

URBAN STORMWATER BMP IMPLEMENTATION IN THE BOROUGH OF ETNA

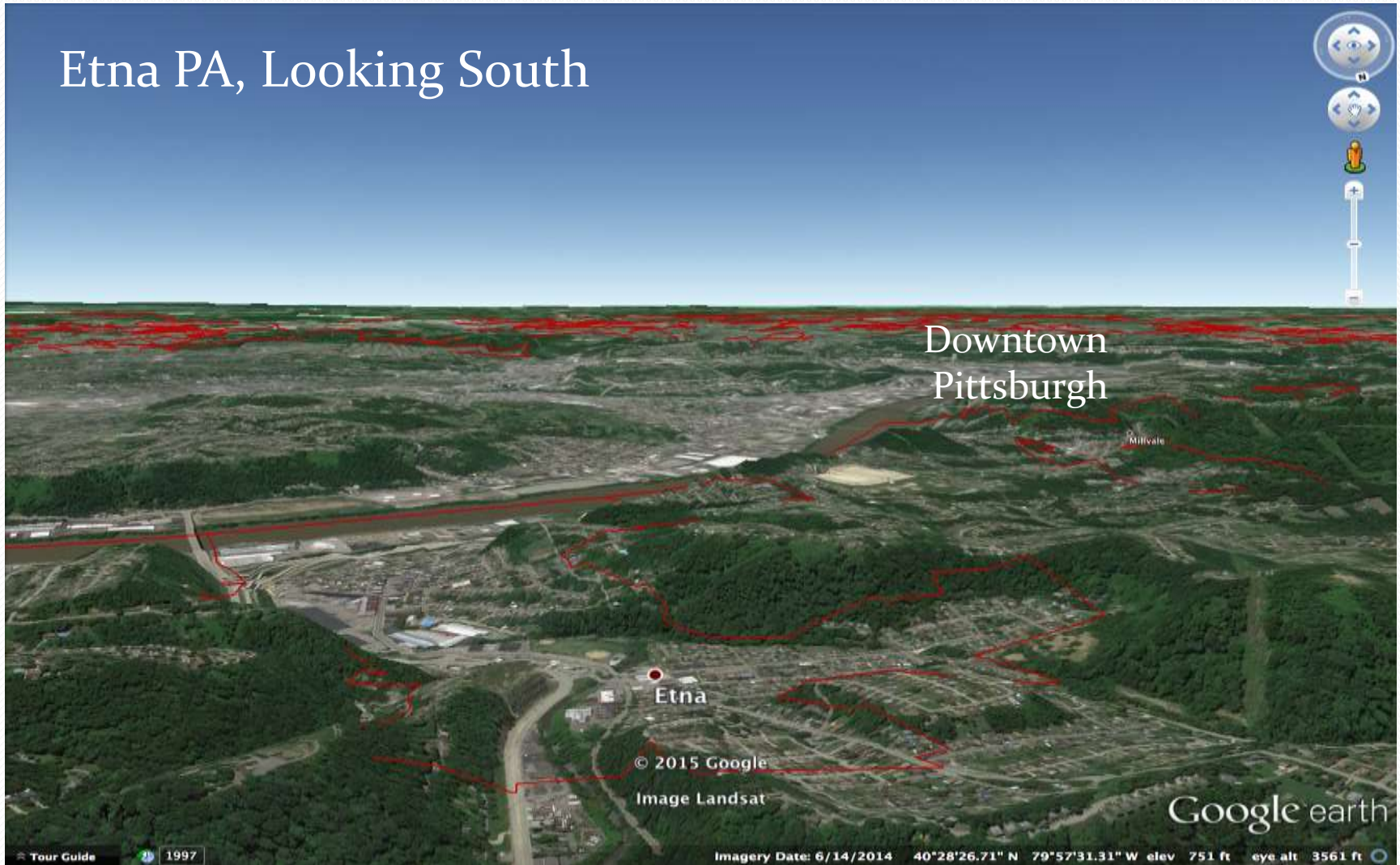
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URBAN STORMWATER BMP IMPLEMENTATION IN THE BOROUGH OF ETNA

Etna PA, Looking South



URBAN STORMWATER BMP IMPLEMENTATION IN THE BOROUGH OF ETNA



Etna represents a challenge for BMPs!

Hydrological soil group B (the green areas in the figure) are amenable to GSI installations. The remainder of the Borough is mapped as either group C (purple or orange) or C/D (yellow).

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Etna represents a challenge for BMPS!

Dense development:

Overall 3% of total area is mapped as open space.

The median parcel size ranges from 2500 square feet to 5800 square feet.

Suggests source reduction technologies that are not as space consumptive as other techniques be examined closely for potential use in planning GSI in Etna.

