

## APPENDIX 1: GSI BENEFITS BY PRACTICE

Prepared by Erma Leaphart

Examining the benefits of GSI by practice type is a necessary step in deciding which technique to implement. Below are benefits by practice type.

### BIORETENTION AND INFILTRATION

*Economic Benefits:*

- Can qualify for green credit against drainage fee.
- As part of a well-designed landscape plan, have been shown to add about 7 percent to the average rental rate for office buildings (Green Edge).
- On commercial properties, improve urban aesthetics and have been documented to correspond with higher occupancy and rental rates, e.g. providing views of ponds or constructed wetlands were shown to contribute to rent premiums for office spaces (US EPA).
- Can minimize costs related to flooding by reducing or preventing property damage, stress and illness, and lessening the time it takes to clean up and recover.

*Environmental Benefits:*

- Incorporate vegetation that provides habitat for wildlife including migrating birds and pollinators.
- Capture and infiltrate rain/stormwater, improving water quality.
- Sequester greenhouse gases including CO<sub>2</sub>, and Ozone.

*Social/Quality of Life Benefits:*

- Beautify urban spaces contributing a sense of place. Local examples include the Riverwalk, Dequindre Cut, Campus Martius, Beacon Park, Viola Liuzzo park.
- Can add value when stacked with other amenities such as parking lots, green alleys and/or street right-of-ways, new parks and open space.

### PERMEABLE PAVEMENT

*Economic Benefits:*

- Can have lower annual maintenance costs compared to conventional asphalt pavement.
- Reduces need for salt in colder climates during winter months.

*Environmental Benefits:*

- Increases groundwater recharge, replenishing underground aquifers.
- Improves air quality.
- Reduces atmospheric carbon dioxide.
- Reduces urban heat island.

*Social/Quality of Life Benefits:*

- Reduces noise pollution.
- Can reduce excessive puddling and onsite flooding.
- Reduces ice cover in the winter creating safer walking conditions for tenants and/or customers.

### TREES/WELL-DESIGNED LANDSCAPING

*Economic Benefits:*

- Reduce energy use by providing shading/cooling and blocking wind.
- Reduce urban heat island effect.
- Increase property value (a tree within 50 feet of a house can increase sale price by 10–15%).
- Increases experience with and proximity to nature and natural spaces.
- Appeal to customers, tenants and buyers (a 2004 report found that creating pedestrian-only zones and related improvements in retail areas increased rents approximately 22%, on average).

*Environmental Benefits:*

- Reduce greenhouse gases, absorb Carbon Dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>).
- Cleanse the air of pollutants (e.g. dust, particulate matter (PM), sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), and ozone (O<sub>3</sub>)).
- Intercepts and absorbs rainfall, thus reducing the volume of polluted stormwater going into the sewer system and contributing to basement backups and flooding.
- Recharge ground water.
- Improves wildlife habitat.

*Societal/Quality of Life Benefits:*

- Improves aesthetic value/beautification.
- Creates a noise buffer.
- Provides closeness to natural features or nature (e.g. parks, trails, open space).
- Increased positive impact on mental health and worker productivity.
- Reduction in crime rates.
- Improves likelihood for walkability.
- Provides places to gather in the shade for rest and relaxation.

### WATER HARVESTING

*Economic Benefits:*

- Increases available water supply.
- Saves costs related to water conveyance and treatment.
- Reduces energy costs to produce, treat and transport potable water.
- Decreases water bill expenditures due to reduced piped in water usage.

*Environmental Benefits:*

- Increases ground water recharge when reusing for irrigation.

*Social/Quality of Life Benefits*

- Provides water that is healthier for plants.
- Provides entry point to introduce benefits of green infrastructure/sustainability.
- Enhances community cohesion through educational and entertaining activities (rain barrel design and use).

## GREEN ROOFS

### *Economic Benefits:*

- Have a longer lifespan than conventional roofs, saving money in roof maintenance and replacement costs.
- Reduce building energy costs due to better insulation, including soil and plant material, reduce surface temperature of the roof, reduce adsorbed solar radiation and improve the operational efficiency of rooftop air conditioning units.
- Can command rental premiums, e.g. apartment buildings with green roofs, according to one study, received a 16% rental premium.
- Can qualify for green credit against drainage fee.

### *Environmental Benefit:*

- Incorporate vegetation that provides habitat for wildlife including pollinators
- Capture and infiltrate rain/stormwater improving water quality.
- Sequestration or capture of greenhouse gases, particularly CO<sub>2</sub>.

### *Social / Quality of Life Benefit:*

- Provide a green space or refuge/respice for employees, tenants or customers particularly if it includes seating or walking paths or a view of an aesthetically pleasing rooftop garden.
- Improve air quality due to absorption of noxious substances such as SO<sub>2</sub>, PM<sub>10</sub>.
- Increase perception of that business's commitment to a healthier, sustainable community

## BENEFITS SOURCES

The Green Edge: How Commercial Property Investment in Green Infrastructure Creates Value, The National Resources Defense Council, December 2013.

The Value of Green Infrastructure: A Guide to Recognizing Its Economic, Environmental and Social Benefits, Center for Neighborhood Technologies (CNT), 2010.

EPA, Benefits of Green Infrastructure, <https://www.epa.gov/green-infrastructure/benefits-green-infrastructure>

Portland's Green Infrastructure: Quantifying the Health, Energy, and Community Livability Benefits, City of Portland.

SEMCOG, Green Infrastructure, <https://www.semco.org/Green-Infrastructure>

"Shared, Stacked-function Green Infrastructure Policy Investigation," White paper, appendix F, SRF consulting, December 23, 2013.

"Homeowner's Guide to Stormwater Management" Office of Watersheds, Philadelphia Water Department, Volume 1, January 2006

## CALCULATORS:

EPA National Stormwater Calculator

<https://www.epa.gov/water-research/national-stormwater-calculator>

National Green Values™ Calculator

<http://greenvalues.cnt.org/national/calculator.php>

New York City - Green Infrastructure Co-Benefits Calculator

<http://www.nycgicobenefits.ne>