



SAN ANTONIO
RIVER AUTHORITY

Green Infrastructure Opportunities to Mitigate Roadway Pollutants and Achieve Multiple Benefits

Presented to ATAC
February 8, 2022

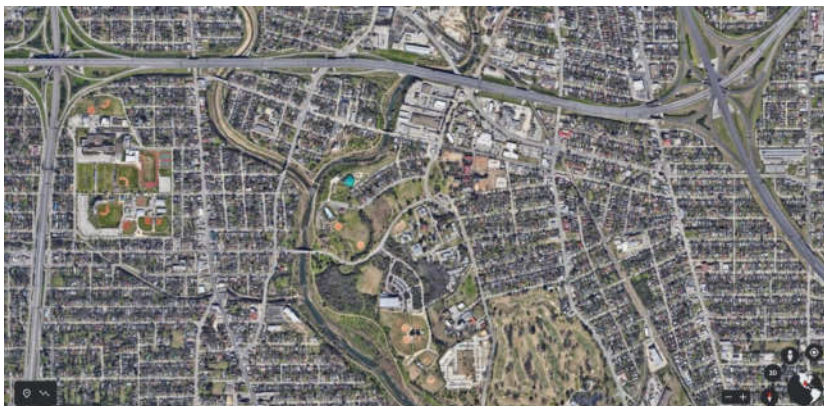


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Problem

Roadways are directly connected to our community's river and creek network.

Stormwater runoff is our #1 threat to stream health.



Pollutants associated with road stormwater runoff

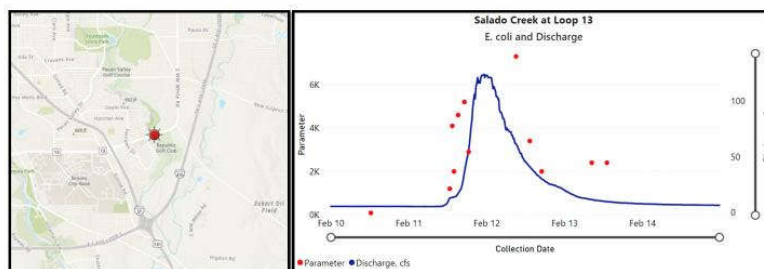
- Oil & Grease
- Polycyclic Aromatic Hydrocarbons (PAH's)
- Bacteria*
- Metals (Aluminum*, Lead*, Zinc*, Copper*, Cadmium*, etc.)
- Sediment (soil and particulates, suspended solids*)
- Temperature*
- Road salts

*Tested by San Antonio River Authority

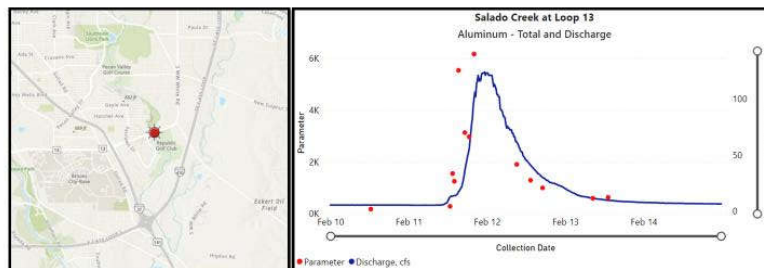


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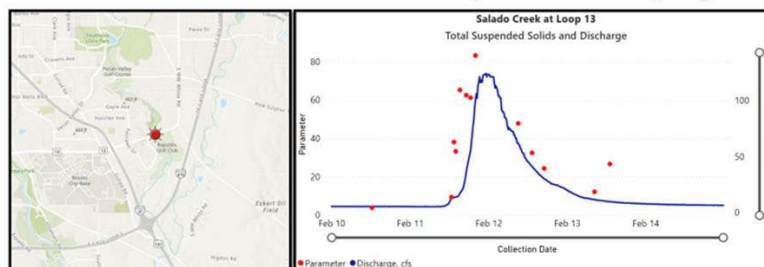
Increased Flow = Increased Bacteria Levels



