

THE VALUE OF GREEN STORMWATER INFRASTRUCTURE IN WASHINGTON DC

Since 2010, the District of Columbia has been under a federal order to reduce flooding and improve water quality to conform with the Clean Water Act of 1972. Roughly 2 billion gallons of combined stormwater and sewer overflow are released into the District's rivers and tributaries every year, carrying trash, pollutants, and toxins that are hazardous to both humans and wildlife. Gray infrastructure—tunnels, sewers, and treatment plants—has come to be the central approach to capturing and discharging stormwater downstream, but nature-based solutions—also known as green infrastructure—can play an important role, too.

From rain gardens to urban tree canopy, green infrastructure uses landscape features to capture and infiltrate rainwater where it falls. Green infrastructure reduces stormwater runoff, the leading source of urban water pollution. When properly incorporated and maintained, green infrastructure supports stormwater capture and water quality improvement while also providing broader community benefits.

The Stormwater Retention Credit (SRC) trading program, managed by the DC Department of Energy and Environment (DOEE), incentivizes private landowners to remove impermeable surfaces and install green infrastructure, which increases infiltration and prevents polluted runoff from flowing directly into waterways without treatment. These projects create credits that can be purchased by a land developer to offset the runoff created by impermeable surfaces in another area in the watershed. The landowner also benefits from a reduction in their yearly stormwater fees, which are based on the area of impermeable surfaces on their property.

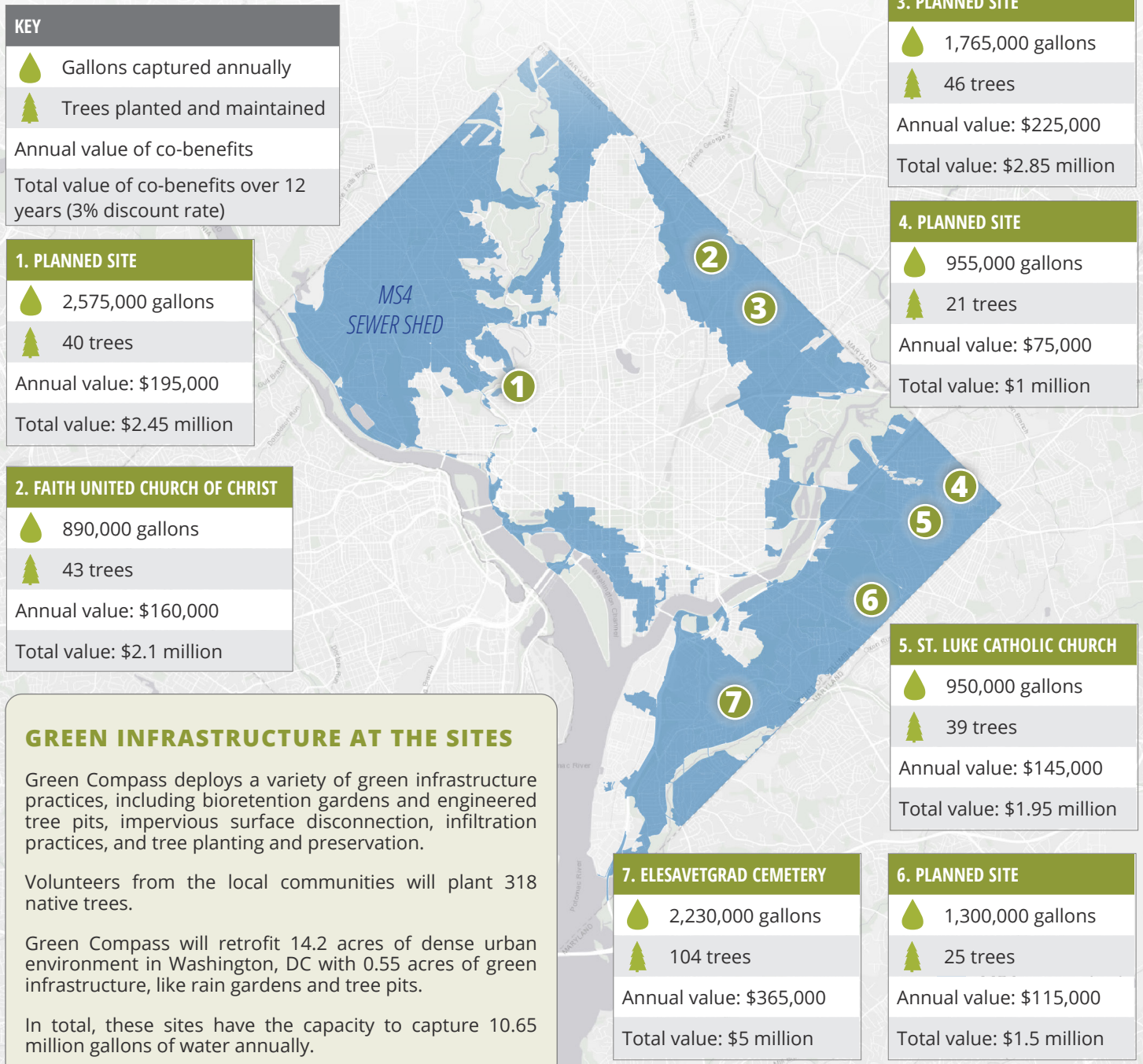


Developers of new construction and major renovations in DC are required to include green infrastructure at sites to manage stormwater to ensure impermeable surfaces do not intensify runoff and flash flooding. Where installing green infrastructure is impractical or not possible, the SRC program allows compliance flexibility by allowing sites to offset their stormwater management requirement with green infrastructure installed off-site. Offsetting runoff requires private landowners who are willing to install green infrastructure. However, many landowners lack the knowledge, capacity, and time to build green infrastructure on their property.

