



CITY OF  
LANCASTER  
*A City Authentic*

# Stormwater Management in Lancaster City, PA

Douglas Smith , Sustainability Planner



# PROBLEM

Lancaster is one of about 770 cities nationwide with a combined sewer system, which releases about 1 billion gallons of untreated wastewater into the Conestoga River when overwhelmed during intense rainstorms.

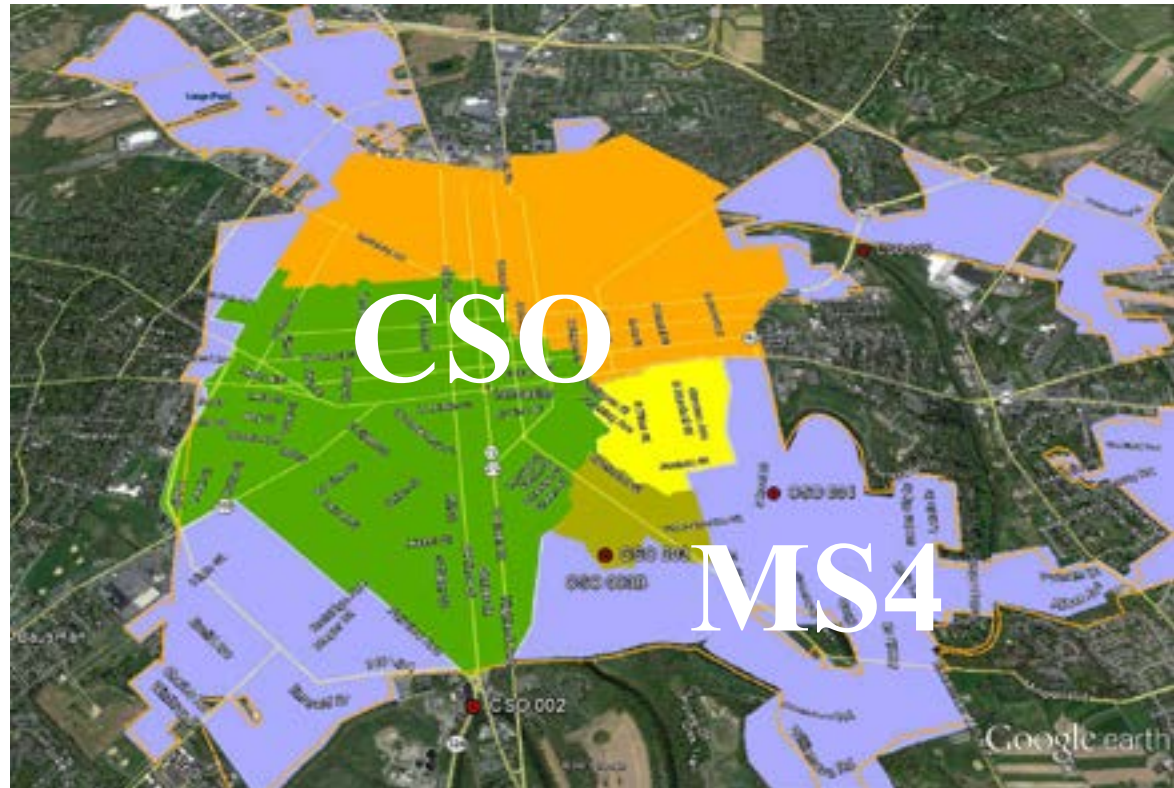
**45% CSS**  
**55% MS4**

**518 miles**  
streets and alleys

**464 of 572 alleys**  
are common alleys

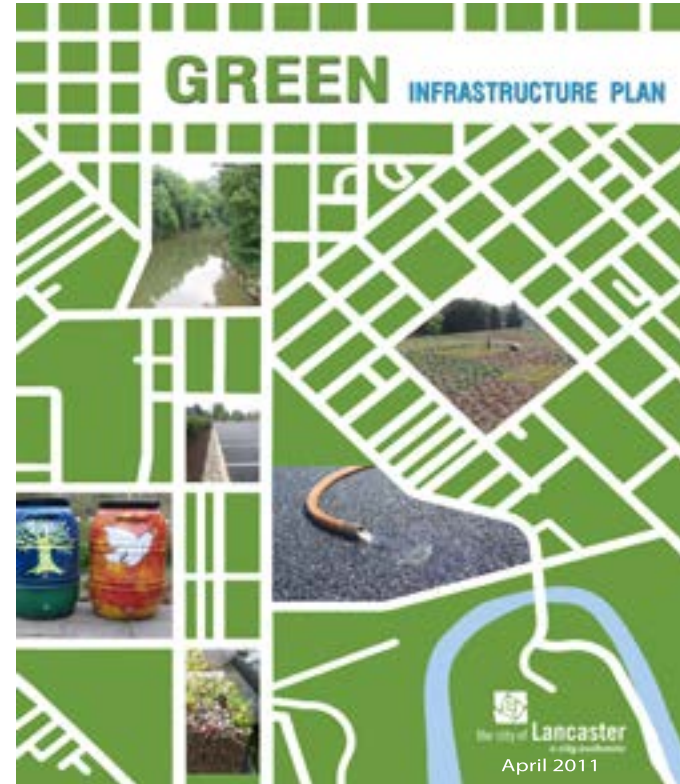
**500 +acres**  
surface parking lots

**17,000+**  
private parcels of land



# MISSION

*“To provide more livable, sustainable neighborhoods for City residents and reduce combined sewer overflows and nutrient loads.”*



**Extensive GIS analysis is used to map impervious areas and develop conceptual green infrastructure projects. Following field verification and design, over 40 demonstrations projects have been constructed and about 20 more are in design or under construction**



# GOALS

## Community

Strengthen the City's economy and improve health by linking clean water to community improvements

## Livability

Create a green infrastructure program that makes Lancaster attractive, safe, interesting, and alive.

## Sustainability

Emplify a triple bottom line approach (Environment, Economy, and Equity) to green infrastructure design.

## Vitality

Achieve lower cost and higher benefit from the City's infrastructure in a way that attracts investment and ensures economic vitality for residents and business.



# PLANNING & DESIGN:

The City of Lancaster is in the Lower Susquehanna River Basin, tributary to the



The GI Plan Proposes to Manage Approx. 1,200 Acres Impervious Area and 750 MG of Stormwater Runoff within 25

**Park Improvements**

**Roads/Alleys/Sidewalks:**

- Green Streets,*
- Disconnection,*
- Porous Pavement*
- Enhanced Tree Planting*

**Roofs/Parking Lots:**

- Vegetated Roofs,*
- Disconnection,*
- Rain Gardens,*
- Porous Pavement,*
- Bioretention*

