policy incentives. Over the last several years, the Commonwealth of Virginia has passed enabling legislation addressing sea-level rise adaptation and coastal resilience, which, in turn, has helped the ERP secure funding for NI projects and sustain innovative NI financing programs like the River Star Homes program. In 2021 the Virginia Marine Resources Commission (VMRC) passed new wetlands guidelines to support 2020 legislation mandating the VMRC permit “only living-shoreline approaches to shoreline management unless the best available science shows that such approaches are not suitable”⁵ (VMRC 2021). Because of these new codes, Virginia homeowners are no longer allowed to install hardened structures for erosion control, such as bulkheads or revetments. This regulation has redirected homeowner attention towards soft

5. Living shorelines; development of general permit; guidance. Va. Code § 28.2-104.1.D (2022). <https://law.lis.virginia.gov/pdf/vacode/28.2-104.1/>.

measures such as living shorelines, which are one of the NI BMPs in the River Star Homes program. Additionally, funds acquired through Virginia’s former participation in the Regional Greenhouse Gas Initiative (RGGI),⁶ a regional market-based program that tackles carbon pollution generated by power production, were allocated to a community flood-preparedness fund. This fund assisted communities and local governments affected by recurrent flooding and sea-level rise through, in part, the installation of NI projects such as living shorelines.

Building relationships. The ERP’s NI-financing story also underscores the importance of stakeholder relationship building to open new funding opportunities, because projects (particularly those at the federal level) often receive funding only when project leads have engaged all necessary partners. The case of ERP’s residential wetland-restoration work throughout the watershed showcases the significance of this enabling factor. The ERP’s River Star Homes program provides free expertise for restoring eroding wetlands, vegetating riparian buffers, and creating oyster-reef habitat. In 2019 the ERP began training another Virginia nonprofit, the James River Association (JRA), to assess shorelines, design and permit living shorelines, estimate costs, and manage installation of projects. Over the last three years, the organizations have collaborated closely and built a sustained partnership focusing on restoring wetlands in the Elizabeth River.

At residential sites like the Miller residence on the Lafayette River (a tributary to the Elizabeth River), the ERP and JRA worked together to design and permit the project and partnered with a local contractor to install the project. This collaborative partnership provided JRA an opportunity to see how the ERP coordinates with contractors and takes the initiative when leading their own living-shoreline projects. Collaborations like this one allow ERP’s staff to share knowledge and forge broader partnerships that improve water quality in the Elizabeth River.

Partnerships with Elizabeth River watershed cities, regional government bodies (for example, Hampton Roads Sanitation District and Hampton Roads Planning District Commission) and other nonprofits (for example, the Living Shoreline Collaborative) have allowed the ERP to diversify its capital flows for NI and expand the reach of its NI efforts. The ERP’s contracts with Virginia Beach, Norfolk, and Chesapeake materialized because they built rapport and trust with the cities’ staff. Further, the ongoing partnership with the Living Shoreline Collaborative has allowed the ERP to apply for and secure grants in collaboration with partner organizations of the collaborative to augment the cost-sharing program. Last, relationship building has also proven essential to obtaining the multifaceted expertise required during NI project development, installation, and adaptive management—as shown by VIMS’s monitoring of NI projects.

LESSONS LEARNED—BARRIERS: The ERP has also encountered barriers that complicated the process of executing NI projects. While the cost-sharing program has led to the implementation of more NI projects, some homeowners remain priced out by certain BMP costs (which, for smaller BMPs like rain gardens often start at \$6,000 and for living shorelines up to \$50,000 depending on size, materials used, etc.). The federal permitting requirements for NI installations hamper the ERP’s NI-based restoration initiatives (J. Rieger, pers. comm., 2022).