Increased Flow = Increased Aluminum Levels, ug/L



Increased Flow = Increased Suspended Solids, mg/L

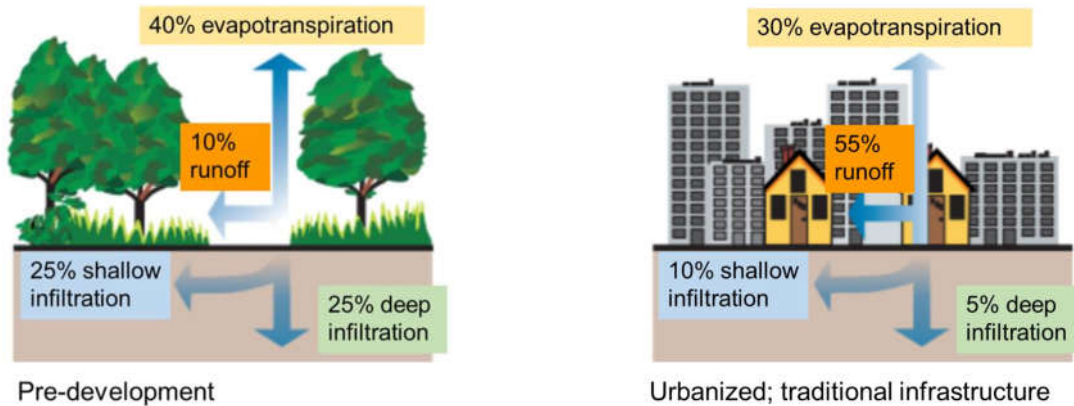


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Opportunity

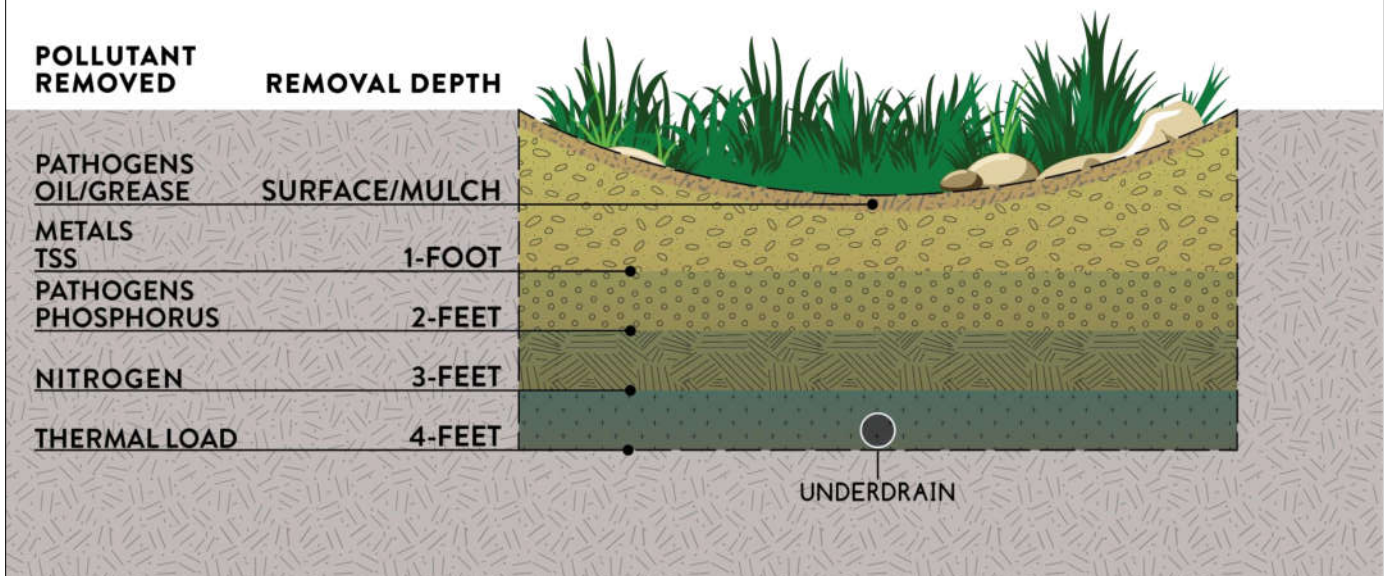
Green Infrastructure is a set of tools to

- mitigate stormwater runoff pollution
- mitigate street-level flooding
- provide multiple benefits including improving community health.



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How does GI remove pollutants?



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GI Recommendations

- **Green streets**
- Stormwater parks
- Open space preservation
- GI in
 - Home retrofits
 - New development
- Floodplain preservation / stream buffers
- Cluster development with GI
- Policy and program changes
 - Reducing minimum parking requirements
 - Increase street sweep and pet waste programs



Multi-Benefits

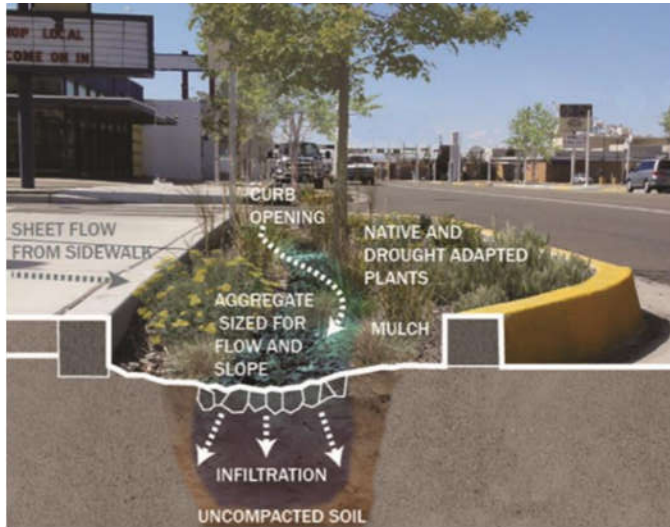
- Improvement of stream and stormwater quality
- Flood reduction
- Trash reduction
- Habitat improvement
- Air pollution reduction
- Urban heat reduction
- Recreation opportunities



Street-side bioretention planter located in New York.
Source: National Association of City Transportation Officials



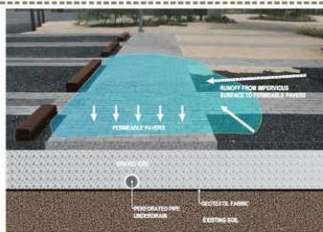
Stormwater Bumpouts



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Other LID BMPs

Permeable Pavement



Figures PP-1 and PP-2
Permeable parking installations at the San Antonio River Authority
Guarneri Offices (bottom) and at Confluence Park.

