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STORM WATER MANAGEMENT PROGRAM ELEMENTS

PUBLIC EDUCATION AND OUTREACH

ILLICIT DISCHARGE DETECTION AND ELIMINATION

CONSTRUCTION SITE RUNOFF CONTROL

POST-CONSTRUCTION STORM WATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT

POLLUTION PREVENTION/GOOD HOUSEKEEPING DEBRIS CONTROL BMPS

POLLUTION PREVENTION/GOOD HOUSEKEEPING CHEMICAL APPLICATIONS BMPS

POLLUTION PREVENTION/GOOD HOUSEKEEPING EROSION CONTROL BMPS

POLLUTION PREVENTION/GOOD HOUSEKEEPING MAINTENANCE ACTIVITIES BMPS

INDUSTRIAL AND COMMERCIAL ACTIVITIES DISCHARGE MANAGEMENT

MUNICIPAL INDUSTRIAL FACILITIES

MONITORING

TOTAL MAXIMUM DAILY LOAD

REPORTING

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POST-CONSTRUCTION PROGRAM ELEMENTS

1. Revise the Storm Water Permanent BMPs Manual to include Low Impact Development (LID) requirements.
2. Review plans to ensure that appropriate permanent BMPs (PBMPs) have been included in project design and bid package.
3. Track inspection frequency and maintenance of PBMPs.
4. Provide education and outreach materials to parties applying for DOT-HWYS' permits.
5. Provide annual training for DOT-HWYS staff and contractors responsible for inspecting PBMPs and LID practices.

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SPEAKER

RICHARD PRICE, P.E., LEED, CSM

- Email: rprice@eaest.com

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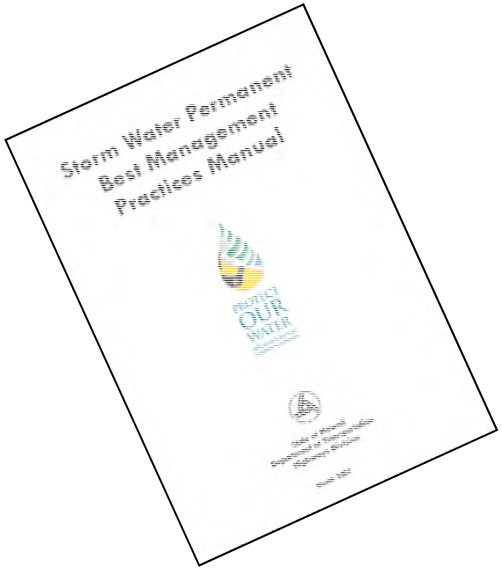
CHANGES TO DOT-HWYS PERMANENT BMP PROGRAM

August 2015

Standards for Storm Water Management

Bottom Line Up Front

Projects (new or redevelopment) that generate one (1) acre or more of new impervious area must incorporate LID storm water controls unless qualifying for exemptions or variances



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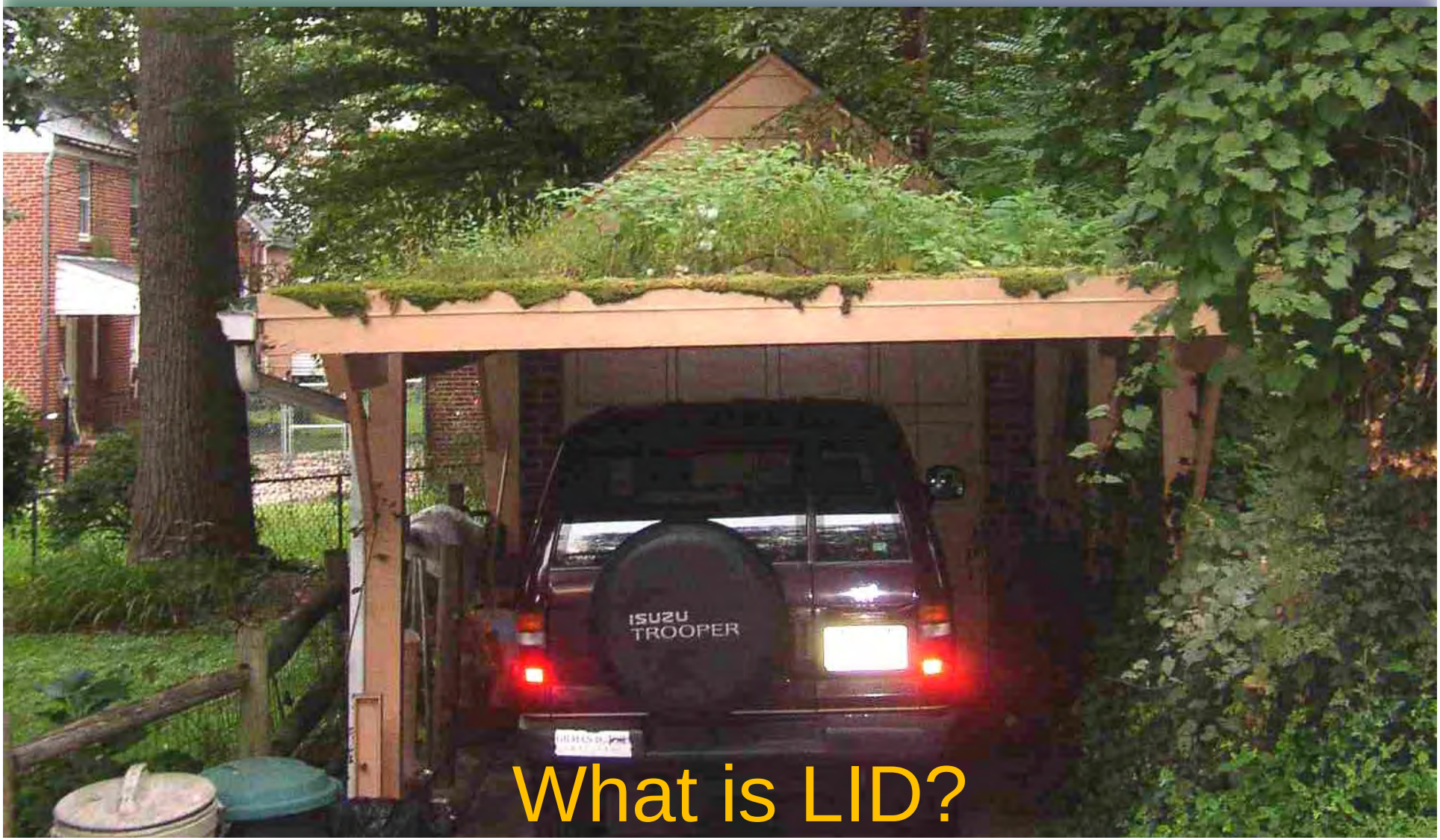

What is LID?

STANDARDS FOR STORM WATER MANAGEMENT

What is LID?

A comprehensive land planning and engineering design approach with a goal of maintaining and enhancing the pre-development hydrologic regime of urban and developing watersheds.

STANDARDS FOR STORM WATER MANAGEMENT

What is LID?

LID is a strategy seeking to control storm water quality at its source, incorporating such elements as infiltration, retention, and biofiltration.

STANDARDS FOR STORM WATER MANAGEMENT

What is LID?

Storm water management practices which seek to mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating storm water runoff close to its source.

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What is LID?

STANDARDS FOR STORM WATER MANAGEMENT

What is LID?

An innovative stormwater management approach with a basic principle that is modeled after nature: manage rainfall at the source using uniformly distributed decentralized micro-scale controls. LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source.

http://lid-stormwater.net

STANDARDS FOR STORM WATER MANAGEMENT

- Smaller projects less than one (1) acre, that have the potential to discharge pollutants to the MS4 may be required to install specific BMPs at the discretion of DOT-HWYS

STANDARDS FOR STORM WATER MANAGEMENT

Common Project Exemptions:

- Returns area to pre-development hydrologic conditions
- Does not discharge to State waters
- Operations and Maintenance Activities
- Water Quality Improvement or Preservation
- Emergency
- Temporary

STANDARDS FOR STORM WATER MANAGEMENT

Variances:

- Hydrogeological Constraints
- Physical Constraints
- Operational Constraints
- Other

STANDARDS FOR STORM WATER MANAGEMENT

Water Quality Design Volume

1-inch storm: 1” represents the design storm depth

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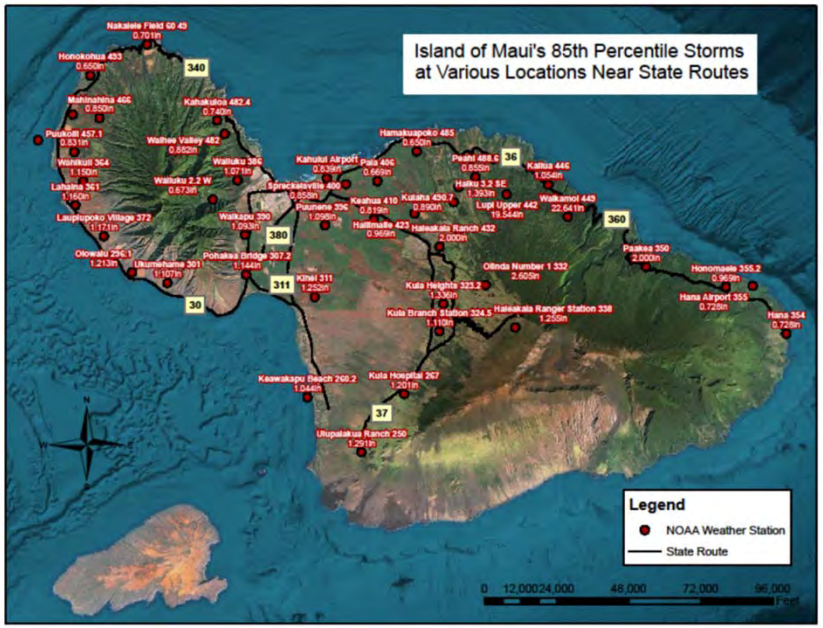
Why 1 inch as the design storm?

- DOT-HWYS analyzed rainfall data from around the State near State Highways and determined that 1-inch is acceptable



STANDARDS FOR STORM WATER MANAGEMENT

Designing for Storm Water Controls

- Once 1 acre or more new impervious area is established, design for LID to treat the design volume
- If the complete volume cannot be treated, utilize LID where feasible and treat the remaining volume with alternative BMPs
- Consult with DOT-HWYS regarding any constraints that require a variance and alternative BMPs

STANDARDS FOR STORM WATER MANAGEMENT

Designing for Storm Water Controls (Con't)

- For smaller projects less than one acre that have the potential to pollute, apply source control. Such projects include:
  - Retail Gasoline Outlets
  - Automotive Repair Shops
  - Restaurants
  - Projects with Parking Lots with at least 10,000 square feet of total impervious area

Introduction to Low Impact Development and Green Infrastructure

Hawaii DOT 2015

Neil Weinstein, P.E., ASLA, AICP, ENVSP
Executive Director, LID Center

The Low Impact
Development Center, Inc.

Courtesy: Ed Snodgrass

I want this now!!!! (whatever it is)

Urban Redevelopment

Option 2


The Good Old Days!

Traditional Urban Drainage

Capacity

Sustainable Urban Drainage

Capacity

Water Quality

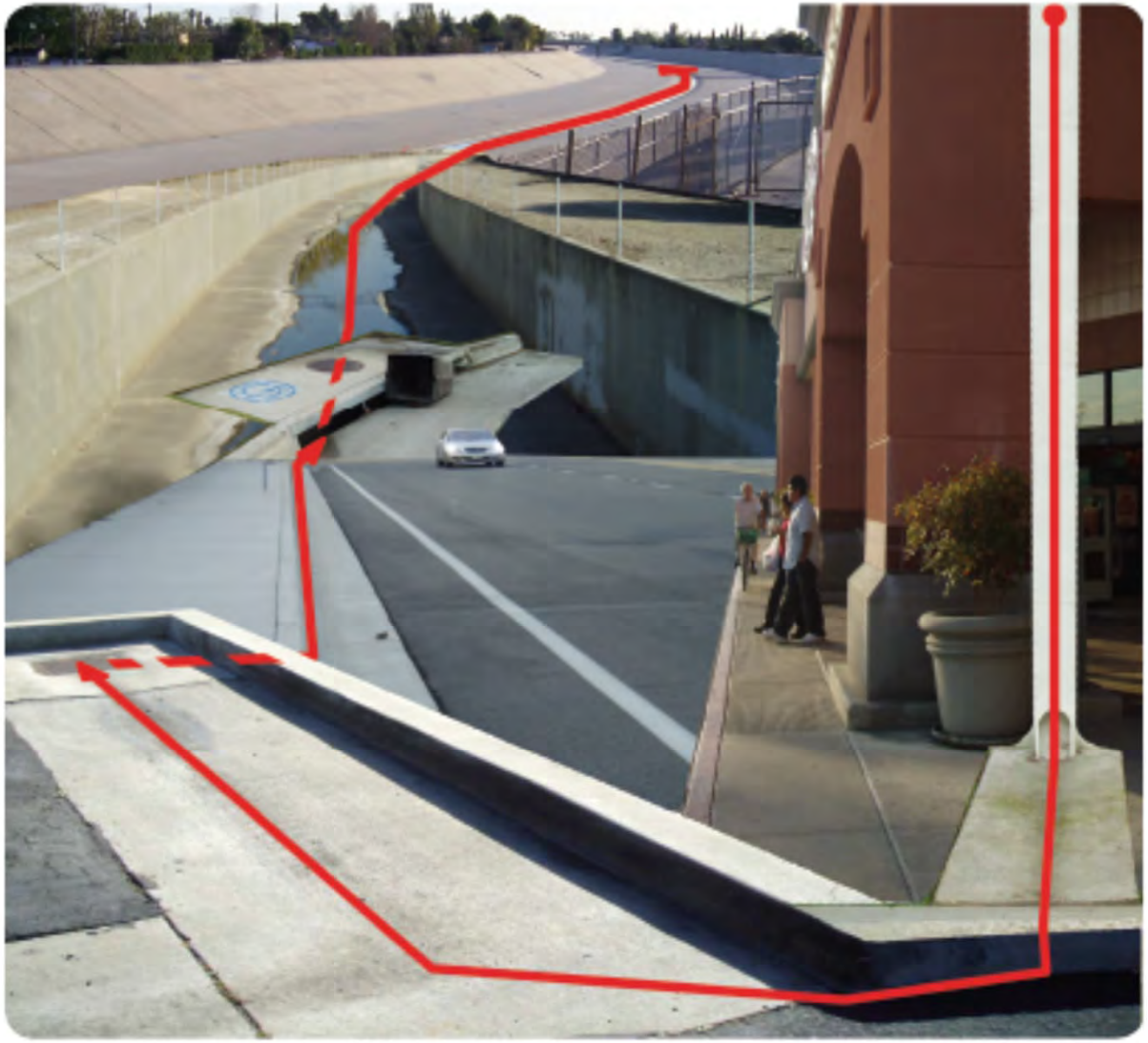
Amenity

Adapted from Stahre

Urban Drainage System

Current urban development directs stormwater runoff from roofs, parking lots, streets and landscapes into storm pipes and channels and out into the ocean.

The system is designed to carry runoff away from the site as quickly as possible to prevent flooding. Nutrients and contaminants are carried out to sea with it. Rainwater, a valuable resource, is treated as waste.