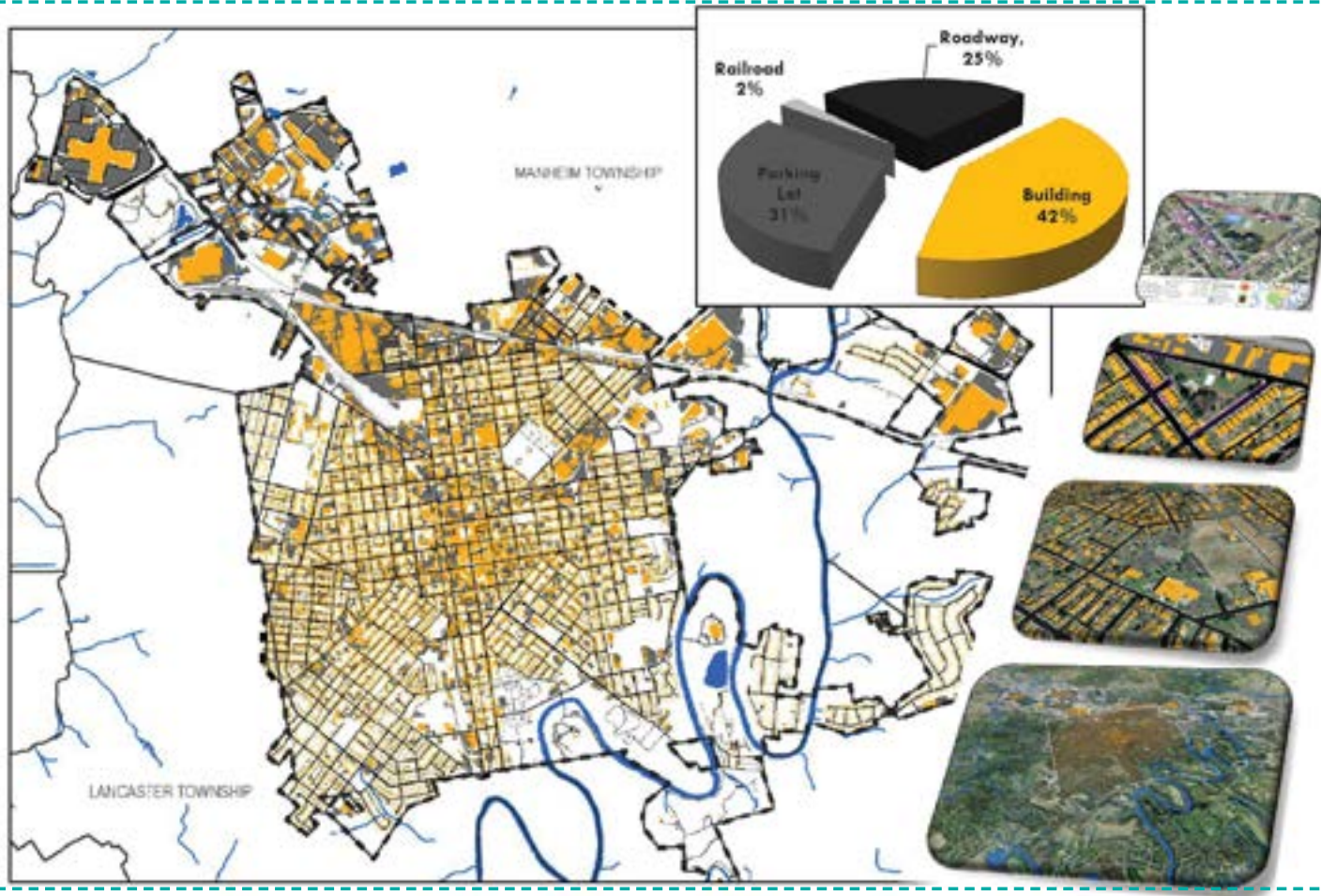
**Public Schools:**

- Green Schools*



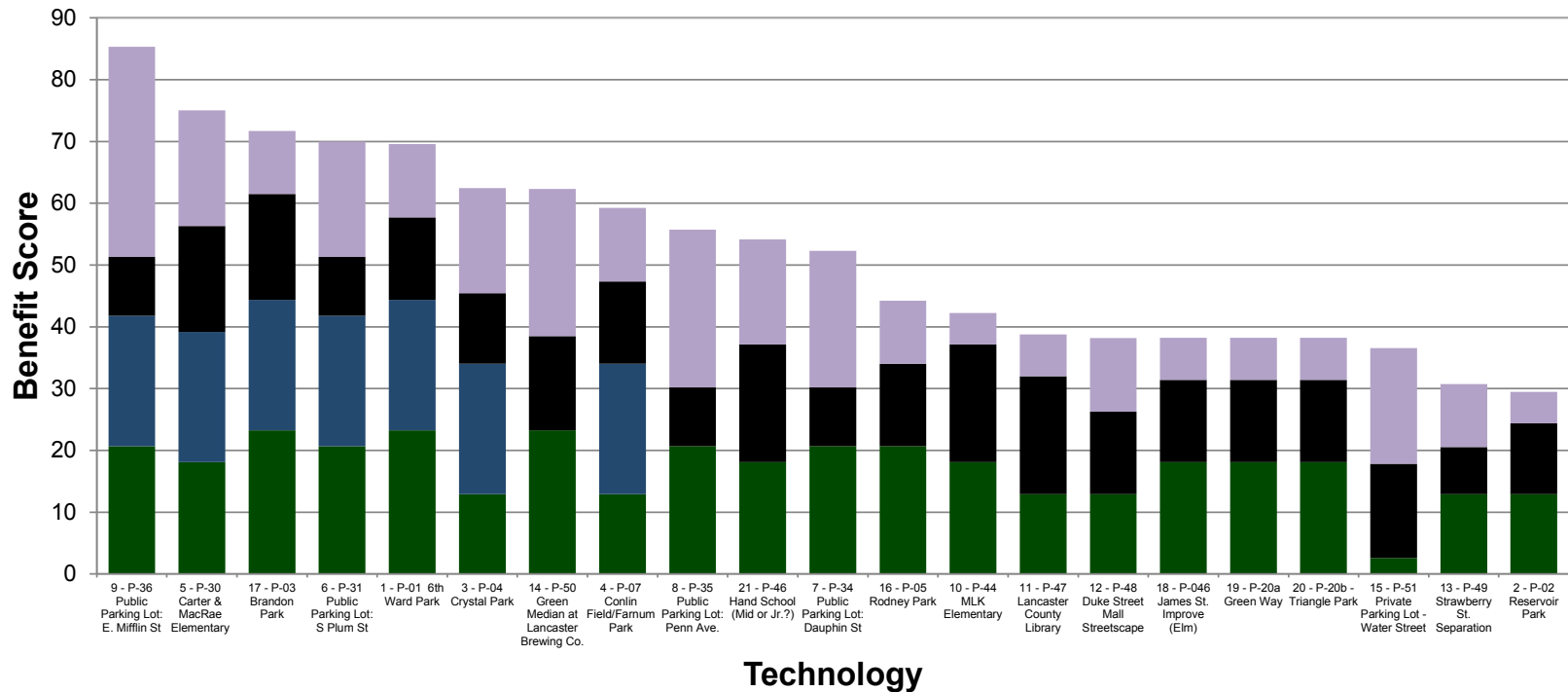


## PLANNING & DESIGN:



# SITE