The time line for securing the required local, state, and federal permits poses a challenge for the ERP. The permitting process can take longer than other components of River Star Homes projects,

6. Virginia withdrew from the RGGI in December 2021.



thereby delaying implementation. The total time required to finalize a project can be unattractive to otherwise interested homeowners, and when projects are delayed by permitting, the ERP often cannot maintain homeowner commitment. The ERP reports that this challenge applies largely to riverine-based NI (for example, riparian buffers) and less so to living shorelines, as most of the coastline where living shorelines are suitable is not along river reaches with navigational-servitude issues. Additional requirements exist for projects near federal navigation channels, as described in USACE Engineering Circular 1165-2-220 (USACE 2018). Existing hindrances and inefficiencies in acquiring permits for NI are well known, and the White House Council on Environmental Quality report on scaling up nature-based solutions included recommendations to accelerate federal permitting and reviews (CEQ et al. 2022, 19–20). Project-by-project or individual project reviews are burdensome, unsupported by staff capacity, and lack effective interagency coordination (CEQ et al. 2022, 15–16).

NEXT STEPS: In their recently published 2022 watershed action plan, the ERP highlighted several action items, one of which is incorporating environmental justice and equity approaches into all of ERP’s work. In partnership with Norfolk State University, the ERP will develop on-the-ground actions such as expanding the River Star Homes program to include a renters’ program to expand restoration opportunities and community engagement in underresourced neighborhoods and implement BMPs more equitably within the Elizabeth River watershed. The ERP will also use the Elizabeth River Environmental Justice Mapping Tool, a multilayered, online map recently developed in collaboration with VIMS, to target its priority areas. Additionally, the ERP has set more ambitious goals (for example, for sea-level-rise adaptation and climate-change mitigation) along with continued restoration of the Elizabeth River.

ADDITIONAL INFORMATION: The project team engaged with Mr. Joe Rieger, the ERP’s current deputy director of restoration, starting in December 2021 to collect the information within this technical note. This technical note summarizes the information Deputy Director Rieger provided, incorporates his comments on draft versions, and is supplemented by additional background research. Feedback on drafts of this technical note was also provided by Ms. Barbara Gavin, the River Star Homes program manager (bgavin@elizabethriver.org); Ms. Pamela Boatwright, the River Star Business program manager (pboatwright@elizabethriver.org); and Ms. Robin Dunbar, the ERP’s deputy director of education (rdunbar@elizabethriver.org). External feedback was also provided by Ms. Pamela Mason of VIMS.

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APPENDIX A: PLAINTEXT VERSIONS OF FIGURES 3 AND 4

Figure 3.

- River Star Homes
 - Norfolk, Chesapeake, and Virginia Beach City Contracts
 - Chesapeake Bay Innovative Nutrient & Sediment Reduction Grant (CBINSRG) – NFWF
 - Chesapeake Bay Small Watershed Grant – NFWF
 - Virginia Environmental Endowment Grant
- River Star Businesses
 - Chesapeake Bay Innovative Nutrient & Sediment Reduction Grant
 - Chesapeake Bay Small Watershed Grant
- River Star Schools
 - American Honda Foundation
 - Chesapeake Bay Innovative Nutrient & Sediment Reduction Grant
 - Dollar Tree Foundation
 - Funds generated by sale of Chesapeake Bay license plates
 - Bay Watershed & Education Training Program – NOAA
 - Dominion Learning Barge
 - Portsmouth General Hospital Foundation

Figure 4. *Note:* Text in square brackets is not in original figure. It has been added to the plaintext version for clarity.

- Regulation (Virginia, EPA, Chesapeake Bay Program) [two exchanges]
 - [Brown arrow to Municipality] TMDL Requirements
 - [Brown arrow from Municipality] TMDL Compliance*
 - * [White arrow to Funding to Generate Nutrient Credits] *via
- Municipality [five exchanges]
 - [Brown arrow from Regulation] TMDL Requirements
 - [Brown arrow to Regulation] TMDL Compliance*
 - * [White arrow to Funding to Generate Nutrient Credits] *via
 - [Green arrow to Elizabeth River Project] Funding to Generate Credits
 - * [White arrow from TMDL Compliance*] *via
 - [Brown arrow from Nutrient Credit Exchange] Approval
 - [Blue arrow from NI-based BMP Implementation on Private Property] Nutrient Credits
- Elizabeth River Project [four exchanges]
 - [Green arrow from Municipality] Funding to Generate Credits
 - [Green arrow to NI-based BMP Implementation on Private Property] Cost match for BMP
 - [Brown arrow to NI-based BMP Implementation on Private Property] Nutrient Credit Certification
 - [Brown arrow to NI-based BMP Implementation on Private Property] Design and Construction Expertise
- River Star Homeowners [two exchanges]
 - [Green arrow to NI-based BMP Implementation on Private Property] Cost for BMP
 - [Brown arrow to NI-based BMP Implementation on Private Property] Monitoring