Urban stormwater management system

Courtesy E. Takata

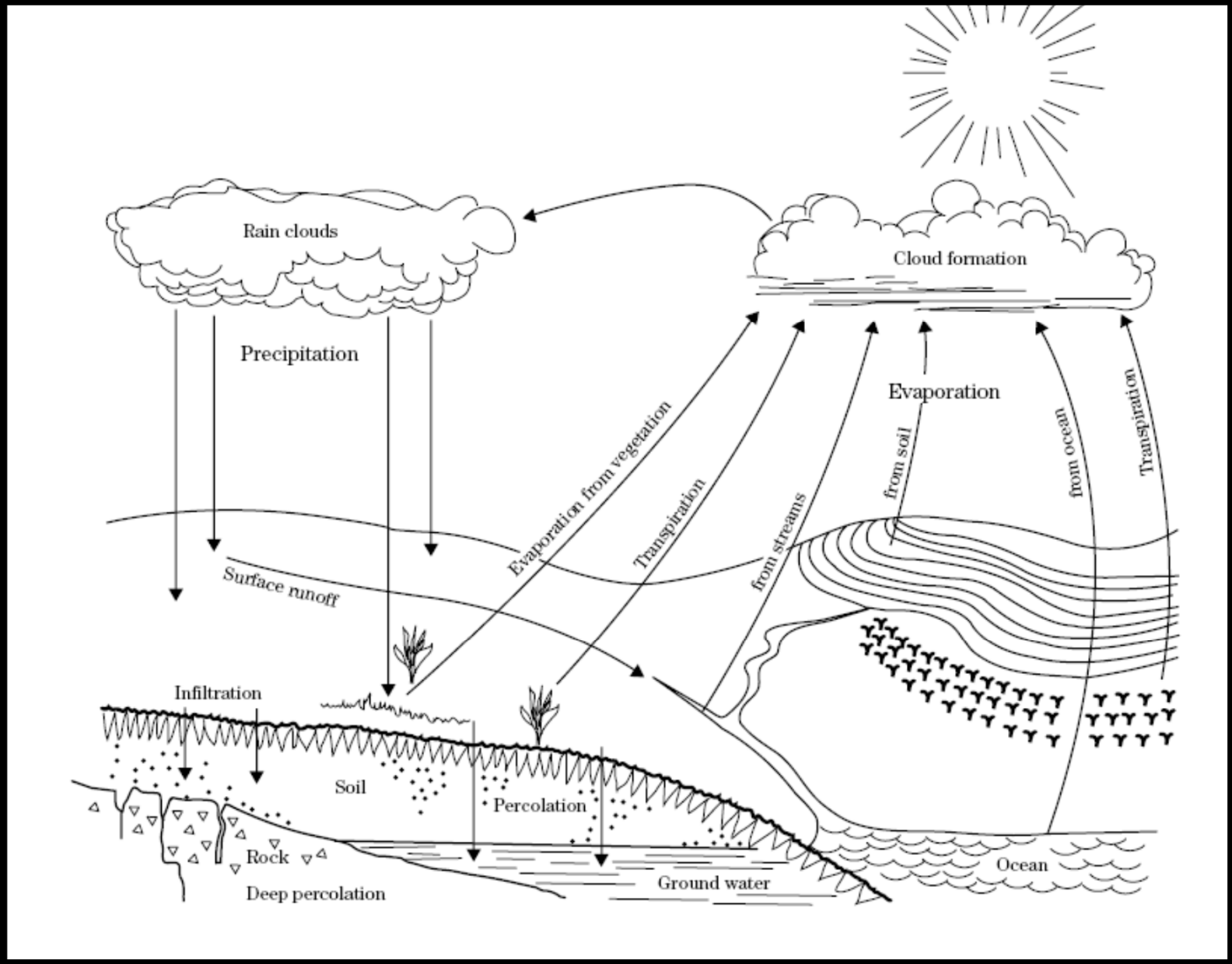
Natural stormwater management system

Natural Drainage System

In a natural system, rainfall is soaked up by leaves and soil. Riparian systems act as sponges, holding water after rain and slowly releasing it over time.

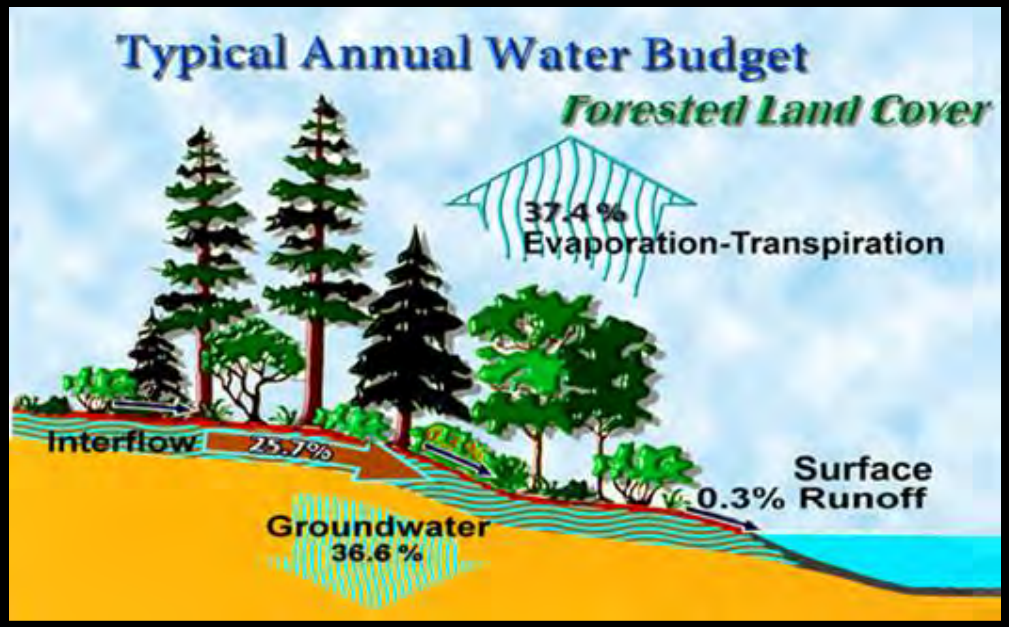
Tree canopy alone can prevent up to 17% of rainfall from reaching the ground (Alexander 2006). Root systems prevent sedimentation and erosion. Nutrients and contaminants are filtered through permeable soil before recharging the groundwater table to replenish supply.

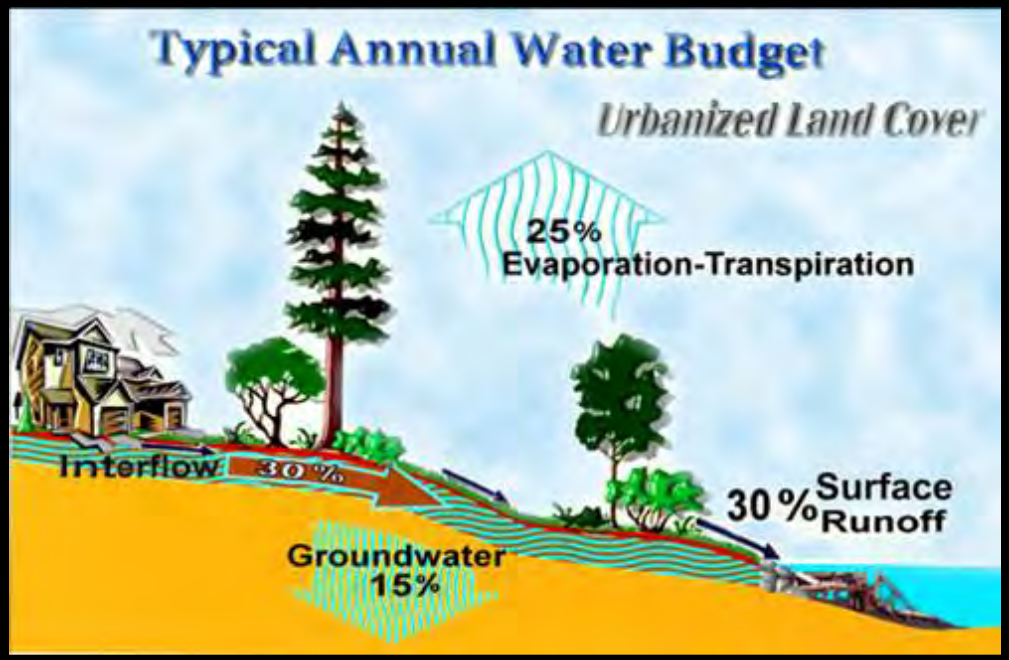
Courtesy E. Takata



USDA

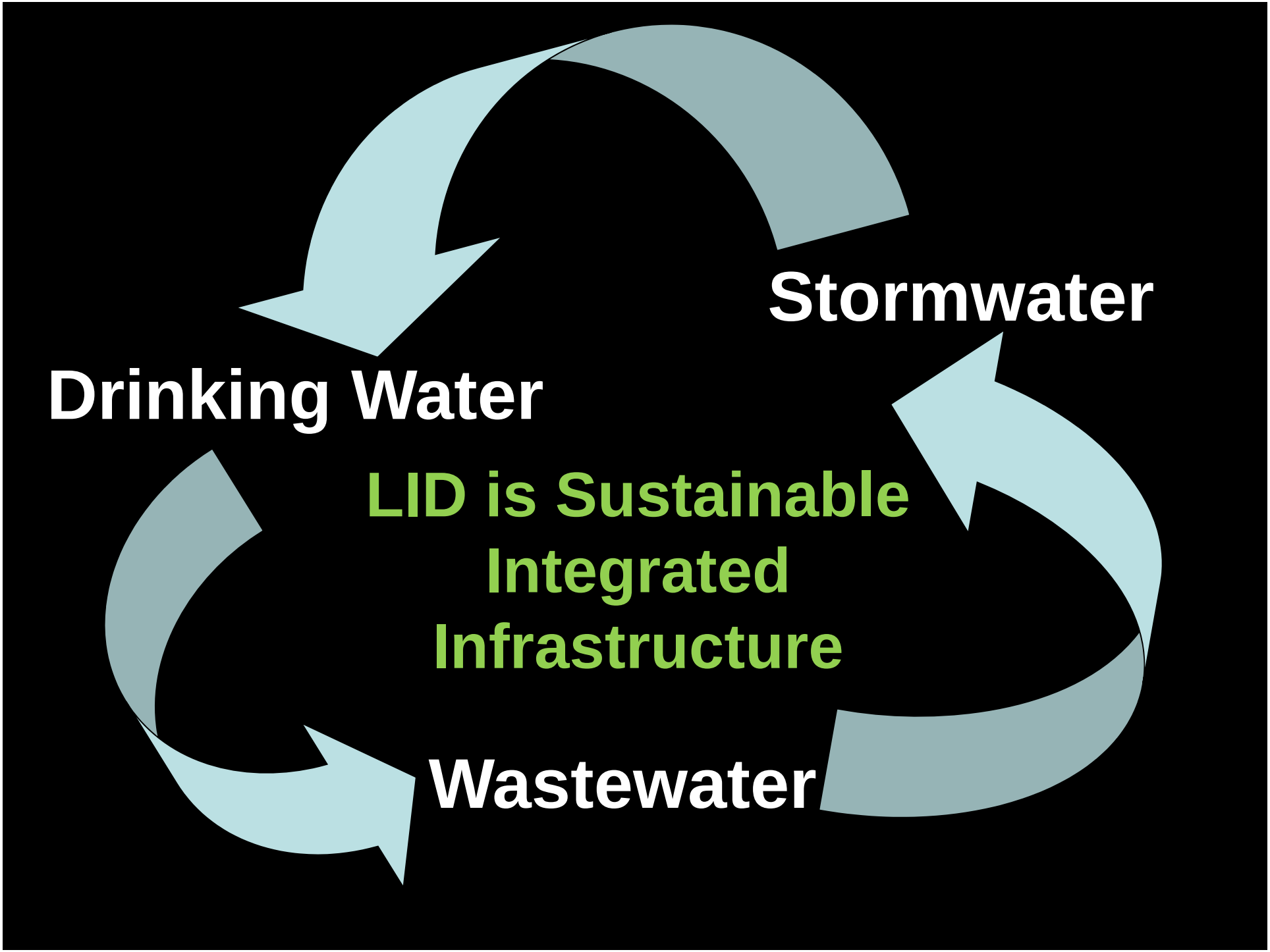
Natural Runoff Processes





Forested vs. Urban Land Cover

Courtesy Chris May


Stormwater
Drinking Water
LID is Sustainable
Integrated
Infrastructure
Wastewater

Stormwater is an asset!

Buckman Terrace Portland

Integrated into Sites…

and buildings

The temperature above Chicago's City Hall green roof averages 10 -15°F lower than the black tar roof. Difference can be 50°F or greater during the summer.

Energy savings of $3,600 per year.

Courtesy Roofmeadow

Courtesy City of Seattle

Planning and Design to Reduce Impacts and Update Infrastructure

Decentralized controls
Integrated into urban infrastructure

BMP	Infiltration	ET*	Interception	Conveyance	Detention	Retention	Reuse**
Downspout Disconnection	◉	○			○	◉	
Filter Strips	○	○	○	○		○	
Infiltration Practices	◉			○		◉	
Pocket Wetlands	◉	◉	○		●	◉	
Porous Pavement	●				●	◉	
Rain Barrels/Cisterns						◉	●
Rain Gardens	●	◉	○		●	◉	
Soil Amendments	◉				○	◉	
Tree Box Filters	◉	◉	○		◉	◉	
Vegetated Roofs	◉	◉	○		●	◉	
Vegetated Swales	◉	○	○	◉	●	○	

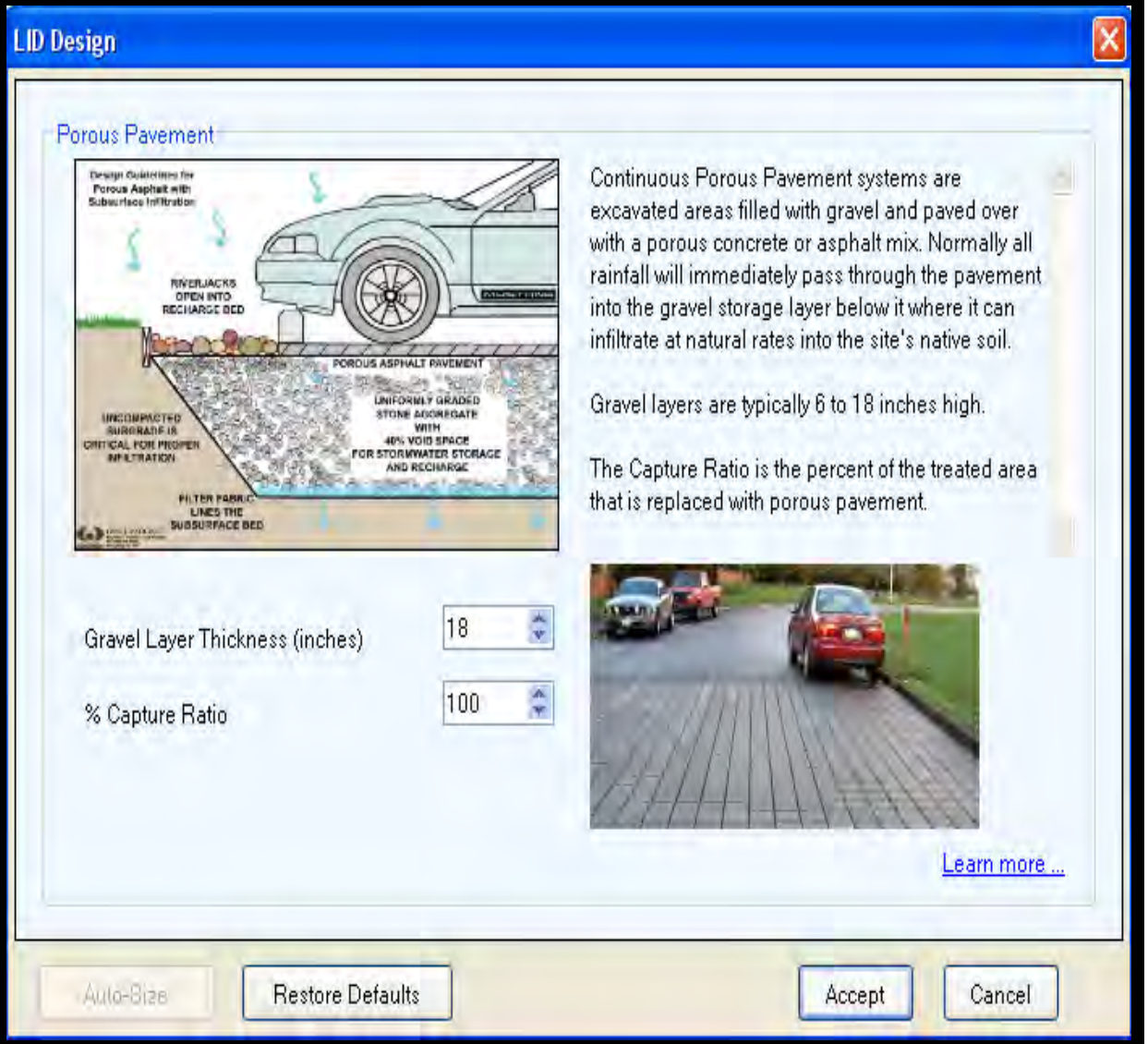
* Evapotranspiration

** Collected water can be used for landscaping, non-potable building uses (e.g., toilets), or as raw water to be treated for drinking.

