**Planning and Planting for Climate Resilience: 48,000 Plants and Trees Take Root**

Topic Area(s)

Green/blue space and biodiversity;Community/public engagement;Public health, health equity or prevention;Green Infrastructure;

Please specify your project approach

Both adaptation and mitigation

Key message / aim

**During a four-year collaborative project, MHH massively reduced stormwater runoff, dramatically transformed an urban waterfront edge with conservation landscaping, significantly increased the urban tree canopy, and engaged the community on the important links between environmental and public health—all in a historically marginalized, highly visible and highly utilized area of Baltimore.**

**The project converted five of seventeen acres of impervious surface – sidewalks, parking lots, and highly compacted soils – to pervious surface – bioswales, bioretention areas, and rain gardens. MHH planted five rain gardens, four micro-bioretention practices, three bioretention areas, and two bioswales, with plants, almost all of which are native.**

What was the problem?

MedStar Harbor Hospital sits on the banks of the Middle Branch section of the Patapsco River, a tributary to the Chesapeake Bay. The campus covers 25 acres, of which 17 acres were impervious. About 20 million gallons of stormwater runoff each year with a stormwater fee to Baltimore City of $43,000. Regular flooding and standing water occurred during extreme rain events.

Additionally, MHH is part of the Cherry Hill neighborhood, one of the most historic African American neighborhoods in United States. There has been a long history of public neglect in specific areas of Cherry Hill. The neighborhood is cut off from the city due to interstates, like Route 95.

MHH is on the Gwynns Falls Trail of the Middle Branch, allowing folks to walk, bike and run. However, with low tree cover on hospital grounds, MHH is subject to urban heat island effect.

Previously, the hospital had no stormwater management facilities and championed the project as a voluntary effort to help restore local water quality. The installation of 48,000 plants and trees on prevents five million gallons of stormwater runoff, along with the pollution contained therein, from flowing off the MHH property directly into the Patapsco River.

What was the solution?

MHH Director of Clinical Engineering oversaw the project. He was supported by several local small businesses and non-profit organizations in the four-step process:

1. The team wrote a proposal and was funded from the Chesapeake Bay Trust to create a Green Infrastructure Master Plan. The team attained executive leadership buy in; conducted a campus assessment using surveys, value-based assessment, and a site tour; identified and then selected the best options using environmental, economic, and social benefits criteria, rating and ranking; created a GI Master Plan with list of projects along with costs related to design, construction, operations & maintenance, and the estimated impervious surface fee reduction; and created signage to promote health and wellness benefits of GI on campus.
2. The team wrote another grant and was awarded monies from the Chesapeake bay Trust to create 100% engineering designs.
3. The team applied for and was awarded $1.3 million grant from Maryland Department of Natural Resources to implement the project with included planting five rain gardens, four micro-bioretention practices, three bioretention areas, and two bioswales, with plants, almost all of which are native.
4. The hospital took on the maintenance element of this project which is a significant undertaking.

What were the challenges?

There were several unexpected issues and costs. First, during construction, while a predominance of the bioretention areas worked as designed and implemented, there was one pond that was highly compacted and needed remediation. The engineers redesigned the substrate and added more sand. The area now drains properly, within 24 hours of a major rain event.

Second, a piece of the MHH property used to be a Ford dealership. During excavation, the team unearthed underground an in tact storage tank under one of the parking lots and had to work with the Maryland Department of the Environment to remove and dispose of the tank, at a cost of $90,000. Additionally, the contractors hit a water line that Miss Utility missed – another unexpected expense in time and money. The next unexpected construction cost was that of a retaining wall so that is was more aesthetically pleasing and matched the current infrastructure. MHH found a quarry to match stone at a cost of $22,000.

Finally, while ongoing maintenance costs were identified for monthly weeding, annual mulching, and the clean out or curb cutouts that collect sediment, the ongoing annual cost is more than expected, about $30,000/year.

