

Optimizing Environmental Benefits: LID Project Considerations

State Water Resources Control Board
Climate Change Workshop: Urban Water Reuse
Sacramento, CA
June 17, 2009

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Presentation Focus

- Current drivers for municipal project selection
- How broader environmental benefits can be incorporated into municipal alternative analysis
 - Comprehensive accounting of environmental benefit
 - Use of whole-life cycle, triple bottom line project assessment
- What is a sustainable stormwater design?



History of Stormwater Management



Courtesy of the City of Seattle

Protection of
Public Health &
Property



Courtesy of the City of Seattle



Courtesy of the City of New Brighton

WQ
and Peak Flow
Management



Photo from Utility Vault for
Stormwater Management, Inc.



Courtesy of the City of Seattle

Decentralized
Stormwater
Management

LID is a Tool



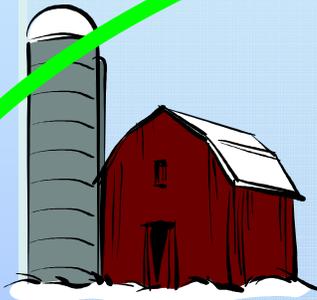
What is LID?

Performance and technology based

=

environmental effectiveness and economic
efficiency.

LID can address multiple environmental objectives



stormwater
& LID



water supply



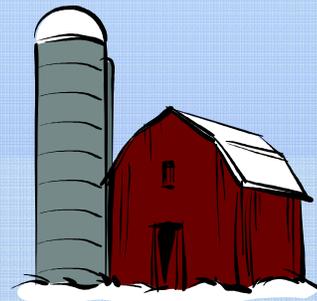
groundwater



wastewater



climate change



energy



The Low Impact
Development Center, Inc.

How do we start linking the silos?

Let's look at current way projects are developed at the municipal level.

The Current Municipal Perspective

What are primary drivers that initiate municipal projects?

- Local government: customer service

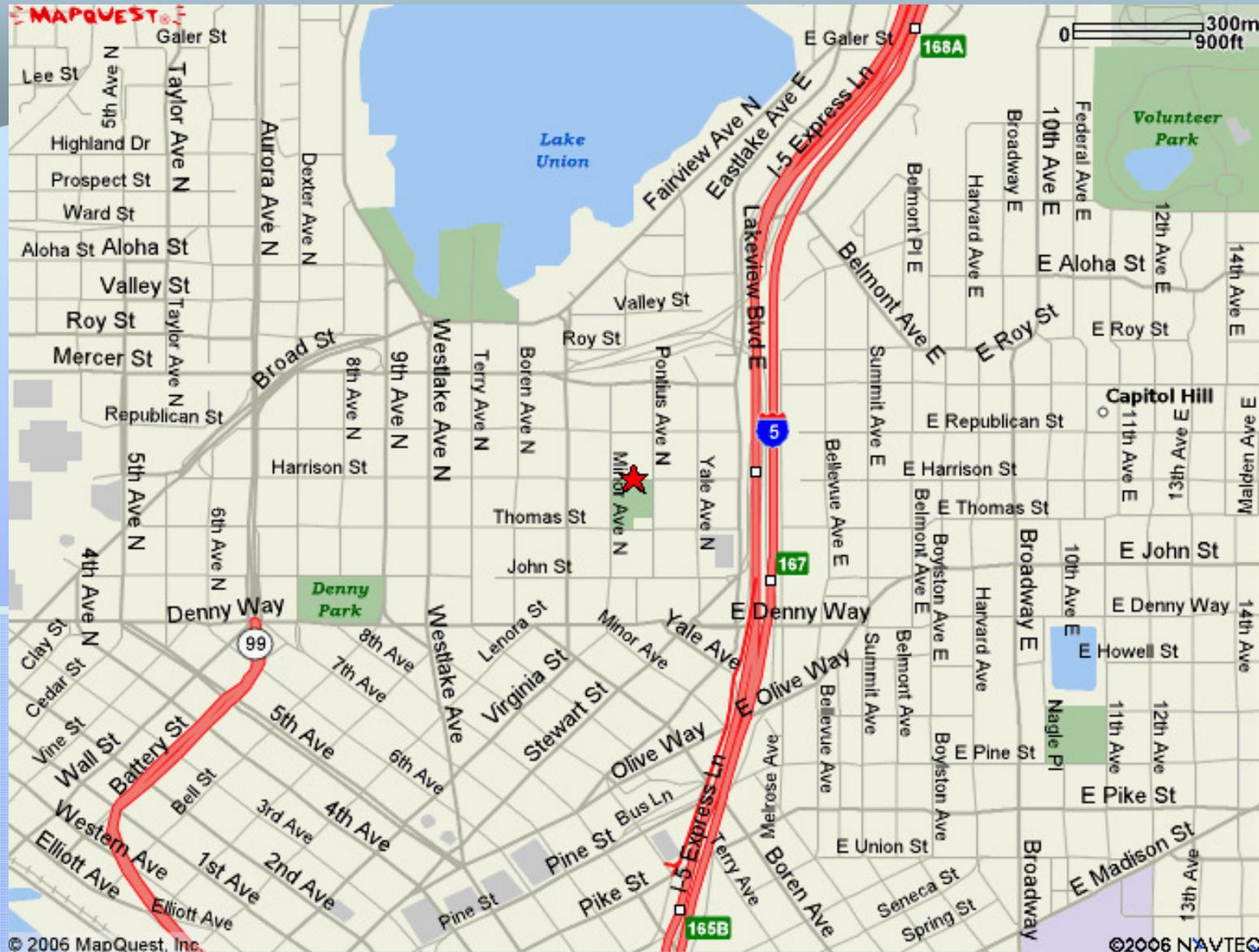
(flood protection, water quality, road improvements)