Key: ● High reliance ◉ Medium reliance ○ Low reliance Blank: N/A

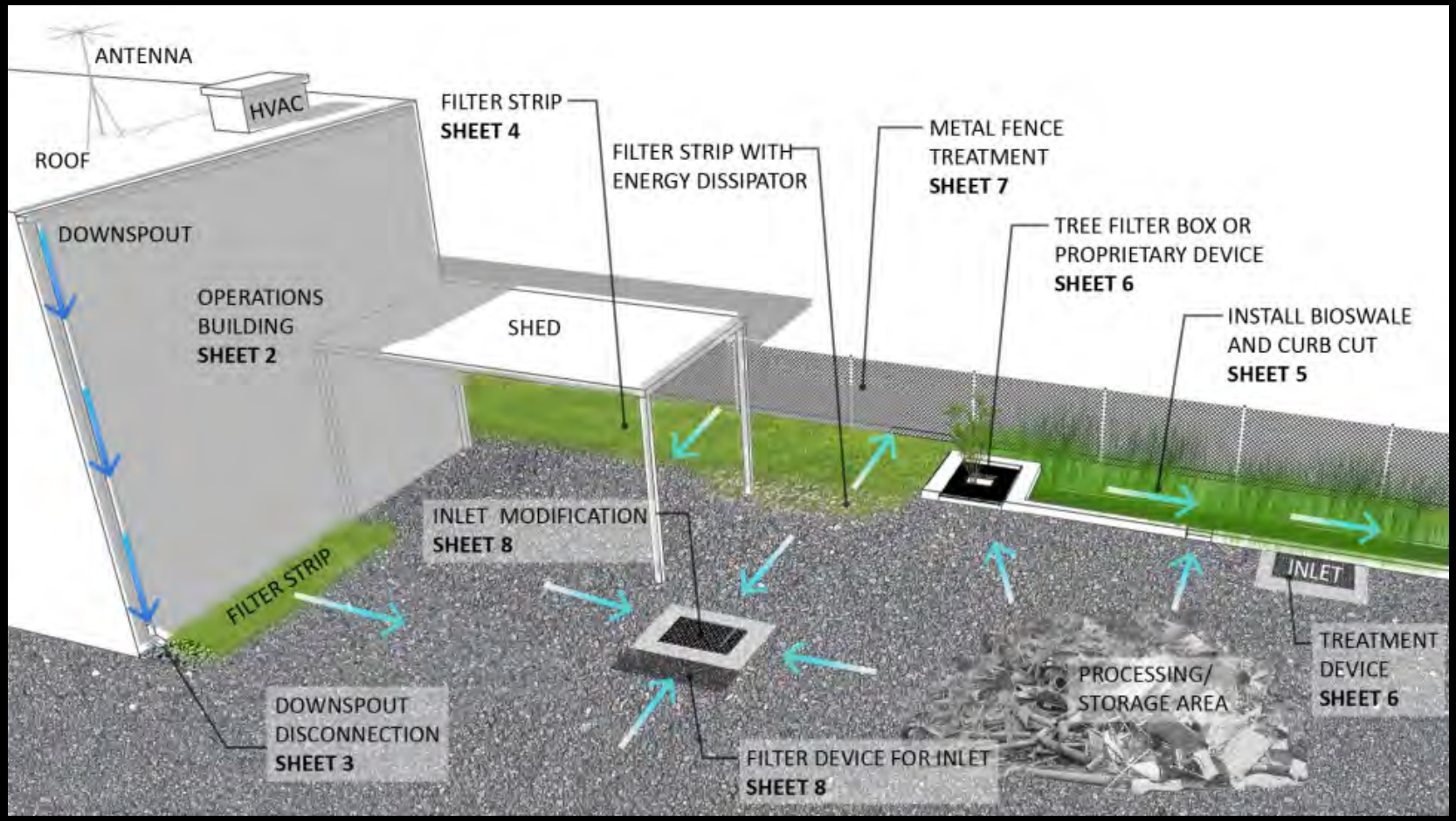
Rankings are qualitative. "High reliance" means that the process is integral to the BMP's ability to meet stormwater management objectives, and that the BMP uses the process to its full potential in the urban environment. "Medium reliance" was assigned when a process is a secondary component of the BMP's operation, or when the BMP does not use the process to its full potential. "Low reliance" means that the process only marginally contributes to the BMP's ability to meet stormwater management objectives. The rationale for ranking hydrologic cycle elements is given in Section 2.3.2.

- Analyze site hydrology over a continuous, long-term meteorological record using the SWMM engine
- Be intelligible to users without prior modeling experience or hydrology expertise
- Require only a minimum amount of readily available site information
- Produce technically sound and defensible results for screening level analysis



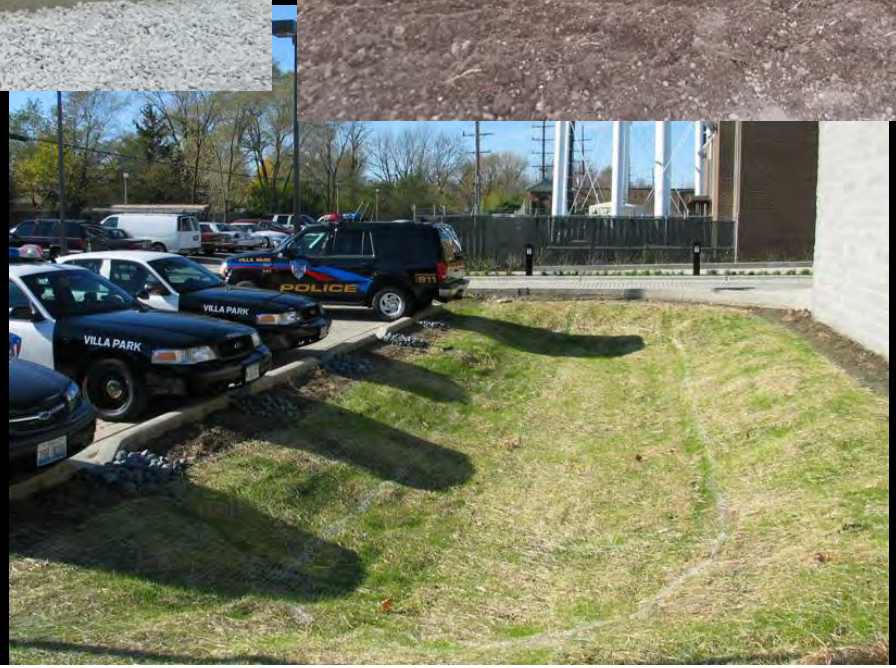
EPA's National Stormwater Calculator

Select appropriate technologies



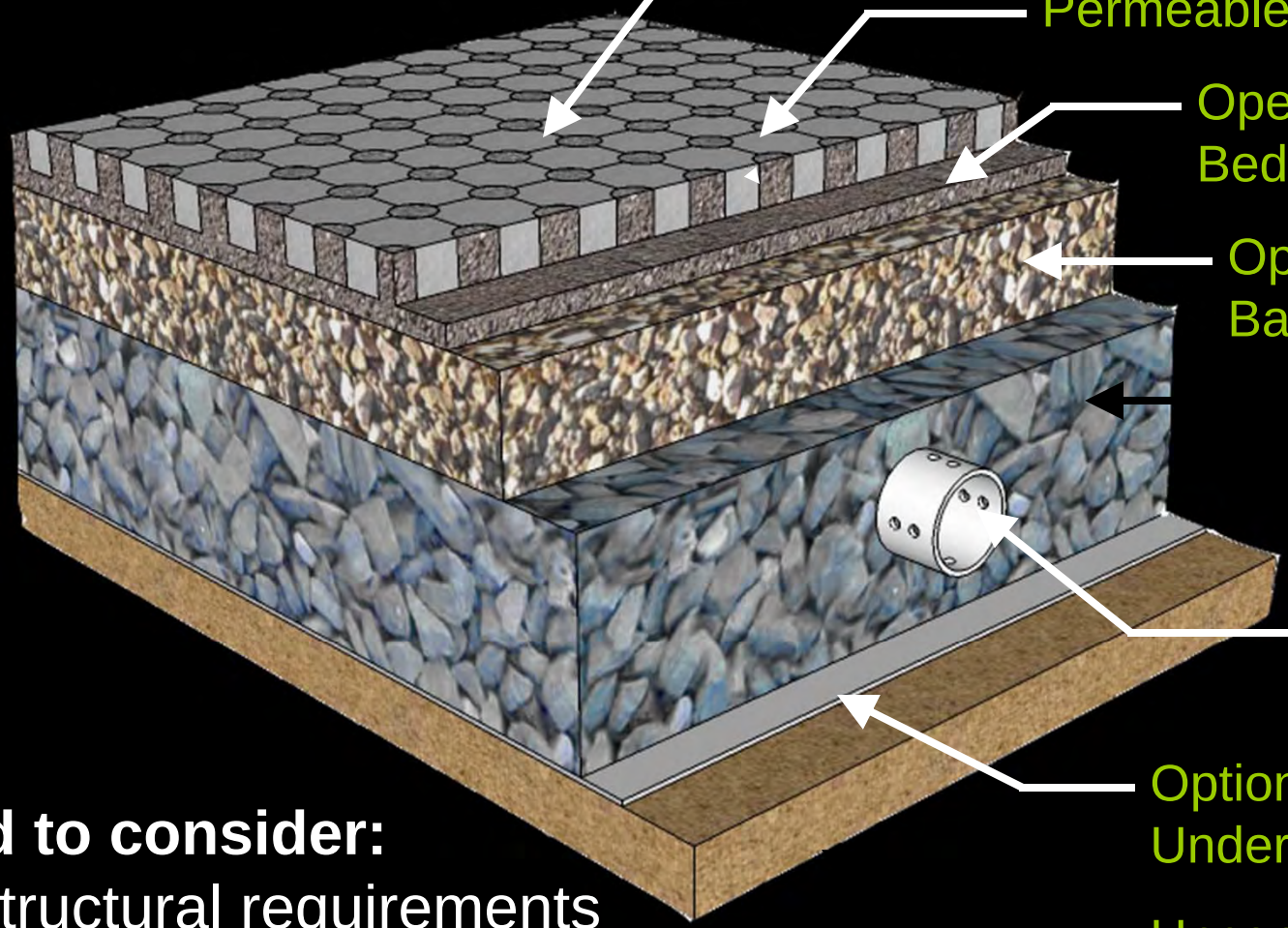
LID for Navy Industrial Facilities

Many Variations and Flexibility!



Courtesy CDF

Permeable Pavement Design



Need to consider:

- Structural requirements
- Hydrologic requirements

Pilots, Pilots, Pilots, and more Pilots!

Navy and Army LID Projects

Bioretention Trench

Washington Navy Yard

Plant and “Media” selection are critical

Survive neglect

Green credits!!


Building 166 Permeable Pavement


Local
One Way
PENSKE
Truck Rental

Maplewood, Minnesota

Courtesy Barr Engineering

Rain garden in commercial parking lot

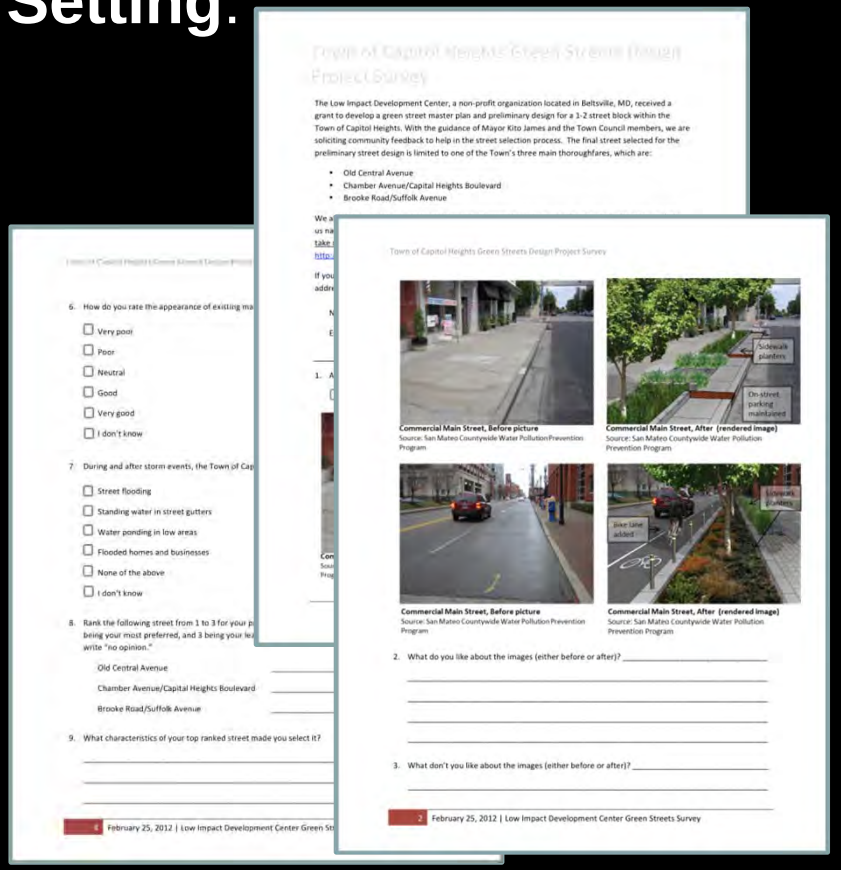
Oakland, California

Town of Capitol Heights
Green Street Master Plan

- **Two Goals**:
  - A ***green street master plan*** to encourage the use of green infrastructure and low-impact development practices for new and retrofitted road projects.
  - A ***preliminary green street design*** for one street within the town that can serve as a future green street demonstration project

Town of Capitol Heights Green Street Master Plan

- **Public Participation/Place Setting**:
  - Outreach events
  - Town Environmental Committee Meeting
  - In-person and online surveys
  - Review/incorporation of existing studies & planning efforts



Green Street Survey Responses

Top 4 considerations related to main streets:

- Improving the look of the streetscape
- Improving neighborhood walkability/connectivity & pedestrian friendliness

Ranked equally

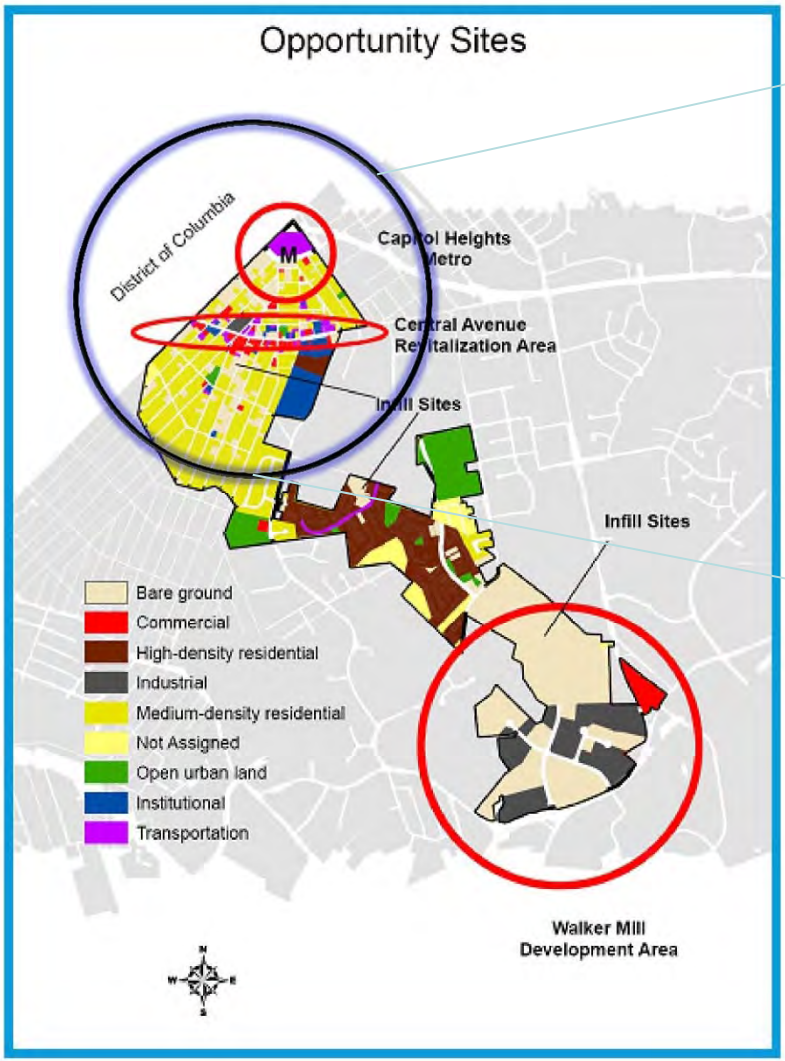
- Reduce crime & vandalism
- Improve the environment

Ranked fourth

Greatest safety concerns:

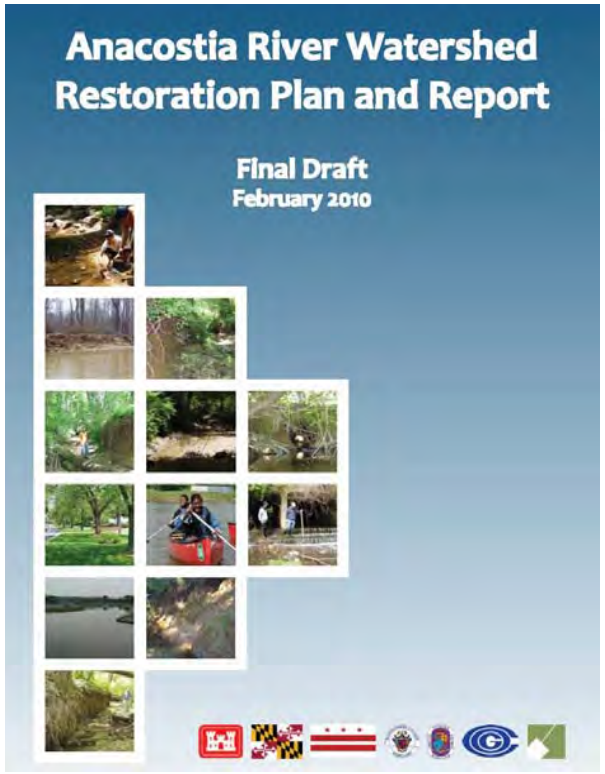
- Safety for children going to/coming from school
- Drivers not yielding to pedestrians
- Lack of crosswalks

Community Sustainability Plan



Green strategies: Incorporate LID/ environmentally sensitive storm water management in all new development; repair/replace streets in the most environmentally responsible way; increase the tree canopy; and encourage green jobs

Anacostia Restoration Plan



◆ = Stormwater retrofit
◆ = Riparian reforestation
○ = Trash reduction
◆ = Stream restoration
◆ = Parkland Acquisition

Green Street Selection Process

1. **Community Input**. Sites are evaluated based on community concerns regarding safety, environmental factors, economic factors, aesthetics, etc.
2. **Screening**. Sites are then evaluated to determine if they're a good candidate based on a range of factors, including street slope, sidewalk widths, building setbacks, utilities in footway, street trees, soils, and drainage areas.
3. **Selection.** The final road selected for preliminary design is selected based upon feasibility, cost-effectiveness, a consideration of any planning activities, and the potential to team up with other concurrent projects.