What helped the intervention implementation/success?

Every project needs champions. From the beginning of the project, executive buy-in was critical. At the onset, Jill Johnson, then Vice President of Operations immediately and completely understood the importance of the connection between green infrastructure, health, and the environment. Brian Gray, Director of Clinical Support Operations and Chair of the hospital Green Team oversaw the implementation of this project. His passion and commitment to the project was astounding.

The project team provided education for Green Team members to ensure they were knowledgeable and well-spoken on the importance of this multifacted project. MHH partnered with robust community partners to conceptualize, design, and implement the project. MHH created and installed educational signage across campus. This allowed for employees and community members to understand the significance and importance of the project. Each sign has different topic including: pollinators, rain gardens, climate resilience, tree cover, history, healing gardens, and the removal of impervious surfaces.

What were the results/Impact?

Patient outcomes:

The most important aspects of green infrastructure for a healthcare facility is the positive impact on patient outcomes since being in and seeing the natural world, trees, and plants has been shown to reduce length of stay, reduces patient recovery time after surgery, leads to less of a need for pain or anxiety medication, as well as a decrease in complaints. Research indicates that mothers who spend time in nature have children with increased birth weight and have a lower risk for delivering a pre-term baby. Being in nature also increases patient and family satisfaction, staff satisfaction, and the retention of qualified personnel.

Population outcomes:

The installation of 48,000 plants and trees on a health care campus aligns with the mission of healthcare in and of itself. Being in nature, even seeing nature and the natural world is good for psychological and mental health -- it boosts focus and memory, enhances happiness and healing, reduces stress and anger, and promotes social behavior. Being in nature is also great for physical wellbeing. Research shows it reduces obesity and Type II diabetes, improves immune function, lowers blood pressure and risk of heart failure, improves birth outcomes and supports child development, reduces heat-related illnesses, and improves sleep.

Environmental impact:

The installation of the green infrastructure projects effectively treats 5 million gallons of stormwater runoff before it enters the Patapsco River and ultimately the Chesapeake Bay.

Social impact:

MHH employs over 1,200 associates, around 10,000 inpatient admissions and close to 60,000 emergency department visits per year. MHH’s waterfront attracts large crowds of visitors several times per year during harbor events such as Independence Day fireworks displays, Maryland Fleet Week airshows, and Tall Ships regalia. In addition, the Middle Brach Park bike trail crosses through campus, making the green infrastructure retrofits visible to hundreds of additional recreational users each year. The design plans took advantage of this high visibility by strategically locating educational signage throughout the campus, directly adjacent to the retrofits, to illustrate the importance of environmental stewardship and responsible stormwater management for improved water quality, a healthier Chesapeake Bay, greater climate resiliency, and improved human health.

The Green Team developed a broad range of ideas on how to use the outdoor spaces for learning, wellbeing, and hands-on activities. After initially holding an outdoor meditation and aroma therapy session, programs were postponed due to the onset of Covid 19. In the future, MHH plans to implement programs that include walking challenges, yoga or meditation classes, bird house making, herb planting, and much more.

Financial impacts:

The annual cost for maintenance of the native gardens and storm water ponds is $40,920 plus $9k for mulching.

What were the learning points?

* The biggest learning point is choosing the right builder willing to work closely with the MHH team to obtain upfront maintenance costs. This includes choosing a reputable maintenance vendor who has experience and knowledge working with native perennial gardens and storm water projects, as well as non-hazardous methods to remediate weed growth.
* It is vital to assure that the MHH team remains knowledgeable of the benefits to both human and environmental health so they can speak to the benefits when asked. As such, MHH built an education program through the creation and installation of eight museum quality signs, production of three educational videos (listed below), messaging via internal communication tools, and community engagement.
* We plan and budget funds to replace plants that may fail each year. If planning additional expansion of the project, assure access to a grant writing professional who is knowledgeable of grant opportunities and can facilitate the grant writing process.
	+ (500) Our Tree Canopy Program and How it Supports Nature – YouTube (https://www.youtube.com/watch?v=oyvbKB3lWE4)
	+ (500) Why Plants are Beneficial for the Health of our Campus – YouTube (https://www.youtube.com/watch?v=ijJxpj2iU1w)
	+ (500) How Mind, Body, and Nature Work Together to Promote Sustainability – YouTube (https://www.youtube.com/watch?v=xuKTDjAsj8o)