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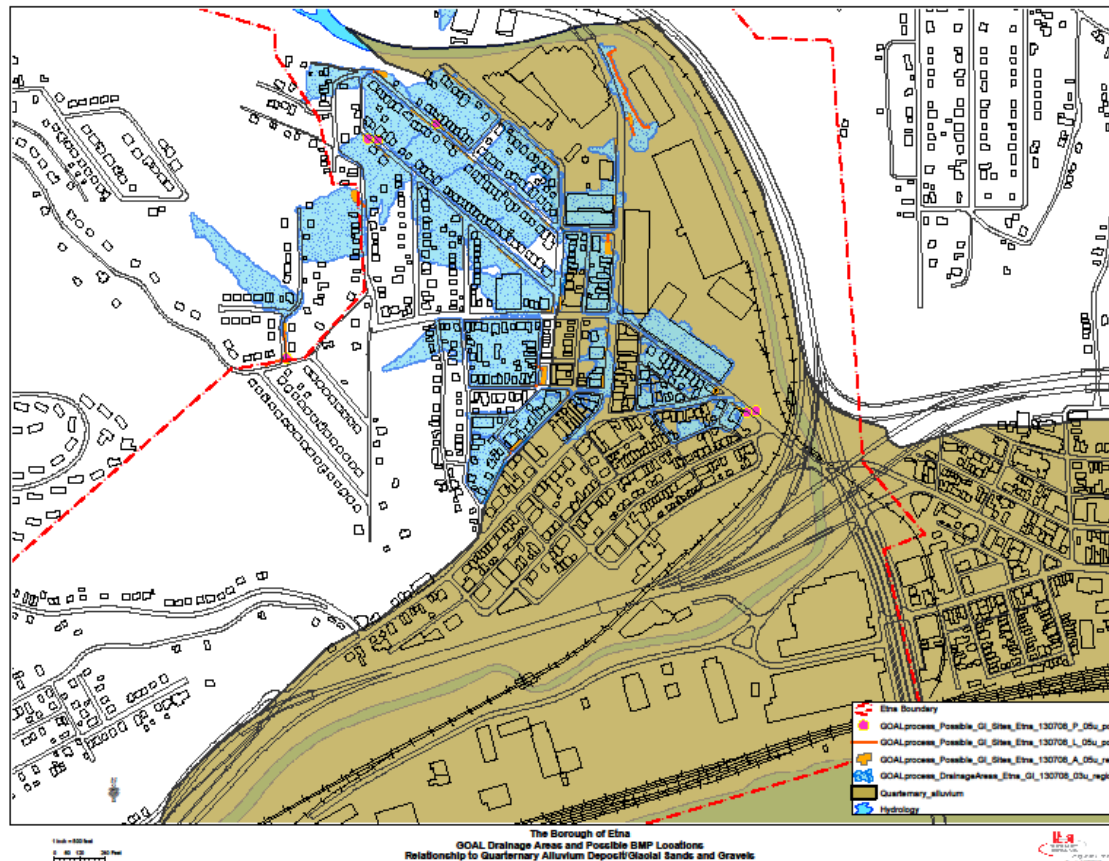


Etna represents a challenge for BMPs!

Steep slopes:

Etna's topography is dominated by areas with steep slopes-more than 75% of the tributary areas have slopes greater than 5%.

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A GSI strategy of 'Filter, Infiltrate, and Remove' (FIRm) is proposed for high flow sites on the lower and main streets of Etna that are close to Pine Creek or in locations that have been mapped as being in the Valley Fill (Quaternary) sands and gravel formation

[illegible]

67.3 % of the runoff or 142.3 million gallons (mg) during the Typical Year 2003 would expected to reach 20% of the inlets identified as the two top ranked groups of inlets.