Final Preliminary Design

Capitol Heights Blvd / Chamber Ave

CAPITOL HEIGHTS BLVD LOOKING SOUTH

METRO PARK LOOKING WEST

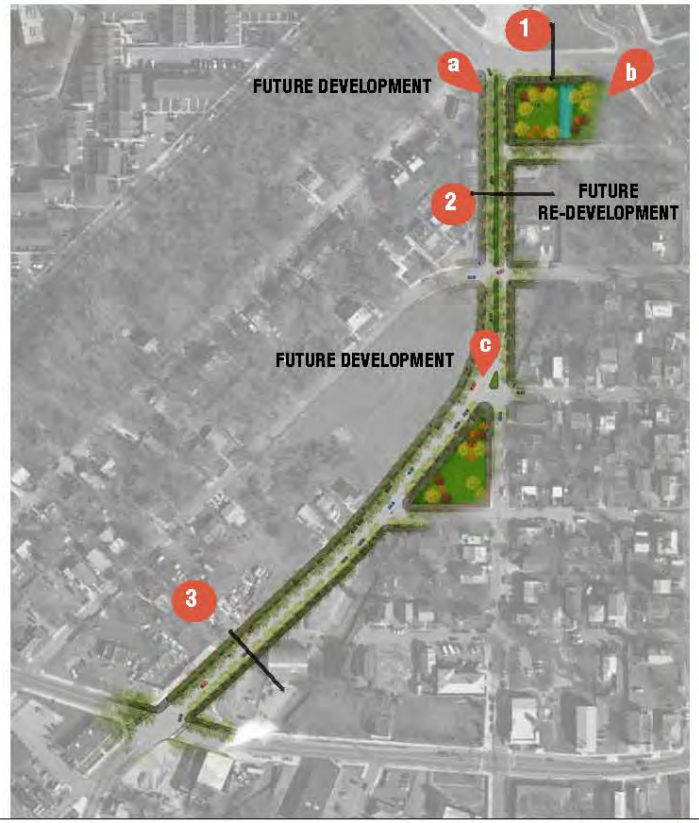
CHAMBER AVE LOOKING SOUTH

MAIN STREET

METRO EDGE

METRO CORE

Preliminary Green Street Design



Preliminary Green Street Design

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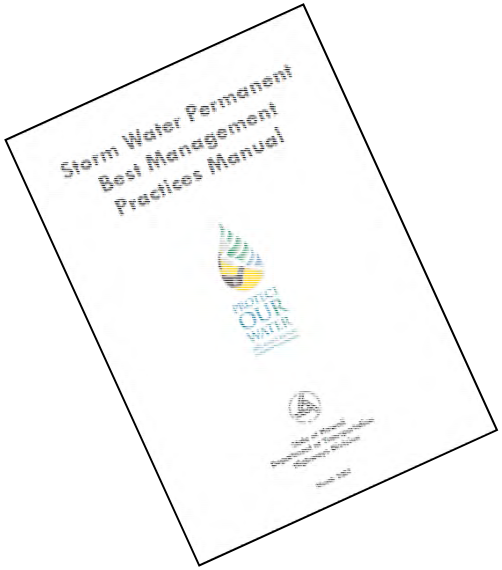
CHANGES TO DOT-HWYS PERMANENT BMP PROGRAM

August 2015

Standards for Storm Water Management

Bottom Line Up Front

Projects (new or redevelopment) that generate one (1) acre or more of new impervious area must incorporate LID storm water controls unless qualifying for exemptions or variances



STANDARDS FOR STORM WATER MANAGEMENT

Any project (new or redevelopment) is required to install a permanent BMP(s) for storm water management if it generates equal to or greater than one (1) acre of new permanent impervious surface

CURRENTLY

(UP TO OCTOBER 2015)

STANDARDS FOR STORM WATER MANAGEMENT

All projects (new development or redevelopment) that disturb (1) acre or more of land reviewed.

- Greater than one (1) acre of new permanent impervious surface requires LID PBMP

- Smaller projects (less than one acre new impervious) that have the potential to discharge pollutants to the MS4 may be required to install specific BMPs

FUTURE

(AFTER OCTOBER 2015)

STANDARDS FOR STORM WATER MANAGEMENT

(CONTINUED)

- All permanent BMP projects are required to install LID BMP(s)

- *However*: Some projects may qualify for exemptions and or variances from this requirement to install LID BMP(s). Projects that qualify for variance from LID must install alternative permanent BMPs approved by DOT-HWYS

FUTURE

(AFTER OCTOBER 2015)

STANDARDS FOR STORM WATER MANAGEMENT

Variances:

- Hydrogeological Constraints
- Physical Constraints
- Operational Constraints
- Other

STANDARDS FOR STORM WATER MANAGEMENT

Variances: Hydrogeological Constraints

Constraints	Safety Concern
Permeability	Soil under BMP basin invert does not allow for water to permeate less than 0.5 in/hr
Depth to Ground Water	BMP invert is closer than 3 ft depth to seasonally high groundwater table
Distance to Drinking Water	BMP is closer than 50 ft to nearest groundwater well for drinking
Distance to Septic System	BMP is closer than 35 ft to nearest septic system
Slope Stability	BMP and infiltration would destabilize slope or cause landslide
Structural Impacts to Buildings/Roadbed	BMP is close to the nearest building foundation or roadbed. Proximity is dependent on BMP type, but minimum is 10 feet distance
Sensitive Downstream Areas	Instituting BMPs would significantly affect downstream habitats

STANDARDS FOR STORM WATER MANAGEMENT

Variances: Physical Constraints

Constraints	Safety Concern
Space Constraints	Instituting LID BMPs to MEP doesn't yield enough treatment for WQDV
Site Slope	Usable flat area doesn't yield enough treatment for WQDV
Lack of Right of Way	Project is closer than 10 ft to the nearest property line and no memorandum of understanding or joint ownership has been established
Contaminated Subsoil	Project is in the vicinity of industrial contamination
Sensitive Community Site	Excavation for BMP would permanently damage a community resource (e.g. wildlife refuge)
Sensitive Archeological Site	Excavation for BMP would result in disturbance of remains or artifacts

STANDARDS FOR STORM WATER MANAGEMENT

Variances:

- Operational Constraints

Constraints	Safety Concern
Strength/Loading Requirements for Pavement	BMP is closer than 10 feet to pavement
No Application for Water Reuse	Landscaping or green roof is not an option due to space, energy systems, electrical, or mechanical systems
Hazardous Operations	Nature of site's permanent operations leave potential for mobilizing pollutants via proposed BMPs

- Other

Constraints/Non Applicability	Description
Legality	Implementing a BMP in the project would violate Federal or State Law

STANDARDS FOR STORM WATER MANAGEMENT

Exemptions:

- Returns area to pre-development hydrologic conditions
- Does not discharge to State waters
- Operations and Maintenance Activities
- Water Quality Improvement or Preservation
- Emergency
- Temporary

STANDARDS FOR STORM WATER MANAGEMENT

The Design Volume:

1-inch. By the Total Drainage Area = Design Volume

WQDV= C x 1” x A x 3630

WQDV= water quality design volume in cubic feet
C= runoff coefficient (refer to PBMP manual)
A= total drainage area in ACRES
3630= conversion factor
1” represents the design storm depth (using a more conservative value is acceptable)

STANDARDS FOR STORM WATER MANAGEMENT

Table 6-1. Values of Runoff Coefficients, C

Type of Surface	Runoff Coefficient (C)
Rural Areas	
Concrete or asphalt pavement	0.90 - 0.95
Gravel roadways or shoulders	0.4 - 0.6
Bare earth	0.2 - 0.9
Steep grassed areas (2:1)	0.5 - 0.7
Turf meadows	0.1 - 0.4
Forested areas	0.1 - 0.3
Cultivated fields	0.2 - 0.4

STANDARDS FOR STORM WATER MANAGEMENT

Implementation:

- Calculate WQ Design Volume
- Collect site data:
  - Soil type
  - Depth to ground water
  - Perc tests
  - Site history
- Assess/Select LID BMPs to infiltrate, store, detain, evapotransporate, and/or bio-treat the WQ Volume

STANDARDS FOR STORM WATER MANAGEMENT

Designing for Storm Water Controls

- Once 1 acre or more new impervious area is established, design for LID to treat the design volume
- If, due to variances, the complete volume cannot be treated, utilize LID where feasible and treat the remaining volume with alternative BMPs
- Consult with DOT-HWYS regarding any constraints that require a variance and alternative BMPs

STANDARDS FOR STORM WATER MANAGEMENT

Designing for Storm Water Controls (Con't)

- For smaller projects less than one acre that have the potential to pollute, apply source control. Such projects include:
  - Retail Gasoline Outlets
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  - Projects with Parking Lots with at least 10,000 square feet of total impervious area

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Questions?

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GROUP PROJECT

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INTRODUCTION

LUNCH

GROUP PROJECT WORKING SESSION

Low Impact Development and Green Infrastructure in the Linear Environment

Presented By:
The Low Impact Development (LID) Center, Inc.
HI DOT 2015

The Low Impact Development Center, Inc.
A non-profit water resources and sustainable design organization
www.lowimpactdevelopment.org

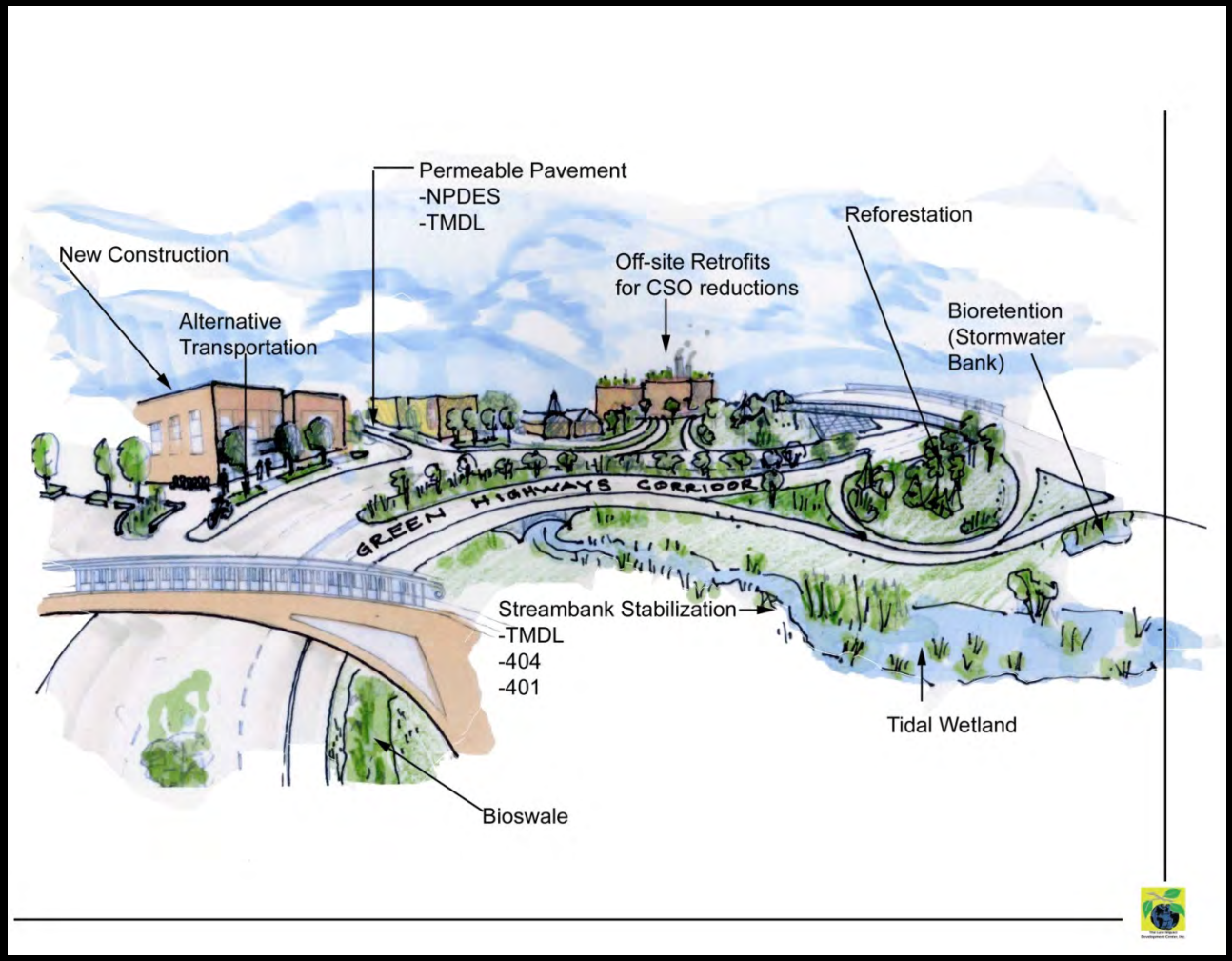
Green Highways and Green Infrastructure

Presentation Overview

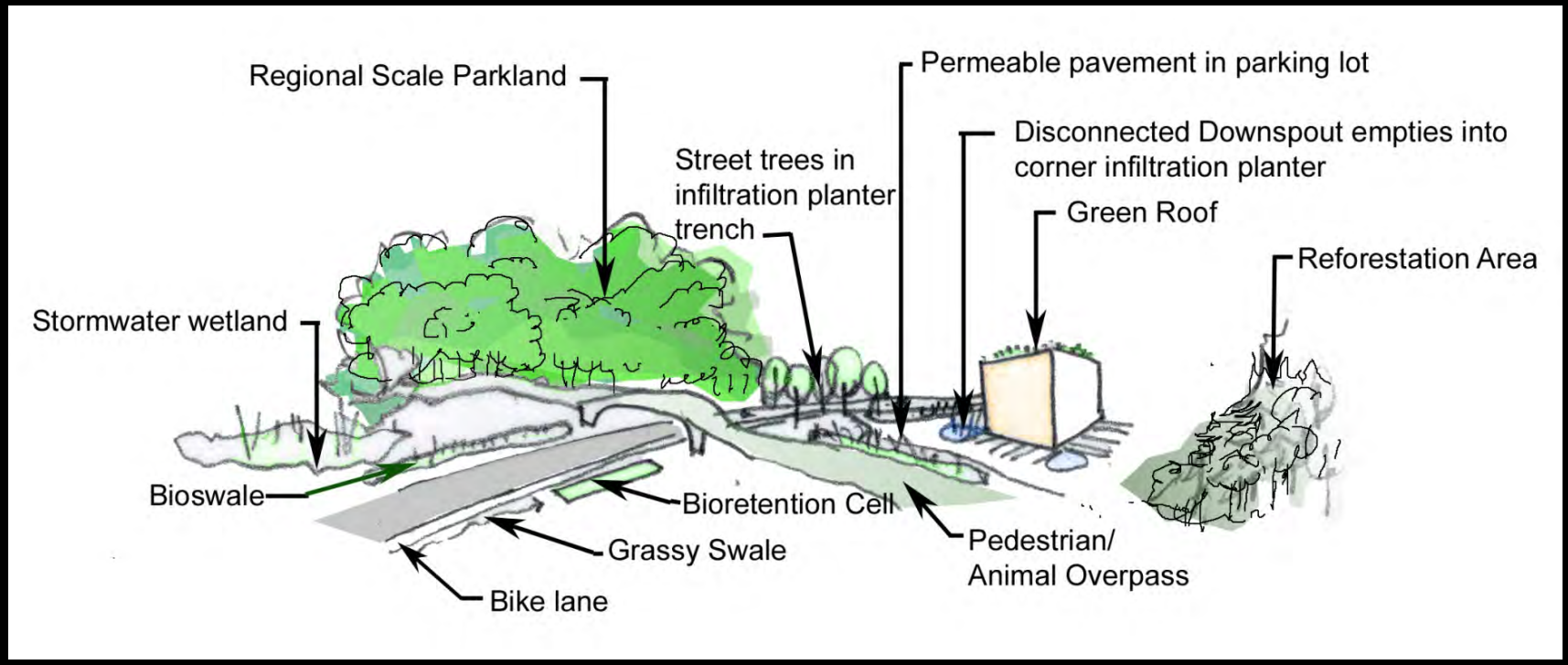
- Basic principles for linear projects
- State-of-the-practice and research
- Projects/Lessons learned

