

Green Infrastructure & Sustainable Urban Land Use Decision Analysis Workshop

May 4, 2010 - - Cleveland, OH





Objective: City of Cleveland

We are committed to improving the quality of life in the City of Cleveland by strengthening our neighborhoods, delivering superior services, embracing the diversity of our citizens, and making Cleveland a desirable, safe city in which to live, work, raise a family, shop, study, play and grow old.



Objective: U.S. EPA

To help the City of Cleveland realize its vision by supporting the City's decision-making process

- Explore ideas for re-use of vacant land
 - Menu of alternatives to meet City's objectives
 - Costs and benefits; operational issues
- Develop tools and share technical information to help the City assess and make decisions regarding the re-purposing of vacant land at the site & neighborhood scales
- Support Cleveland's long-term planning process in a way that adds value to the community and improves environmental quality

Working Outline

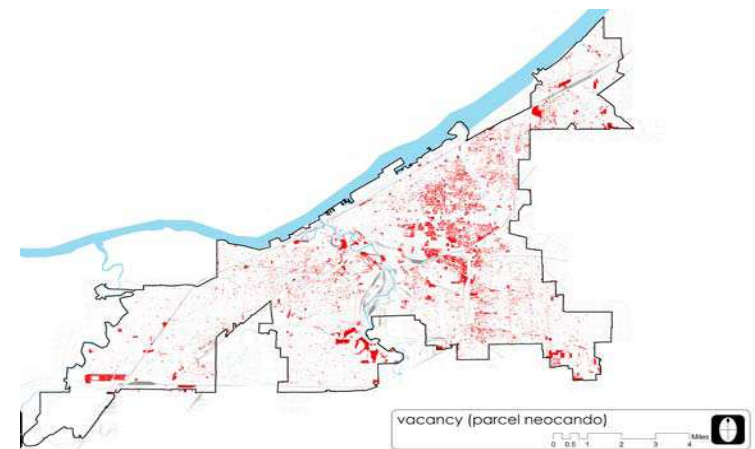
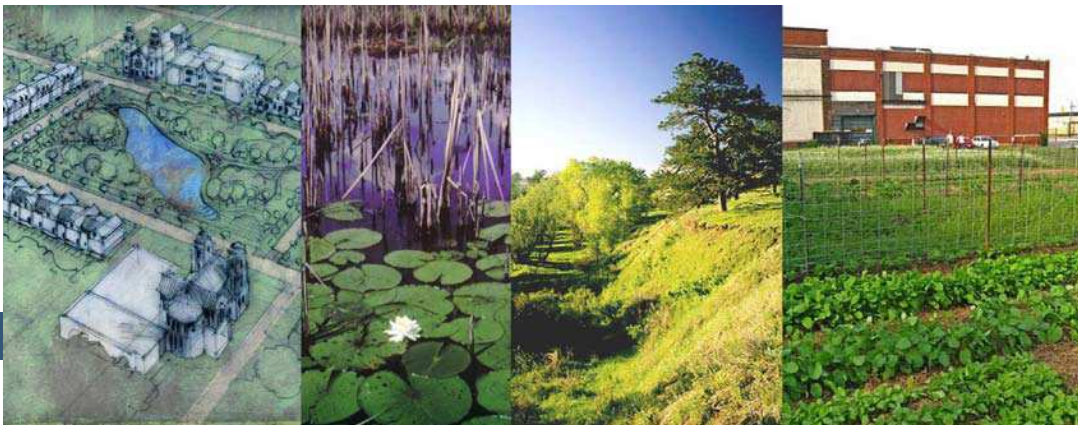
- Big Picture: What is Possible
 - Reimagining a More Sustainable Cleveland
 - Rating Systems for Sustainable Development
 - Cincinnati Project Groundwork: Lick Run Video
- Definitions: What is Green Infrastructure?
- Define the Alternatives
 - List, provide examples
 - What's happening in Cleveland?
- Next Steps
 - Restate goals & benefits
 - Impact on City Operations, open discussion



What's the Big Picture?

