Bringing Benefits Together

Capturing the Value(s) Of Raindrops Where They Fall

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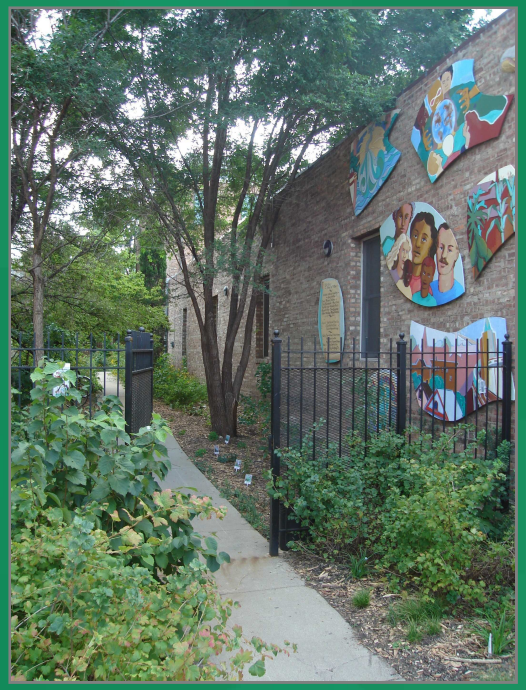
CNT Sustainable Communities Attainable Results

The Center for Neighborhood Technology

- 28 year old Chicago-based non-profit
- Promotes economic development that is environmentally sustainable through:
  - Research
  - Advocacy
  - Demonstration projects
- Green Infrastructure agenda
  - Planning/Analysis Toolbox
  - Policy
  - Education
  - Practice



Energy Analogy: Pacific NW Electricity

- 1970s Capacity Shortages Predicted
- Large Nuclear Infrastructure proposed, started

Energy Analogy: Pacific NW Electricity

- Seattle Reconsidered: "Energy 1990"
- Recognized advantage of efficiency: conservation cost 20% of new nukes

Energy Analogy: Pacific NW Electricity

- Conservation required new law, policy, practice
- Utilities invest in distributed, small-scale conservation
- Prevented new power plant construction for 20 years

The Challenge: (Re)Capture Natural Capacity

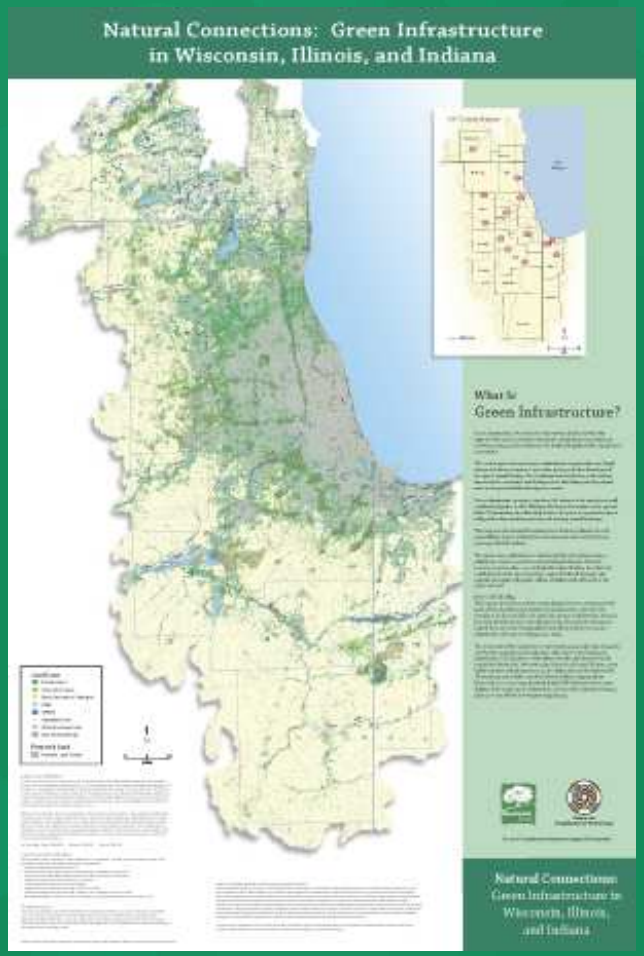
- **Create peak and baseload capacity via conservation**
- **Adapt, (re)naturalize built landscape to absorb, clean and hold water**
- **Get it right in new and retrofit development**

Portland, Oregon "Green Streets" Program

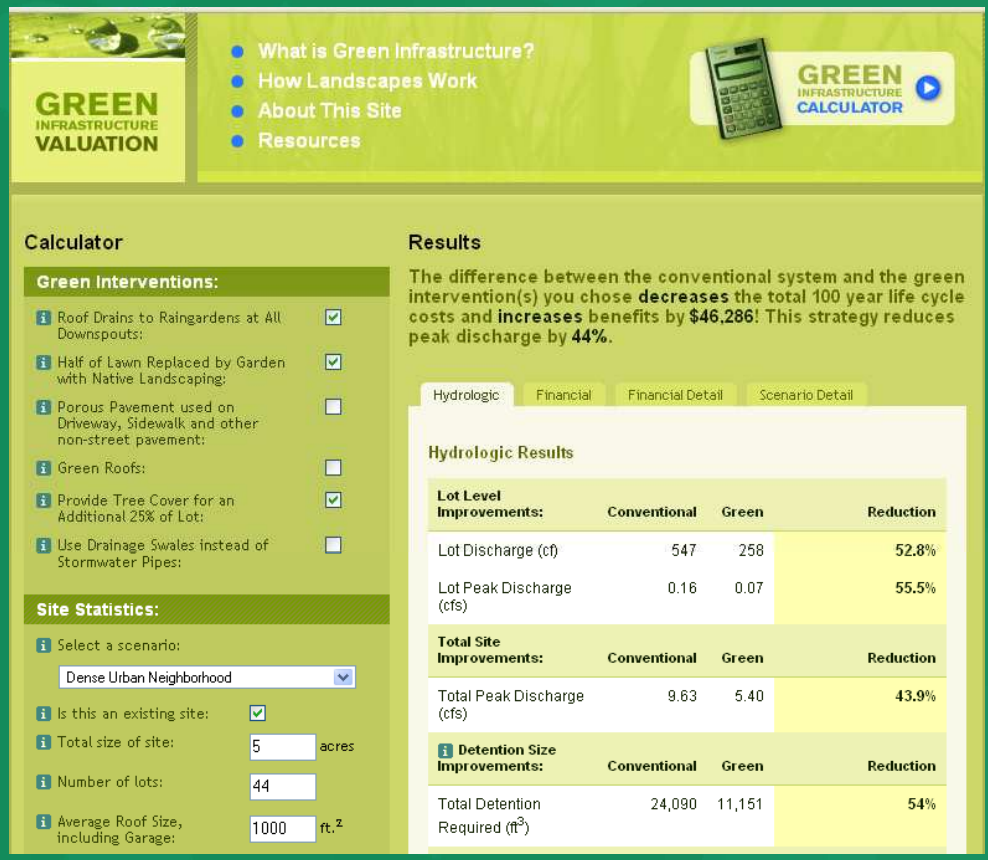
Green Infrastructure Economic Advantages