Green Infrastructure

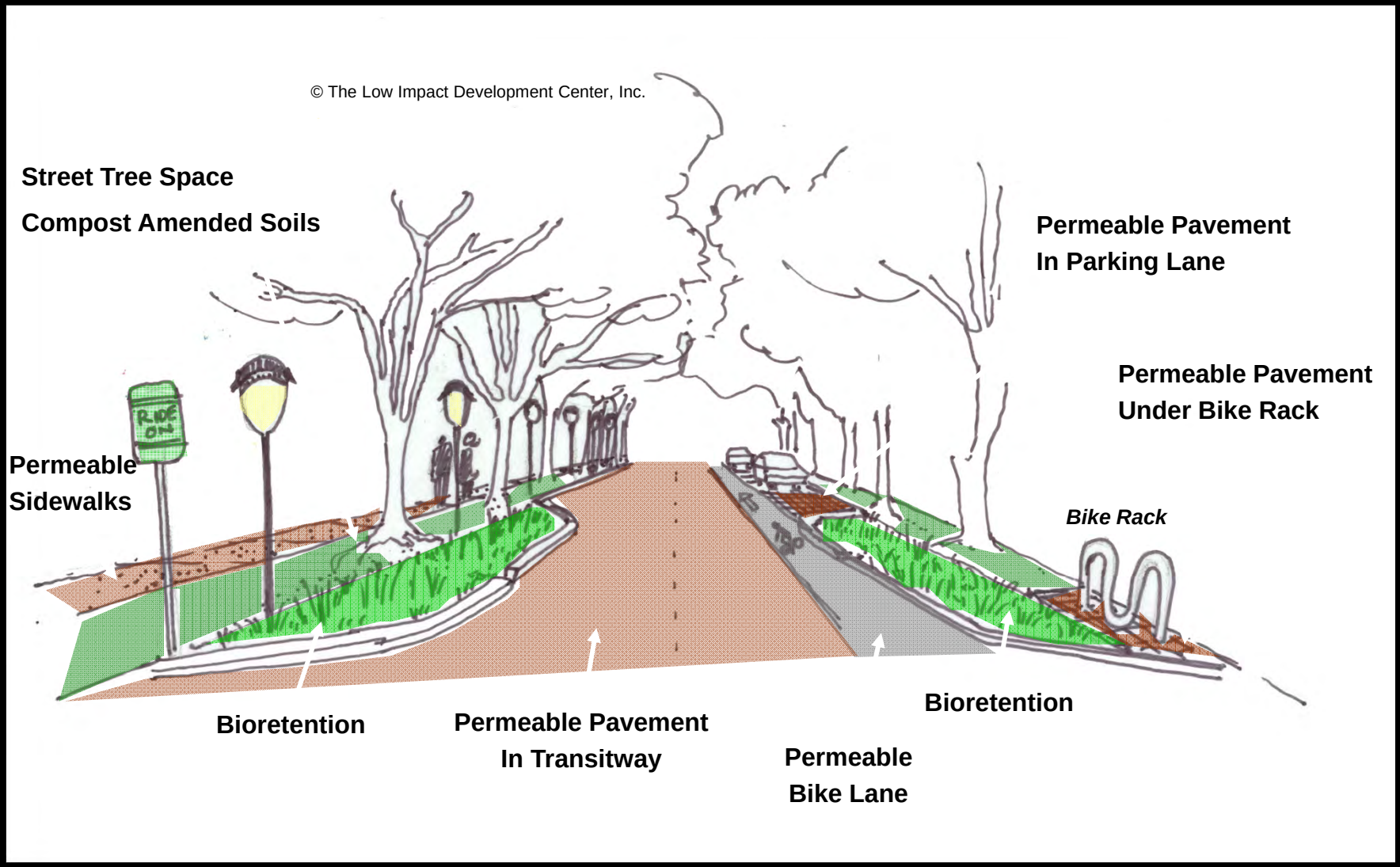
Regulatory and Resource Programs



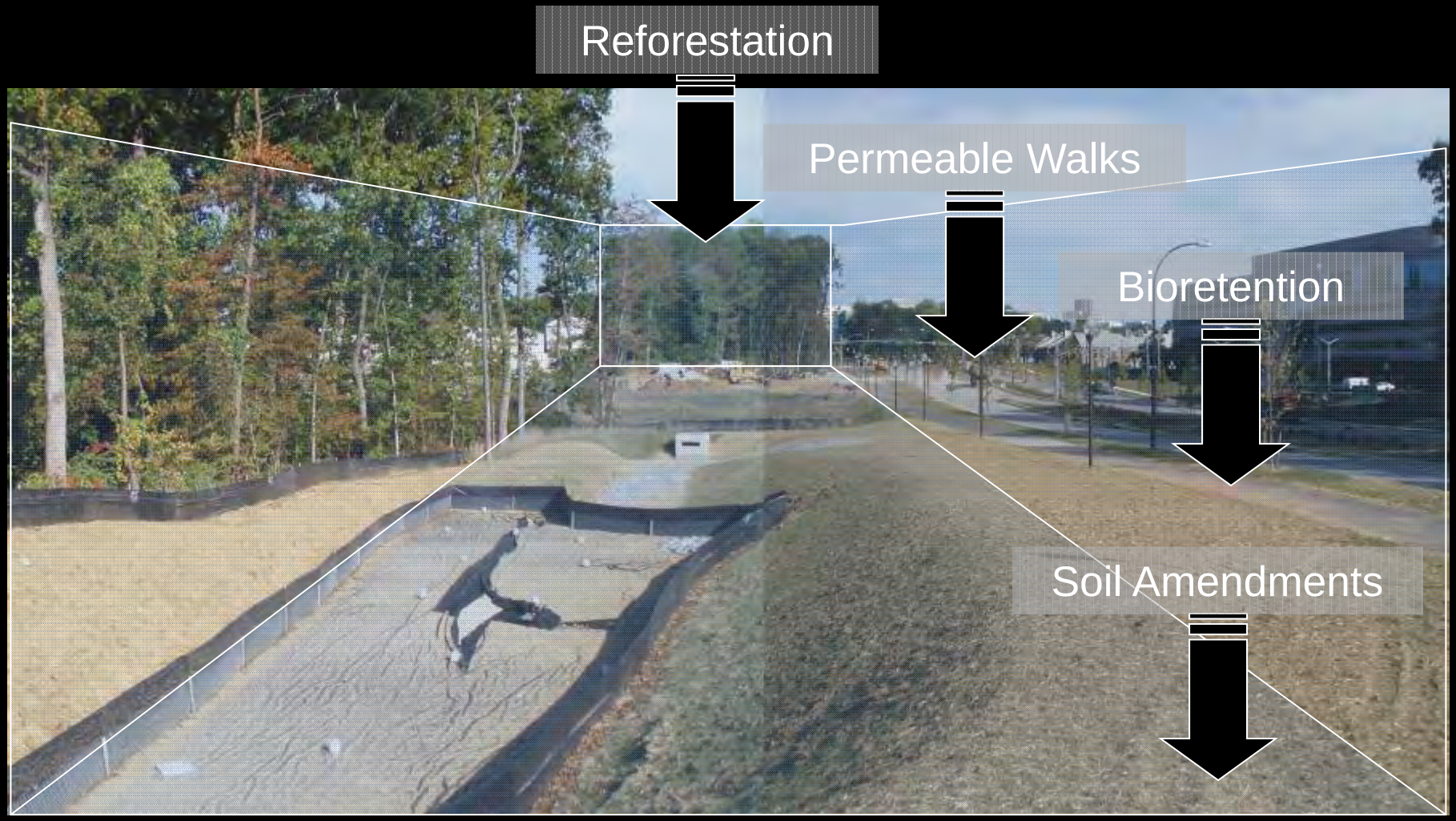
Green Infrastructure Concepts



What makes a highway or street green?

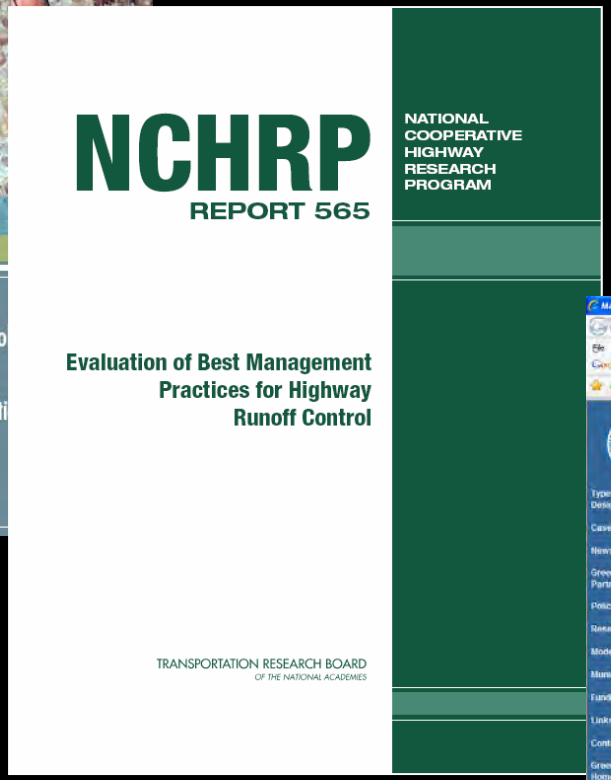


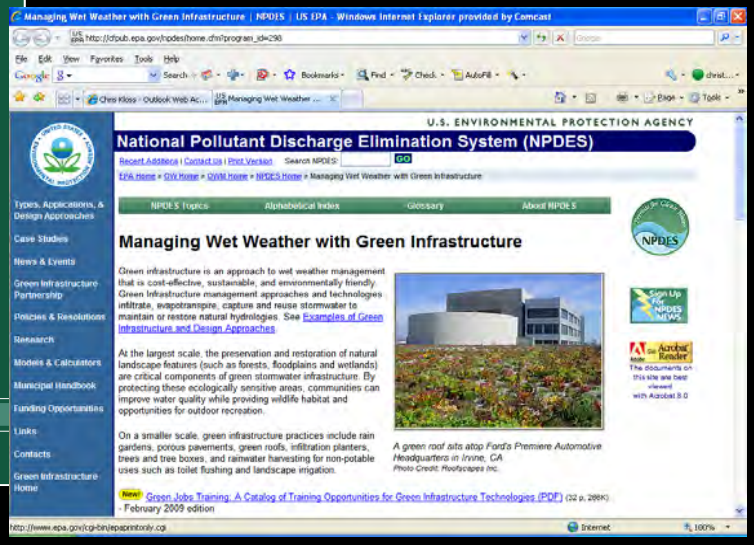
Green Strategies



End of Pipe vs. LID/Green Infrastructure

Research and Guidance





Relevant NCHRP Publications

- ***NCHRP 728:*** Guidelines for Evaluating and Selecting Modifications to Existing Roadway Drainage Infrastructure to Improve Water Quality in Ultra-Urban Areas
- ***NCHRP 792:*** Long-Term Performance and Life-Cycle Costs of Stormwater Best Management Practices
- ***NCHRP 444:*** Pollutant Load Reductions for Total Maximum Daily Loads for Highways
- ***NCHRP 612:*** Safe and Aesthetic Design of Urban Roadside Treatments
- ***NCHRP 565:*** Evaluation of Best Management Practices for Highway Runoff Control (Low Impact Development)

NCHRP 25-37 Watershed Based Approach to Stormwater Management

- Linear facilities often do not have sufficient ROW for BMPs
- Offsite in-kind and out-of-kind approaches at the watershed level
- Development of “equivalencies” or ratios of mitigation
- Use of readily available data
- Toolbox can me modified for local values and data

Toolbox Process

- Location / Unit Area Runoff Volume
- Characteristic Runoff Quality
- Representative BMP Type
- Volume Capture/Reduction Goal

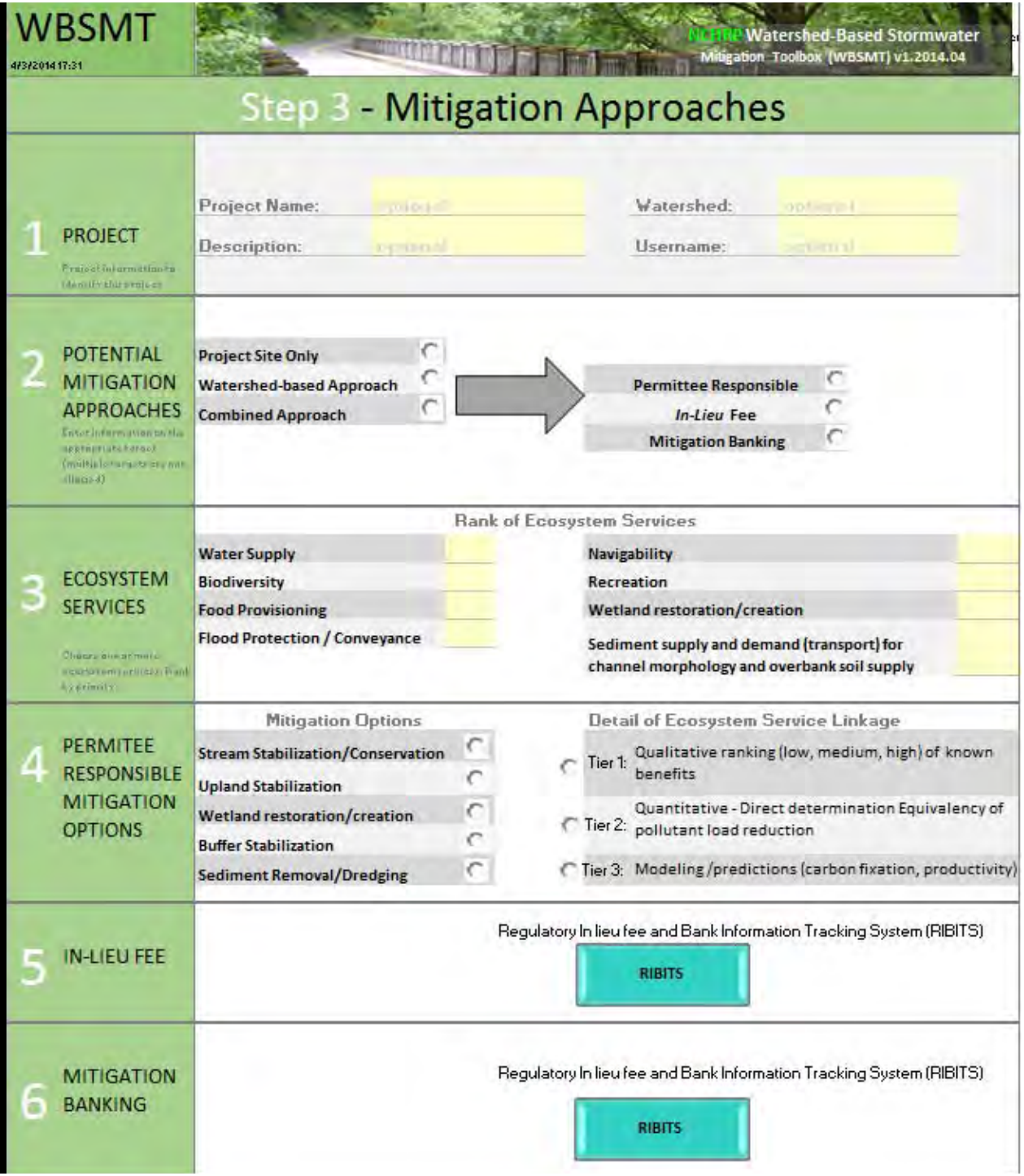
Volume or Mass Removed / Impervious Acre Treated