Relmaging A More Sustainable Cleveland

- **PRODUCTIVE USE / PUBLIC BENEFIT** Whether vacant properties are developed with buildings and infrastructure, preserved as open space, or put into productive use as agriculture or energy generation sites, they should provide an economic return, a community benefit, and/or an enhancement to natural ecosystems.
- **ECOSYSTEM FUNCTION** Stormwater management, soil restoration, air quality, carbon sequestration, urban heat island effects, biodiversity, and wildlife habitat should be incorporated into future plans for vacant sites in the city.
- **REMEDIATION** Remove the risk to human health and the environment from environmental pollutants at vacant sites, either with targeted remediation projects or with long-term incremental strategies.




<http://www.cudc.kent.edu/shrink/landlab.html>

Rating systems that support decision-making

- Numerical rating systems provide a strong basis for making decisions about sustainable development at the neighborhood level
- LEED ND (Neighborhood Development) guidance recently issued by USGBC (!)
- the Sustainable Sites Initiative also recently issued guidance that will be linked with LEED ND
- These will be used within the decision analysis approach we develop with the City of Cleveland...
- Imagine promoting a LEED Platinum certified neighborhood... Edgewater? Detroit Shoreway?

Rating systems that support decision-making: (1) LEED for Neighborhood Development

 LEED 2009 for Neighborhood Development Project Scorecard		Project Name: _____ Date: _____	
Yes ? No <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Smart Location and Linkage 27 Points Possible	
Y	Prereq 1 Smart Location	Required	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Y	Prereq 2 Imperiled Species and Ecological Communities	Required	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Y	Prereq 3 Wetland and Water Body Conservation	Required	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Y	Prereq 4 Agricultural Land Conservation	Required	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Y	Prereq 5 Floodplain Avoidance	Required	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	Credit 1 Preferred Locations	10	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	Credit 2 Brownfield Redevelopment	2	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	Credit 3 Locations with Reduced Automobile Dependence	7	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	Credit 4 Bicycle Network and Storage	1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	Credit 5 Housing and Jobs Proximity	3	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	Credit 6 Steep Slope Protection	1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	Credit 7 Site Design for Habitat or Wetland and Water Body Conservation	1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	Credit 8 Restoration of Habitat or Wetlands and Water Bodies	1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	Credit 9 Long-Term Conservation Management of Habitat or Wetlands and Water	1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Yes ? No <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Neighborhood Pattern and Design 44 Points Possible	
Y	Prereq 1 Walkable Streets	Required	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Y	Prereq 2 Compact Development	Required	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Y	Prereq 3 Connected and Open Community	Required	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	Credit 1 Walkable Streets	12	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	Credit 2 Compact Development	6	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Green Infrastructure and Buildings, Continued	
		Yes ? No	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
			Credit 1 Certified Green Buildings
			Credit 2 Building Energy Efficiency
			Credit 3 Building Water Efficiency
			Credit 4 Water-Efficient Landscaping
			Credit 5 Existing Building Use
			Credit 6 Historic Resource Preservation and Adaptive Reuse
			Credit 7 Minimized Site Disturbance in Design and Construction
			Credit 8 Stormwater Management
			Credit 9 Heat Island Reduction
			Credit 10 Solar Orientation
			Credit 11 On-Site Renewable Energy Sources
			Credit 12 District Heating and Cooling
			Credit 13 Infrastructure Energy Efficiency
			Credit 14 Wastewater Management
			Credit 15 Recycled Content in Infrastructure
			Credit 16 Solid Waste Management Infrastructure
			Credit 17 Light Pollution Reduction
		Innovation and Design Process	
		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Credit 1. Innovation and Exemplary Performance: Provide Specific Title
		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Credit 1. Innovation and Exemplary Performance: Provide Specific Title

