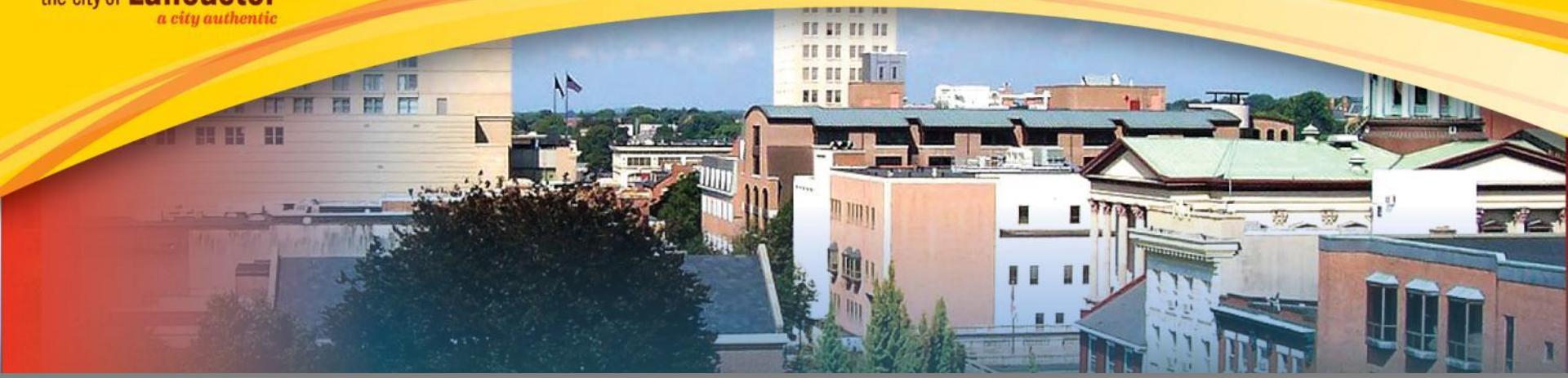
the city of Lancaster
a city authentic



MORE BANG FOR THE "GREEN" BUCK: INTEGRATING GREEN INFRASTRUCTURE AND UTC INTO EXISTING CAPITAL PROJECTS

Chesapeake UTC Summit
October 14, 2014

The City of Lancaster – Overview

- Incorporated in 1742 as a borough and in 1818 as a City
- Served as the temporary National Capital during the Revolution
- ~60,000 residents in the 2010 census
- 7.34 square miles
- Historic building stock (median home age of 100 years)
- Surrounded by some of the most productive non-irrigated farmland in the U.S.
- Environmental Justice Community

THE CHALLENGE

We are not alone! Many municipalities have combined sewer overflows (CSOs).

750 million gal. polluted stormwater discharge

= 1150 Olympic-sized swimming pools

Cost of Solutions Are Significant

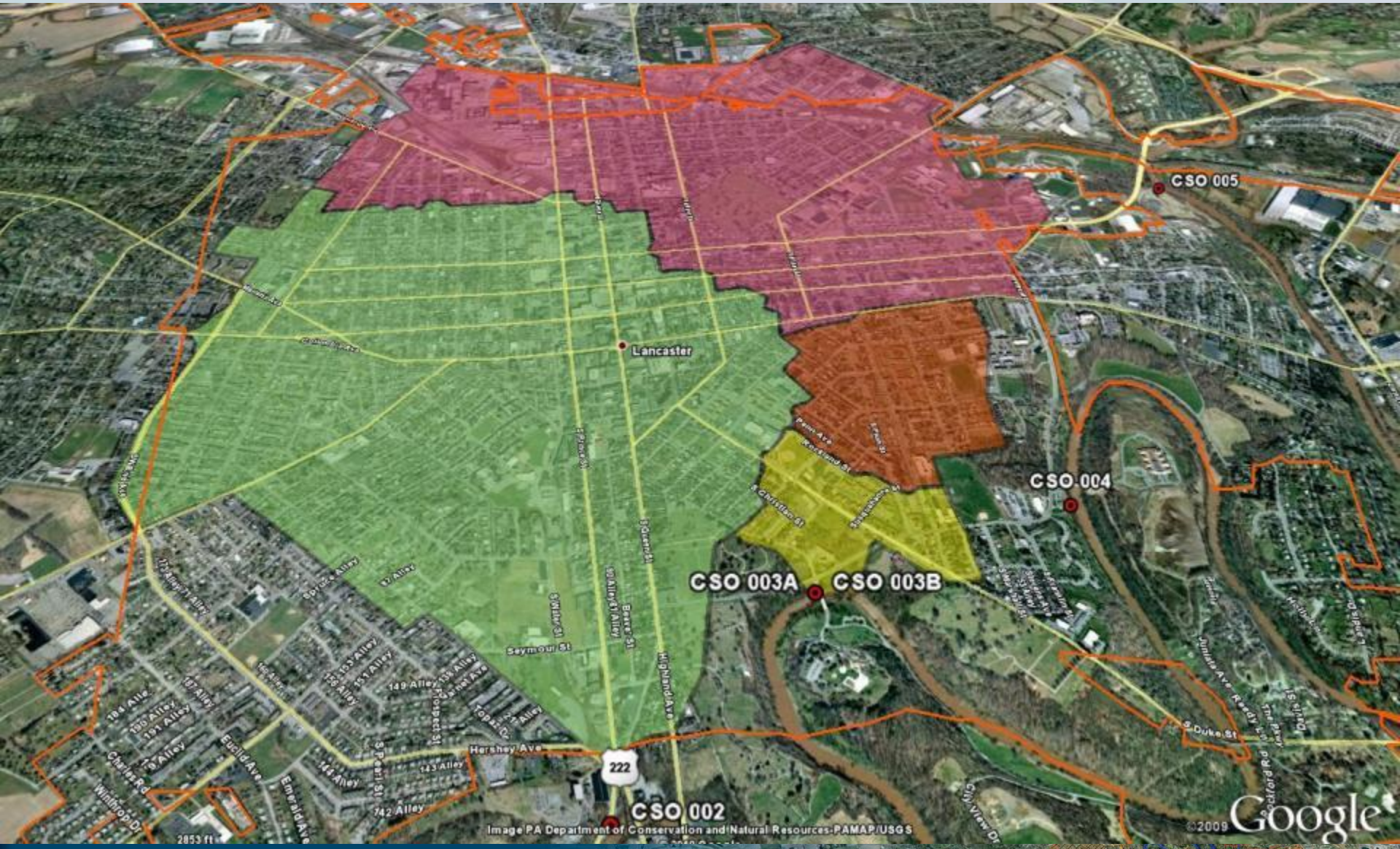
Previous Solution

Proposed Solution

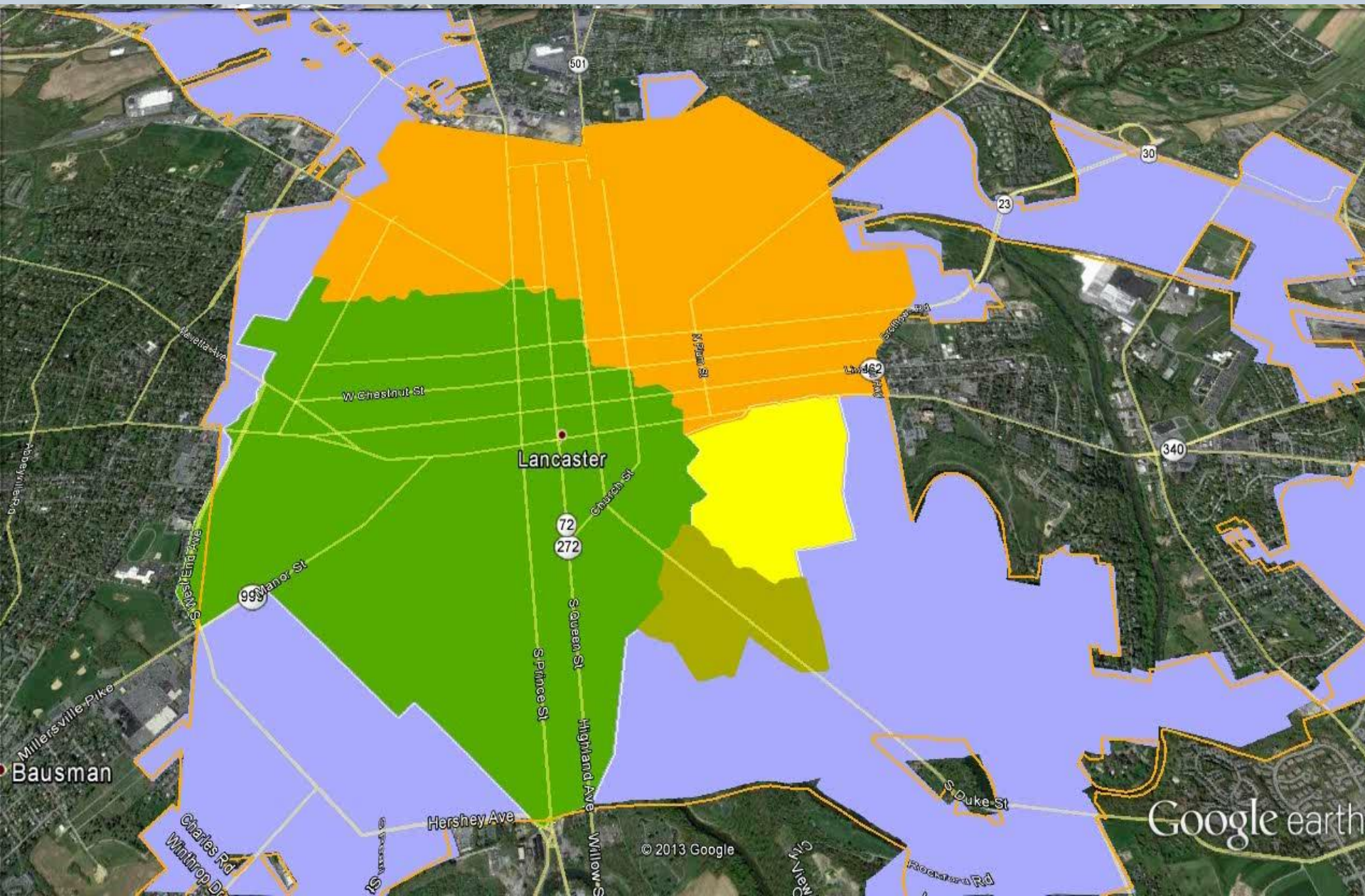
"**Lancaster is in violation** of the AO, and needs to address these deficiencies as soon as possible. Violation of the terms of the AO may result in **further EPA enforcement** action for violation of the order and for the underlying violations including, but not limited to, imposition of **administrative penalties**, 33 U.S.C § 1319(g), and/or initiation of judicial proceedings that allow for **civil penalties of up to $37,500 per day**, 33 U.S.C § 1319 (b) and (d), for each day of violation."