- Private Sector: economics



How can municipalities start integrating broader environmental benefits when they evaluate project options?

Case Study: Seattle Swale on Yale WQ Project Evaluation

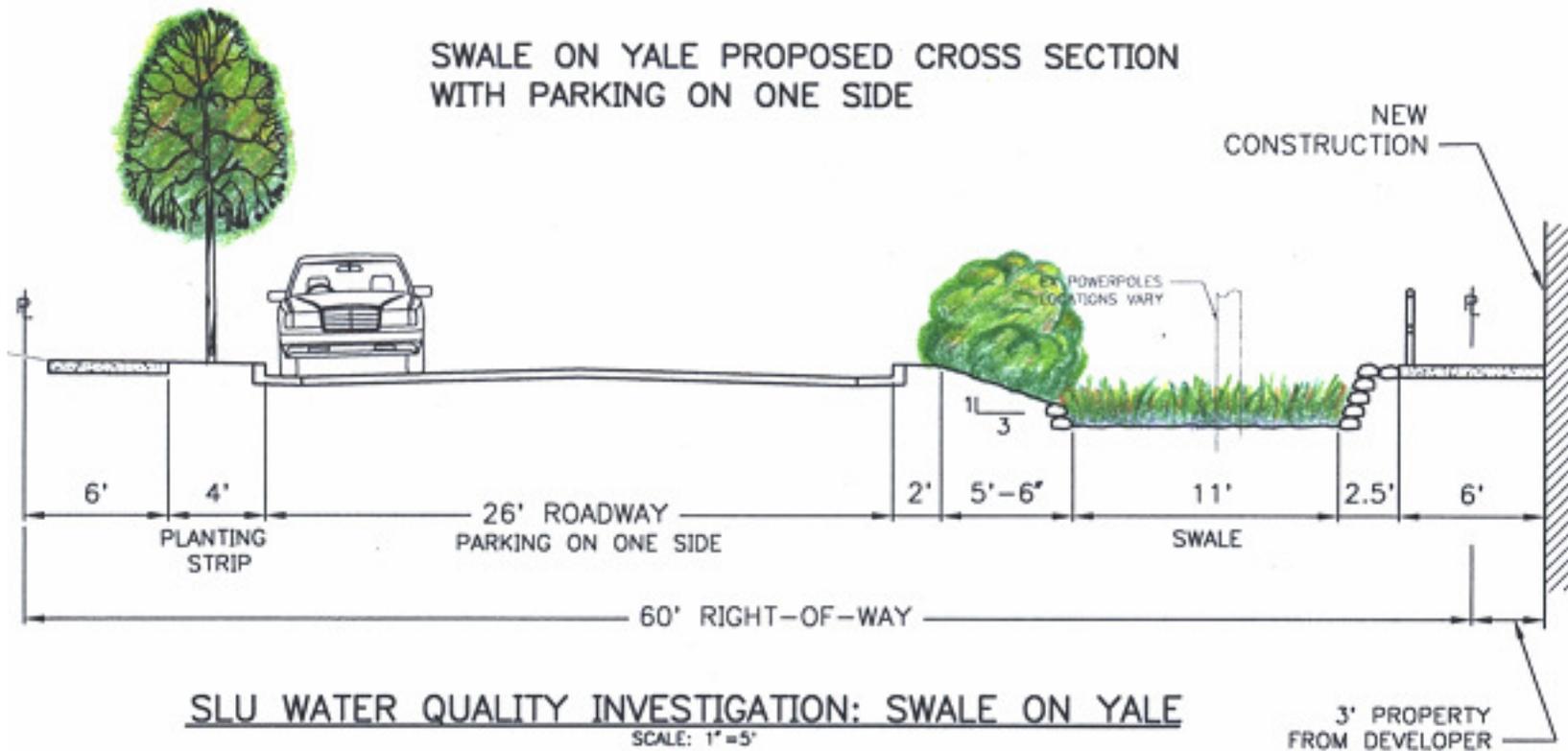


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Swale on Yale alternative analysis incorporated economic, environmental, and social factors in a whole life cycle cost-benefit analysis