- Credits from Bank or Exchange
- Offsite Impervious Acre s Treated
- Multipliers to Account for:
  - Location in Watershed
  - Land Use Treated
  - BMP Type Applied / Effectiveness
  - Uncertainty in Watershed Benefit

- Mitigation Type
- Ranked Ecosystem Services Improved
- Volume or Mass Equivalent per Mitigation Length or Area
- Multipliers to Account for Uncertainty in Watershed Benefit

Watershed Characterization

Watershed Opportunities



WBSMT

8/16/2015 11:50

STEP 6 - Out-of-Kind Options

1 PROJECT INFO

Project Information: I-5 Lane Addition Tualatin Watershed, OR (John Smith)

2 OFF-SITE ADJUSTMENT

LOAD REDUCTION FACTOR	DEFAULT	VALUE
Offsite Load Reduction Adjustment Factor	2	2

3 BENEFICIAL USES

BENEFICIAL USE APPLICABILITY	DEFAULT	VALUE
Aquatic life / warm and cold habitats	1	1
Drinking water supply	1	0
Primary and Secondary Contact recreation	1	0
Fish Consumption (edible seafood)	1	0
Aesthetics	1	1
Industrial Uses	1	0
Wildlife / terrestrial life	1	1
Rare and endangered species	1	0
Wetland Habitat	1	1

Note: 0 - Beneficial use not applicable or important, 1 - Beneficial use applicable or important, 2-Beneficial use applicable and impaired

4 ECOSYSTEM SERVICES

WATERSHED ECOSYSTEM SERVICE RANKS	DEFAULT PRIORITY RANK	USER PRIORITY RANK
Biodiversity Conservation	4	1
Clean and Plentiful Water	4	3
Food, Fuel, and Materials	1	4
Natural Hazard Mitigation	3	2
Recreation, Culture, and Aesthetics	1	1

Note: Score range is 1 - 5, Lower is better

5 MITIGATION MEASURES

MITIGATION MEASURES	DEFAULT PRIORITY SCORE (sums to 1.0)	USER PRIORITY SCORE (sums to 1.0)	DEFAULT OPPORTUNITY SCORE (Range is 0 - 1)	USER OPPORTUNITY SCORE (Range is 0 - 1)
Stream Improvement Techniques	0.00	0.00	1.00	1.00
Upland Stabilization	0.00	0.00	0.25	0.25
Reducing Impervious Surface Connectivity	0.75	0.75	0.00	0.00
Wetland Restoration / Creation	0.25	0.25	0.75	0.75
Check Sum	1.00	1.00		

Note: Score range is 0 - 1, Higher is better

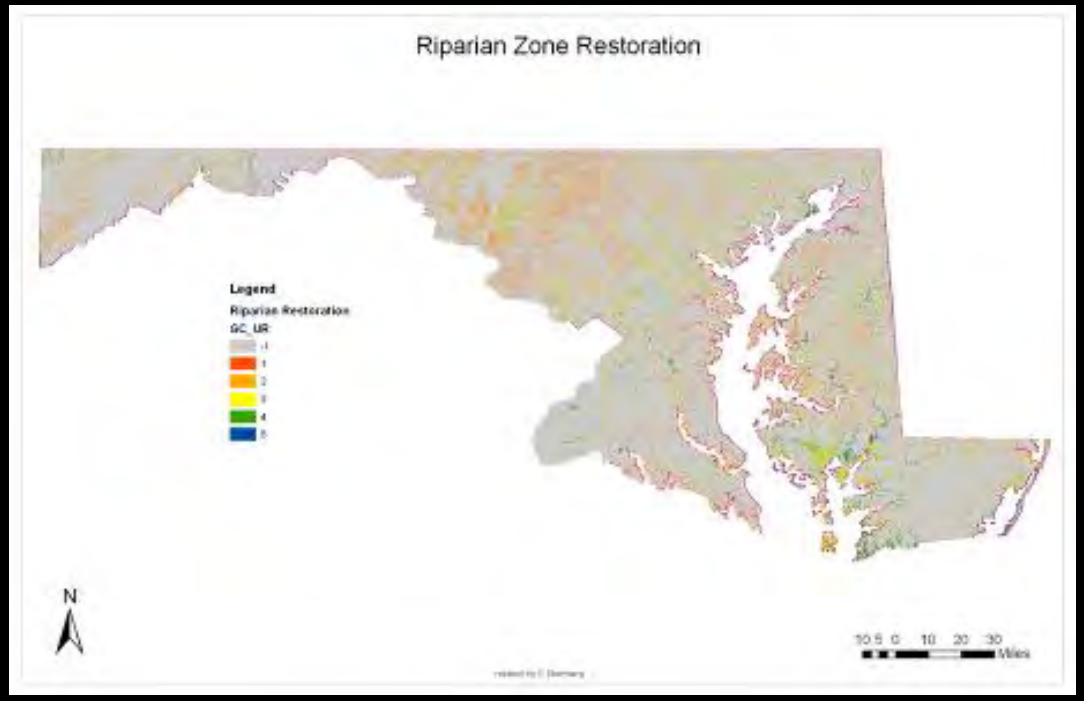
User Priority Scores must sum up to 1.0

6 MITGATION RATIOS

MITIGATION MEASURES	FINAL SCORE	DEFAULT FOOTPRINT RATIO	USER FOOTPRINT RATIO	APPROX. FOOTPRINT (ac)
Stream Improvement Techniques	0.000	0.100	0.100	1.17
Upland Stabilization	0.000	0.031	0.031	0.36
Reducing Impervious Surface Connectivity	0.000	1.000	1.000	11.65
Wetland Restoration / Creation	0.188	0.050	0.050	0.58

Note: Score range is 0 - 1, Higher is better

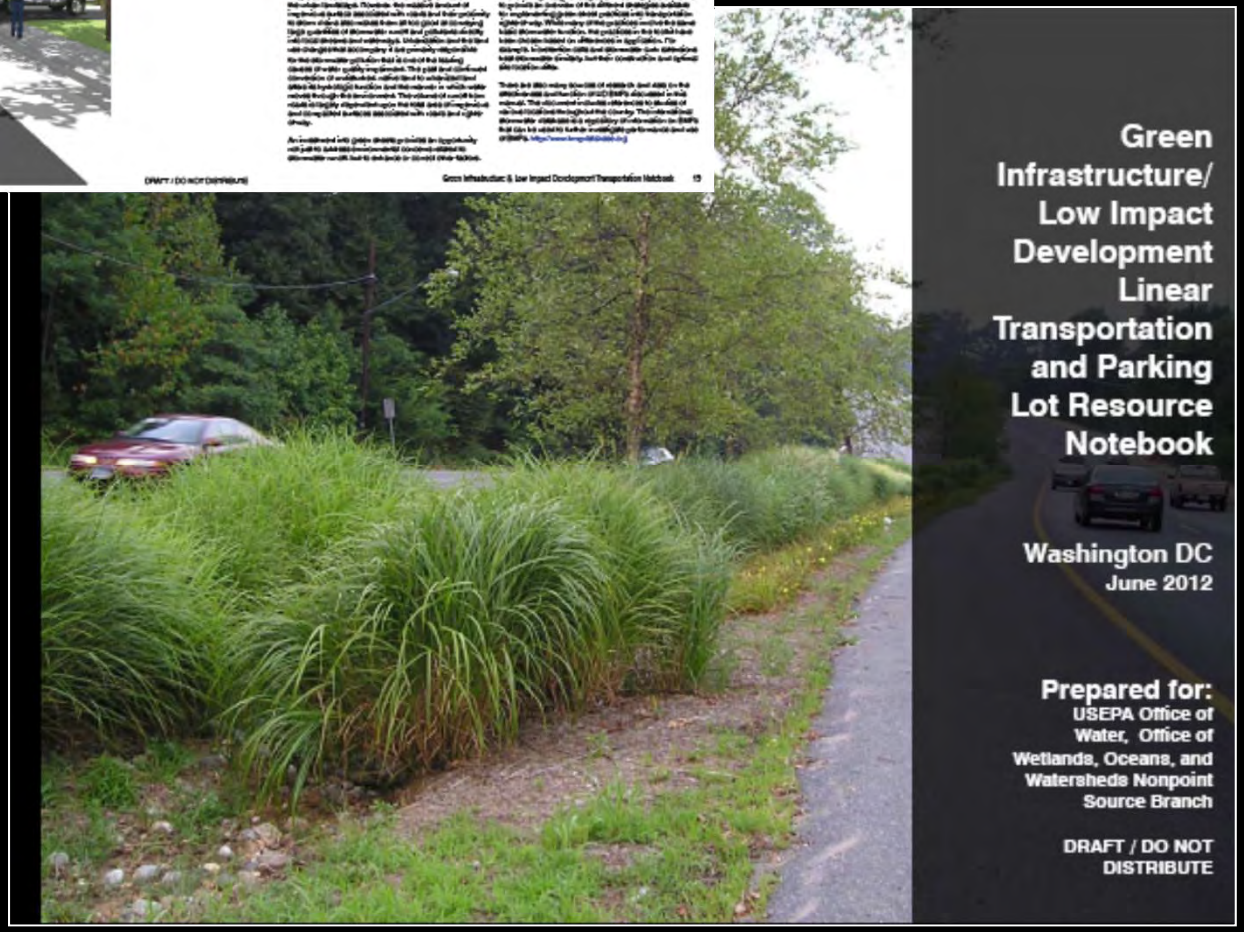
Watershed Resources Registry



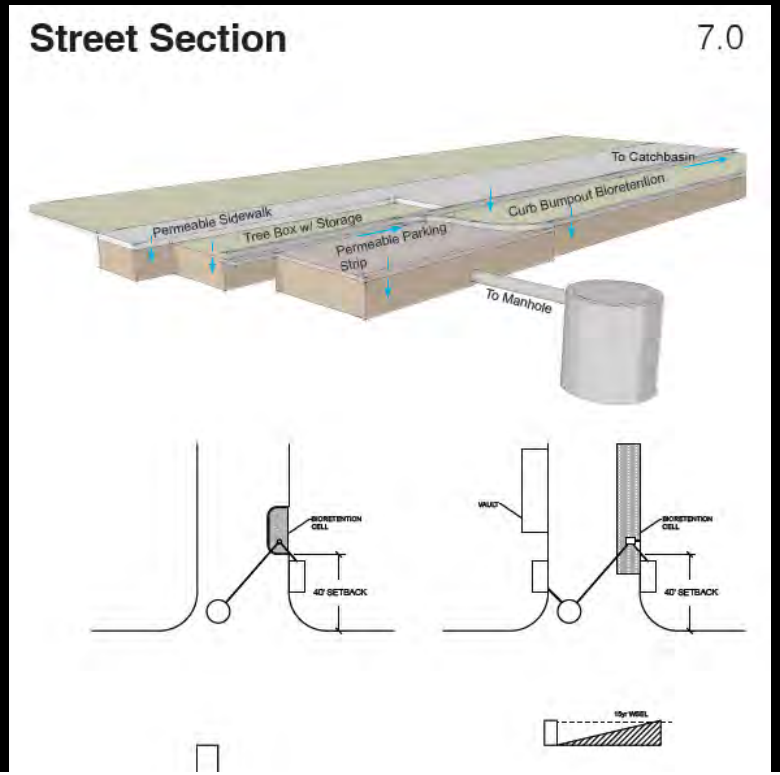
EPA Region 3 Office of Water

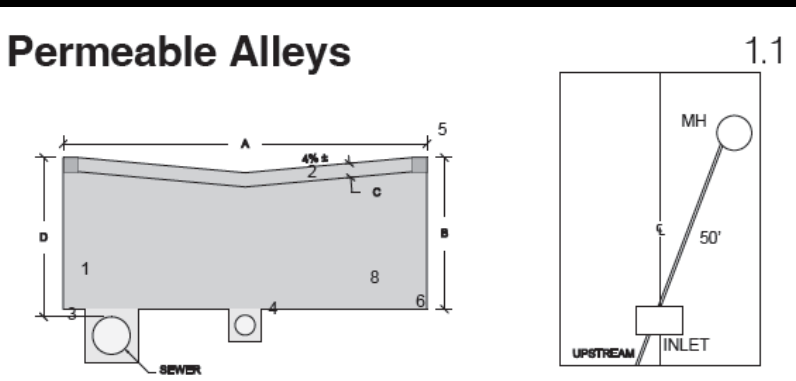
Riparian Zone Restoration

Map and score areas near a stream, but not in a stream, where the natural condition of the riparian zone has been compromised. Examples include areas where the stream quality is impaired, agricultural uses extend right up to the stream, woody vegetation has been removed, etc.



EPA Resources





Key Notes

Dimensions

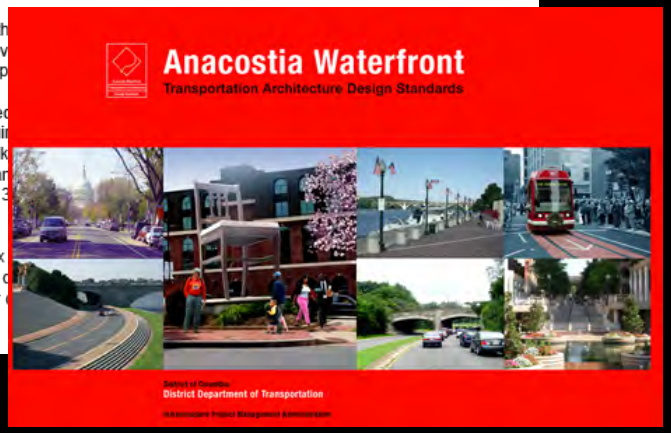
A	12 ft. ±
B	Depth set by structural/ swm storage 2 to 3 ft.
C	Ck with astm and software fro structural
D	Assume 4 ft. to top of sd inlets 3 ft. ±

Detail Notes

1	Assume #2/57/8 matrix with
2	Concrete depth 8 ±inch pav
3	Per std. trench pvc and hdp
4	Underdrain to inlet
5	Curb/deep curb maybe prec

e if requi
or mh. Ck
v peak ar
s above 3

id ratio x
):1 ratio d
un on or



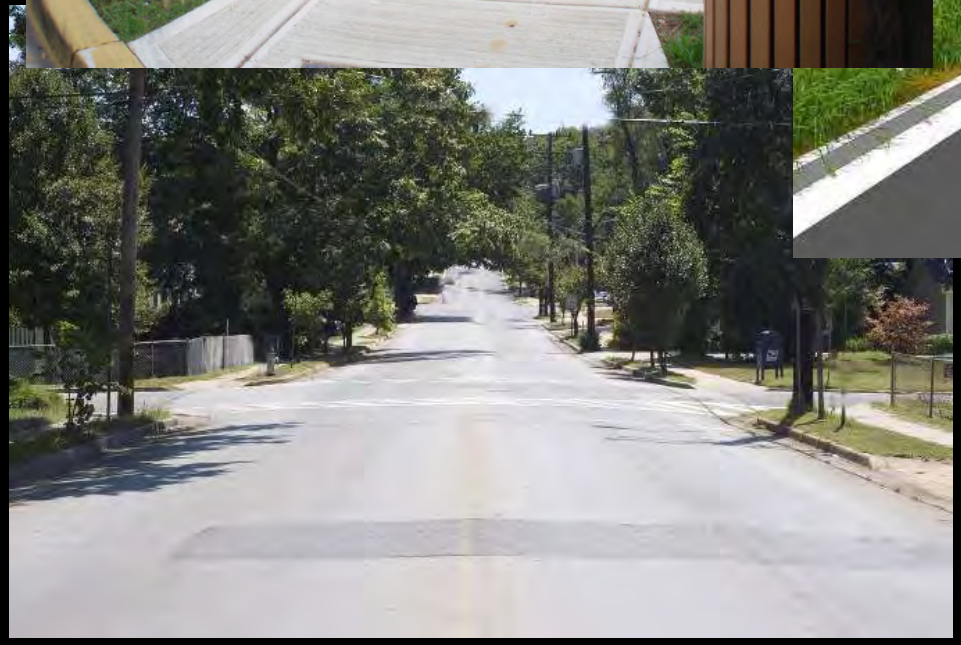
Page	Item	Name	V/T	W	D	Storage Ratio	T	Use
2	1.1	Permeable Alleys	V,T	12'	3'	90:1 per lane	Route	ROW
3	1.2	Permeable Parking Aisles	V,T	VAR	3'	90:1 per lane	Route	ROW/ Private
4	1.3	Tree Pit	V,T	VAR(4'-6')	3'	30:1	Route	ROW
5	1.4	Sidewalk	V,T	VAR	3'	9:1	Route	ROW
6	1.5	Patio	V,T	VAR	3'	9:1	Route	Private
7	2.1	Cistern/Rain Barrel	V,T	VAR	--	1 gal=230 in	Route	Private
8	3.1	Roof	V,T	VAR	--	1:1	Route	Private
9	4.1	Supplemental Storage	V,T	VAR	--	1 gal=230 in	Route	
10	5.1	Downspout Disconnect	V,T	VAR	--	N/A		Private
11	6.1	Bioretention Cell	V,T	VAR	3'	100:1	Route	Private
12	6.2	Bioswale/Swale		VAR	3'	45:1		ROW/ Private
13	6.3	Planter Wall	V,T	VAR	--	40:1		ROW