Doing Nothing is Not an Option

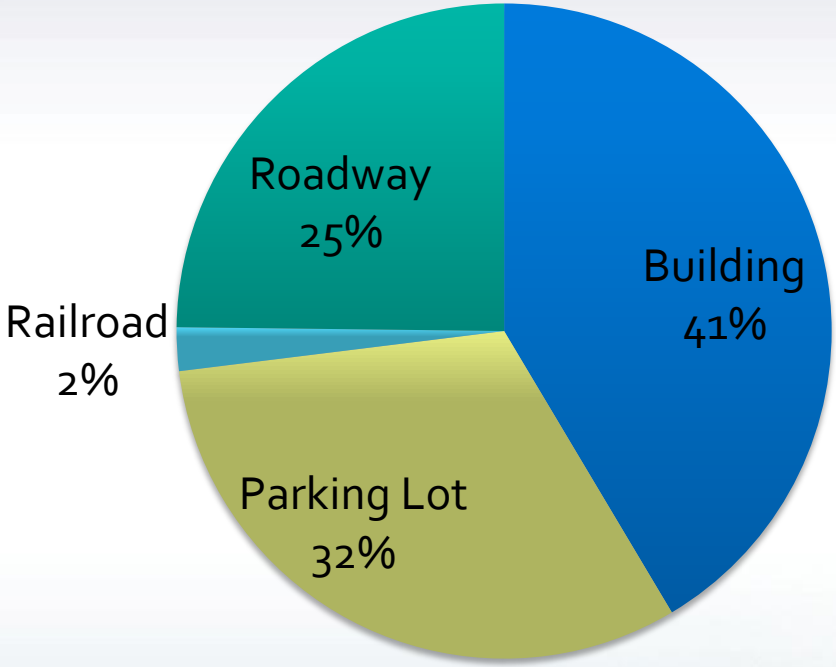
45% of the City is Served by Combined Sewers

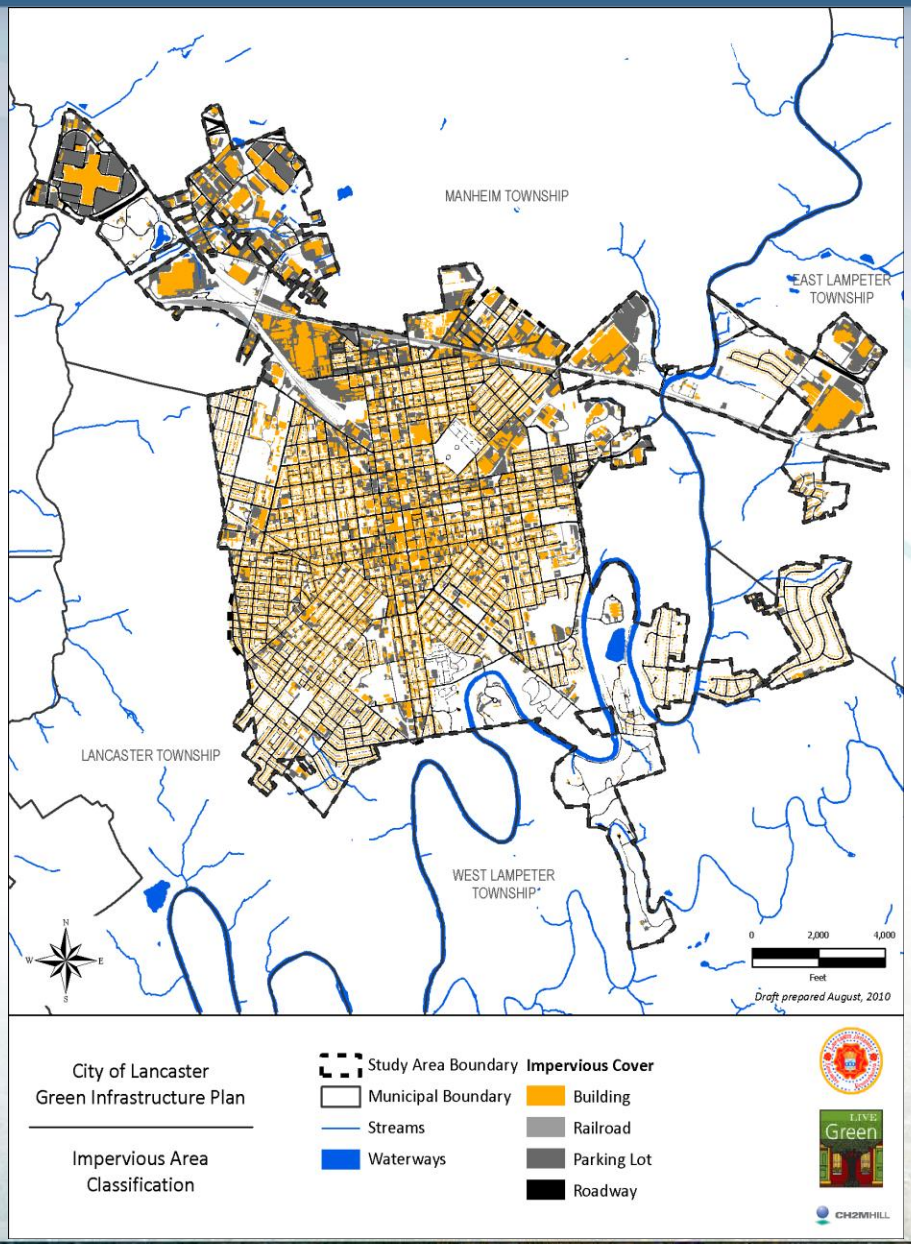


Separate Stormwater Areas



Impervious Area = 48% of city





The Green Infrastructure Benefit Calculator Projects Future Benefits for CSO and MS4 Areas

Table 5-11 – Green Infrastructure Calculator for long-term (approximately 25-year) period

Impervious Area Type | Impervious Area | Green Technology | Impervious Area Managed | Annual Runoff / Runoff Reduction

Impervious Area / Impervious Source	Impervious Contributing Area (acres)	Percent Imperv.	Green Infrastructure Project / Program Type	Assumed Percent of Impervious Area Managed	Impervious Area Managed (acres)	Total SW Runoff (MG/yr)	Assumed [illegible] BMP Capture Volume	Average Annual Runoff Reduction	Runoff Reduction (MG/yr)
Roads / Alleys	529	100%	Green Streets	30%	159	513	1.0	86%	132.4
Parks	241	8%	Park Improvements / Greening	85%	17.0	19	1.0	86%	14.2
Sidewalks	124	100%	Disconnection, Porous Pavement	35%	43.3	120	1.0	86%	36.1
Parking Lots	648	100%	Porous Pavement, Bioretention	20%	130	628	2.0	97%	121.3
Flat Roofs	218	100%	Vegetated Roofs / Disconnection	15%	32.7	212	1.0	86%	27.3
Sloping Roofs	654	100%	Disconnection/Rain Gardens	25%	164	635	1.0	86%	136.5
Street Trees	N/A	N/A	Enhanced Tree Planting	N/A	45.1	44	0.3	49%	21.5
Public Schools	175	29%	Green Schools	75%	38.4	50	1.0	86%	32.0
Various (Ordinance)	1274	100%	First-Flush Ordinance	50%	637	1236	1.0	86%	531.6
Total					**1,265**	**3,752**			**1,053**
					55%				

Pollutant Load Reductions

Pollutant	Average Stormwater Concentration* (mg/L)	Average CSO Discharge Concentration* (mg/L)	Pollutant Reduction from Stormwater (lb/yr)	Pollutant Reduction from CSOs (lb/yr)	Total Est. Pollutant Reduction (lb/yr)
Total Suspended Solids (TSS)	[illegible]	[illegible]	[illegible]	[illegible]	1,457,000
Total Phosphorus (TP)	1.2	5.5	3,485	24,267	27,800
Total Nitrogen (TN)	0.7	13.5	2,033	59,564	61,600

Based on the midpoint pollutant concentrations in USEPA's CSO Report to Congress, 2001

25-Year Plan to manage over 1,200 Acres of Impervious Area
Capture over 1 Billion Gallons of Stormwater Runoff over the long term