SELECTION+DESIGN

Building integrated infrastructure with multiple benefits



- Integrated Infrastructure
- Public Acceptance & Education
- Grant Funded
- Cost Efficiency (e.g. per gallon)



# SITE SELECTION+DESIGN

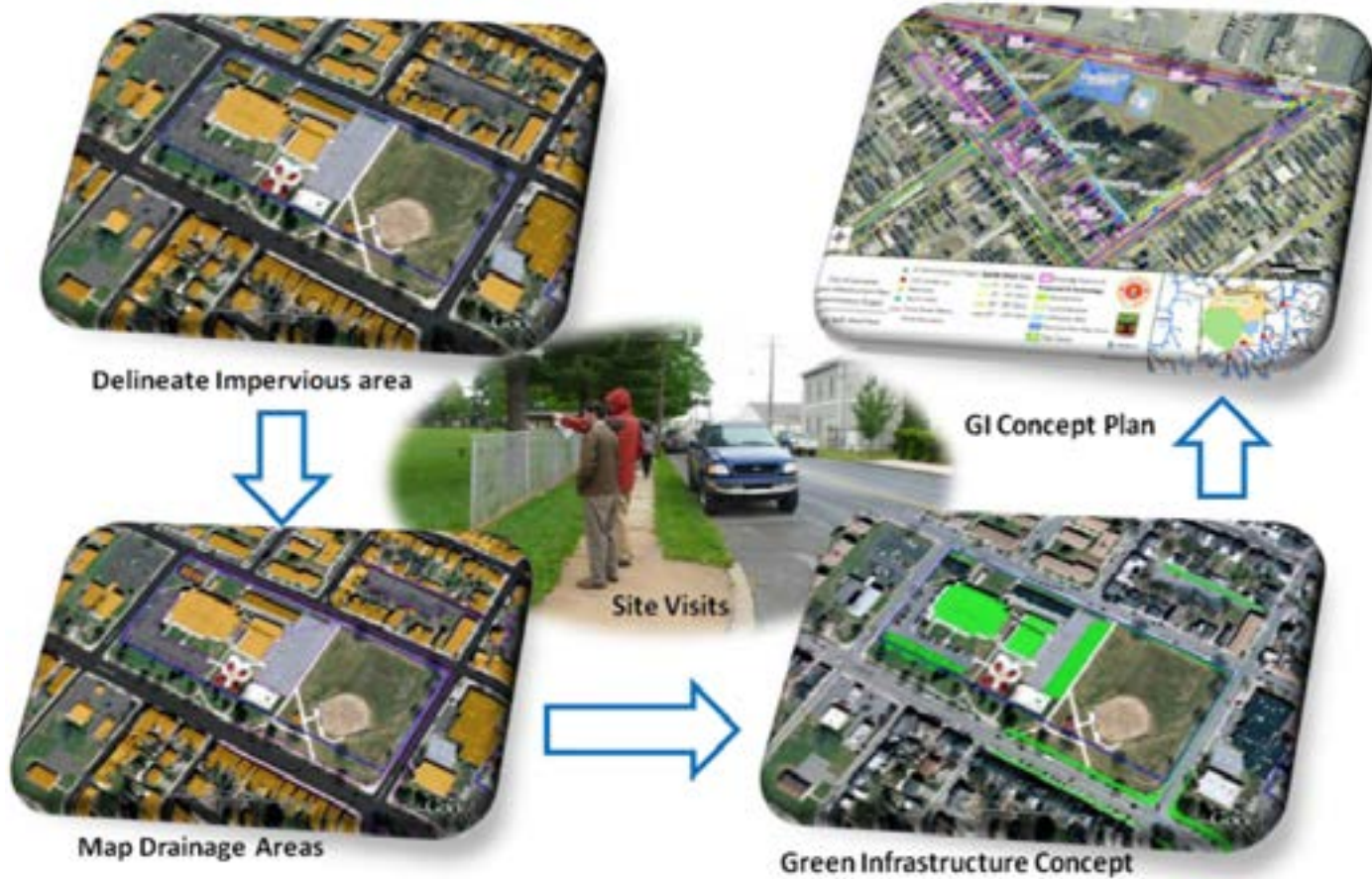
Driving clean water progress with pavement assessment and ADA prioritization.