- Incremental approach stages funding
- Less capital intensive, lower cost
- Effectively extends existing capacity
- Captures asset value of clean water, soil capacity, open space amenities
- Additional social and economic benefits

CNT Green Infrastructure Tools



greenmapping.org



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CNT Green Infrastructure Tools

Outreach

Demonstrations

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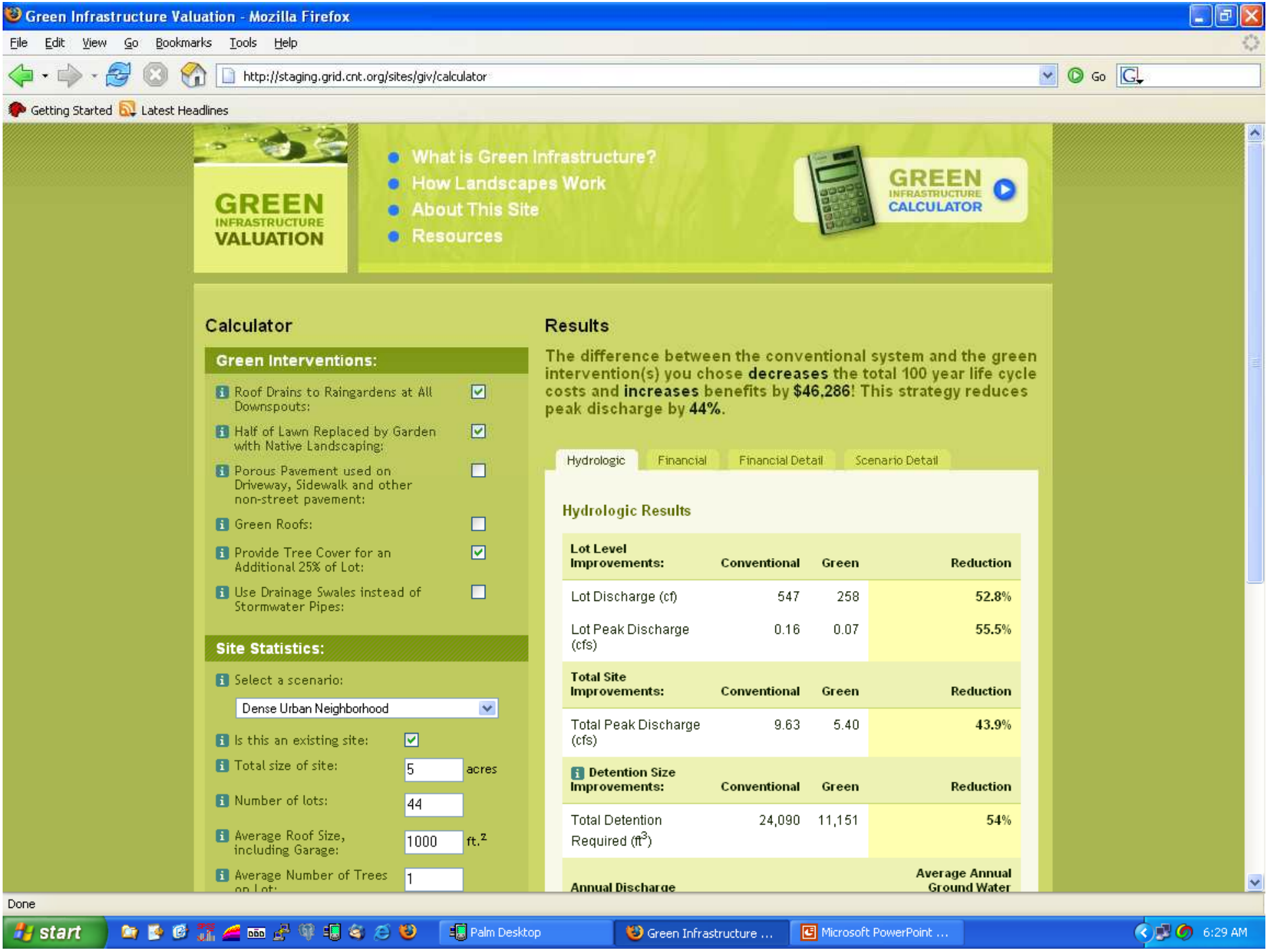