Rating systems that support decision-making: (2) Sustainable Sites Initiative

2 PRE-DESIGN ASSESSMENT AND PLANNING

Prerequisite 2.1

Hydrology			
Identify and map the following information:	Information collected can help achieve the following Sustainable Sites Prerequisites and/or Credits:	Briefly summarize findings OR provide reasons for not addressing topics.	Provide narrative describing how information gathered could influence site design.
Watershed conditions, including common stormwater pollutants and specific pollutants of concern that have been identified. Existing local, regional, or state watershed plans for the site's watershed.	<i>Prerequisite 1.2: Protect floodplain functions</i>		
	<i>Credit 3.3: Protect and restore riparian, wetland, and shoreline buffers</i>		
	<i>Credit 3.4: Rehabilitate lost streams, wetlands, and shorelines</i>		
	<i>Credit 3.5: Manage stormwater on site</i>		
	<i>Credit 3.6: Protect and enhance on-site water resources and receiving water quality</i>		
Initial water storage capacity of the site, using TR-55 curve number or other continuous simulation models.	<i>Credit 3.5: Manage stormwater on site</i>		
Existing and potential pollution sources (both point and nonpoint sources) and health hazards, including sources both on-site and adjacent to the site.	<i>Credit 1.5: Select brownfields or greyfields for redevelopment</i>		
	<i>Credit 3.6: Protect and enhance on-site water resources and receiving water quality</i>		
	<i>Credit 7.3: Restore soils disturbed by previous development</i>		
Seasonal groundwater elevations or problems with over-infiltration that may affect BMP selection.	<i>Credit 3.5: Manage stormwater on site</i>		
	<i>Credit 3.6: Protect and enhance on-site water resources and receiving water quality</i>		



What's the Big Picture?

Project Groundwork: Cincinnati, OH

Project Groundwork In Your Community

- To improve the quality of our lives — through cleaner streams, improved protection of public health, and enhancements to the communities where we work, live, and play — Hamilton County, Ohio is embarking on one of the largest public works projects in its 200-plus year history.

Called Project Groundwork, this major initiative is designed to:

- Reduce or eliminate sewage overflows into local rivers and streams and sewage backups into basements.
- Benefit Hamilton County communities through environmentally, socially, and economically sustainable solutions to these current problems; and
- Revitalize the economy through creation of jobs and growth opportunities for local businesses.

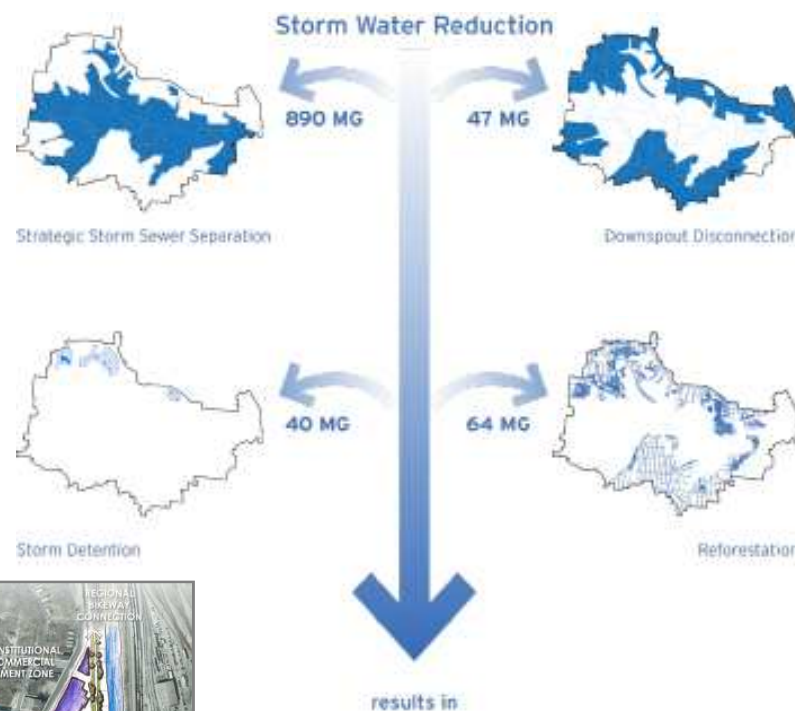
Project Groundwork is your program. It's an investment in your community for generations to come.