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SurfaceTrace™

Realistic and Reliable Drainage Areas and Flow Paths

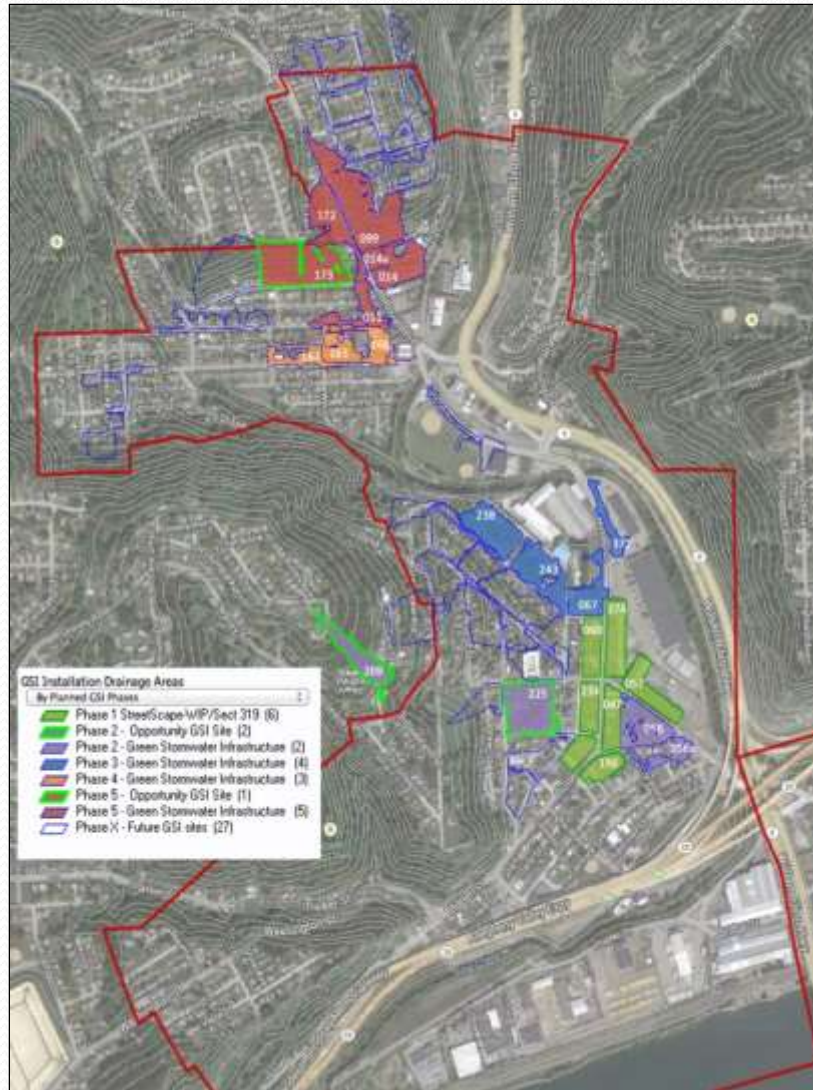


Standard Technical Method

Inconsistent Drainage Area and Flow Path Results



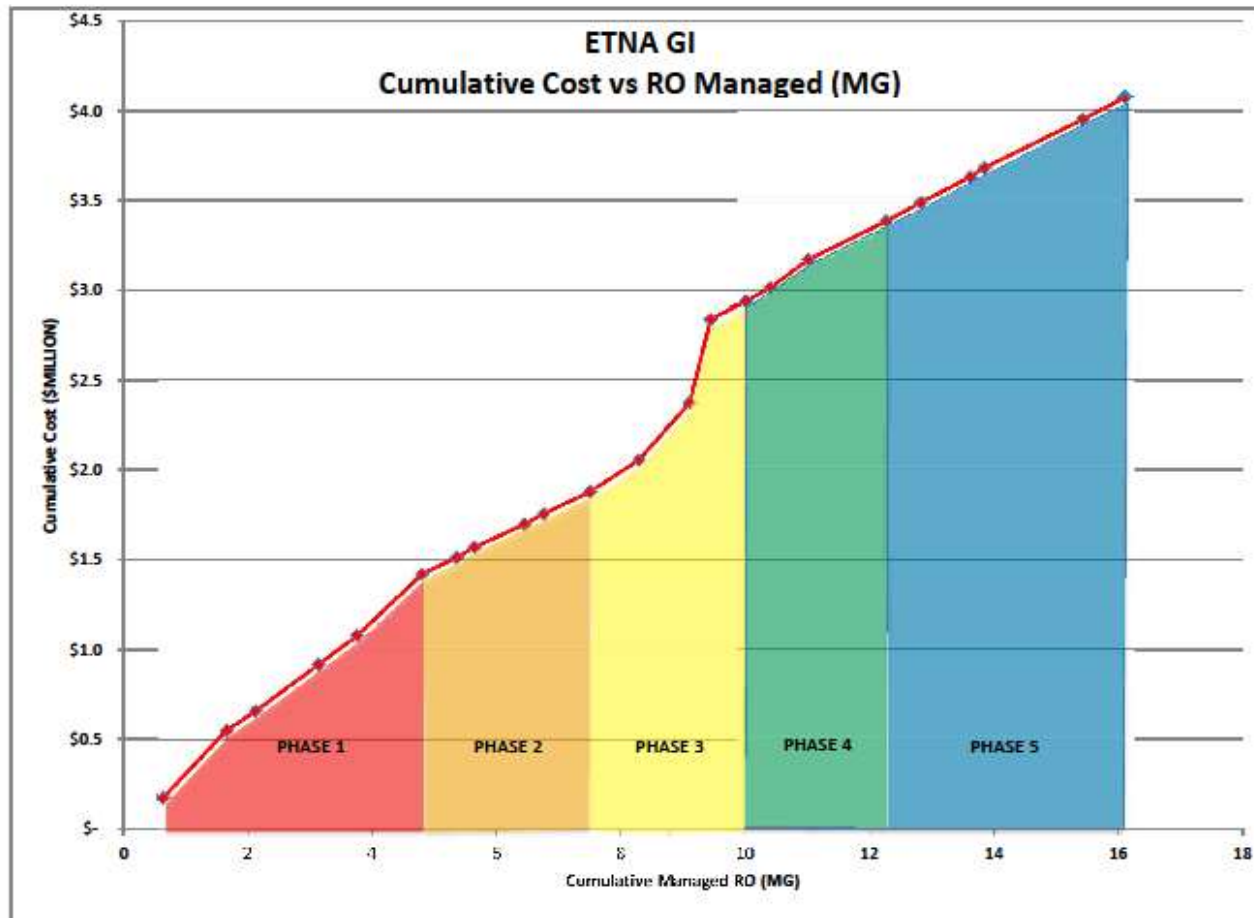
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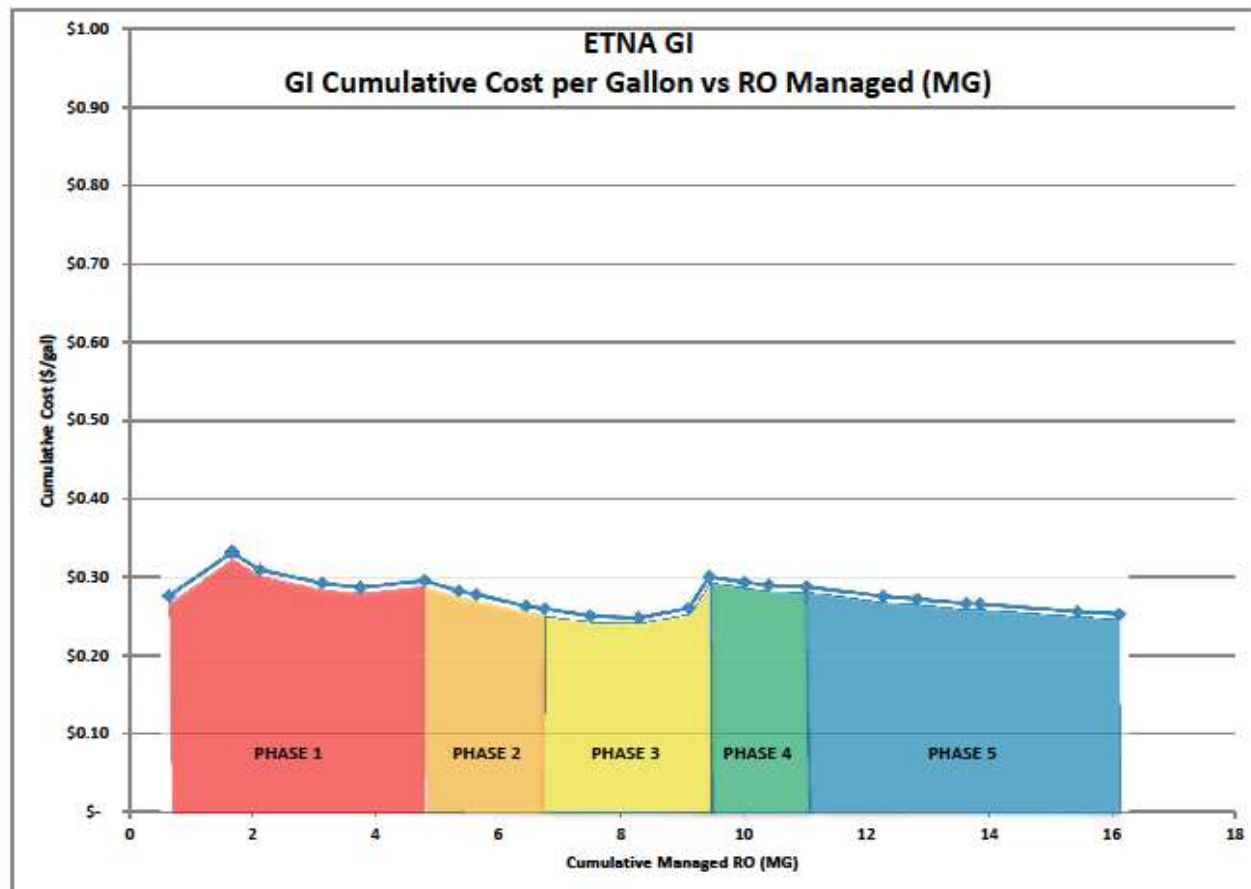
Based upon Municipal priorities, available funds, and GSI opportunities, the team established 5 phases for primary GSI projects (including 23 sites) and a future phase with up to 26 GSI sites.

The work done for this master plan estimates it is feasible to manage a total of 39.4 mg of runoff per year if all GSI sites are implemented.

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Implementing all 23 projects detailed under the Master Plan will manage a total of 16.1 mg annually at an estimated cost of \$6.1 million. This translates into a cost of \$0.38/gal.

This includes the Streetscape components not directly related to RO management. When these components are backed out of the total, the estimated cost for the GSI elements becomes \$4.1 mil and \$0.25/gal of RO managed.