Green Infrastructure Valuation - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://staging.grid.cnt.org/sites/giv/calculator
Go
Getting Started
Latest Headlines
GREEN INFRASTRUCTURE VALUATION
What is Green Infrastructure?
How Landscapes Work
About This Site
Resources
GREEN INFRASTRUCTURE CALCULATOR
Calculator
Green Interventions:
Roof Drains to Raingardens at All Downspouts:
Half of Lawn Replaced by Garden with Native Landscaping:
Porous Pavement used on Driveway, Sidewalk and other non-street pavement:
Green Roofs:
Provide Tree Cover for an Additional 25% of Lot:
Use Drainage Swales instead of Stormwater Pipes:
Site Statistics:
Select a scenario:
Dense Urban Neighborhood
Is this an existing site:
Total size of site: 5 acres
Number of lots: 44
Average Roof Size, including Garage: 1000 ft.2
Average Number of Trees on Lot: 1
Results
The difference between the conventional system and the green intervention(s) you chose decreases the total 100 year life cycle costs and increases benefits by $46,286! This strategy reduces peak discharge by 44%.
Hydrologic
Financial
Financial Detail
Scenario Detail
Hydrologic Results
Lot Level Improvements: Conventional Green Reduction
Lot Discharge (cf) 547 258 52.8%
Lot Peak Discharge (cfs) 0.16 0.07 55.5%
Total Site Improvements: Conventional Green Reduction
Total Peak Discharge (cfs) 9.63 5.40 43.9%
Detention Size Improvements: Conventional Green Reduction
Total Detention Required (ft3) 24,090 11,151 54%
Annual Discharge
Average Annual Ground Water
Done
start
Palm Desktop
Green Infrastructure ...
Microsoft PowerPoint ...
6:29 AM

Green Values Infrastructure Calculator

Analysis currently includes:

- Runoff reduction
- Avoided conventional infrastructure
- Carbon sequestration
- Air quality
- Trees Value
- Groundwater Recharge

CNT Sustainable Communities Attainable Results

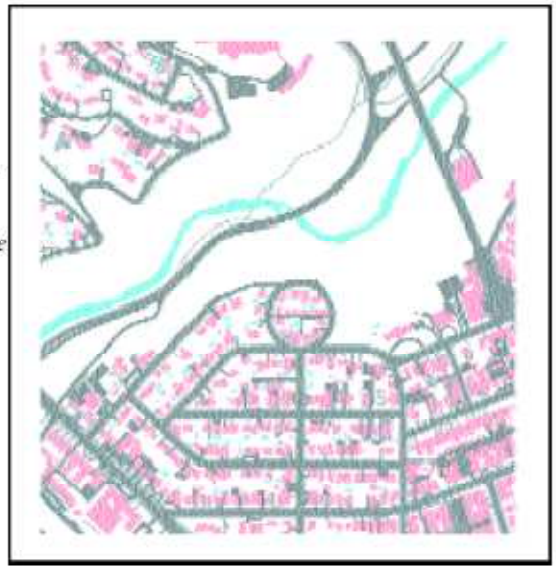
Permeability Index – Growing the Green

Gray and Green Infrastructure

Washington DC:

Streets and Buildings: 27%

Existing Urban Tree Canopy: 46%



Source: American Forests

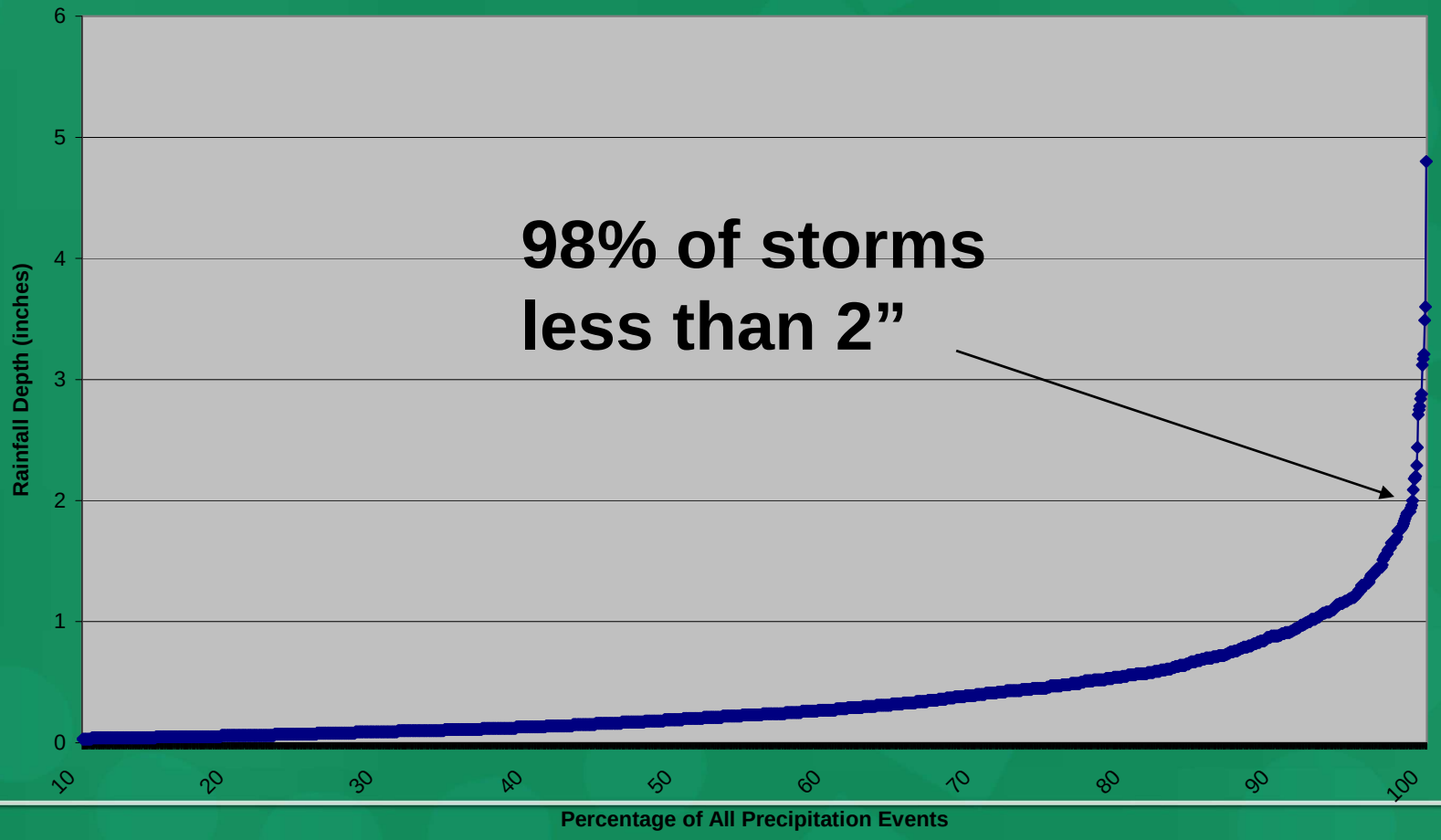
- **~1 billion gallons stormwater retention**
- **$4.7 billion equivalent in structural retention avoided**