What's the Big Picture? Lick Run

Implementation & Estimates:

- Source Control
 - disconnection: 47 MG
 - detention: 40 MG
- Reforestation: 64 MG
- Storm Sewer Separation
 - 890 MG estimate
- Total Revised: 1.1 BG removal

*2700 acre urban watershed, 2.1 billion gals.
(BG) of annual stormwater runoff , ~ 1.4
BGs combined sewer discharge*



*Redevelopment centered on restored,
daylighted stream channel & green-space*



800
million gallons

annually removed from
combined sewer overflow



Green Infrastructure: Definition & Benefits

Definition:

Green infrastructure (GI) is part of a holistic approach to watershed and environmental management that integrates natural processes with wet weather flow management practices into the built environment to improve the quality and sustainability of urban ecosystems, neighborhoods, cities, and regions

Benefits:

- Keeps the rain where it falls - reduces stormwater runoff volumes and pollutant loads
- Cost savings over traditional engineered solutions
- Measurable improvements to ecosystems & urban quality of life
- Part of a city planning response to uncertainties caused by global climate change



Sustainability & Green Communities: Alternatives

- U.S. EPA's Green Infrastructure Website:
 - www.epa.gov/npdes/greeninfrastructure
- Run through the following examples:
 - Brownfields redevelopment
 - Urban rain gardens
 - Wetlands & urban parks
 - Green streets
- Some parcels would potentially be reserved for future commercial, industrial, or residential development
 - There may be “temporary” uses suitable for some for these sites, until the market is ready to redevelop

What does it look like?

Temporary use & “holding” strategies

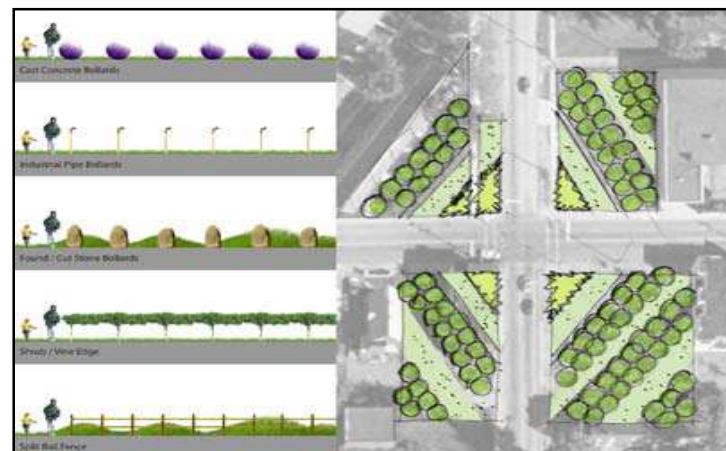
- Most effective in areas where development is likely in the near-term.
- Neighborhood blocks with many unmanaged vacant lots result in lower residential property values (and higher operational costs).
- Strategies are intentionally low-cost and low maintenance.
- Low-mow native plant communities (such as prairie species) improve soil and neighborhood aesthetic.
- Strategies may employ phytoremediation to remove contaminants from brownfield sites.

<http://www.cudc.kent.edu/shrink/landlab.html>

Trees and bollards on vacant sites enhance perceptions of maintenance and deter illegal dumping →



Low-mow native plant materials create a patterned landscape as a holding strategy.



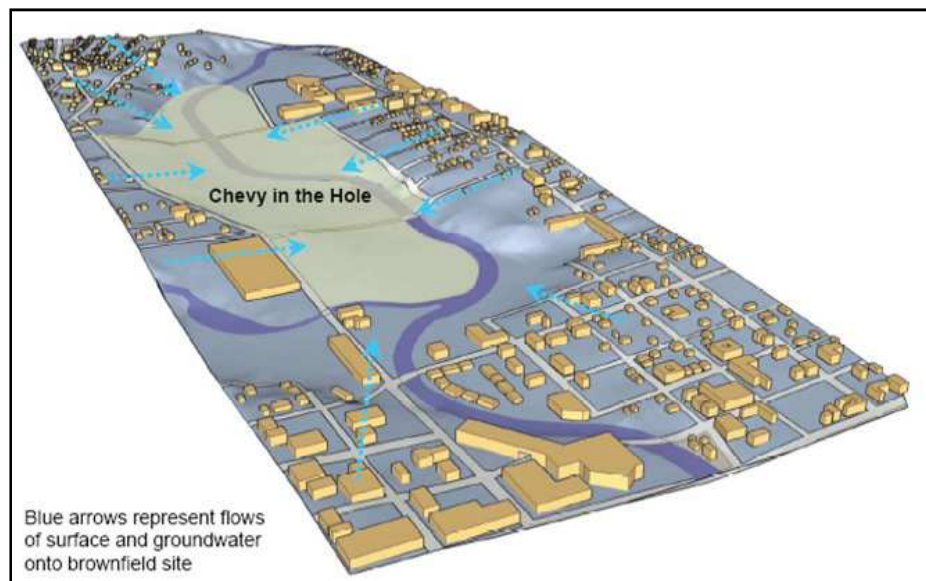
What does it look like?