1. 1-FOOT HIGH ROCKERY OR SIMILAR TYPE OF TREATMENT WILL BE INCORPORATED TO ALTERNATING SIDES OF SWALE
2. PEDESTRIAN DROP OFF / PULL OUT ZONE WOULD BE INCORPORATED MID BLOCK ON SWALE SIDE OF RIGHT OF WAY
3. PEDESTRIAN ACCESS ACROSS SWALES PROPOSED USING OPEN GRATED STRUCTURE

REV 5-8-06

Swale on Yale: Documentation of Benefits and Risks

Table 5. Qualitative comparison of option impacts on project benefits.

Benefit	Perspective	Impact	Option Impact on Benefit ⁸	
			Option 1 - StormFilter	Option 2 - Swale ³
Water Quality Benefits	Human Health/Aquatic Life	TSS removal ¹⁰	●	●
		Total Metals removal	●	●
		Dissolved Metals removal	●	□/●
		Nutrients removal	□/●	■/□
		Oil & Grease removal	●	□

Benefit	Perspective	Impact	Option Impact on Benefit ⁸	
			Option 1 - StormFilter	Option 2 - Swale ³
		Organics	□/●	Unknown
		Temperature	□/●	□
	Contact recreation	Fecal coliform removal	□/●	■/□
		Trash/floatables removal	●	●



Swale on Yale: Documentation of Benefits and Risks

Ancillary Benefits	Environment	Heat Island Reduction	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Habitat	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Community	Sustainability	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Green/open space ¹⁰	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Parking/traffic	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Education/behavioral modification	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Increased property values	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Public/ Private Partnership	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Parks Department	Land use	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Seattle Public Utilities	Water Quality Bank	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		Land easement	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Pilot Project	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Performance monitoring to fill know information gap	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Cost sharing	<input type="checkbox"/>	<input checked="" type="checkbox"/>



As project options are developed we need to think about the spectrum of environmental benefits and how to quantify those benefits.