THE APPROACH

Green Parks

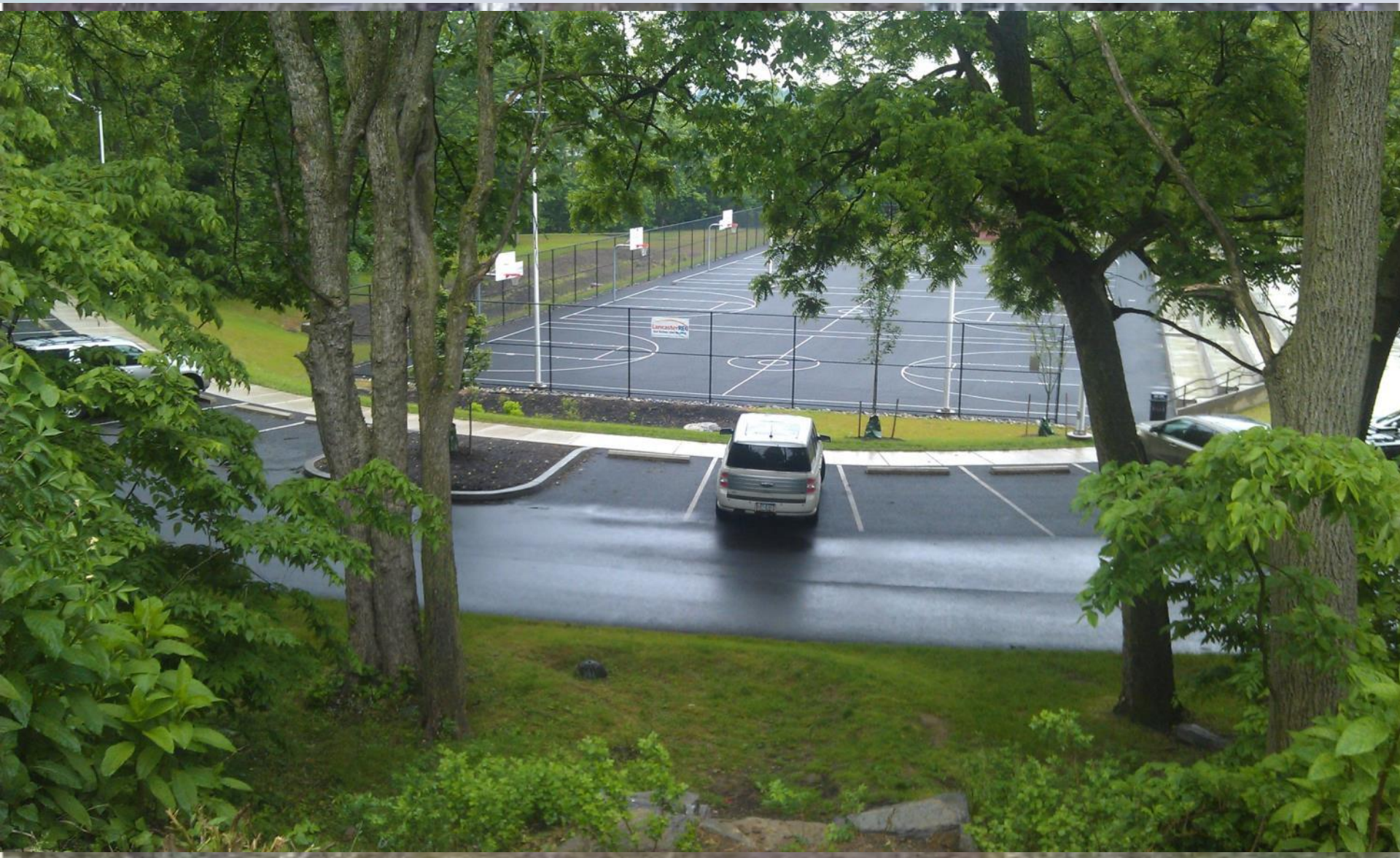

Lancaster
Bausman
W Chestnut St
W King St
Columbia Ave
Millersville Pike
Hershey Ave
S Queen St
Highland Ave
Willow Street Pike
S Duke St
Millport Rd
Eshelman Mill Rd
Wabank St
999
72
272
324
462
501
30
23
©2010 Google

Brandon Park

4 Million Gallons / year reduction in runoff volume
$0.15 / gal

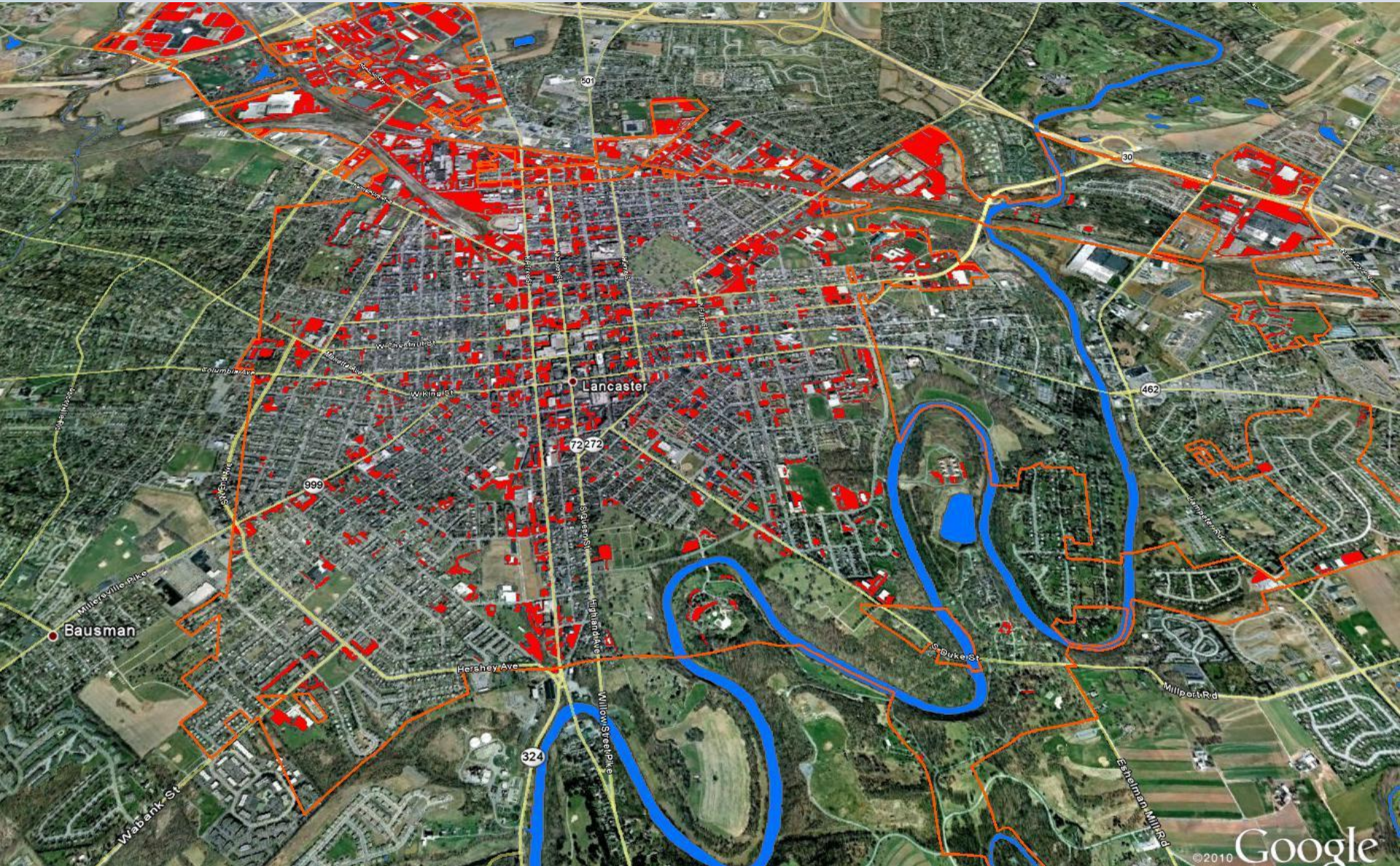
Brandon Park – Wabank St. Curb Extensions

Brandon Park

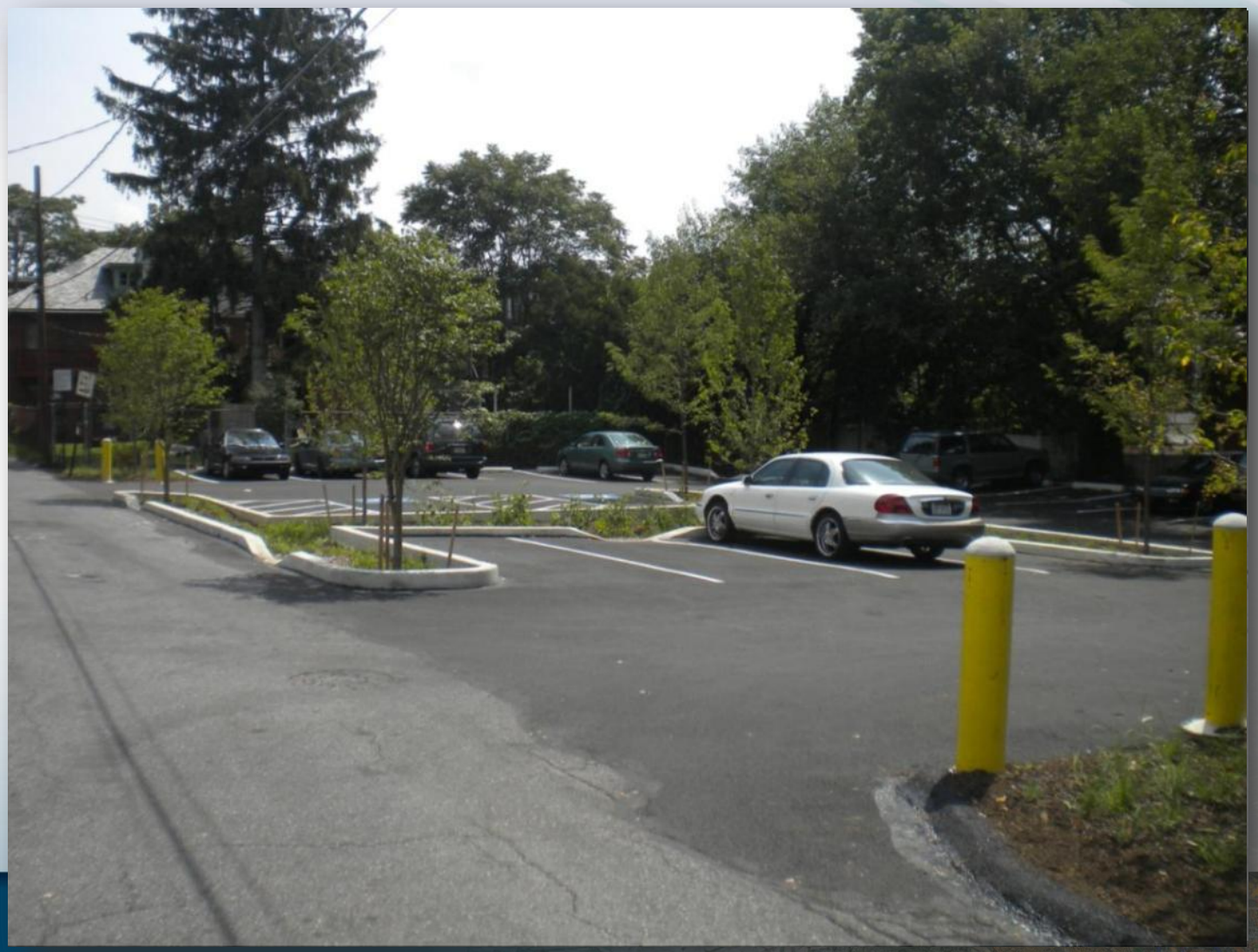


Brandon Park

Parking Lots



Mifflin Street Parking Lot



Plum Street Parking Lot

Summary of city-owned parking lots retrofit projects

Parking Lot	Drainage Area	GI Area	Capture Volume	Capital Costs with Contingency
Plum Street	23,402	4,680	511,000	$89,862
Dauphin	20,582	4,516	411,000	$61,822
Penn	22,758	4,219	455,000	$60,749
Mifflin	13,242	1,324	265,000	$27,013
TOTAL			1,642,000	$239,446

COST PER GALLON = $0.14/gallon

Green Roofs

Over 100,000 square feet of green roofs in Lancaster City. Ten green roofs in PENNVEST funding planned. This is the green roof being added onto the city hall annex project.