Brownfields: Chevy in the Hole - Flint, MI



A 130-acre property known in Flint as “Chevy in the Hole,” was a key center of manufacturing for GM for most of the past century. Adjacent to downtown and surrounded by residential neighborhoods, redevelopment of this riverfront property will play a key role in Flint’s recovery.

- What economic drivers will spur redevelopment and stimulate new growth?
- Given the economic and environmental risks what kinds of remediation are advisable?
- After remediation, what kinds of redevelopment and ecological restoration are feasible?
- How could redevelopment phases respond to both community needs (and constraints)?



What does it look like?

Brownfields: Chevy in the Hole - Flint, MI

General Principles for Using Green Infrastructure on Brownfield Sites:

- Differentiate between groups of contaminants to better minimize risks.
- Keep non-contaminated stormwater separate from contaminated soils and water to prevent leaching and spreading of contaminants.
- Prevent soil erosion using vegetation & structural practices.
- Include measures that minimize runoff on all new development within and adjacent to a brownfield. [Retain / Treat / Reuse]



14 Urban Riverfront Scenario



State Park Scenario

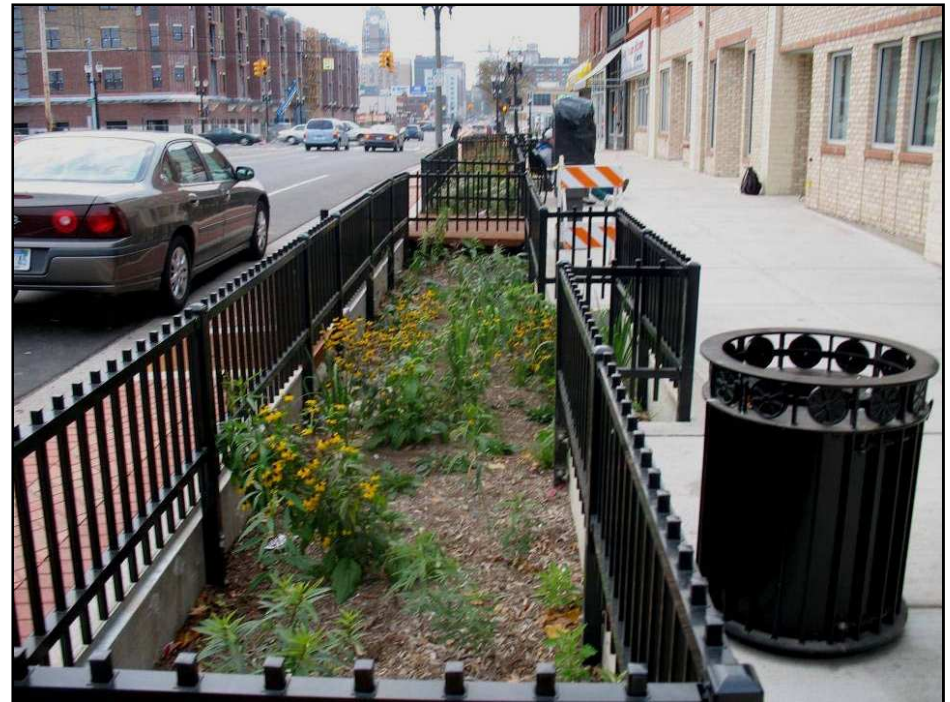
What does it look like?

Urban Rain Garden: City of Lansing, MI



The rain gardens provide aesthetic appeal, educational opportunities for the public, and a pedestrian friendly environment.

The rain garden project extends over four city blocks of Michigan Avenue... and has helped ease peak flows for nearly 90% of storm events.



How did it happen?