Scanned 120 miles in 2 weeks.  
Used to prioritize green street projects.

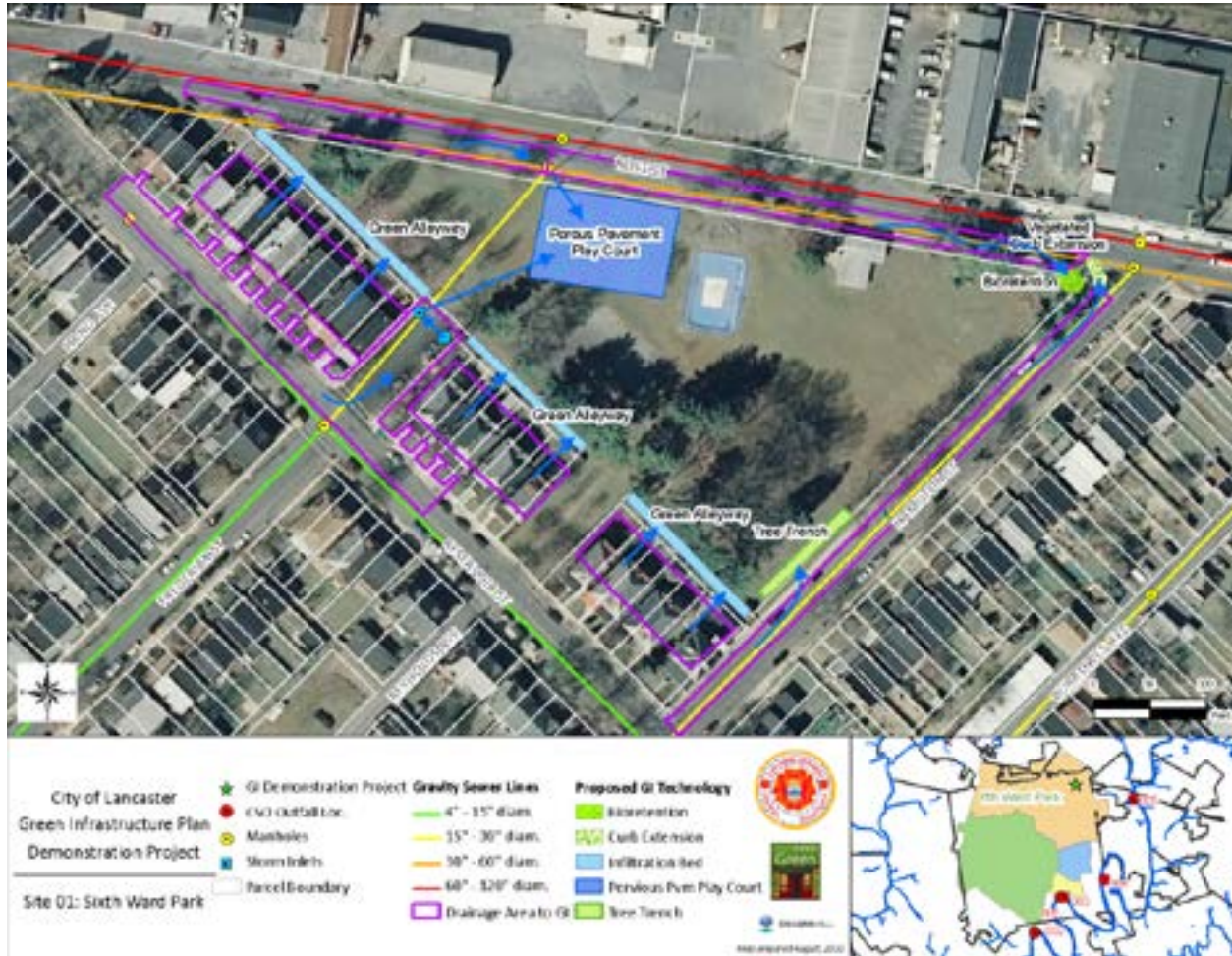




# SITE SELECTION+DESIGN



# SITE SELECTION+DESIGN





# SITE SELECTION+DESIGN

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

Impervious Area Type	Impervious Area (acres)	Impervious Percent	Green Project / Technology	Impervious Area Managed (acres)	Annual Runoff / Runoff Reduction (MG/yr)
Roads / Alleys	529	100%	Green Streets	30%	513
Parks	241	8%	Park Improvements / Greening	85%	19
Sidewalks	124	100%	Disconnection, Porous Pavement	35%	120
Parking Lots	648	100%	Porous Pavement, Bioretention	20%	628
Flat Roofs	218	100%	Vegetated Roofs / Disconnection	15%	212
Sloping Roofs	654	100%	Disconnection/Rain Gardens	25%	635
Street Trees	N/A	N/A	Enhanced Tree Planting	N/A	44
Public Schools	175	29%	Green Schools	75%	50
Various (Ordinance)	1274	100%	First-Flush Ordinance	50%	1236
<b>Total</b>				<b>1,265</b>	<b>3,752</b>

55%

Pollutant	Average Stormwater Concentration*	Average CSO Discharge Concentration	Pollutant Reduction from Stormwater (lb/yr)	Pollutant Reduction from CSOs	Total Est. Pollutant Reduction (lb/yr)
Total Suspended Solids (TSS)	1.2	5.5	3,485	24,267	27,752
Total Phosphorus (TP)	0.7	13.5	2,033	59,564	61,597

## Pollutant Load Reductions

\* Based on the midpoint pollutant concentrations in USEPA's CSO Report to Congress, 2002





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LANCASTER GREEN INFRASTRUCTURE PROGRAM

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# IMPLEMENTATION SUCCESSES

**The GI Program incorporates stormwater management into all aspects of City governance, including infrastructure, policy, and outreach. Together, these improvements are transforming the City into a more sustainable community**

# IMPLEMENTATION SUCCESSES

## Green & Complete Streets



- Integrates pedestrian and bike amenities to improve safety
- Slows traffic and shortens crossing distances
- 21 green street/alley projects
- 20MG managed annually
- Average cost of \$0.24/gallons
- Accessible Pedestrian Signals & ADA

## Green Parking Lots



- 4 retrofitted public parking lots
- 7 green private parking lots