Reversing the Flow – Rethinking Performance

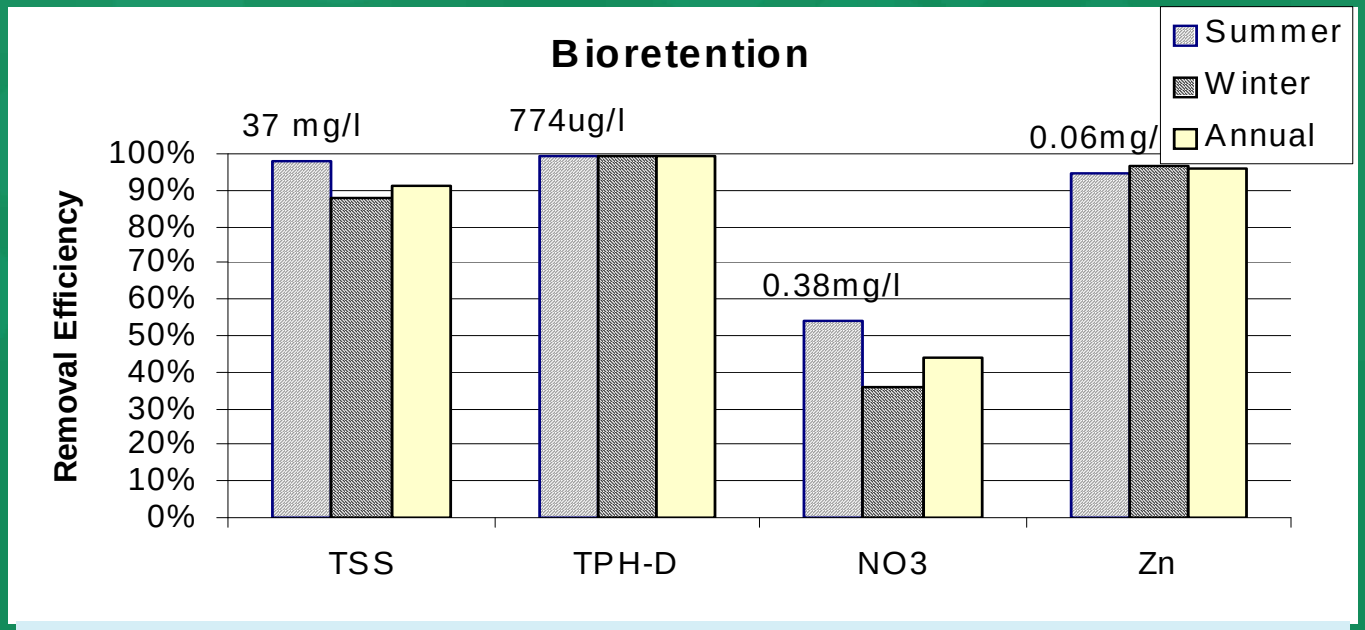
- Performance measured in 'Anti-Gallons' left in natural drainage
- Drainage, flood control, pollution prevention move upstream from treatment plant to water's origins