Urban Rain Garden: City of Lansing, MI

Concerns? Public perception, safety, access, utilities, existing stormwater system, cost, construction time & impacts, maintenance...

Cost? ~ \$1 million bid



Part of the solution? Individual groups & businesses sponsor maintenance

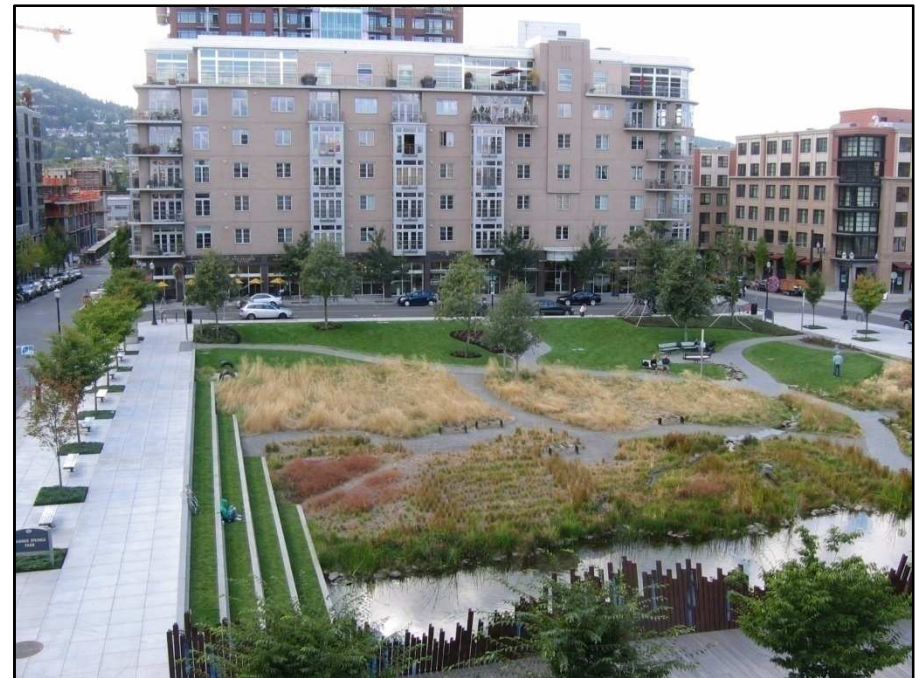
What does it look like?

Philadelphia, PA & Portland, OR



← Philadelphia's three acre Fairmont Park, and its one acre Saylor Grove wetland receive & treat stormwater from 56 acres

Portland Oregon's Tanner Park provides approximately one acre of greenspace in a dense, urban environment →



<http://static.panoramio.com/photos/original/5399055.jpg>

What are the benefits? Philadelphia



- The New Kensington Community Development Corporation and the Pennsylvania Horticultural Society implemented green retrofit measures in a community area in Philadelphia
- NKCDC and PHS converted unsightly abandoned lots with “clean & green” landscapes of mowed grass, ringed with trees
- Significant economic impacts from these green retrofits:
 - Vacant land improvements resulted in surrounding housing values increased by as much as 30%
 - New tree plantings increased surrounding housing values by approximately 10%
- This translated to a \$4 million gain in property values through tree plantings and a \$12 million gain through lot improvements (*link to site & University of Pennsylvania study, below*)

What does it look like? Green Streets

STORMWATER CURB EXTENSIONS

Conventional curb extensions (also known as curb bulb outs, chokers, or chicanes) have been used for decades to enhance pedestrian safety and help in traffic calming.

A stormwater curb extension simply incorporates a rain garden into which runoff flows.