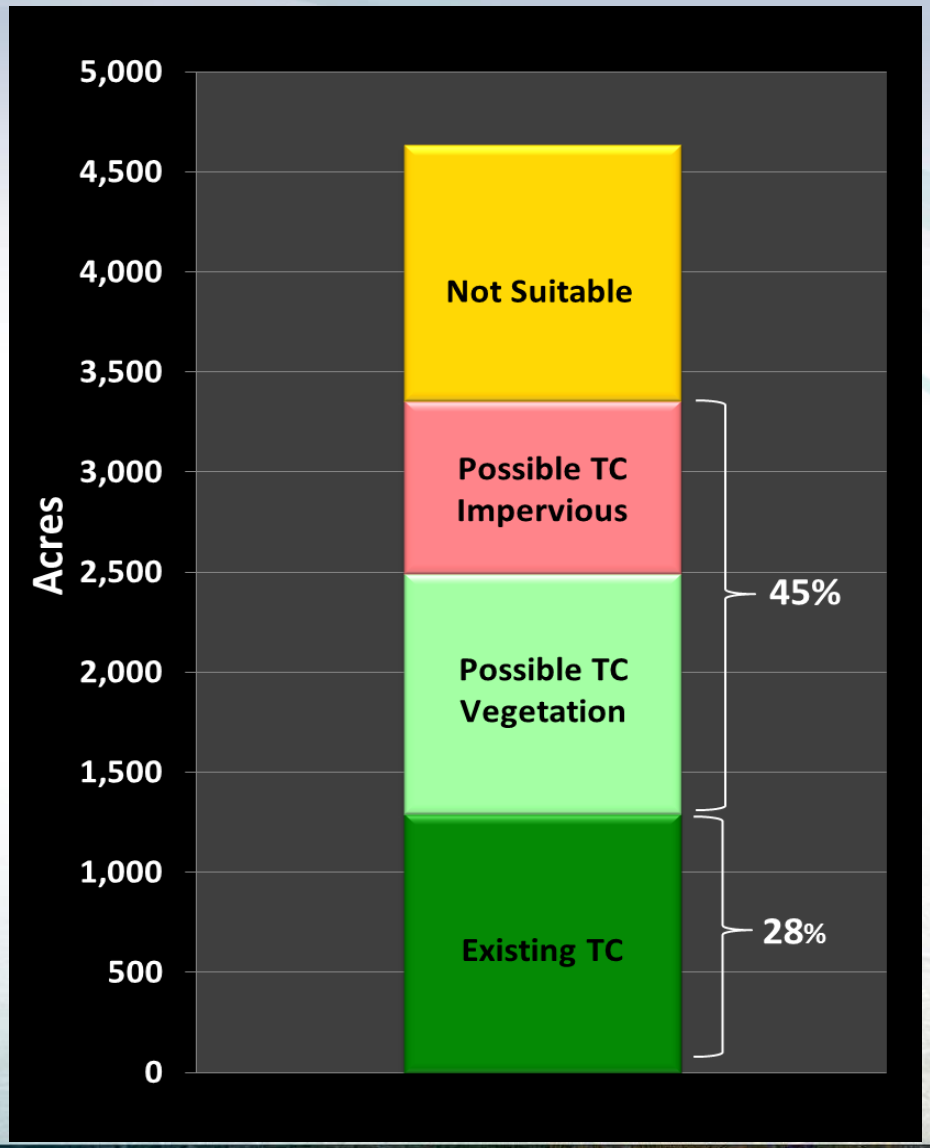
INCORPORATING UTC INTO GREEN STREETS

Urban Tree Canopy

- **Current: 28%**
- **Potential: 45%**
- **Goal: 40%**

Not just about Environmental Benefits:

- Clean Air
- Curbing Heat Island Effect (shading and cooling)
- AND of course Stormwater Management



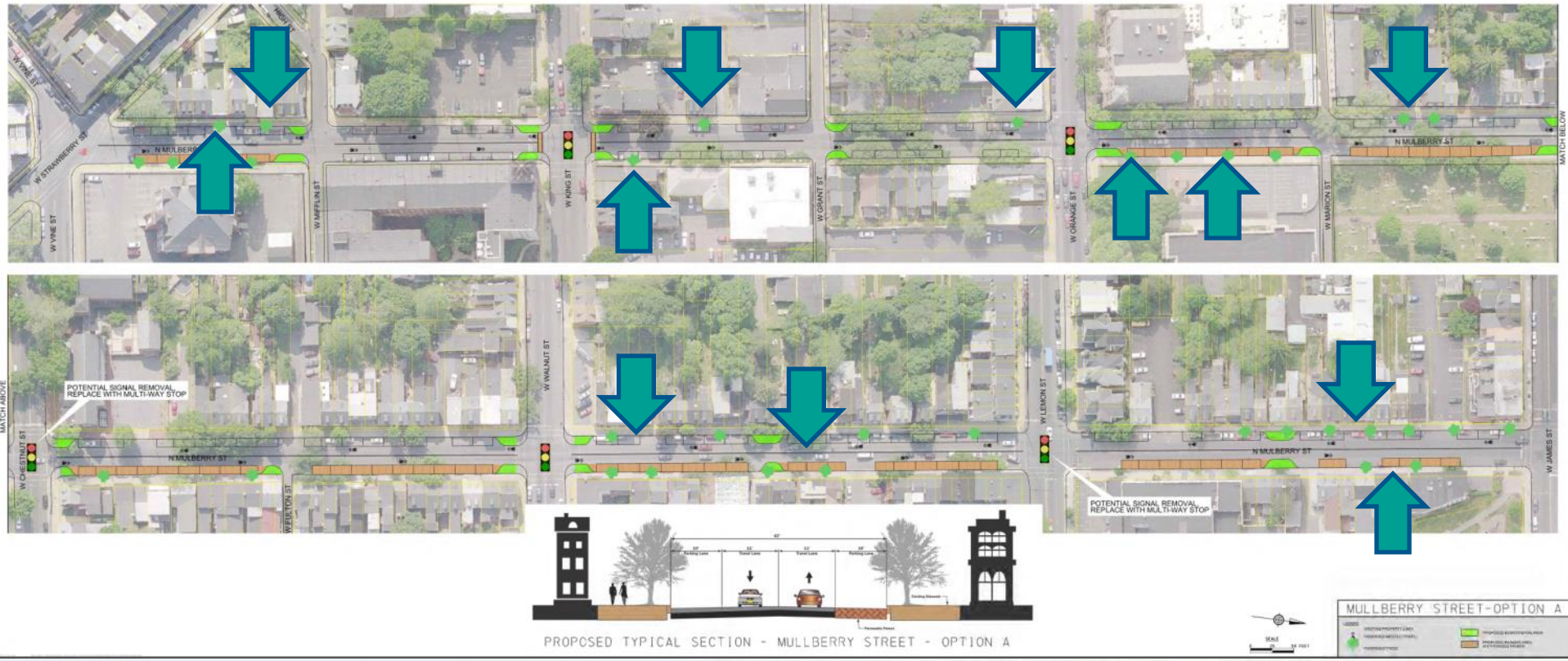
Benefits of Tree Canopy in EJC

- **There is growing interest in the public health benefits from the presence of nature and trees in the urban environment. Research is being conducted on several aspects of these benefits including creating environments conducive to an active lifestyle, reducing stress and violence, and positively affecting behavior. [1]**

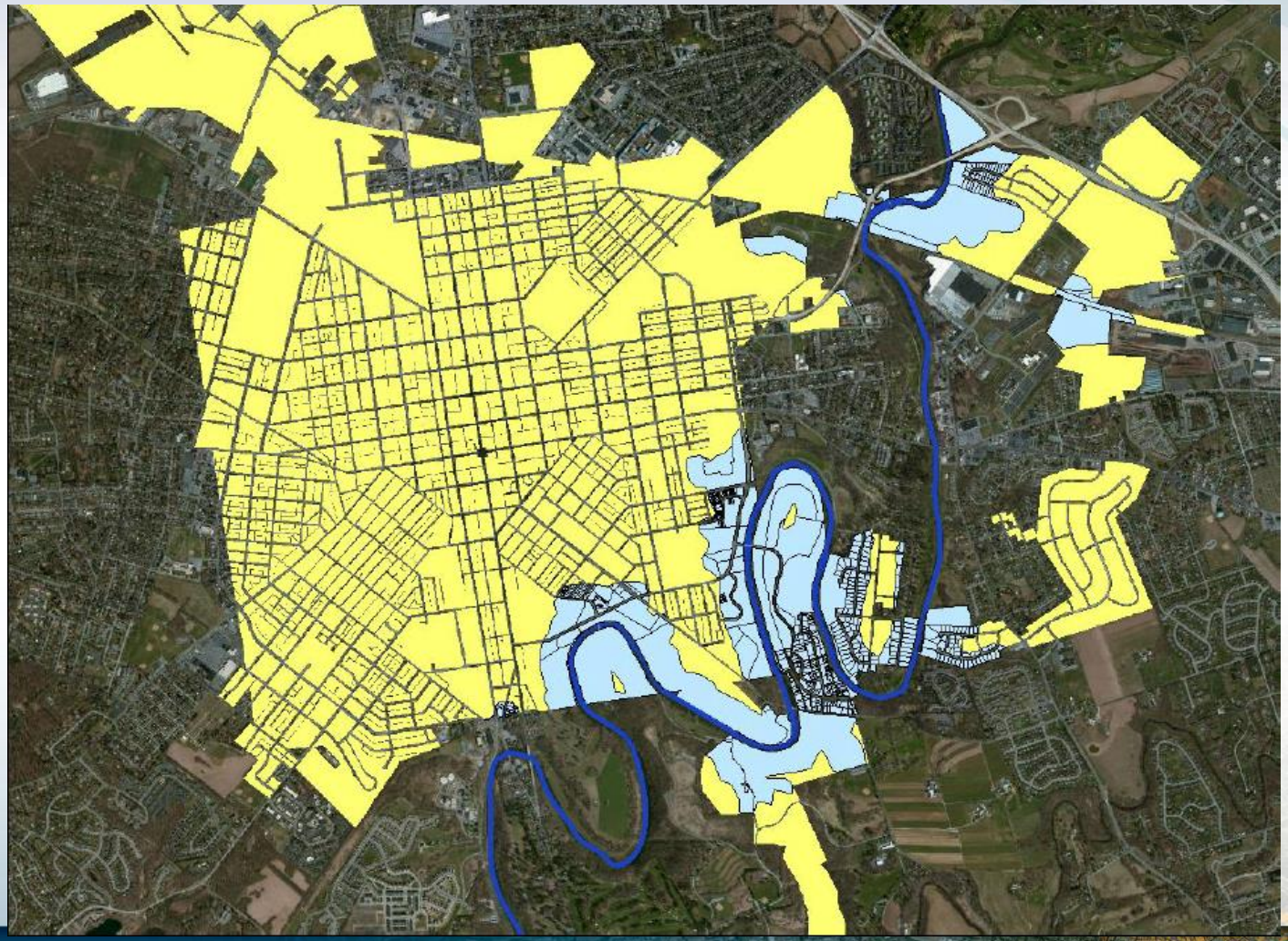
- **Create spaces fit for active and passive recreation to combat obesity**
- **Decrease physical and emotional stress**
- **Reduce violence**
- **Effect on girls decision making**
- **Effect of green settings on ADD**