Next steps

* This was a huge team effort which included funding from the Chesapeake Bay Trust for the planning and design phases and from the Maryland Department of Natural Resources for the implementation phase. MHH is committed to the ongoing maintenance of the project and has subsequently partnered with the Baltimore Tree Trust to further increase the tree canopy on campus. Adding to the tree canopy helps to reduce the impacts of the urban heat island effect.
* Maintaining relevance to the project through continued education is of great importance. We tell our story to as many who will listen (e.g., conferences, community associations, business associations, social media).
* As a 10-hospital system, we share our success and assist our sister hospitals to achieve similar results. Recently we helped MedStar Good Samaritan revitalize their courtyard which has reopened to associates, visitors, and patients. They installed native plants and trees along with an education sign based on MHH template.
* MHH was recently awarded additional funding to install two native gardens this spring. We developed social media hashtags and encouraged associates to share photos they take of our campus using the hashtags. #MHHrainbowsky #medstarharborinbloom

Want to know more?

Contact name: **Brian Gray**

Role: **Director Clinical Engineering, EOC Safety Officer- CHSP, CHEP, Sustainability Officer**

Contact details: **brian.k.gray@medstar.net**

Location & NHS Region: **Baltimore, Maryland, United States**

Partner organisations involved: **MHH supports local businesses, small businesses, as well as woman-owned businesses such as Plisko Sustainable Solutions, LLC, CityScape Engineering, Rain Underground, Stormwater Management, and SBC Outdoor Services, and local non-profits such as Blue Water Baltimore, Baltimore Tree Trust, and the Neighborhood Design Center. The Baltimore City Department of Public Works also participated in this project.**

Additional Contacts: **Joan Plisko, PhD, Plisko Sustainable Solutions, LLC; joan@pliskosolutions.com (Sustainability consultant)**

Has this case study or story been made public in any form before? *Yes*

There are numerous articles and press releases about this project. Additionally, we share updates internally, and examples are attached. We host campus visits including members of the Community Advisory Council for Masonville Cove. We created wellness videos that live on our intranet page as well as YouTube. We presented at Clean Med, the conference about sustainability in health care (twice). Here are some articles. MedStar Harbor Hospital Launches Environmental Project MedStar Harbor Hospital Launches Environmental Project | MedStar Health Green Infrastructure Project Connects Human Health and Environmental Health Green Infrastructure Project Connects Human Health and Environmental Health (maryland.gov) Baltimore Hospital Going Green To Help Local Environment And Their Patients Baltimore Hospital Going Green To Help Local Environment And Their Patients - CBS Baltimore (cbsnews.com) A garden for healing patients and the river. In Baltimore, a hospital’s green space aids recovery and filters stormwater pollution A garden for healing patients and the river (chesapeakebay.net)

Jana Davis, Executive Director, Chesapeake Bay Trust, jdavis@cbtrust.org

Joan Plisko, PhD, President, Plisko Sustainable Solutions, LLC, joan@pliskosolutions.com

Feedback

We receive countless positive comments from associates, visitors, vendors, and patients. Here are a few quotes:

“The campus is so beautiful.”

“I love watching the birds and butterflies enjoy all the flowers on campus”

“It looks like you’ve planted a lot of trees. How many and what kind?”

“What are the big basins that capture rainwater?”

“Can you share with me a list of native plants and shrubs for my home garden?”