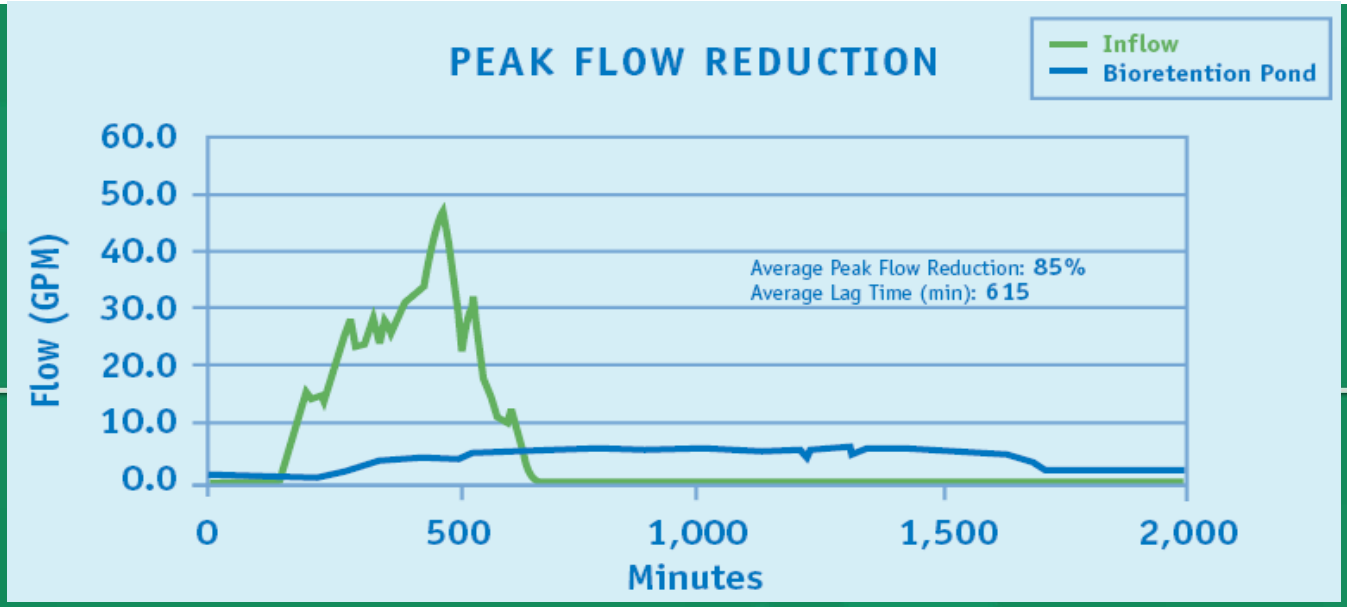
Effectiveness and Performance

Rainfall Frequency Spectrum
(17 Years of Precipitation Data from Chinatown, Chicago)



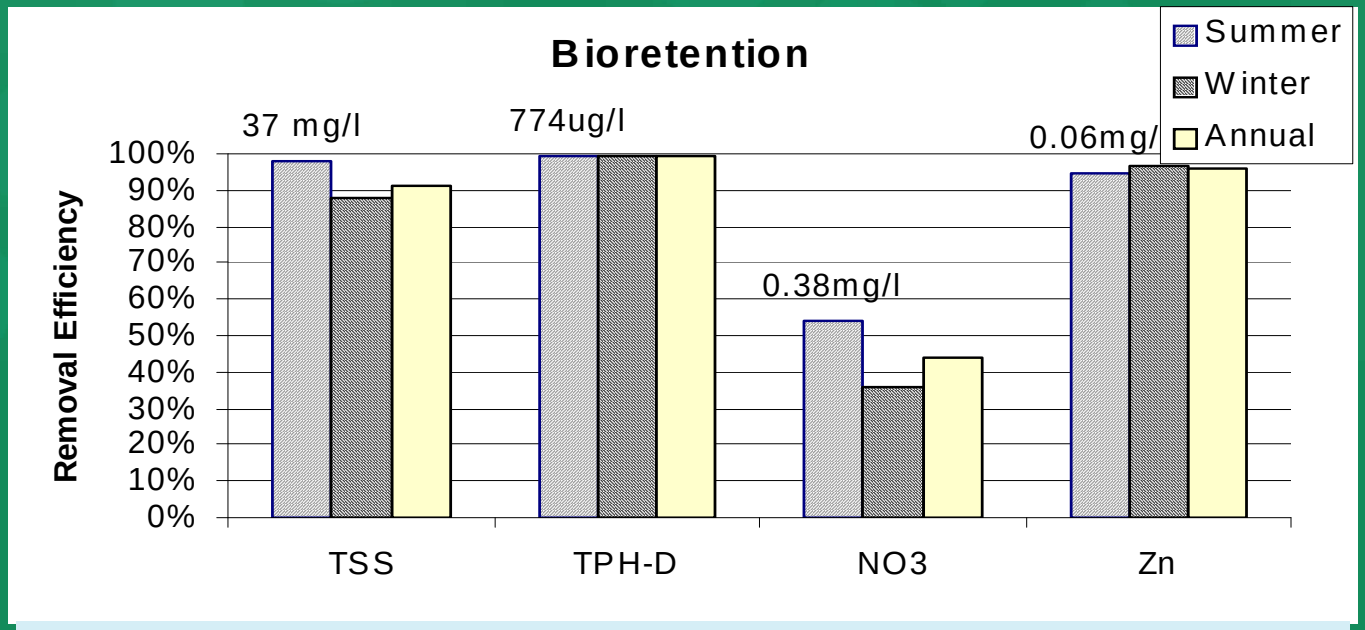
Performance Efficiencies –Filtration/Infiltration