- 2.7 MG managed annually
- Average cost of \$0.24/gallon
- Surface parking lots ordinance requires SW management
- Porous pavements, bioretention, and tree canopy are all used in GI parking

# IMPLEMENTATION SUCCESSES

## Green Roofs



LEED Silver City Hall Annex green roof in its second year.

- Most green roof per capita of any City in North America
- 17 green roofs installed
- 100,000+ sqft of green roof
- 5 municipal, 7 educational, 2 institutional, and 3 commercial
- >1 MG managed annually
- Piloted cooperatively with county government

## Green Parks



Brandon Park is one of the City's largest green infrastructure parks.

- 4 GI park improvements
- Pollinator-rich rain gardens, porous basketball courts and play equipment surfaces
- Captures 8 MG of stormwater annually from surroundings
- Pedestrian improvements increase park use
- Average cost of \$0.28/gallon



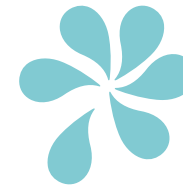
# IMPLEMENTATION SUCCESSES

## Private Property Implementation



- 16 private projects including a church, industrial, businesses, multi-family residential, and parking lots
- 6.8 MG managed annually
- 90% grant offered with only 10% match by landowner
- Incentive program to reduce SWM Fee

## Public Education & Outreach



**SAVE IT!**

**YOUR WATER. YOUR MONEY. YOUR CITY.**

[www.saveitlanaster.org](http://www.saveitlanaster.org)

- Savelt! is a unique logo and brand for stormwater outreach
- Social media campaign with 1,500+ followers
- Presentations at conferences, schools, and symposiums
- Tours for state, national, and international municipal officials
- Biannual contractor workshops

# IMPLEMENTATION SUCCESSES

## Policy & Regulation



- Integration of SW management into all city code, including:
- Established Stormwater Management Fee and credit program (2014)
- Stormwater Management Ordinance (2012)
- Surface Parking Lot Ordinance
- Tree Ordinance & Manual

## Urban Tree Canopy



- Tree Inventory of 9,000 street and park trees
- Urban Tree Canopy Assessment
- Formed Tree Tenders, a Public-Private Partnership
- Street tree planting program
- Riparian buffer planting and yard planting programs forthcoming