- NI-based BMP Implementation on Private Property [six exchanges]
 - [Green arrow from Elizabeth River Project] Cost match for BMP
 - [Brown arrow from Elizabeth River Project] Nutrient Credit Certification
 - [Brown arrow from Elizabeth River Project] Design and Construction Expertise
 - [Green arrow from River Star Homeowners] Cost for BMP
 - [Brown arrow from River Star Homeowners] Monitoring
 - [Blue arrow to Municipality] Nutrient Credits
- Nutrient Credit Exchange [one exchange]
 - [Brown arrow to Municipality] Approval

APPENDIX B: ABOUT THE NI FINANCING CASE STUDY SERIES

This research effort is a collaboration between the Engineering With Nature® (EWN) and Systems Approach to Geomorphic Engineering (SAGE) initiatives, undertaken in response to an identified information gap about how to secure the funds necessary to scope, design, construct, monitor, and adaptively manage natural infrastructure (NI).

The project development team identified initial case studies through team members' professional networks. Requisite criteria are that the projects include NI features, have progressed at least partially through construction, and have a knowledgeable point of contact willing to communicate relevant details about the project and financing process. For the purpose of this effort, *NI* is defined as an area or system that is naturally occurring, naturalized, or constructed to mimic naturally occurring features and then intentionally managed to enhance ecosystem value and provide social and economic benefits (Ozment et al. 2015; Roy 2018). Examples include river floodplains, setback levees, forested-water-supply watersheds, freshwater and coastal wetlands, living shorelines, dune and beach systems, living breakwaters, and reefs. NI are dynamic, with landscape-level interactions occurring among different features as well as in tandem with conventional infrastructure (Sharifi 2021).

For each case study, a semistructured interview of the project's point of contact was conducted to obtain pertinent information about the project, with emphasis on the process for securing funding for each stage. The project team developed a questionnaire to elicit information about a project's time line, funding sources, and how they were obtained and the barriers and enablers of successful financing. The standardized questionnaire will facilitate consistent collection of pertinent information and potentially independent authorship of case studies for inclusion in the evidence base for NI.

The library of case studies will increase as additional projects are identified by the EWN and SAGE team, or are nominated by the network surrounding the project, or by NI practitioners themselves. Practitioners can nominate projects by contacting the project leads Bari Greenfeld (bari.n.greenfeld@usace.army.mil) and Margaret Kurth (margaret.h.kurth@usace.army.mil). The project intends to showcase a diversity of project types and funding or financing mechanisms.

The EWN Initiative is developing the science and practice of intentionally aligning natural and engineering processes to efficiently and sustainably deliver economic, environmental, and social benefits through collaborative processes. The EWN Initiative is led by ERDC and brings together

a growing international community of practitioners, scientists, engineers, and researchers from a wide range of disciplines to understand how best to harness the power of nature to innovate, solve problems, and create sustainable solutions. More information can be found at www.engineeringwithnature.org.

The SAGE Community of Practice advances coastal community, ecosystem, and shoreline resilience by promoting a spectrum of green (natural and nature-based) and gray (structural) techniques. Organizations across many different sectors are investing in the research, development, and implementation of NI solutions. The SAGE Community of Practice improves coordination among these entities and provides a forum to share information and collaborate on innovative projects. Through SAGE, the USACE Institute for Water Resources (IWR) engages with a diverse suite of multidisciplinary partners including federal and state agencies, nongovernmental organizations, Tribal governments and Indigenous nations, academic institutions, and the private sector. More information can be found at <https://www.iwr.usace.army.mil/SAGE/>.



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