Canopy – Public Benefits of Trees, Catherine Martineau 2/15/2011

Mulberry street two-way conversion project



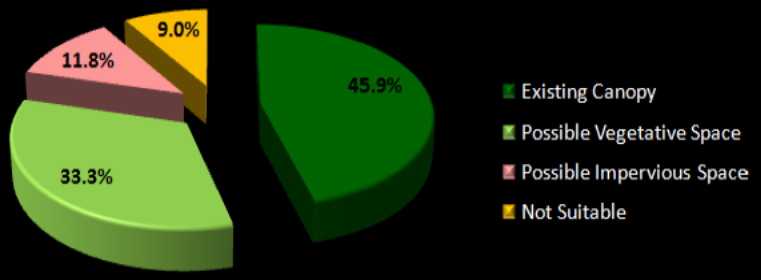
CONESTOGA RIVER RIPARIAN BUFFER



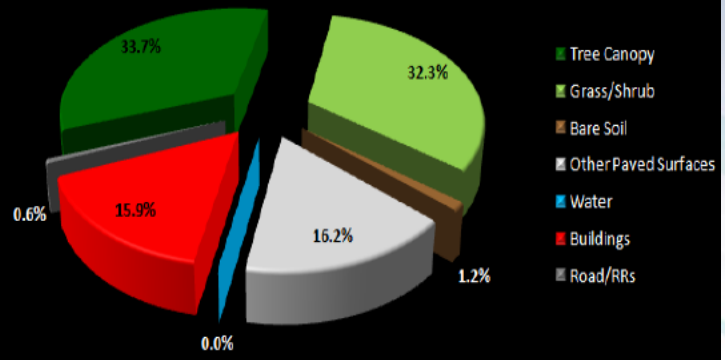
Tree Canopy (TC) metrics

432 acres of existing tree canopy	46%
313 acres of possible vegetative space	33%
111 acres of possible impervious space	12%
85 acres not suitable	9%

Conestoga River City Parcels TC Metrics (%)
(w/in 500' of river)

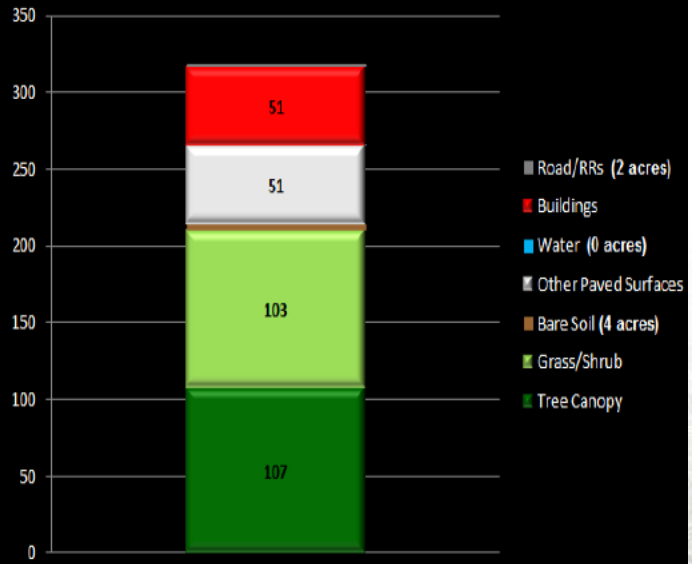


Conestoga River City Parcels Land Cover Metrics (%)
(w/in 500' of river)



Conestoga River City Parcels TC Metrics (acres)
(w/in 500' of river)

Conestoga River City Parcels Land Cover Metrics (acres) (w/in 500' of river)



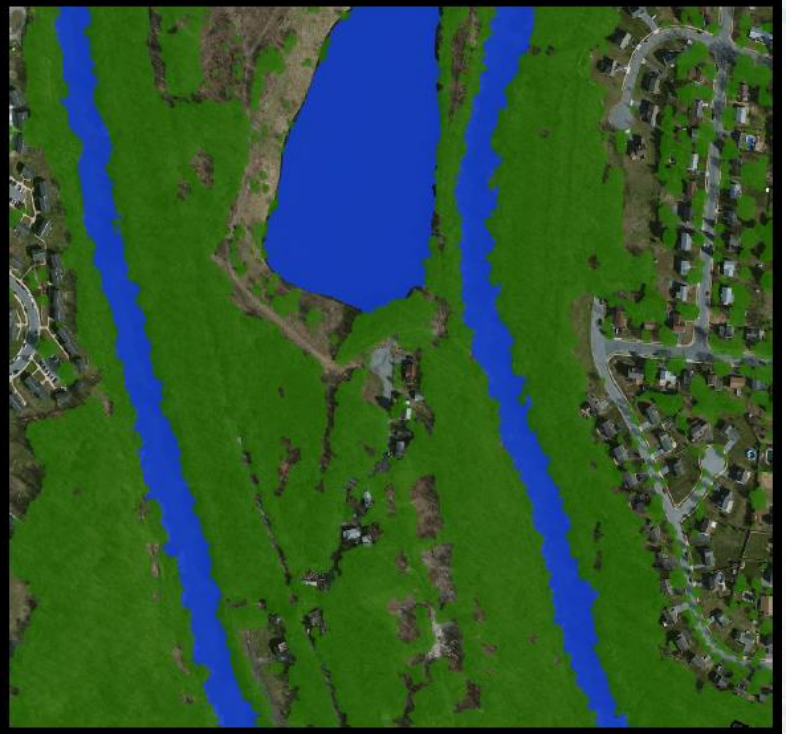
- 1% canopy increase for the riparian area of the Conestoga for every 580 trees added
- = ½ of the required tree #'s needed per year to reach City 40% goal

Priority Scenarios

- Parcels with less than the City's overall TC % (28%) and more than 2000 sq ft of impervious

Other scenarios

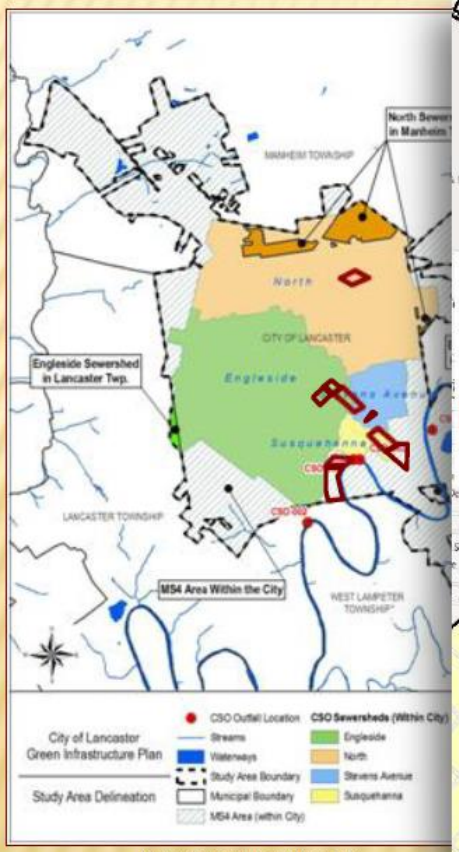
- Low tree canopy, lots of space
- Steep slopes
- Different buffer widths
- Land use
- Locate gaps to encourage contiguous canopy



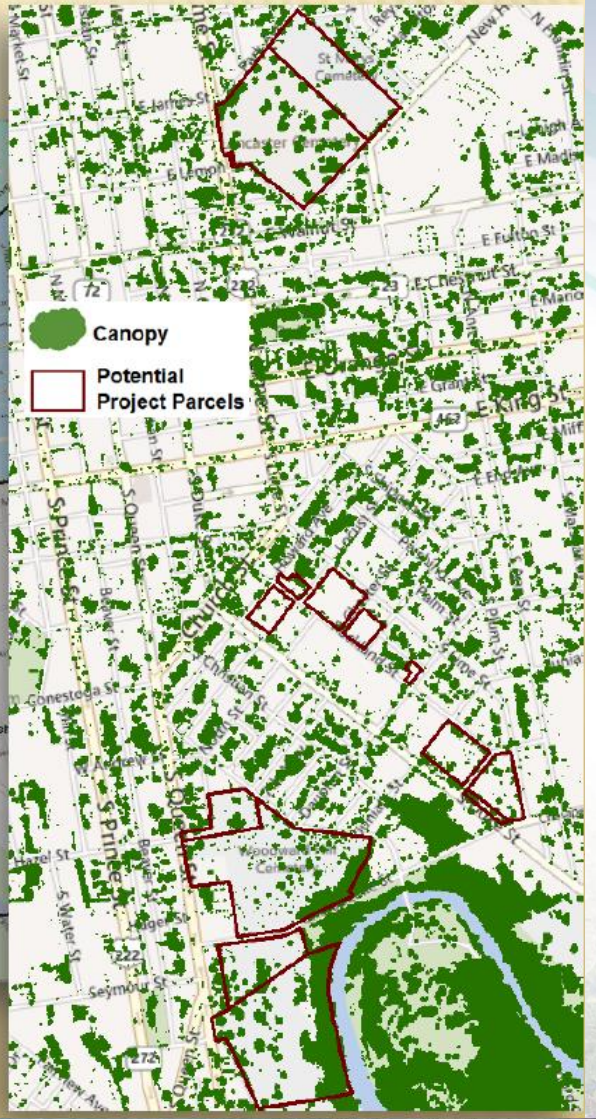
CHESAPEAKE BAY COMMISSION GRANT

CEMETERY CANOPY PLAN

POTENTIAL PROJECTS



(Parcel locations not exact)