# URBAN TREE CANOPY EFFORTS

## Community Partnerships

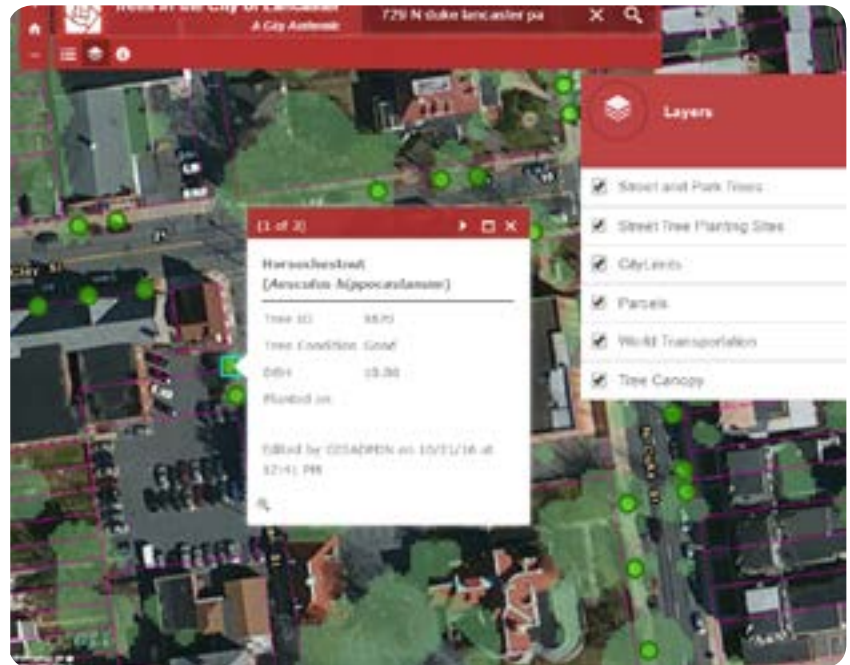


Expanding our urban canopy

To increase and enhance Lancaster's urban forest by engaging and empowering neighborhoods to plant and care for trees



## Urban Tree Data



- Tree Inventory of 9,000 street and park trees
- Existing and potential planting locations
- Publicly available inventory

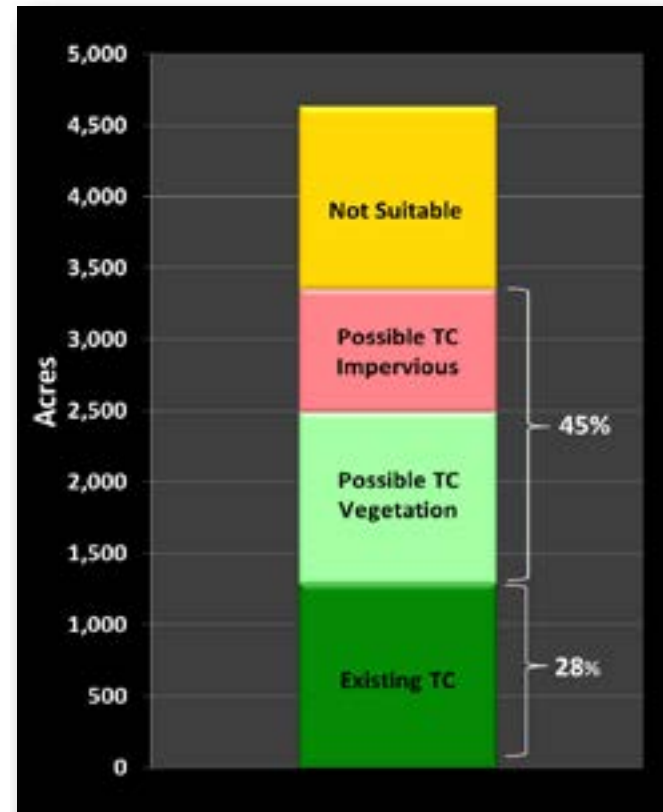


# URBAN TREE CANOPY EFFORTS

## Community Partnerships



## Urban Tree Data





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## Stormwater Fee

More than 17,000 properties in the City were assessed a stormwater fee proportional to their impervious area at a rate of \$31/1,000 sqft. Fees directly fund stormwater management in the City.

### Benefits

- Equity: fees are determined based on amount of impervious area
- Reduces reliance on general fund
- Stable and reliable funding source

### Policy Considerations

- All properties pay (like water/sewer bills)
- Level of Service
- Tiered Billing approach

## SW Credit Program

The City developed a stormwater credit program providing an incentive to property owners for implementing stormwater management practices that could reduce their annual fee by up to 50%.