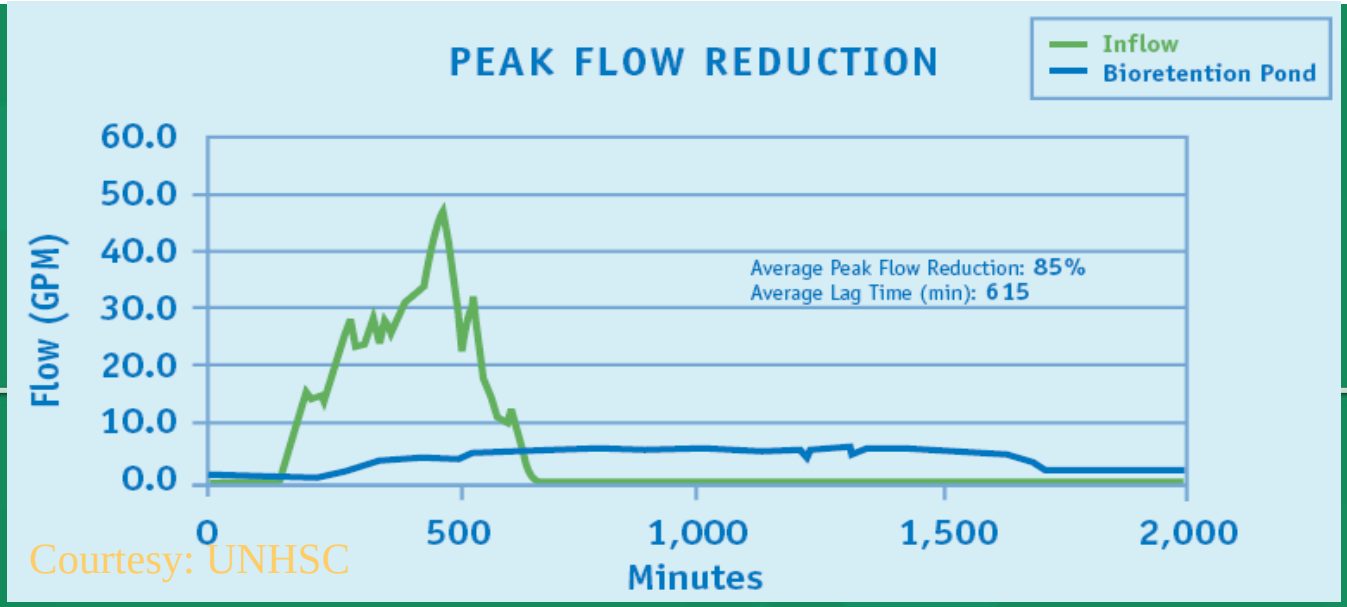


Courtesy: UNHSC

Stormwater Performance Values



Pollutant Removal



Courtesy: UNHSC

On-site runoff capture

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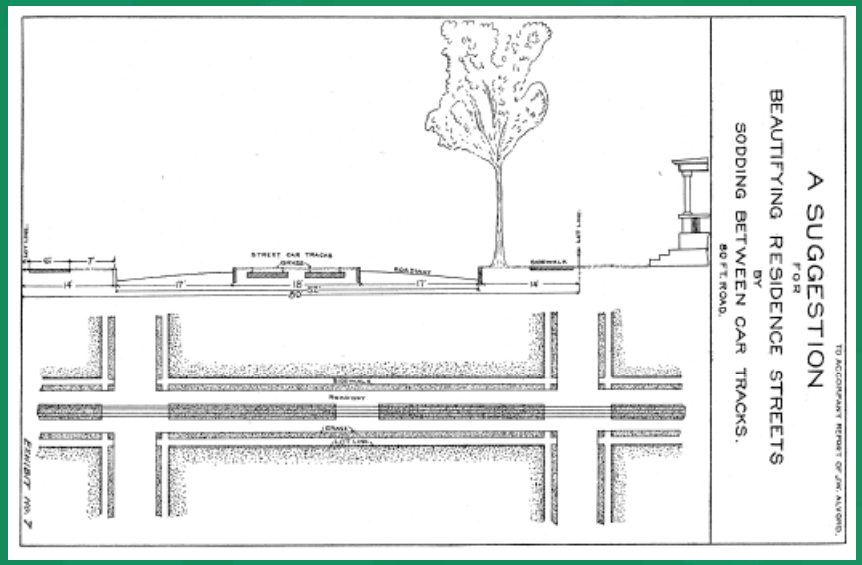
How many problems can your community solve for $3 billion?

- **CSO Tunnel:**
  - Reduce sewerage overflows to rivers and lakes
- **Green Infrastructure Strategies:**
  - Reduce sewerage overflows to rivers and lakes
  - **Create green space, urban land restoration and real estate value, mitigate global climate change, reduce heat deaths, improve quality of life, water and energy conservation, education, recreation, riparian buffers, flood control, access, unimpaired streams…**

Unpaving the Way…

- **Re-addressing the design and function of urban streets, parking lots, hardscape surfaces**
- **Major parts of problem becomes potential solutions**



Green Infrastructure Cost-Effectiveness

Seattle SEA Streets program

vegetated strips, no curbs = 11% reduction in impermeable surface

90+% runoff reduction

25% cost savings compared to conventional design

Green Infrastructure Cost-Effectiveness

Portland Green Streets Program

- **Citywide priority – included in all development, redevelopment**
- **40% cost savings compared to conventional design**
- **80-85% CSO peak flow reduction;**
- **Establishes 1% fee on street construction projects to establish Green Streets fund**

Cost Effectiveness – Pervious Pavers

Item	Permeable Pavers	Concrete	Asphalt
Paving/sf	$2.25	$8.00	$3.00
Excavating/sf	$1.00	$1.00	$1.00
Stone/sf	$2.00	$1.50	$1.50
Installation/sf	$4.00	(in paving cost)	$1.50
Curbs	$1.50	$1.50	$1.50
Maintenance	$0.20	0	Not known
Replacement	None	None	Every 12 years
Detention/Retention required	None	Yes	Yes
Storm Sewer System/sf paving	None	$3.00	$3.00
Total/sf	**$10.95**	**$14.00**	**$11.50**
Total/linear foot – municipal street	**$171**	**$218**	**$179**
Total/linear ft for 30 ft wide street	**$230**	**$280**	**$230**

Stormwater magazine

Milwaukee School of Engineering

- **"Water quality sampling and testing was not possible because the pervious pavements do not discharge runoff even during the simulated rainfalls. The pervious parking lot is 100% effective at eliminating discharge of contaminants through surface runoff during rainfall events."**

  (2007 MMSD Monitoring Report)

- **Comparable cost to conventional asphalt**

Porous Pavement Performance

- 16 year old porous pavement in Philadelphia reported zero discharge during Hurricane Floyd in 1999 (10” rain/24 hours)
- Functions in cold weather
- Requires vacuum sweeping maintenance

Chicago Sustainable Urban Design

- City governments are at the forefront of sustainable design, and have an obligation to make cities livable places where people want to live, work and play.
- Chicago Land Area = 144,593 ac
  Public Right-of-Way (23%)

- In addition, there are 839 acres of public park space and 53.4 miles of lake and river frontage.