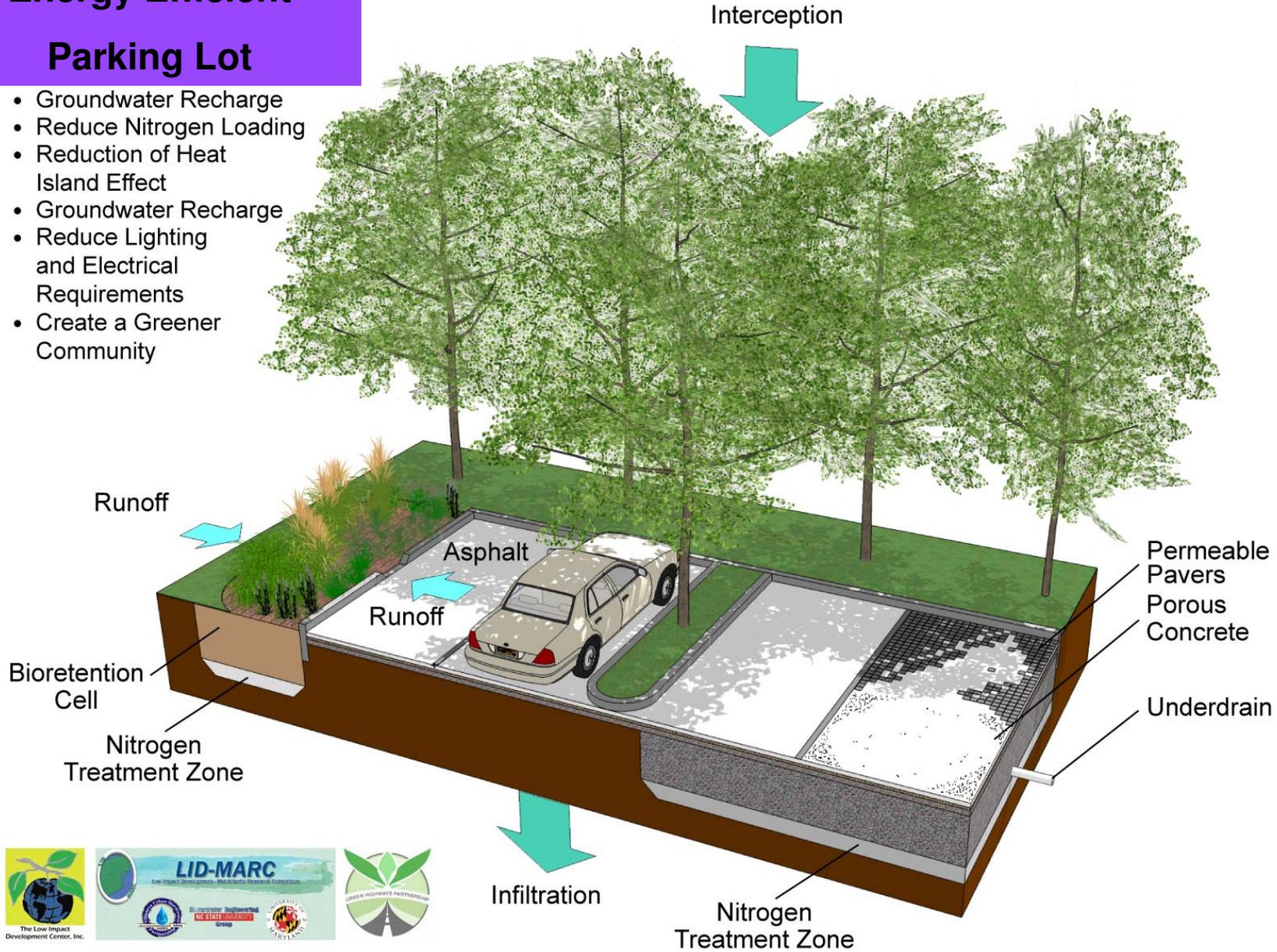
Courtesy of Seattle Public Utilities



Energy Efficient

Parking Lot

- Groundwater Recharge
- Reduce Nitrogen Loading
- Reduction of Heat Island Effect
- Groundwater Recharge
- Reduce Lighting and Electrical Requirements
- Create a Greener Community



American Recovery and Reinvestment Act

Great Green Towns: Collaboration for Prosperity and Sustainability

A Model for Sustainable, **Green** Land Use Planning for Working Class Communities located in the

What is..Anacostia River Watershed of the Chesapeake Bay



Green Streets
by the Green Highways Partnership



Source: LID Center



Source: LID Center

What could be...



Bioretention on family-friendly street edge
Source: Portland Bureau of Environmental Services



Traffic calming and signature green space at street entry
Source: Portland Bureau of Environmental Services



Rain gardens for viewing; pedestrian-friendly permeable concrete walks
Source: LID Center



Permeable interlocking concrete pavement (PICP) in parking lanes
Source: Portland Bureau of Environmental Services



Streets constructed of pervious concrete pavement or other permeable surfaces
Source: City of Bellingham, WA



Curb bump-outs/extensions provide bioretention areas; traffic calming measures improve safety
Source: LID Center

Using Green Highways and Green Infrastructure to revitalize our communities: Green Stimulus Plan for the Town of Edmonston, Maryland

What makes this a Great Green Town?

- A Top (tree canopy) to bottom (water quality) plan
- Native tree canopy
- Street lighting with clean energy
- Walking, running, and biking
- Recycled materials
- Stormwater bioretention and filtration
- Open process and public engagement
- Education and replication

Anticipated Project Benefits:

Social Benefits:

- Reduction in urban heat island effect
- Provides "Green Job" opportunities
- Educational through street kiosks
- Crime reduction benefit
- Health benefit

Economic Benefits:

- Energy cost reduction and water conservation
- "Green Enterprise" business opportunities

Environmental Benefits:

- Carbon sequestration
- Improved water quality through 90% capture of stormwater
- Carbon footprint reduction
- Recycling and beneficial reuse

Greening Tools



Solar trash compactor; Program information on trash can
Source: LID Center



ADA-compliant PICP
Source: ICPI



Energy-efficient light fixtures; Banner standards on light poles
Source: Caimell Graphics



Rain garden, Maplewood, MN
Source: City of Maplewood, MN



Recreation, alternative transportation support
Source: Damien Newton, Streetsblog.org



Educational sign explaining greening practices
Source: Chuck Taylor, Advanced Pavement Technology



Benches for local recycling and art opportunities
Source: LID Center



Bioretention next to pervious concrete with recycled materials for edges
Source: LID Center

Planning for environmentally sustainable growth in the Anacostia Watershed