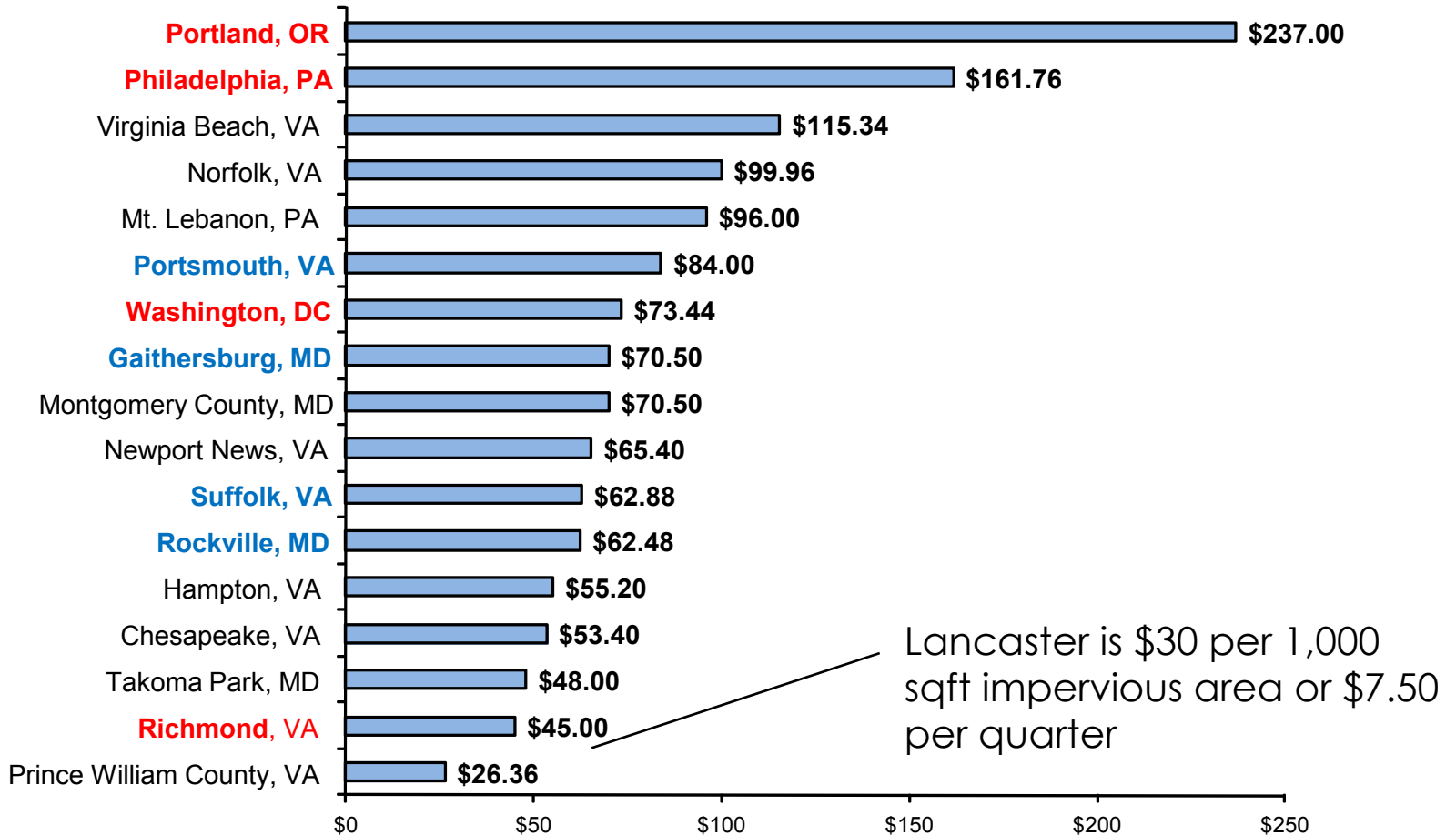
### Benefits

- Residents can reduce their fee through onsite stormwater management
- Engages residents
- Private property projects essential

### Policy Considerations

- Maximum 50% credit
- Educational credits granted to schools
- Nearly every GI technology accepted

Typical Residential Annual Fee





# CASE STUDY: PLUM/WALNUT



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# CASE STUDY: PLUM/WALNUT

5mph speed reduction, increased brewery revenues + jobs, 1MG+ SW







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GREEN INFRASTRUCTURE PROGRAM

# Contact/Questions

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