Developers like Green Compass play an important role in the SRC program, scoping, planning, and financing projects at zero cost to landowners. In return, they generate stormwater retention credits, and the landowner benefits from a discounted utility bill, improved site drainage, and reduced risk of nuisance flooding downstream. This partnership incentivizes development of green infrastructure where it otherwise may not have happened and accelerates the uptake of green infrastructure across DC.

Earth Economics worked with Green Compass to value the co-benefits at seven sites—three have already been developed and four are planned. Green Compass has prioritized working with hubs like churches, schools, and apartments, directly connecting the co-benefits created to community centers.

GREEN INFRASTRUCTURE SITES



GREEN INFRASTRUCTURE CO-BENEFITS

Whilst green infrastructure's primary purpose is to capture or reduce stormwater runoff, it performs a range of functions, some of which produce flows of ecosystem goods and services beneficial to humans. Benefits include greater community resilience to flooding, improved local air and water quality, reduced temperatures during heatwaves, and lower stormwater management costs.

These co-benefits are largely ignored in traditional economic analysis because they are not traded in open markets where prices are set based on consumers' willingness to pay for a product or service. Since there are no markets to set the value for ecosystem services, they are often assumed to have no monetary value causing inefficient decision making.

Understanding the value of co-benefits is important to the public sector who have a responsibility to ensure the flow of many of these non-market services. Including valuation of green infrastructure in decision-making helps the public sector create more effective policies, which improve the quality of the public's lives.

Valuing co-benefits could also influence investment into green infrastructure in DC. Without a monetary return, green infrastructure projects are often overlooked by private finance. In DC, the DOEE pays landowners & developers for an ecosystem service – stormwater runoff capture —through the SRC, which acts as an environmental market.

By creating a stormwater credit, a price is set for a gallon of stormwater runoff captured. The additional co-benefits are not priced, but the surrounding communities receive the value of the ecosystem services created. Currently, credit prices are low, slowing the work of developers like Green Compass. A proposed 'high-impact rule' by the DOEE would prioritize vegetated green infrastructure projects—creating a price premium for these credits. Valuing co-benefits could justify a further increase in price by a socially responsible credit purchaser.

With a return, Green Banks and CDFIs have now begun to loan capital to a small number of DC green infrastructure developers like Green Compass. Whilst valuing co-benefits is unlikely to shift the loan amount or interest rate for developers, it does strengthen the case for investment in green infrastructure. Lenders with a social commitment may be encouraged to allocate more capital to green infrastructure projects across their portfolio, stimulating and accelerating the DC SRC program.

THE CO-BENEFITS PROVIDED BY NATURE-BASED SOLUTIONS

Adapted from the Urban Institute



Green Banks and CDFIs are financial institutions that provide low interest loans to projects that are sustainable or support communities. They provide essential finance for projects that have societal benefits but may carry too much risk, deliver low returns, or are simply unfamiliar markets or assets for a traditional investor.



Earth Economics valued a range of ecosystem services and co-benefits using existing valuation studies that could be defensibly transferred to DC. When fully established, the seven sites will create **\$1.3 million** in benefits to local communities every year.

Some benefits are not annual, such as volunteer commitment during construction, other benefits will accrue over time—trees take several years to mature. Finally, a discount rate of 3% is applied to the future annual benefits to account for the real time value of money.

When these different values are aggregated, the green infrastructure at the seven sites will create **\$17 million in benefits to DC residents over the next twelve years**, delivering a return of **\$7.80 for every dollar spent on their development**.

SUPPORTING ECONOMIC DEVELOPMENT

Green Compass will create 12 jobs during construction and support five jobs through quarterly maintenance of the sites.

THE VALUE OF VOLUNTEERS

To date, volunteers have spent 741 hours planting trees. In DC, studies have placed a social value of \$50 an hour for volunteer time. In total, volunteers' time is valued at \$37,050.

TREES, WORTH EVERY PENNY

When mature, trees provide multiple benefits that can each be valued.

Tree benefits	Value per tree
Pollution removal	\$13.33
Value of reduced building energy use	\$2.93
CO2e sequestration	\$1.54
Net CO2e sequestration	\$1.09
Avoided emissions CO2e (from reduced energy production)	\$0.36
Total annual value	\$19.25

ANNUAL PUBLIC BENEFITS



CARBON SEQUESTRATION \$6,000

Native trees, plants, and grasses improve air quality, sequester carbon, reduce building energy consumption, reduce carbon emissions for energy generation, and improve water quality.



HEAT MITIGATION \$1,100,000

Increasing tree canopy and reducing pavement mitigates urban heat island effects and lowers local temperatures during heatwaves, reducing heat-related hospitalizations and mortality rates.



AESTHETIC VALUE \$110,000

Planting trees and other natural green features often improve the visual aesthetics of a neighborhood. This not only has day-to-day benefits for resident wellbeing but can also improve home values, as well.



BIODIVERSITY \$30,000

Native trees and plants provide food and shelter for insects and animals, supporting biodiversity.



NOISE REDUCTION \$11,000

Trees and shrubs create physical barriers to reduce noise, providing quiet retreats for residents, which can be especially important in crowded urban environments.



UTILITIES SAVINGS \$36,700

RCapturing runoff from impermeable surface by installing green infrastructure allows the churches, schools, and apartments to benefit from utility fee savings, receiving water bill credits worth more than \$36,700 a year.