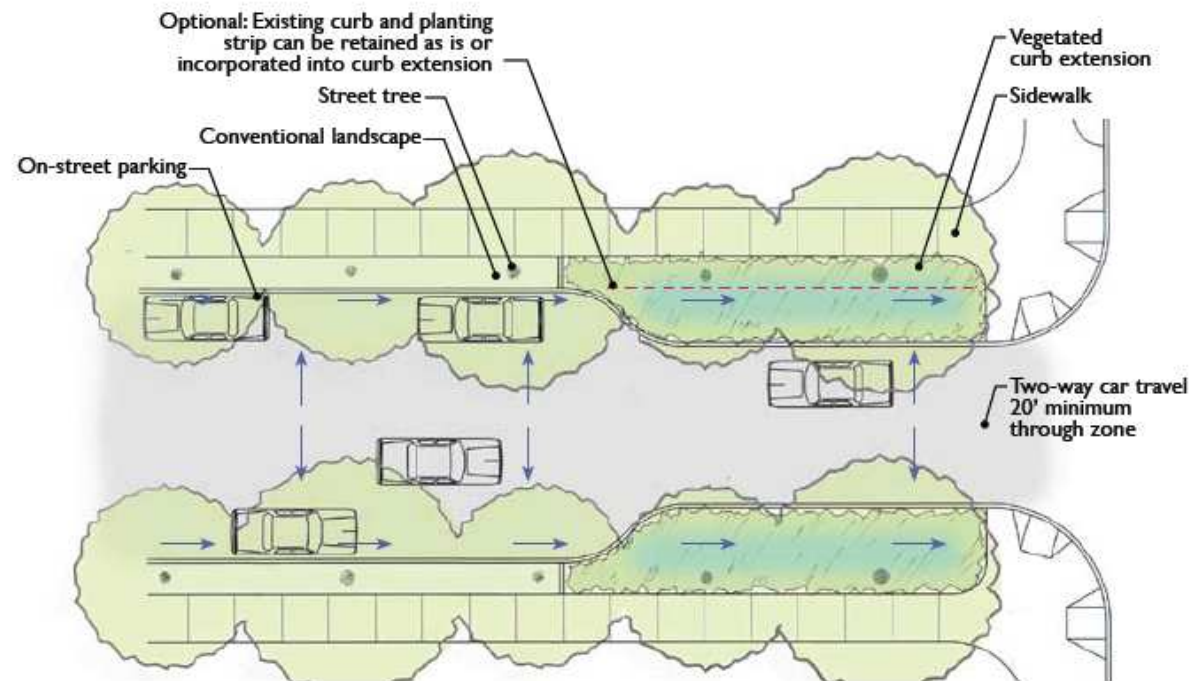
TYPICAL STREET



OPPORTUNITY



IMPLEMENTATION



What does it look like?

Roadside Bioswale: Chagrin Falls, OH

Pepper Pike Bioretention Retrofit Project Goal:

- Modify existing drainage swale to install a bioretention system within the right-of way along a residential street to demonstrate its use to manage road runoff.
- Designed to distribute, reduce, and treat storm water runoff before connecting to a storm sewer system.
- In place for one year, monitoring...

Link to Pepper Pike Construction video...

http://www.crwp.org/LID/usepa_lid_project.htm





Sustainability & Green Communities: Next Steps

Big Picture Goals

- Reduce the amount of vacant land
- Improve the image of city
- Increase property value & tax base
- Attract economic development & facilitate job creation
- Reduce the urban heat island effect & improve air quality
- Provide open recreational space & more livable neighborhoods

Practicalities

- Want to reduce O&M costs of vacant land & area land banks
- But need to understand O&M costs of green & other alternatives
- Need to clean up, control, or contain legacy contamination
- But need to ensure that reuse alternatives are safe for public
- Changes are projected to benefit the City's economy...
- But at what initial cost, and how will these changes impact City operations?



Sustainability & Green Communities: Next Steps

- Stakeholders are actively working with City, State, and Regional agencies to improve Cleveland & Cuyahoga County
- The City of Cleveland has a lot of resources to work with, including vacant land, but only one chance to get it right
- As we understand things, the City needs a flexible process that can account for both short- and long-term development goals, and changing ideas about sustainability as Cleveland works to achieve its vision
- We are proposing an applied research project to work with the City of Cleveland to demonstrate how a structured decision-making process can help to better match City priorities with neighborhood development & sustainability goals



Sustainability & Green Communities: Next Steps

Open Discussion:

1. Ground Rules: Everybody gets a chance to contribute – if you don't speak your mind we don't get it right.
2. What are your specific objectives & priorities for the future of your Department?
3. How likely is it that Cleveland will achieve its vision for Sustainability by 2020?
4. Where do you see issues or barriers coming up?
5. How does this affect your department and your responsibilities?