Street-side Tree Well



Figure TW-1
Fiberra Street Side Tree Well. Shown implemented in edge of parking lot.
Source: Cortech Engineered Solutions LLC.



Figure TW-2
grnTree® typical configuration diagram.
Source: GreenTree®.

Vegetated Filter Strip



Figure VFS-1
Vegetated filter strip receiving stormwater runoff from a parking lot into a stormwater cell. Raleigh, North Carolina. Photo source: Telsa Tech, Inc.
Rendering components: San Antonio River Authority.



Figure VFS-2
Vegetated filter strip between parking lot and street.
San Antonio River Authority. Photo source: Telsa Tech, Inc.
Rendering components: San Antonio River Authority.
University Department of Biological and Agricultural Engineering. Source: Telsa Tech.



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Proprietary BMPs

High-flow Media



Figure HFM-1
High-flow Media BMP including surface vegetation adjacent to street in San Antonio. Source: HART Associates, Inc.



Figure HFM-2
High-flow Media BMP including surface vegetation adjacent to street in San Antonio. Source: HART Associates, Inc.

Hydrodynamic Separator

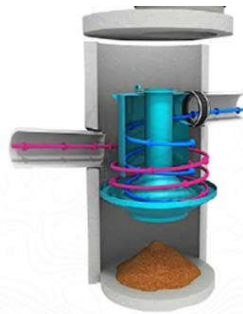


Figure HDS-1
Diagram of Hydrodynamic Separator and function. Source: Hydro International UK Ltd.

Treatment Trains



Figure TTNSB-1
Treatment Train diagram with hydrodynamic separator flowing into bioretention. Source: TerraTech, Inc.



Figure TTVFSBR-1
Vegetated filter strip surrounding a bioretention area in a parking lot, Raleigh, North Carolina. Source: TerraTech, Inc.



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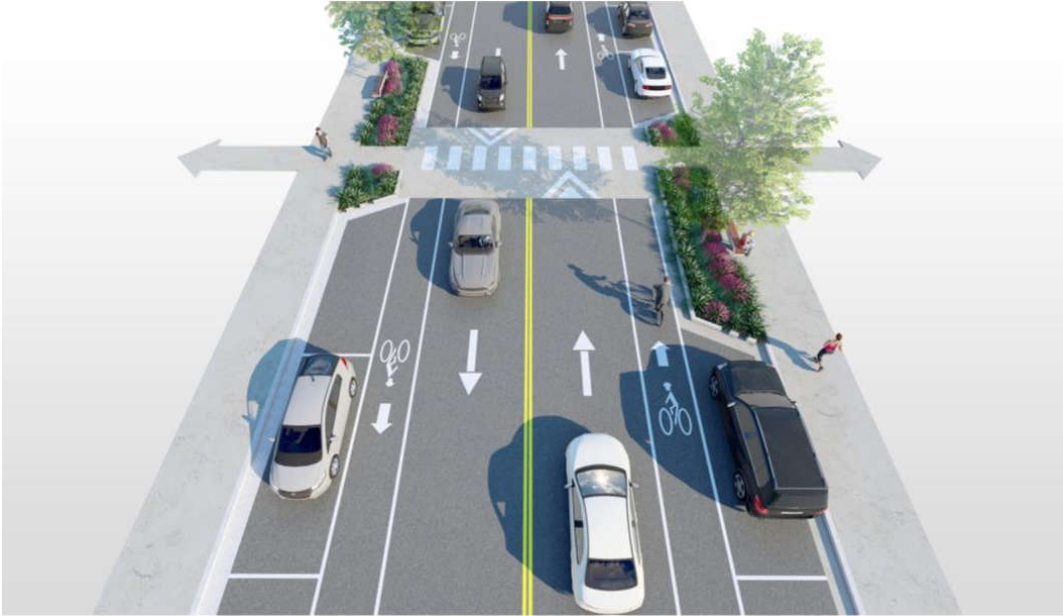
Green Infrastructure for Stormwater Runoff Mitigation Intersection with Bike Left-turn Scenario



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Green Infrastructure for Stormwater Runoff Mitigation

Center Block Cross-walk Scenario



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Green Infrastructure for Stormwater Runoff Mitigation

Center Block Long Bioswale Scenario



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Center Block Bus Stop & Protected Bike Lane Scenario



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Questions?

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