Project Sustainable Goals

Stormwater Management Divert 100% of two year storm event from city storm system through the use of pervious pavements, bioswales and recharge of Chicago River through existing outfall

Water Efficiency No use of potable water sources for irrigation, Specify Native or Climate-adapted, drought tolerant plants for all plantings

Transportation Improve bus stops with signage, shelters where possible, and lighting; facilitate use of bikes with lanes along Blue Island, and strategically located bike racks

Energy Efficiency Meet IESNA Standards for Lighting Levels; select optimal street lights for energy efficiency; use reflective surface on sidewalks/roadways to improve lighting; use of renewable energy on designated fixture as demonstration

Recycling Divert 95% of Construction Waste from Landfills, Specify new materials with a minimum 20% Recycled Content

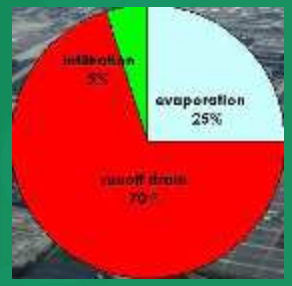
Urban Heat Island Reduce ambient summer temperatures on streets and sidewalks through use of reflective pavements on roadways, light colored materials on sidewalks and use of trees for shading

Education Provide public outreach materials/self-guided tour brochure to highlight innovative, sustainable design features of streetscape

Chicago Green Alley Program

- 1,900 miles of public alleyways in Chicago, the largest of any city in the world.
- Total of 3,500 acres of impermeable surface, the equivalent area of over 5 Midway Airports.

Alley Summary



Total: 13,000 Alleys

- 20% Currently Unimproved
- 20% in Need of Repair

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Smart Growth Saves Money

Prairie Crossing, Gray's Lake, IL

- **300 acre new village left 60% of site undeveloped**
- **Savings of $10-15K/acre**
- **Clusters 359 homes & 36 condominiums vs. 2,400 homes in conventional plan**

Smart Growth Saves Money

Prairie Crossing, Gray's Lake, IL

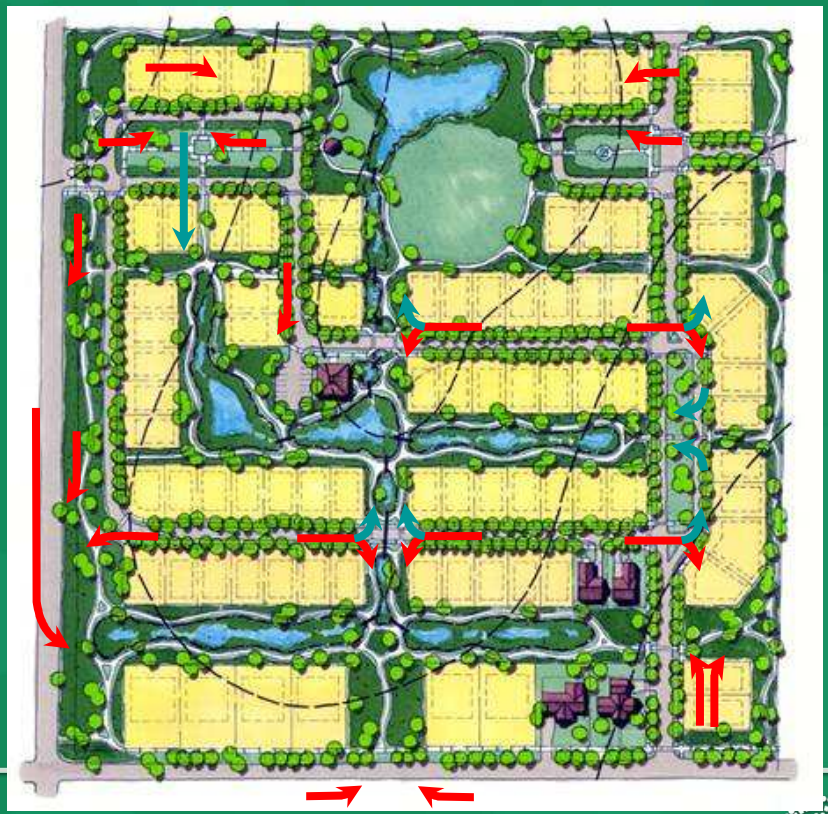
- **Swales replace storm sewers: $1.6M**
- **18'-28' roads instead of 32' pavements: $800K**
- **Grading costs savings: $7.5M**