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The Borough is currently engaged in five Green Infrastructure (GSI) initiatives:

- Residential Downspout Disconnection Program
- Green Streetscape Phase I, IA and Phase II Projects currently funded by Section 319 Grants
- Green Infrastructure Specific projects: Community Pool Bioswale and School Street Municipal Parking Lot.
- Street Tree Planting

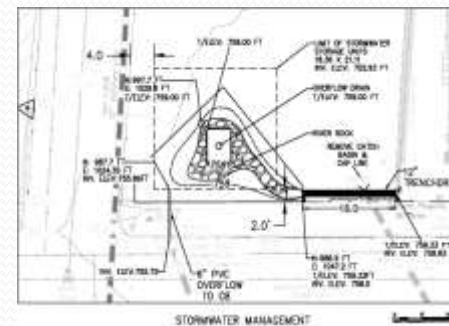
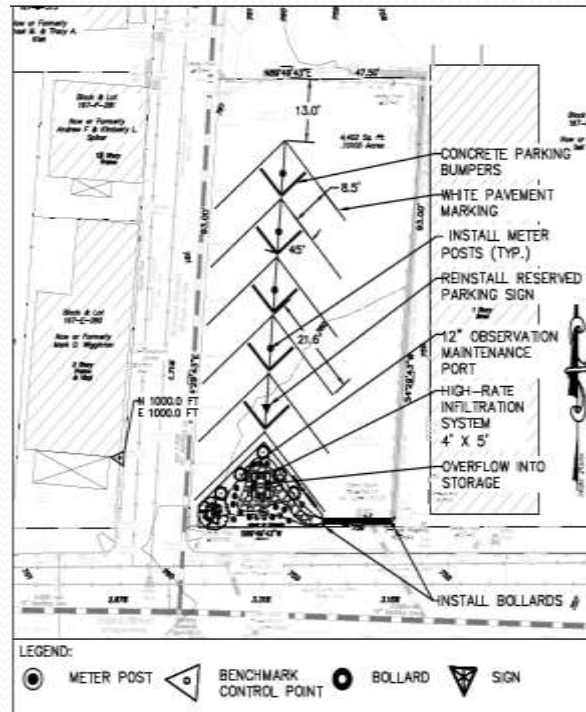
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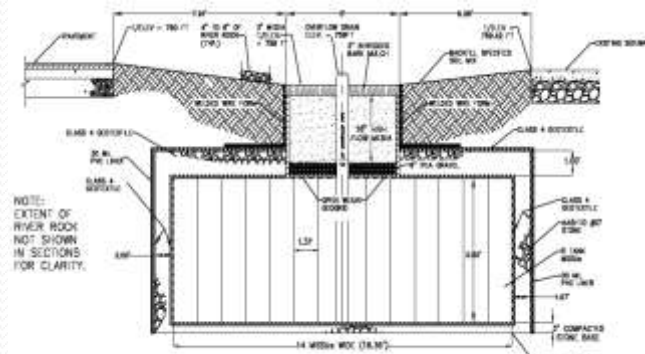
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June 6th the soil mix, mulch and plantings were completed.



Installing the decorative river rock that slows the water and filters larger floatables.



HIGH RATE INFILTRATION FACILITY SECTION Y-Y

High Flow Media

Overcomes the challenges of clogging & flooding and large space requirements associated with 1st generation systems

- Flow at 100" Per Hour
- Flow Media with open roots create pathways through media that allow over 90% infiltration to Clogging



Picture of the plantings next to the plan.



6/12/2014 Thunderstorm Event (0.56" of rain in the Pittsburgh Region National Weather Service website)



1:00 PM



Approximately 10-15 minutes later



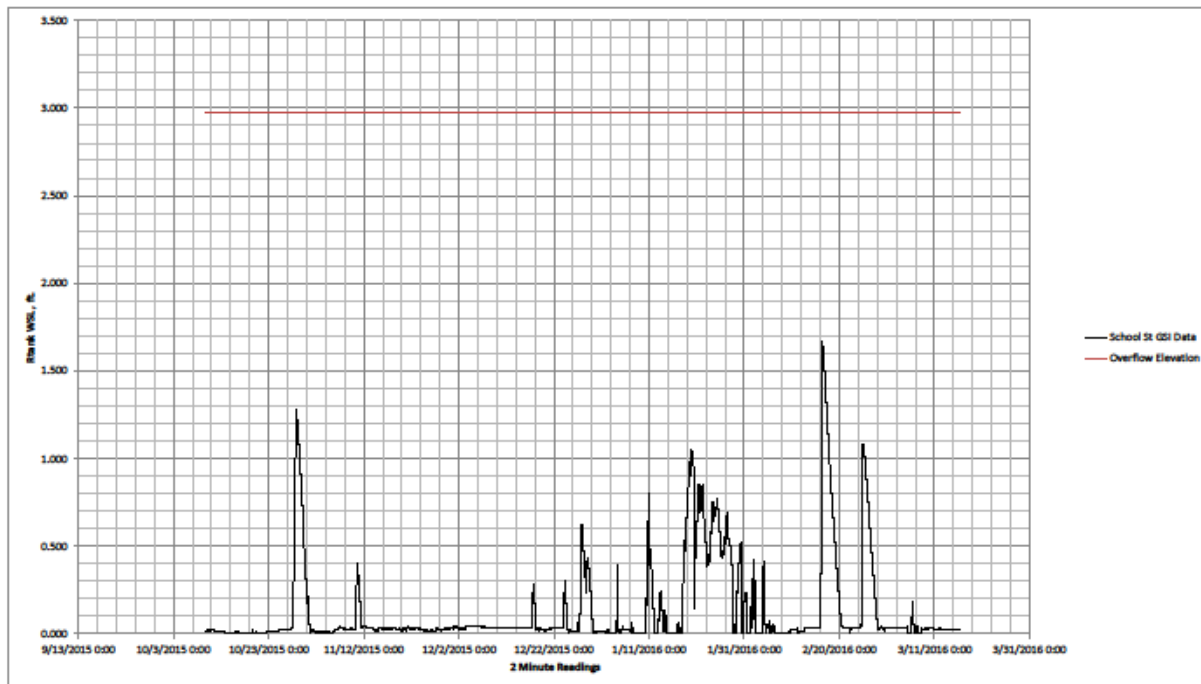
Finished garden with soil mix, plantings and Focal Point.