Standards and Templates

Some DMV Urban Project Examples

- Grants and leveraging
- Retrofits
- Revitalization
- Construction and maintenance lessons learned

Grant Driven

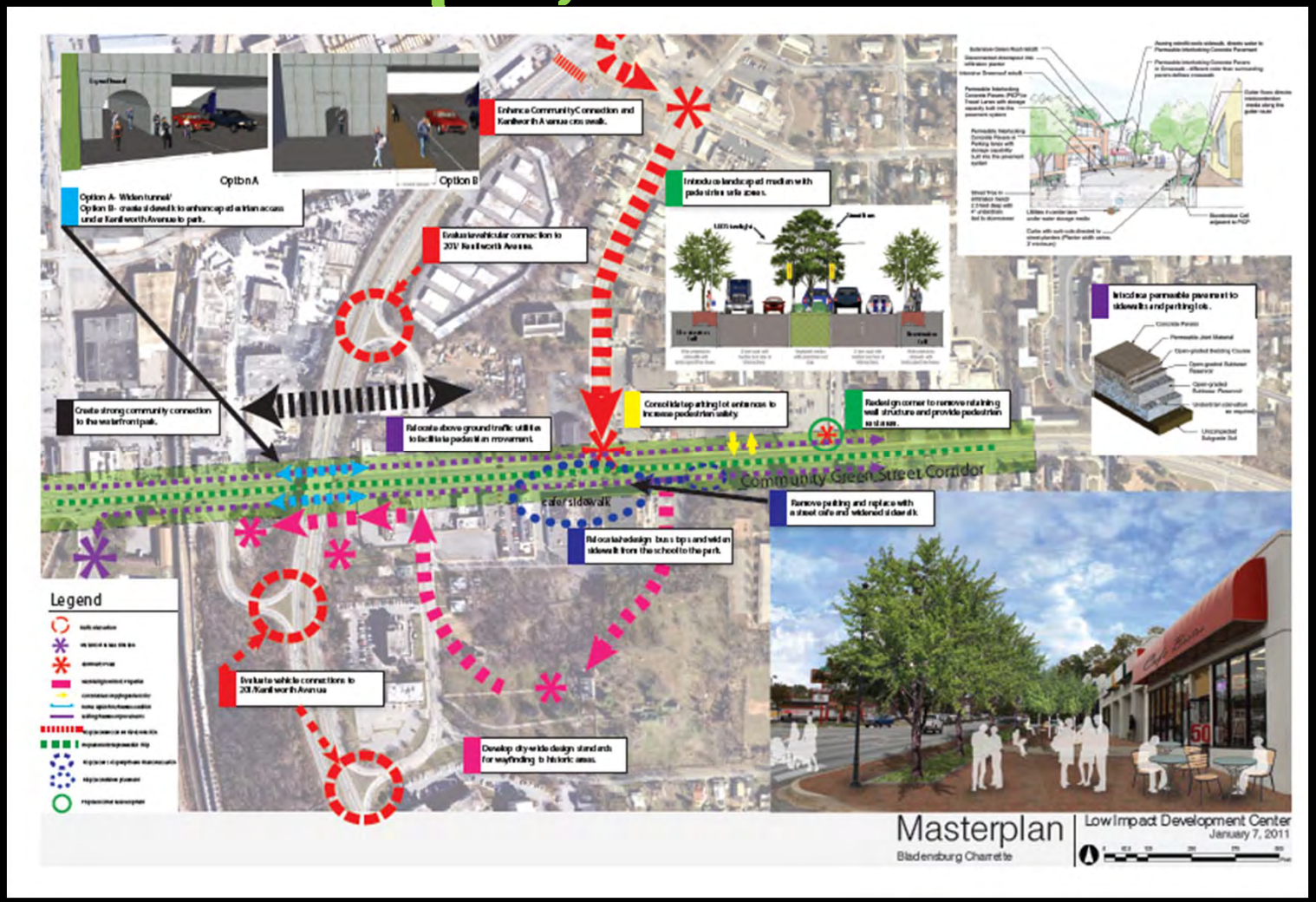


Community revitalization through the use of low impact development, attraction of green businesses, and attention to health by encouraging biking and walking.

The Town of Edmonston, Maryland

ARRA funded and leveraged SHA dollars

Planning Charettes, Workshops, Grants…




10¢, 20¢, 30¢
or more
per gallon
Giant
CASH PRICE
175
Be a Friend
Pitch In.
POKE
Livable
Communities

Maintained

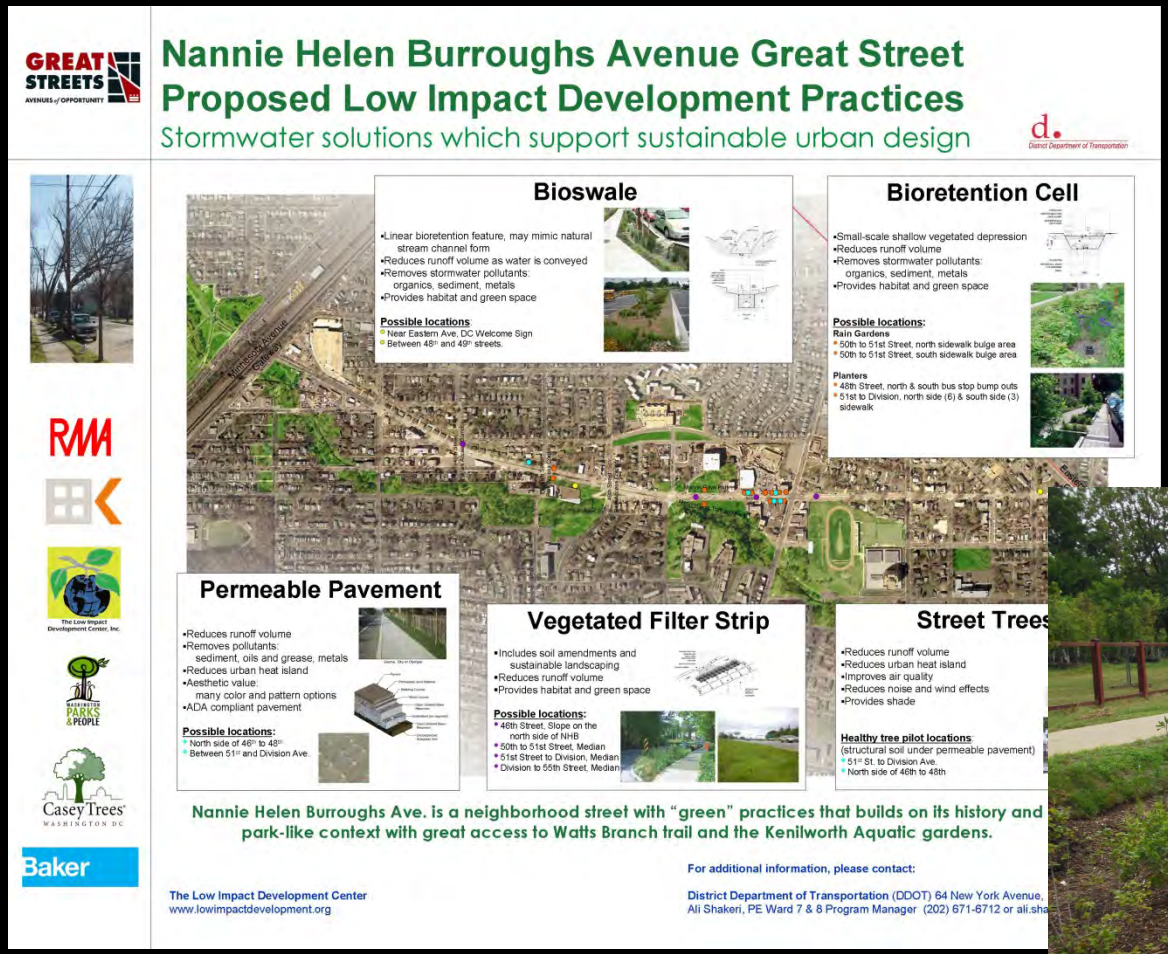
Leveraging Transportation and Stormwater Programs: New York Avenue Corridor

○ -low/short
◐ -medium
● -high/long
✓ -yes
⊗ -no
NA -not applicable

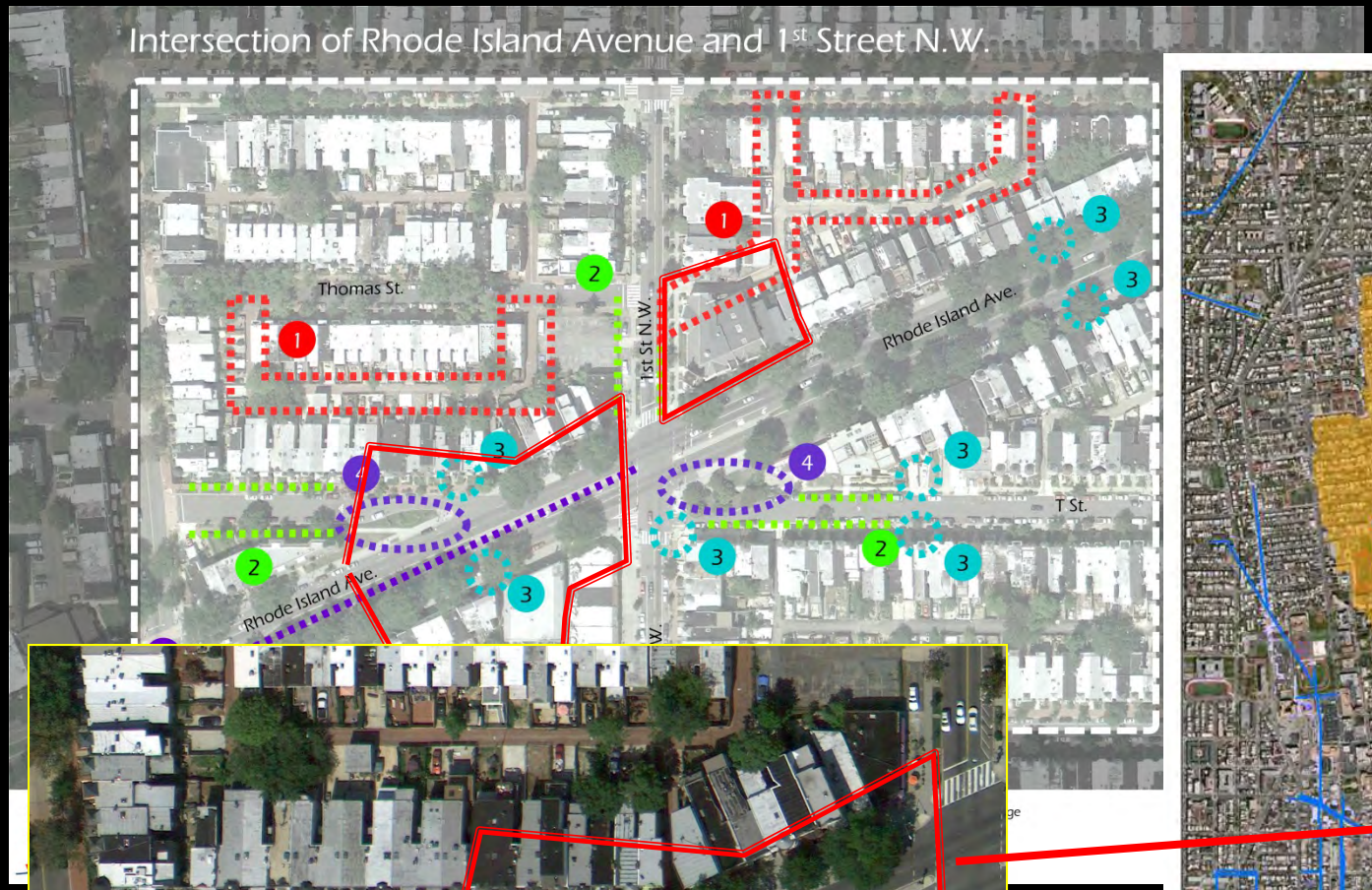
Proposed Project	Project Parameters			Social Function			Human Health		Environmental Function							Economic Function			
	Within CSO (Y/N)	DC Government Property (Y/N)	Project Timeline (S/M/Ln)	Green Reference (L/M/H)	Neighborhood Connectivity (L/M/H)	Conformance with Master Plan/ Area Rec.s (Y/N)	Improved Air Quality (L/M/H)	Heat Stress Reduction (L/M/H)	Links ROW to Private Property (Y/N/NA)	Site Suitability (L/M/H)	Volume Reduction Benefit (L/M/H)	Peak Flow Attenuate (L/M/H)	Groundwater Recharge (L/M/H)	Water Quality & Ecological Benefit (L/M/H)	Carbon Footprint Reduction	Local Green Jobs (Y/N)	Avoided Stormwater Treatment Costs (L/M/H)	Increased Property Values (Y/N)	Overall Rating (L/M/H)
Bus Stop A	⊗	✓	○	◐	●	✓	○	○	✓	●	○	○	○	○	○	⊗	○	✓	○
Bus Stop B	⊗	✓	○	◐	●	✓	○	○	✓	◐	○	○	○	○	○	⊗	○	✓	○
Bus Stop C	⊗	✓	◐	◐	●	✓	○	○	✓	◐	○	○	○	○	○	⊗	○	✓	◐
Bus Stop D	⊗	✓	◐	◐	●	✓	○	○	✓	●	○	○	○	○	○	⊗	○	✓	◐
Bus Stop E	✓	✓	●	◐	●	✓	○	○	✓	●	○	○	○	○	○	⊗	○	✓	◐
Bus Stop F	✓	✓	◐	◐	●	✓	○	○	✓	●	○	○	○	○	○	⊗	○	✓	◐
Bus Stop G	✓	✓	○	◐	●	✓	○	○	✓	◐	○	○	○	○	○	⊗	○	✓	○
Multi-use trail, south side of New York Avenue NE	⊗	✓	◐	◐	●	✓	●	○	NA	●	○	○	○	◐	●	✓	◐	✓	◐
Multi-use trail connection - proposed New York Ave NE multi-use trail & Metropolitan Branch Trail	⊗	⊗	◐	◐	●	✓	●	○	NA	◐	○	○	○	◐	●	✓	○	✓	◐
Multi-use trail, Florida Avenue NE to Bridge**	⊗	✓	◐	◐	●	✓	●		NA	●	○	○	○	NA	●	✓	NA	✓	○
Multi-use trail, Bridge to Penn Street NE	⊗	✓	◐	◐	●	✓	●	○	NA	●	○	○	○	○	●	✓	○	✓	◐
Multi-use trail, Penn Street NE to Brentwood Parkway NE	⊗	✓	◐	◐	●	✓	●		NA	●	○	○	○	○	●	✓	○	✓	○
Multi-use trail, Brentwood Pkwy NE to West Virginia Ave NE/ Montana Ave NE	⊗	✓	◐	◐	●	✓	●	◐	NA	●	○	○	○	◐	●	✓	○	✓	◐
Entrance to Florida Avenue Market off New York Avenue	⊗	✓	◐	◐	●	✓	○	○	✓	●	●	●	●	○	○	✓	○	✓	●
Montana Circle Bioretention	✓	✓	●	●	●	✓	◐	◐	NA	●	●	●	●	●	◐	✓	●	✓	●
Montana Circle Curb Cuts	✓	✓	◐	◐	●	✓	●	◐	✓	●	●	◐	◐	●	●	✓	●	✓	●
DC Property Yard at MontanaAvenue NE	✓	✓	◐	◐	◐	✓	●	◐	✓	●	●	●	●	●	◐				
Mount Olivet Road and Capitol Avenue NE	⊗	✓	◐	◐	●	✓	◐	◐	✓	●	●	●	●	◐	◐				