Blackberry Creek Alternative Futures Analysis
Kane County, Illinois

Moderate Density Residential

Conventional

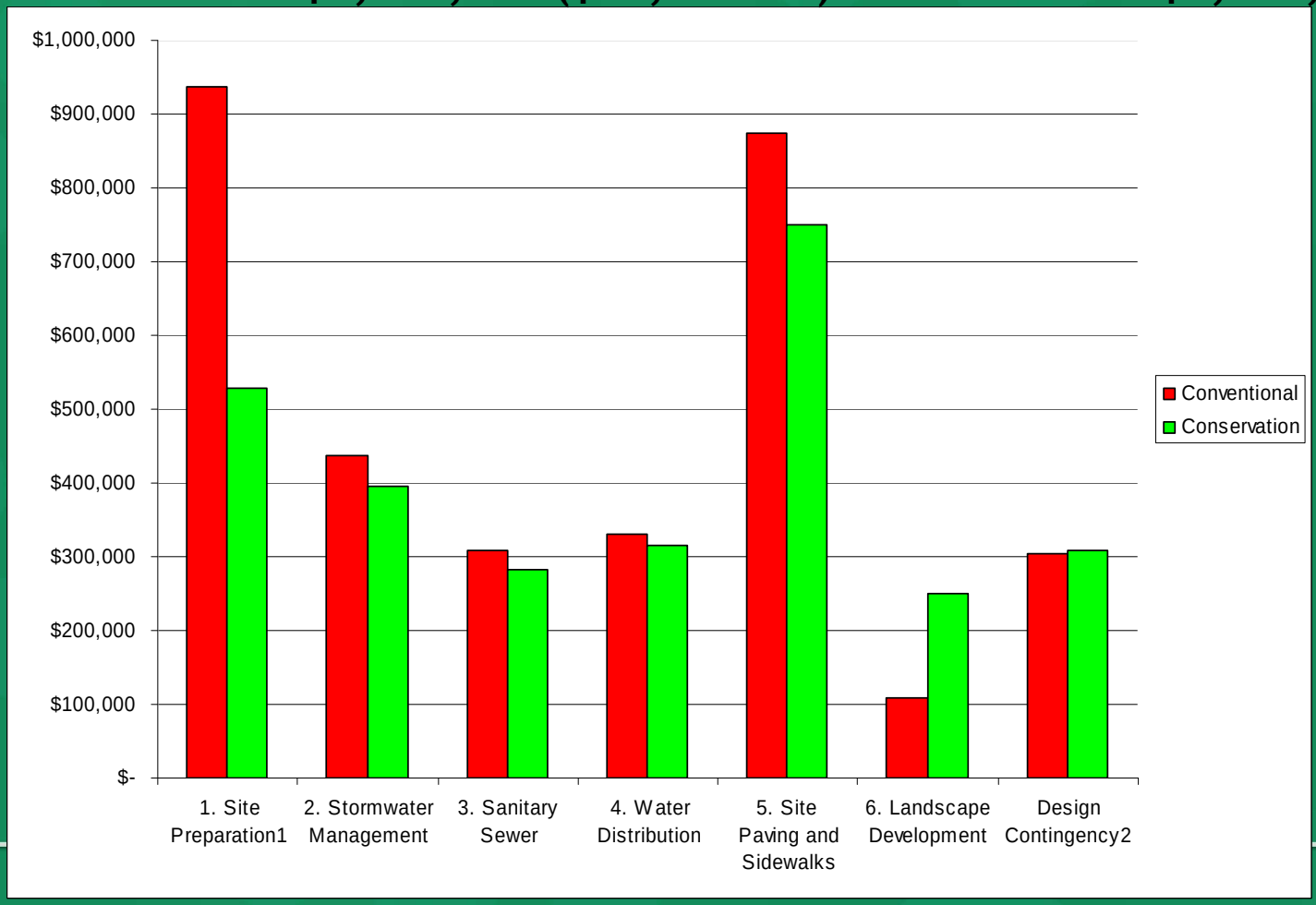
Conservation



(Conservation Design Forum)

Moderate Density Residential Cost Comparison

Conventional $3,350,000 ($37,600/lot) / Conservation $2,880,000 ($32,400/lot)

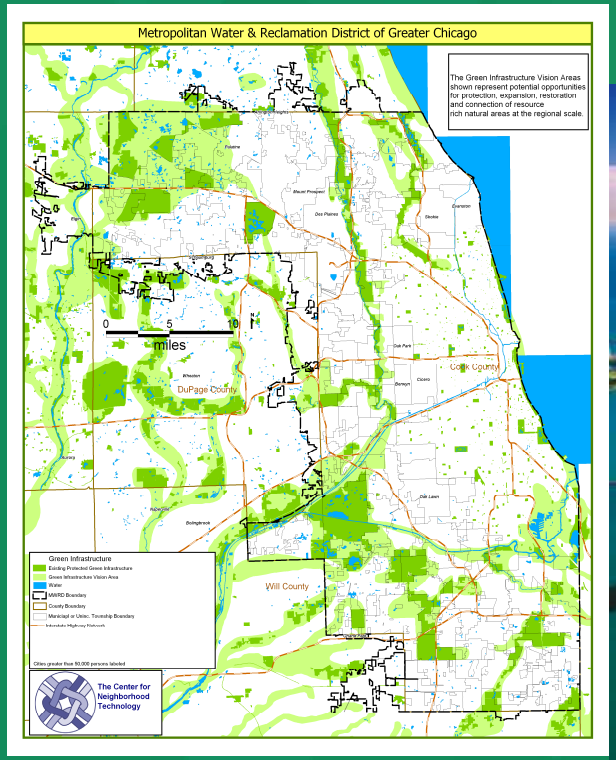


14% development savings

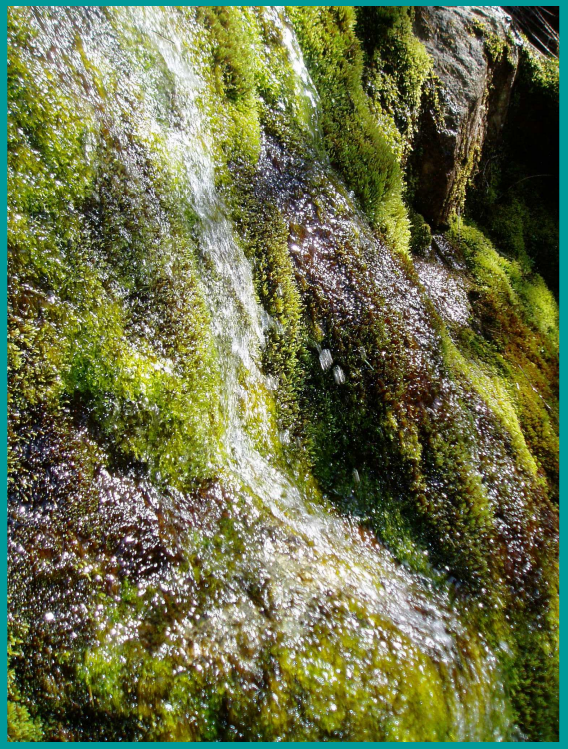
Additional travel and fuel cost efficiencies

Getting to Scale – Water Supply

- Cook County Estimate:
  Apply Various Green Infrastructure →
- 40% runoff reduction
- Aquifer & lake recharge equivalent to additional supply for >1 million people



Connecting Communities & Water



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Toward "New Water Conservatism"

- ***Trickle Down Economics*** **– cost effective avoidance of capital intensive infrastructure**
- ***1000 Points of Infiltration*** **– emphasizing distributed approach to manage clean water asset in place**
- ***Supply Side Theory*** **– preventing stormwater treatment also boosts groundwater supply, extends treatment supply of existing systems**
- ***'Are you more permeable today than you were 4 years ago?'***

Thank You

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