Testing and certification of the Focal Point High Rate Biofiltration unit

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ETNA SCHOOL STREET GSI PROJECT POST CONSTRUCTION MONITORING (PRELIMINARY NOT FOR DISTRIBUTION)



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ETNA STREETSCAPE

Roof Drain Collection

The Butler Street, Freeport Street, and Union Alley facilities collect roof runoff via channels and pipes and direct it to below-ground facilities.

Pervious Pavers

Parking pads on the Union Alley side of the block use permeable pavers with subsurface gravel storage/infiltration beds.

Bump-outs

Bump-outs improve pedestrian safety by reducing the distance and time that pedestrians are exposed to vehicular traffic. Bump-outs also calm traffic as drivers perceive a need to slow down to negotiate the narrow lanes.

Tree Grate

ADA-compliant tree grates maximize pedestrian space in the commercial district and allow oxygen and water to reach the tree roots.

Curvilinear Trench Drain

Emulates water flow in a natural pattern, a nod to Etna's ties to the nearby Allegheny River and to its ironworks history. It also allowed the system to be built around the myriad of existing utility valves in the sidewalk.

Street Trees

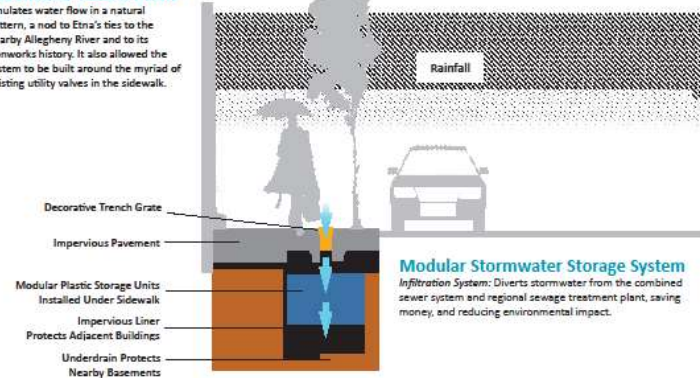
Studies show street trees reduce traffic speeds, create safer walking environments, improve business income streams, absorb 30% of precipitation from normal storm events, provide heat protection, add value to real estate, and screen overhead utilities.

Green Inlets

Treatment inserts in catch basins remove pollutants associated with sediment-laden road runoff.