POTENTIAL PROJECTS

Metrics-based

Existing Canopy % ≤ 10.5%
AND
Plantable Veg. Area ≥ 34000 ft²

Hillrise Mutual Co-op

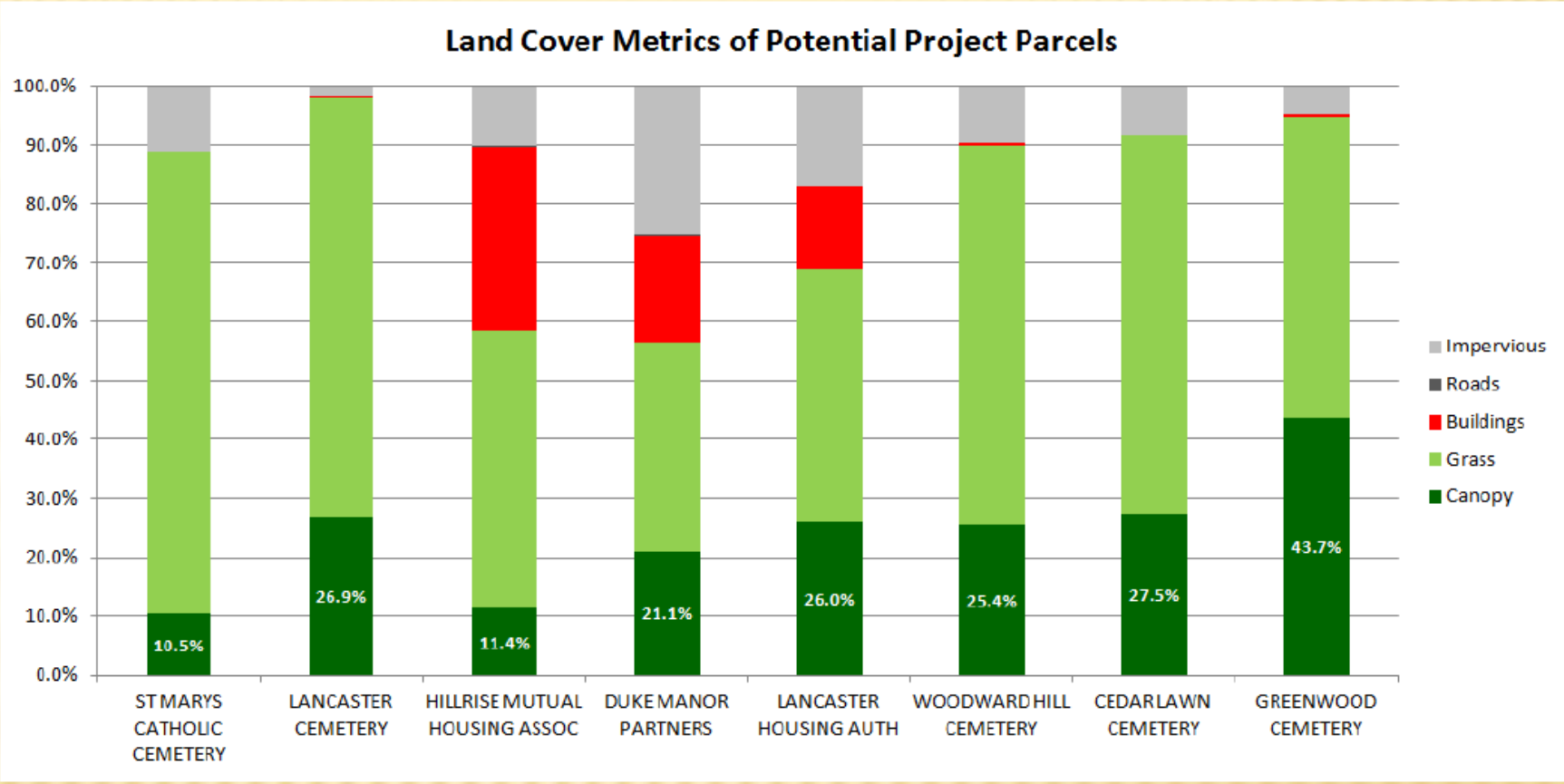
Most plantable area

Woodward Hill Cemetery

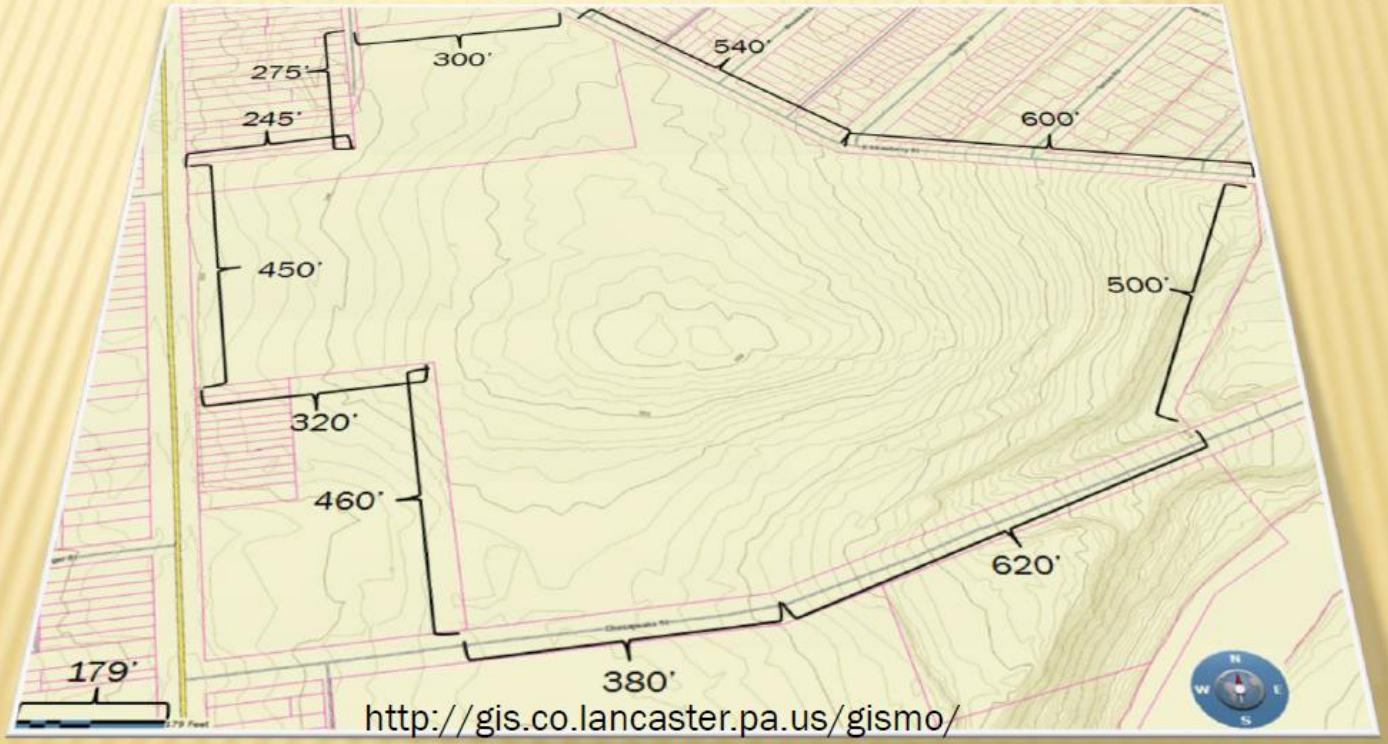
Pilot approach

Duke Manor Apartments

POTENTIAL PROJECTS

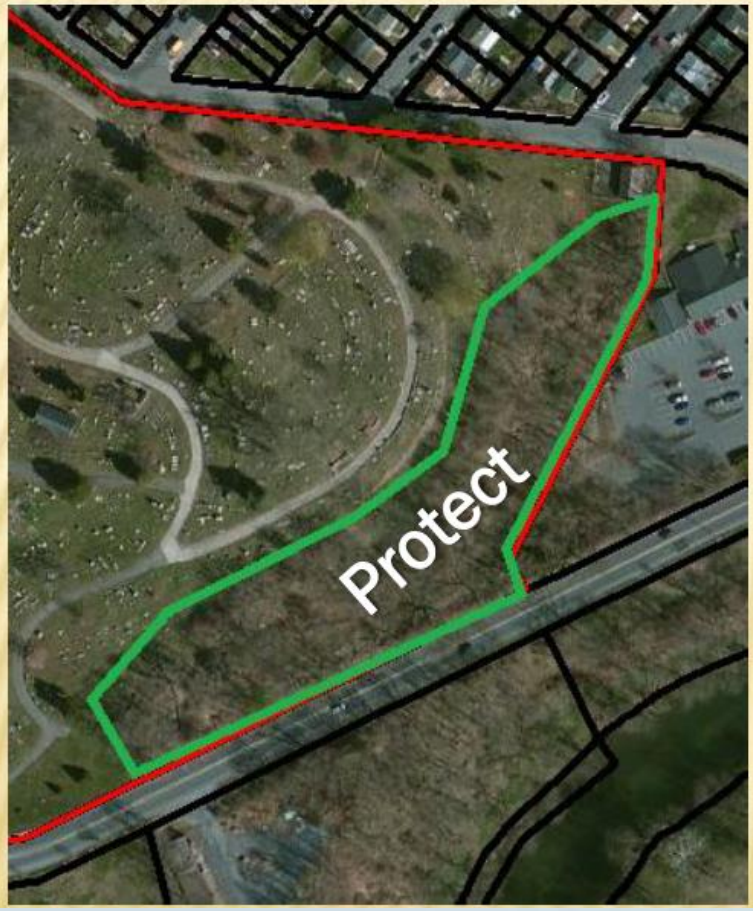


SELECTED PROJECT:
WOODWARD HILL CEMETERY



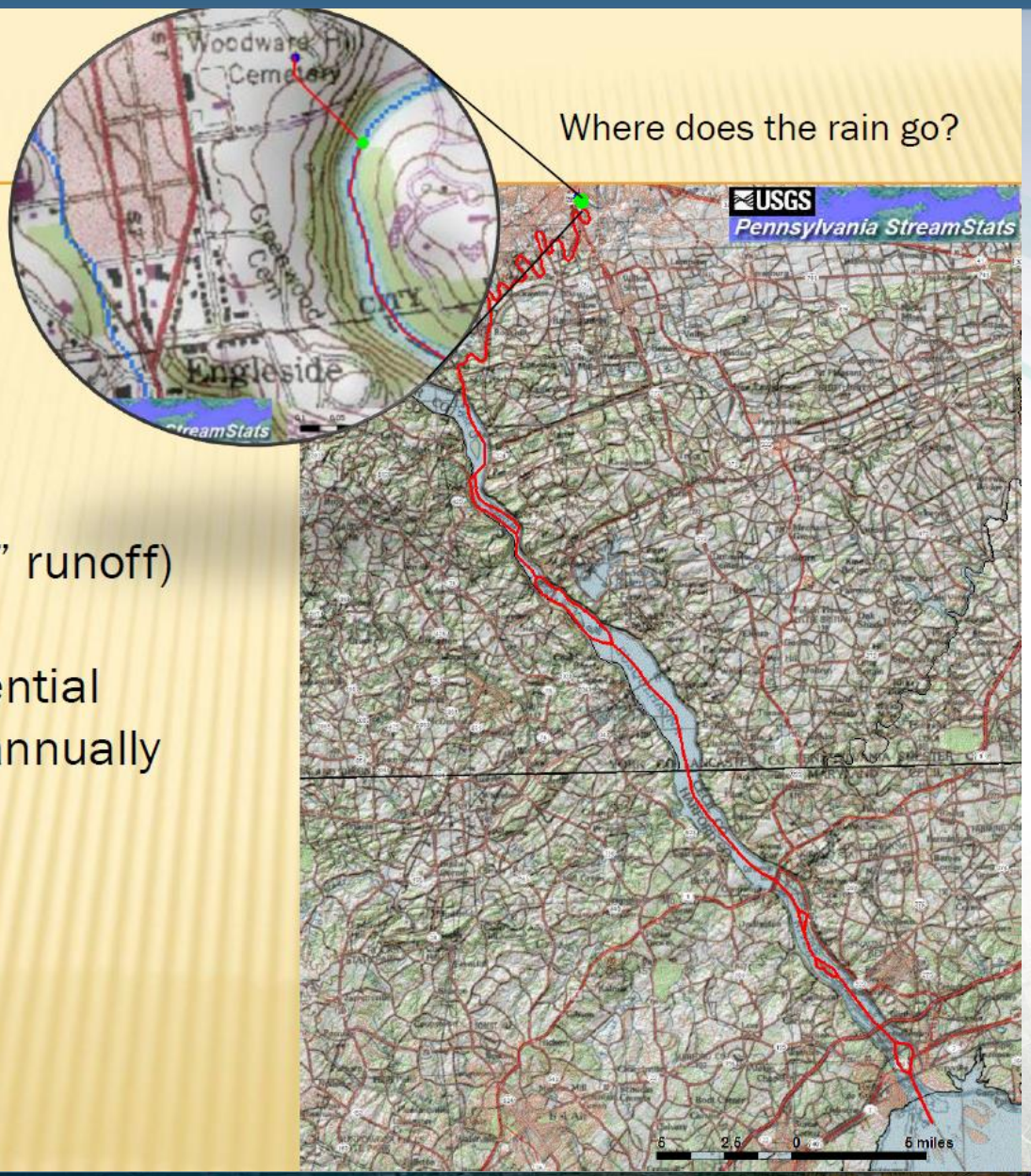
http://gis.co.lancaster.pa.us/gismo/

MAINTAIN CANOPY



MAINTAIN CHARACTER

RUNOFF