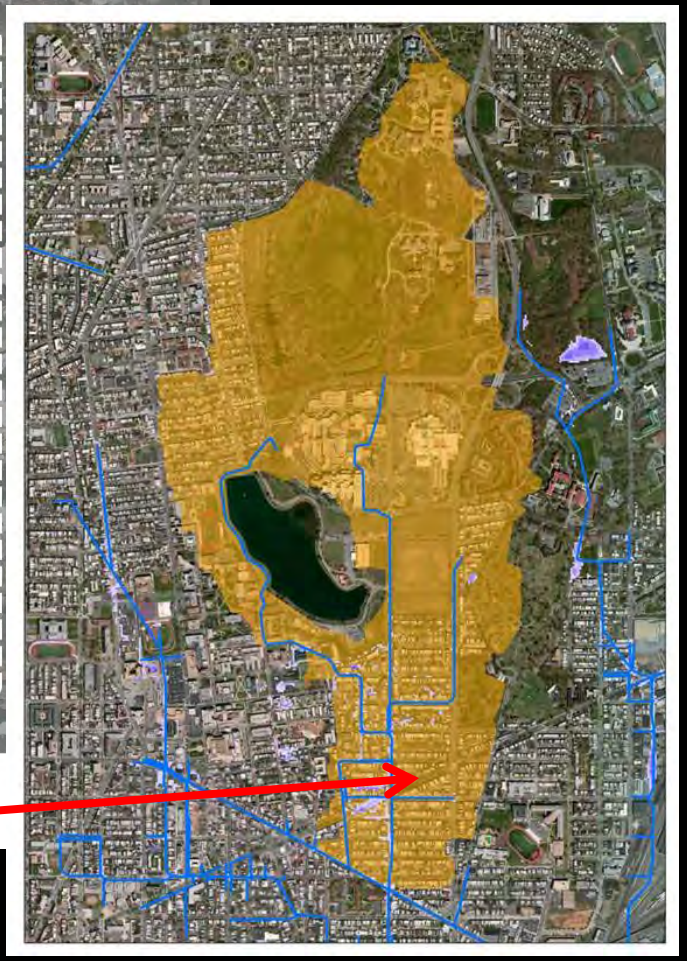
District of Columbia
Office of Planning

Nannie Helen Burroughs



A 1.5 mile long minor arterial pilot project for innovative, environmentally-progressive practices integrated with economic revitalization efforts





Bloomingdale: Integrating Green and Grey Approaches

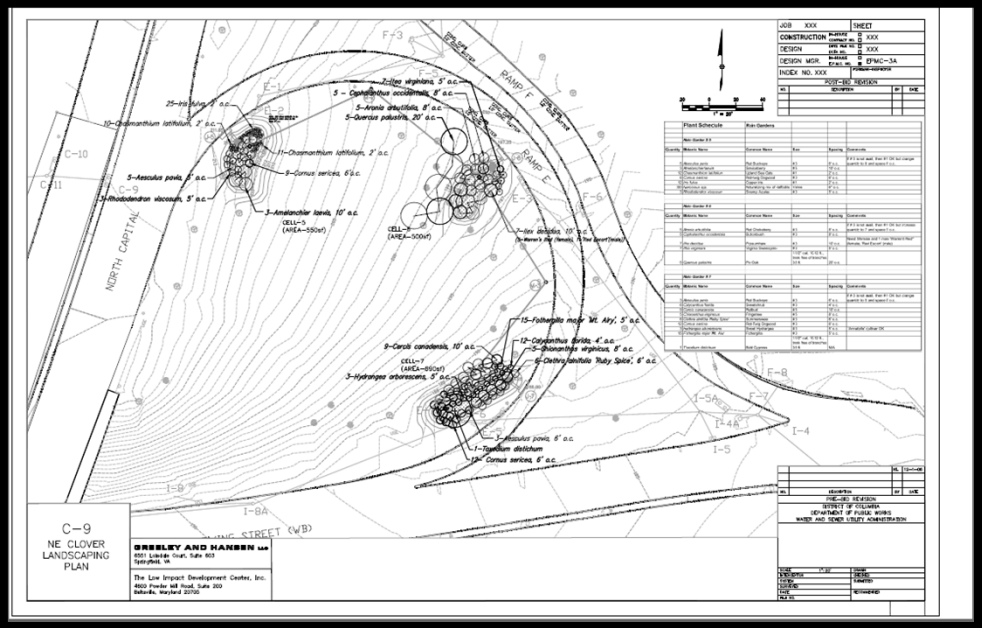
Bloomingdale Grey/ Green Solution

Step One: Intercept the Stormwater

Green Alleys

Pretreatment to Capture Road “Stuff”

Lessons Learned



Afforestation, permeable pavement and bioretention cells on two cloverleaves.

Plant Location and Type are Critical


NOT
TER

Unapproved Material Substitutions

Specifications,
Inspection, Certification

UPDATE ON THE CITY'S NPDES MS4 PERMIT PROGAM

POST-CONSTRUCTION BMP PROGRAM

PLEASE HELP PROTECT OUR WATERS…FOR LIFE
HAWAII STATE DOT PERMANENT BMP WORKSHOP

August 2015

STORM WATER MANAGEMENT PROGRAM REQUIRED ELEMENTS

Public Participation & Outreach

Pollution Prevention and Good Housekeeping

Construction Site Runoff Control

Post Construction Storm Water Management

Illicit Discharge Detection & Elimination

Monitoring & Implementation Plans

Industrial & Commercial Discharge

Post Construction Storm Water Management

Reducing pollutant discharge from new development & redevelopment construction sites

Pollution Prevention BMPs

Structural Source Control BMPs

Site Design BMPs

Treatment BMPs

BACKGROUND

EPA MS4 Audit conducted on April 23-25, 2013

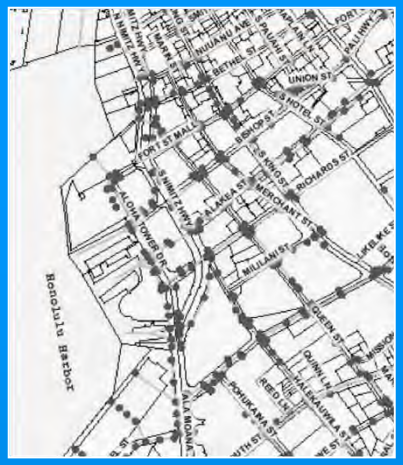
City received a Notice of Apparent Violation Letter on October 16, 2013

Post Construction BMP Program – Potential Violations

- Inadequate Training for City Inspectors
- Exemptions under Current City Revised Drainage Standards
- Inconsistent application of LIDs for smaller sites
- Lack of guidance for preferential BMPs

BACKGROUND

MUNICIPAL SEPARATE STORM SEWER SYSTEM



(MS4)

discharge

RECEIVING WATERS

MS4 PERMIT

Reissued JAN 15, 2015

Permit Became Effective on FEB. 16, 2015

Permit Exprires on JAN 15, 2020

Revised Drainage Standards

- Current City Revised Drainage Standards became effective on June 1, 2013
- Deadline to submit revised standards up to 18 months after effective date of permit (~August 2016)

CURRENT
Drainage Standards Summary

Priority	Description
A1	Disturb ≥ 5 acres of land during construction
A2	Disturb 1 - 5 acres of land during construction
B	Disturb < 1 acre during construction, create at least 10,000 sq-ft of total impervious surface, and is a Retail Gas Station, Auto Repair Shop, Restaurant and Parking Lot

REVISED
Drainage Standards Summary

Priority	Description
A	Disturb ≥ ~~5~~ 1 acres of land during construction
~~A2~~	~~Disturb 1 - 5 acres of land during construction~~
B	Disturb < 1 acre during construction, create at least 10,000 sq-ft of total impervious surface, and is a Retail Gas Station, Auto Repair Shop, Restaurant, Parking Lot, Retail Mall, Industrial Park, Building > 100 ft tall

BMP Sizing Criteria

BMP Type	Sizing Criteria
Volume Based	Rainfall depth of 1 inch
Flow Based	Rainfall intensity of 0.4 in/hr
Area Based	10% of contributing area or 100% of contributing flow path
Demand Based	80% of total annual runoff is captured and 80% of total annual reuse demand is met

Source Control BMPs

Low-technology practices designed to prevent pollutants from contacting storm water runoff and/or prevent discharge of contaminated runoff to the MS4

- Stenciling storm drain inlets
- Covering fueling and storage areas
- Grading dumpster, fueling, and storage areas to prevent run-on & runoff
- Using dumpsters with lids
- Paving high risk areas with concrete instead of asphalt

Gas station, Kapolei, HI

Treatment Control BMPs

Volume or Flow through based practices designed to settle, filter and remove pollutants within storm water runoff

- Catch Basin Inlet Filters
- Hydrodynamic Separators
- Vegetative Buffer Strips
- Vegetative Swales
- Detention Basins

CB Filter

Detention Basin

Vegetative Swales

Low Impact Development (LID) BMPs

LID treatment measures include harvesting and reuse, infiltration, evapotranspiration or biotreatment of storm water runoff as close to its source

- Infiltration Basins
- Bioretention
- Green Roofs
- Permeable Pavement
- Cisterns/Rain Barrels

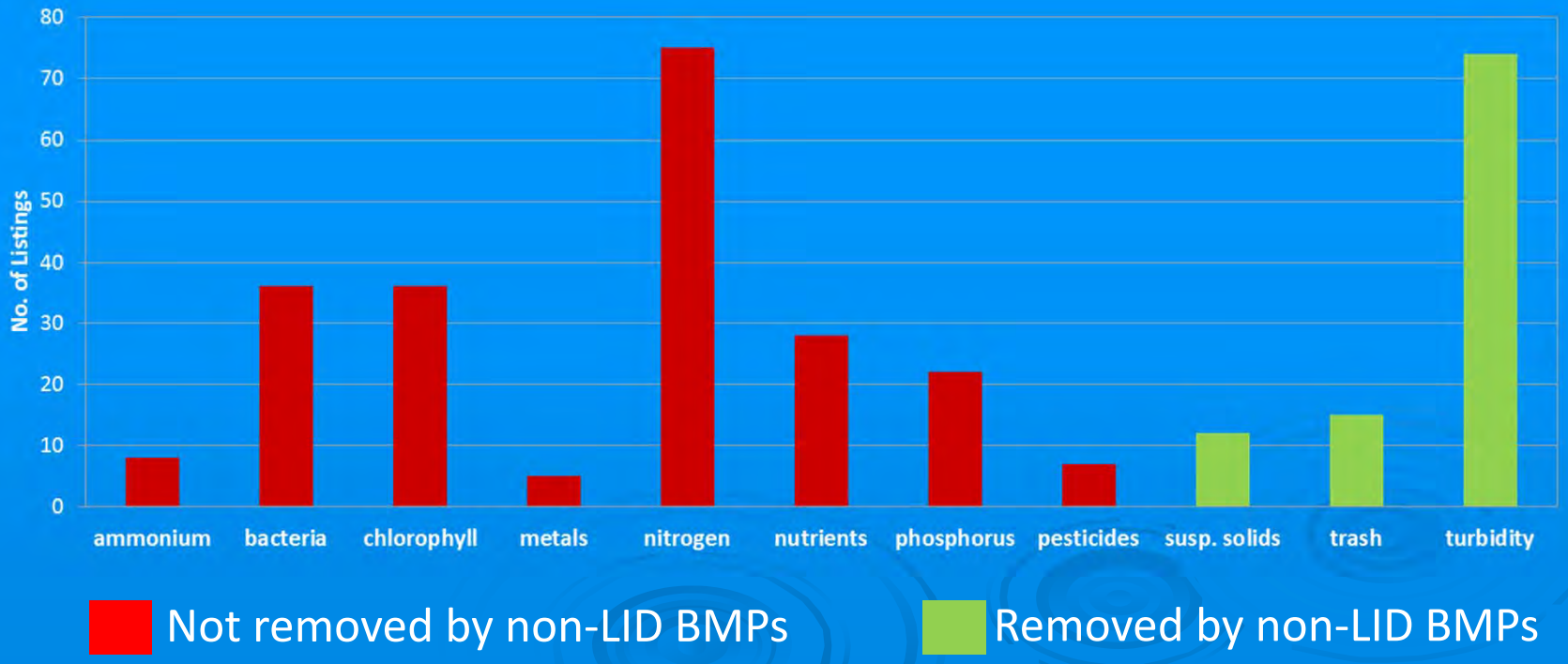
Green Roof

Cistern

Why LID's?

non-LID BMPs don't address Pollutants of Concern

- 117 waterbodies on 2014 303(d) List
- 319 total pollutant listings



Storm Drainage Standards Update

- LID Requirements for all new development and redevelopment projects greater than 1 acre (Priority A and B)
- Expand the types of smaller projects for post-construction BMPs (Priority B) to include
  - Parking Lots greater than 20 stalls
  - Buildings greater than 100-feet tall
  - Retail Malls
  - Industrial Parks
- Require 1.5x the Water Quality Volume (WQV) for any treat and release practices (i.e. biofiltration)

Storm Drainage Standards Update (Cont'd)

- Requirement to prepare a separate Post-Construction BMP Plan that identifies both LID, Treatment and Source Control BMPs on the drawing
- Requirement for submitting a Storm Water Applicability Checklist that prioritizes and identifies the need, type and location for permanent post-construction BMPs.
- Requirement for submitting a Storm Water Quality Checklist for all projects. Checklist will include attaching an O&M Plan outlining inspection and maintenance responsibilities.

Storm Drainage Standards Update (Cont'd)

- Expand on City's Storm Water BMP Guide to include a risk ranking process (low, medium and high) for prioritizing BMP selection that factors in maintenance performance and pollutant removal effectiveness for site specific pollutants of concern.
- Requirement for submitting a Covenant Master Agreement or similar document that must be signed by the owner/developer or authorized representative.
- Requirement for a Certificate of Completion - Licensed Professional Engineer to inspect and confirm that the BMPs have been installed in conformance to the approved construction plans prior to permit closure.

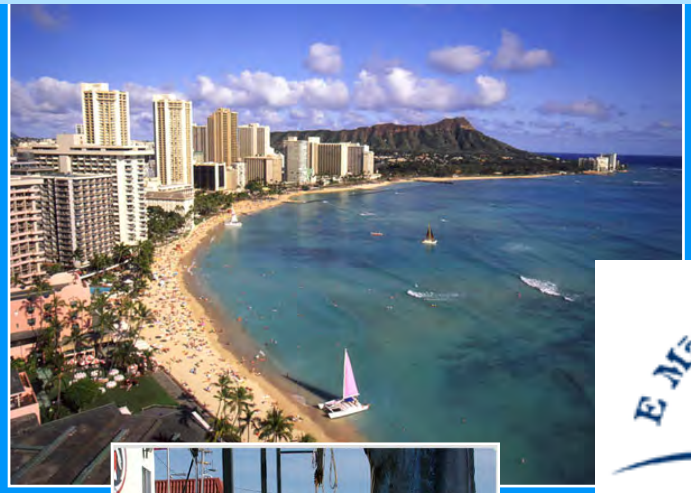
Honolulu Zoo Parking Lot – Bioretention (Rain Gardens)

Maintenance is Critical

BEFORE

AFTER

QUESTIONS

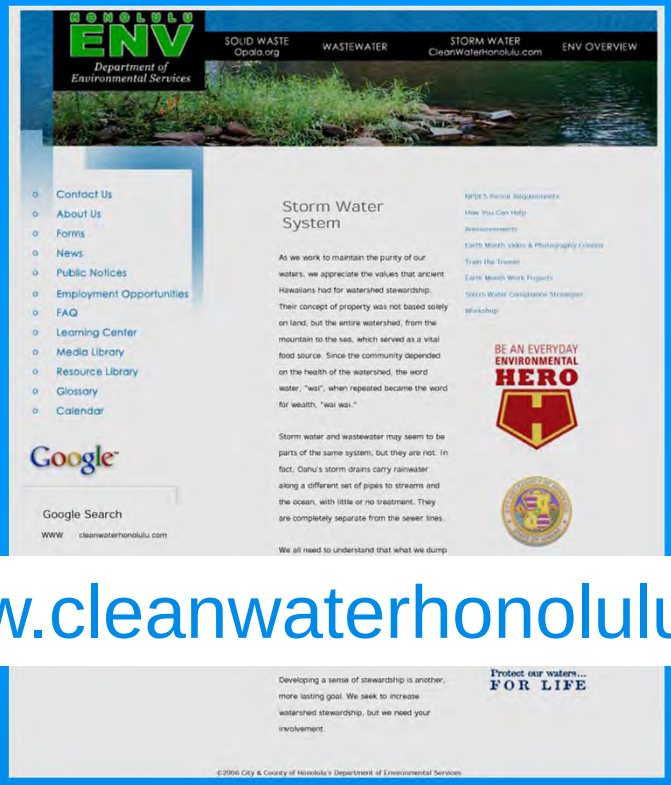


E Mālama I Ka Wai Ola

Protect our waters...
FOR LIFE

THANK YOU

For More Information:



www.cleanwaterhonolulu.com

RANDALL WAKUMOTO, BRANCH HEAD
Storm Water Quality Branch
Ph: 768-3242
Email: rwakumoto@honolulu.gov
City & County of Honolulu
Department of Facility Maintenance

Environmental Concern Line

768-3300

RESULTS

PROTECT OUR WATER
MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION
www.stormwaterhawaii.com

GROUP PROJECT TABLE SECTION X

DEPARTMENT OF TRANSPORTATION · STATE OF HAWAII ·

QUESTIONS AND WRAP-UP

PROTECT
OUR WATER
MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION
www.stormwaterhawaii.com