Impervious pavement

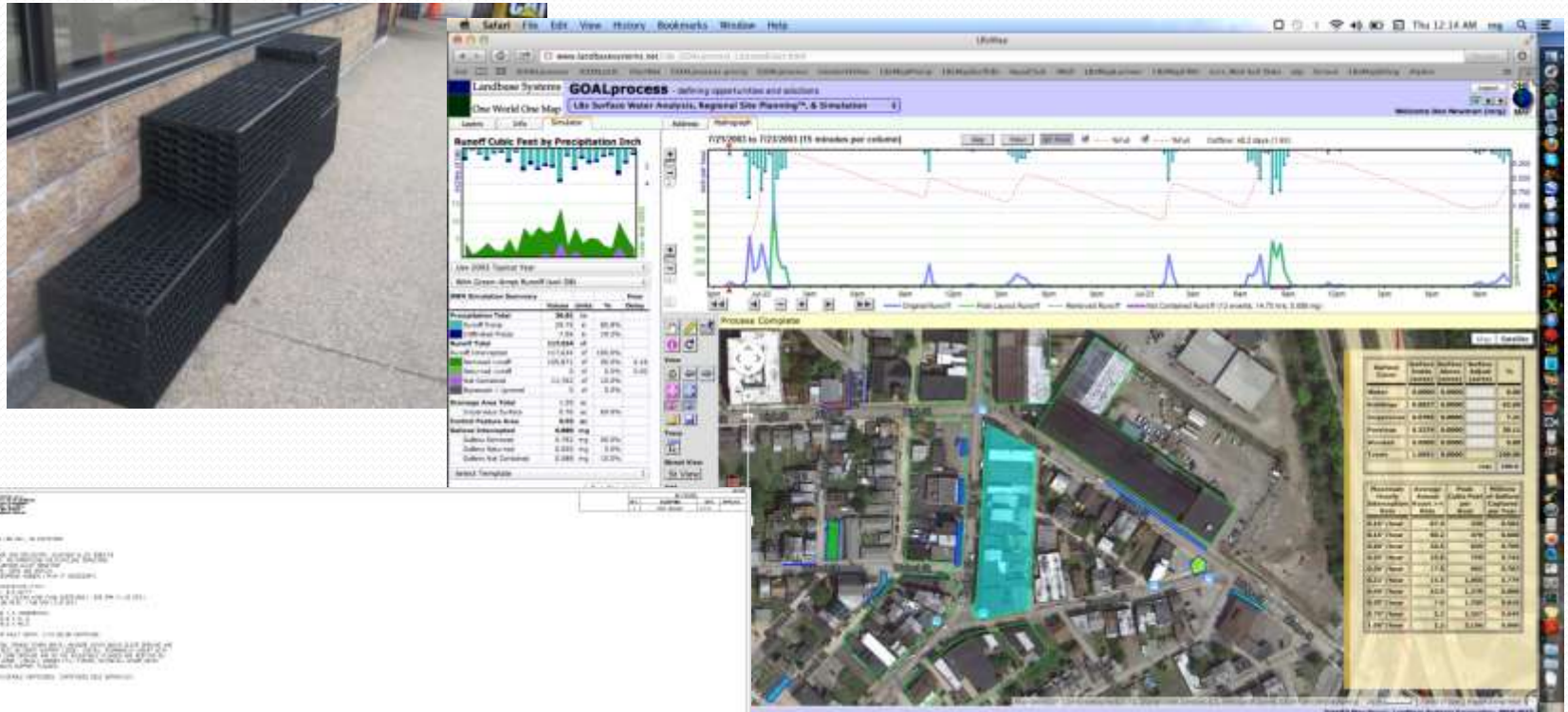
Runoff from the sidewalk within 5 feet of the existing building structures flows to the trench drain, protecting the buildings from water damage.



Modular Stormwater Storage System

Infiltration System: Diverts stormwater from the combined sewer system and regional sewage treatment plant, saving money, and reducing environmental impact.

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Urban BMPs Lessons Learned:

- Community Outreach
- Bidding
- Costs
- Deicing
- Winter Issues
- Value Engineering
- Back-Up Solutions
- Pre-Construction Soils Testing
- GSI Master Planning
- Expect the Unexpected



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Cost Estimation	Units	Unit Costs
Project		
Design, Engineering, & Construction Mgmt	%	15.00
Outflow End Treatment	lump sum	\$8,000
Each installation (23 installations total)		
Interception Structure	each	\$6,500
Cubic Foot Volume Price	/cuft	\$25.00
Square Foot Volume Price	/sqft	\$10.00
Outflow Structure	each	\$3,000
Outflow Pipe Length	/ft	\$100
PADOT Bond (HOP ROW)	\$/1000	\$30.25
Contingency	%	25.00
Streetscape Portion		
Pavement	SF	\$13.00
Curbing	/ft	\$32.00
Grate	/ft	\$300.00
Pervious Pavers	SF	\$14.00
Trees	each	\$520.00