22.5 pervious acres
(Uc soil =“very high” runoff)
2.5 impervious acres
5 million gallons of potential stormwater runoff annually

STRATEGY

Woodward Hill Cemetery	
Year of implementation	2012
Years of UTC goal	2
Goal to be completed by	2014
Total Land Area (ac)	25

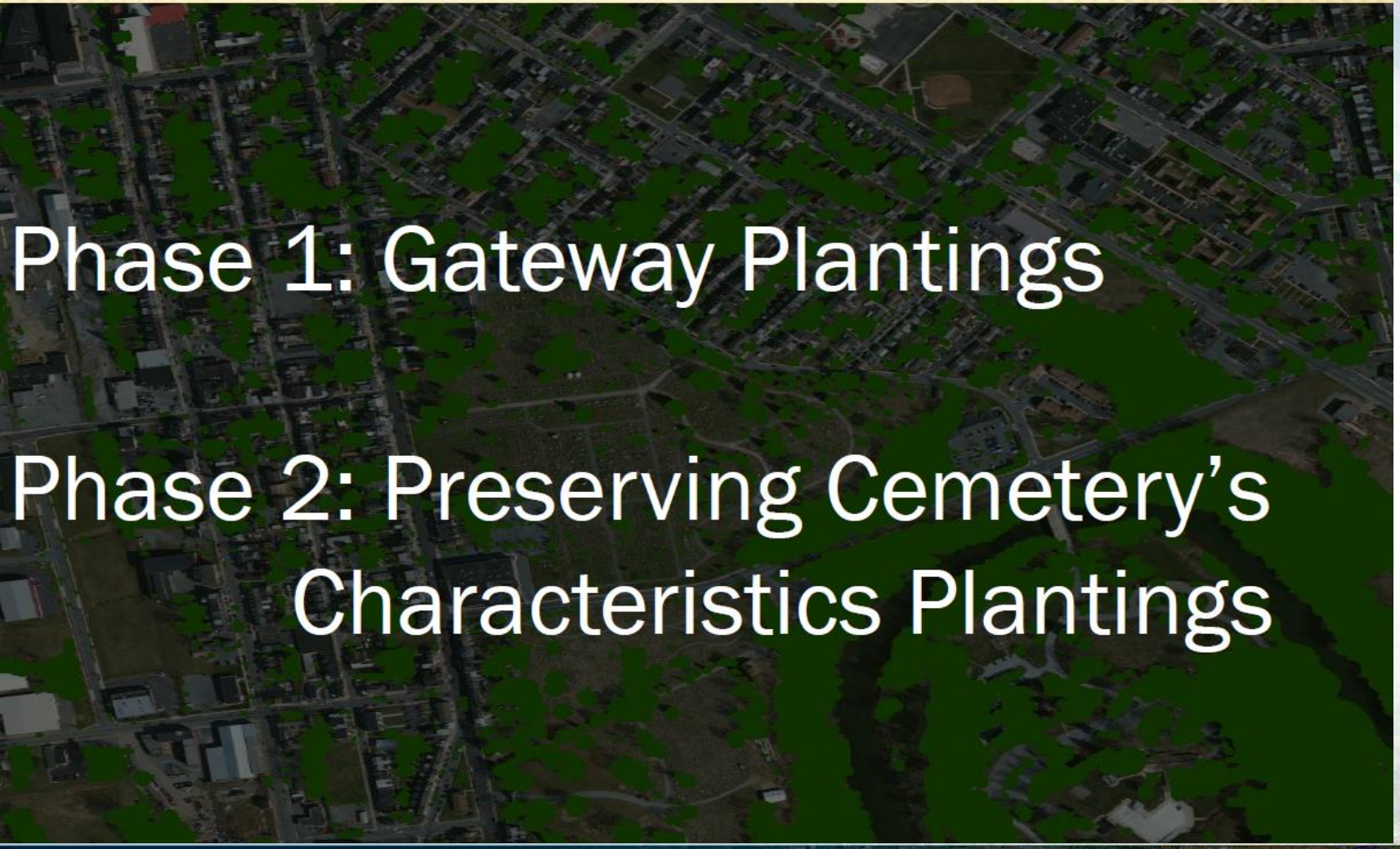
Current TC%		Goal	% increase	Total Trees Needed	Trees/yr
25%	Scenarios	28%	3%	31	16
		30%	5%	55	28
		32%	7%	79	40
		35%	10%	115	58
		40%	15%	175	88

CHOOSE A SCENARIO

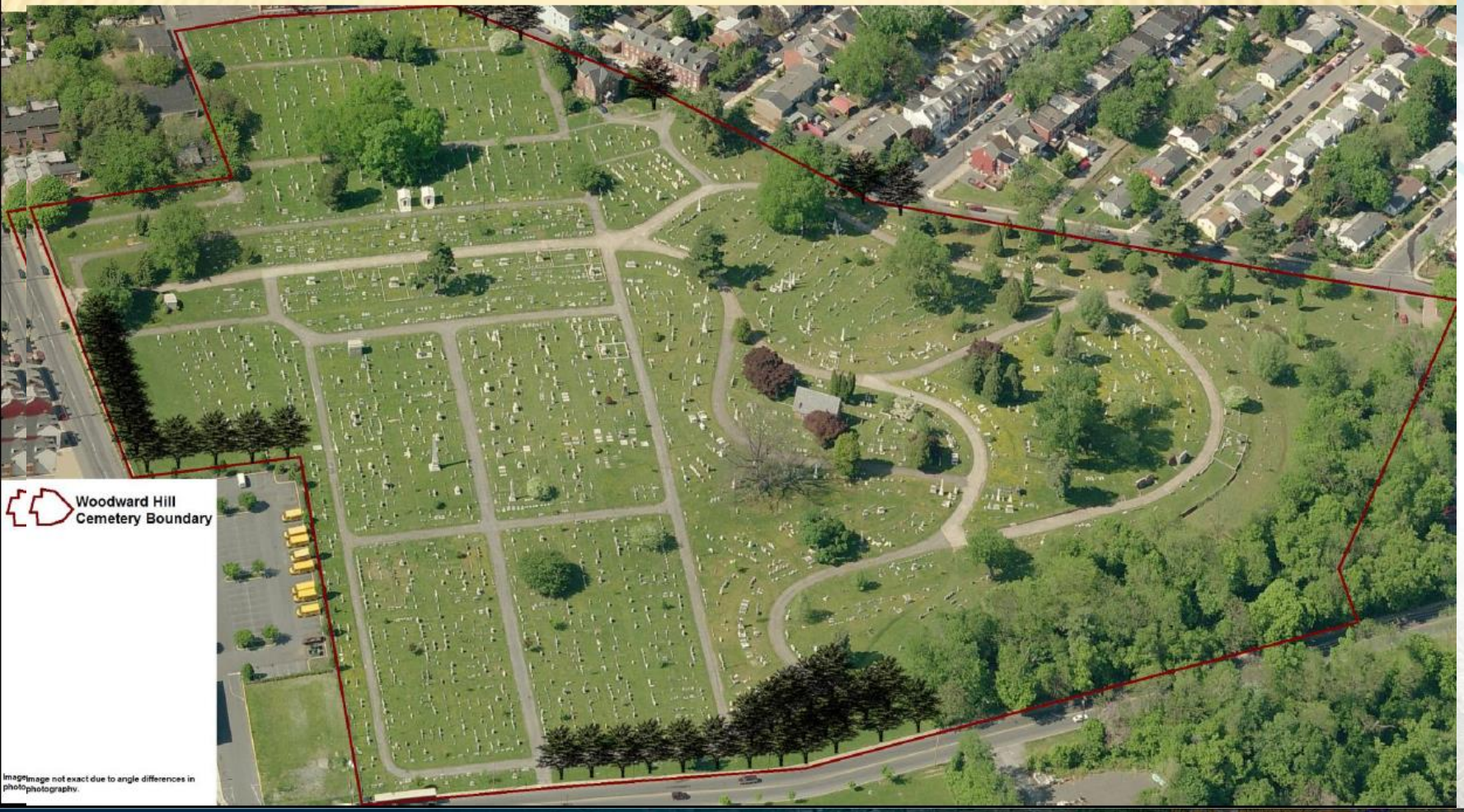
Suggested:

80 trees in 2 years = 32%

PHASES

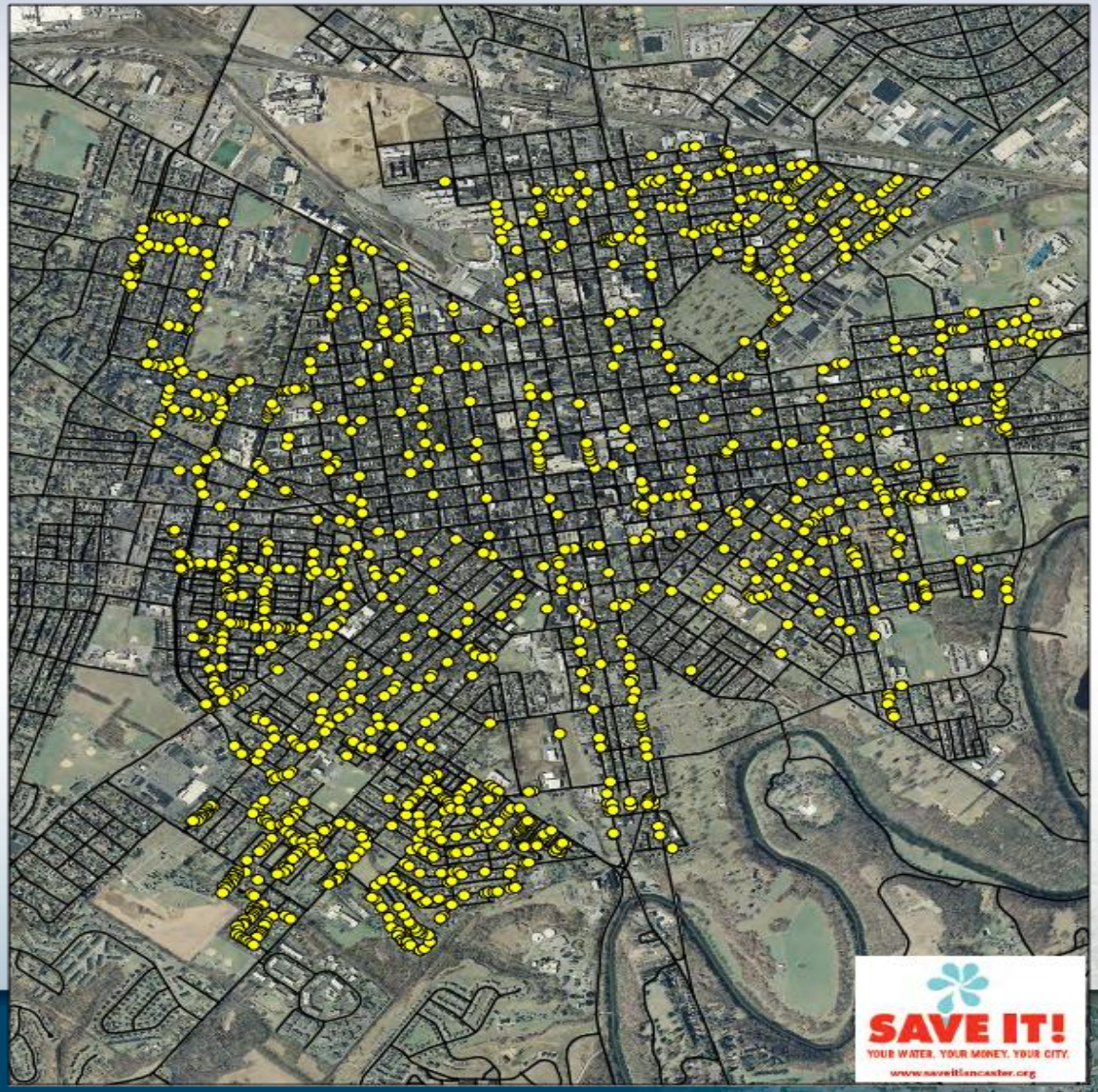

Phase 1: Gateway Plantings
Phase 2: Preserving Cemetery's Characteristics Plantings

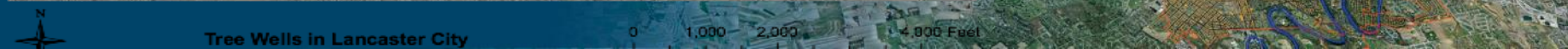
GATEWAY PLANTINGS



GATEWAY PLANTINGS

Empty Tree Wells



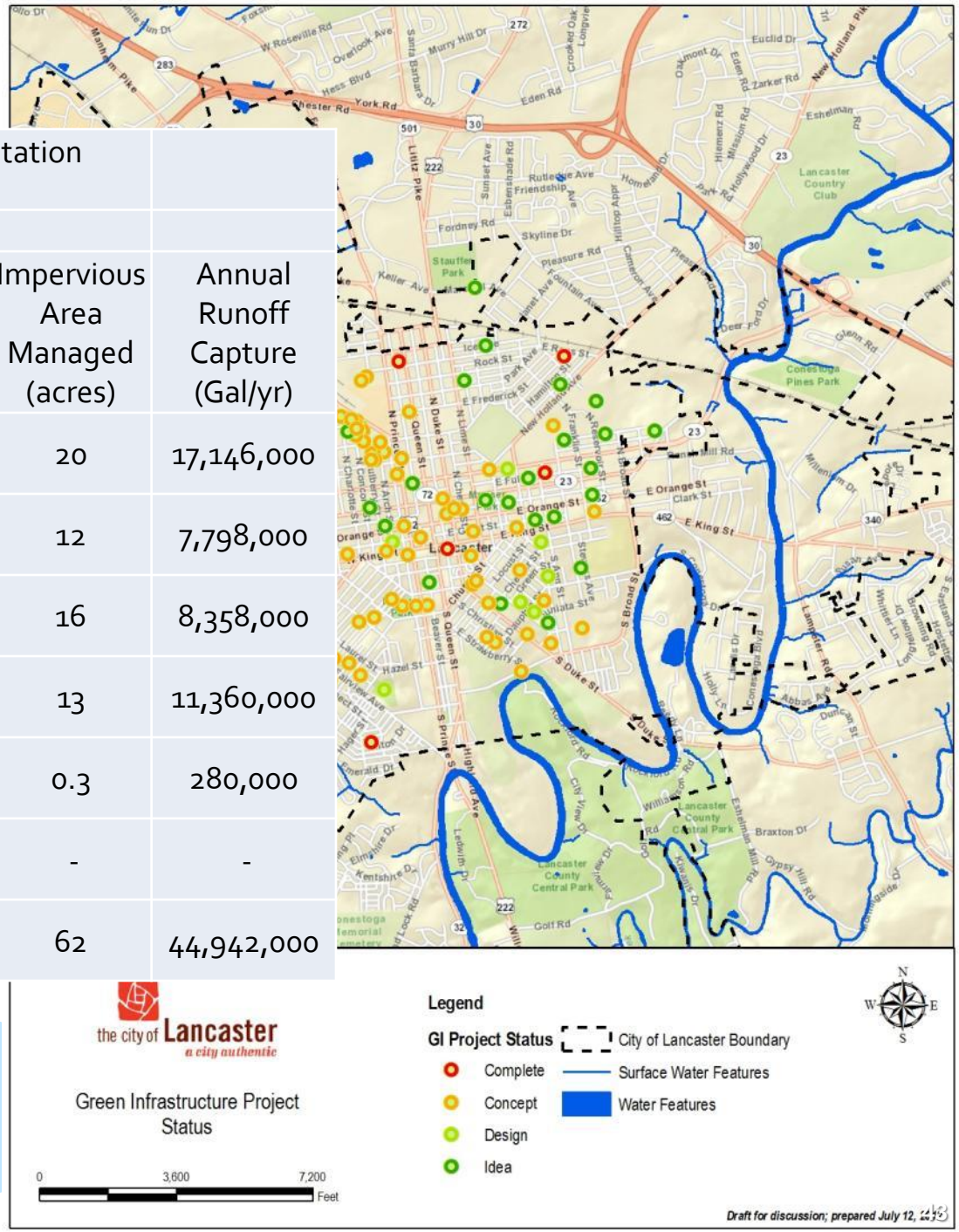


Status

Summary of Green Infrastructure Program Implementation
Status as of 03/28/14

Status	Number of Projects	Impervious Area Managed (sq. ft.)	Impervious Area Managed (acres)	Annual Runoff Capture (Gal/yr)
Constructed / Under Construction	44	891,000	20	17,146,000
In Design for Construction	12	530,000	12	7,798,000
Conceptual Designs (non-PV/GGP)	26	696,000	16	8,358,000
PENNVEST Concepts	25	555,000	13	11,360,000
Growing Greener Plus Concepts	1	14,000	0.3	280,000
In Project Planning	51	-	-	-
Total	159	2,686,000	62	44,942,000

$3.64 M in grants used to date
Matched by $3.7 M in local/city funds



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save it lancaster

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SAVE IT!

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YOUR MONEY.
YOUR CITY.

the city of Lancaster
a city authentic

What's the Problem? | What Can I Do? | Benefits | Local Projects | Resources | What's New? | FAQs

WATER HEROES

Chestnut Hill For Doreen Landis, Chestnut Hill Cafe's owner, Lancaster City's stormwater problem hits home. Literally.

Your Water.
Your Money.
Your City.

Lancaster, you can help

SAVE IT!

Lancaster City needs to save 750 million gallons of water annually from entering its combined sewer system to preserve clean drinking water, avoid costly fines and continue to build a healthy, vibrant community. Join our list serve and stay informed!

Enter your email

BABY STEPS:
I've got 5 minutes, What can I do?
Take a shower instead of a bath

BIG STEPS:
I've got 5 hours, What can I do?
Install a rain barrel

GIANT STEPS:
I've got 5 days, What can I do?
Install a green roof

QUESTIONS?

Contact information

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  Director of Public Works, City of Lancaster
- **ckatzenm@cityoflancasterpa.com**
  717-291-4739