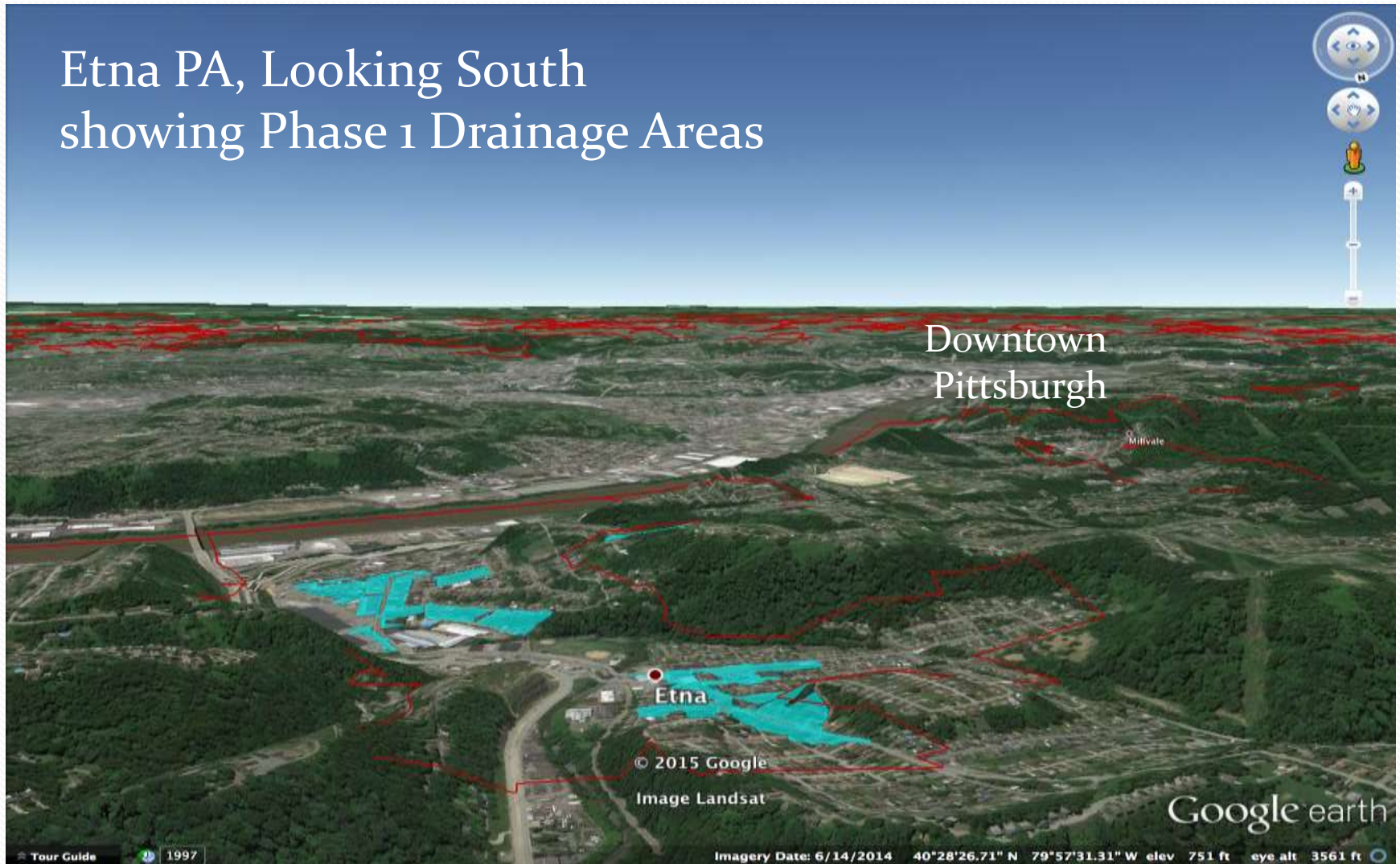
PennDOT Street Restoration and Maintenance Bonds reflect actual costs for HOP security.

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What's Next for Etna?

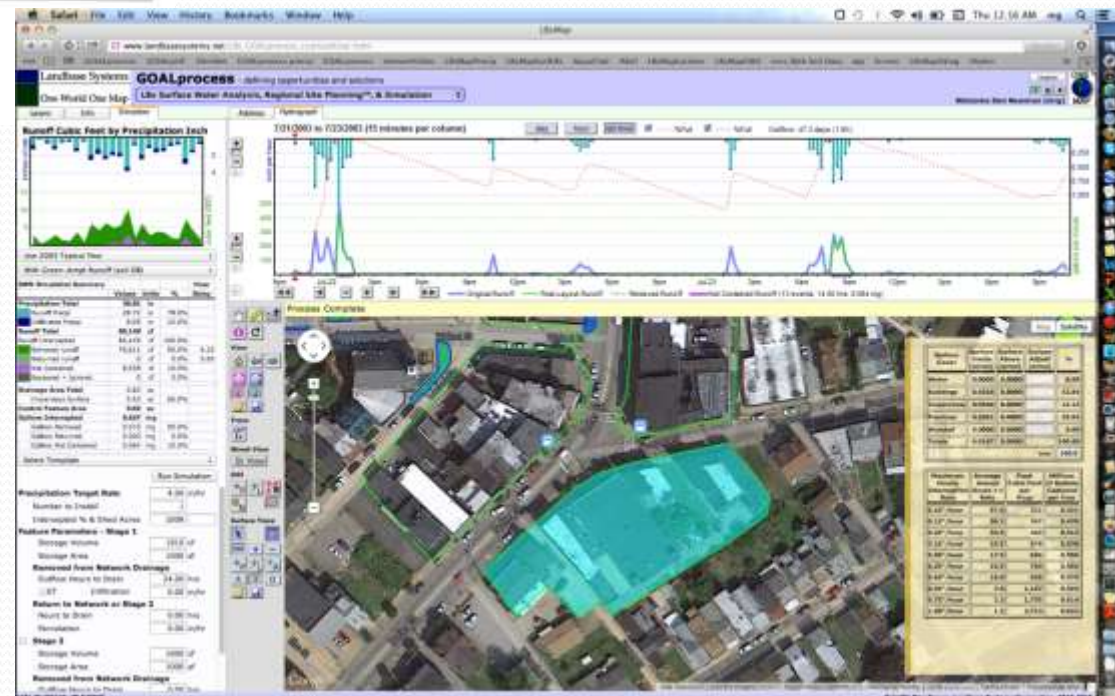
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Etna PA, Looking South
showing Phase 1 Drainage Areas



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Etna Streetscape Phase 2



The Borough of Etna Green Streetscape Phase 2



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Etna GSI Master Plan can be downloaded from the Borough's Website:

<http://www.etnaborough.org/storm-water-management.html>