**EPA Region 1 MS4 Stormwater General Permits and LID Training Clinic**

**Track A: Planning & Budget**
Developing LID Bylaws, Conducting Local Code Audits, & Modifying Street and Parking Lot Standards

**Why is this in the Draft Permit?**
Urbanization results in increased surface runoff

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**BEFORE**

**AFTER**
Impacts are well documented

At ~10% impervious we begin to see:

- Water quality issues
- Impacts to biological communities
- Increased flooding
- Stream erosion
- Loss of recreational uses
- Shellfish bed closures
- Reduced baseflow and recharge

* Sometimes less than 10%
Low Impact Development (LID)

**Traditional controls**
- Goal: Get the water out of here as fast as possible
- Collect and storage in big, “hole in ground” off-site
- Pipe discharge to a stream or wetland
- Limited water quality treatment and infiltration
- Stormwater is a waste product

**LID controls**
- Goal: Reduce the amount of surface runoff by reducing impervious cover and preserving natural areas
- Rely on small, distributed on-site practices
- Infiltrate or reuse as much as possible; filter before discharge
- Source controls to minimize pollution
- Stormwater is a resource
Low Impact Development (LID)

**Site Design**

**Traditional**
- Mass clearing and grading
  - Loss of trees
  - Compaction of native soils
- Residential
  - Wide streets and cul-de-sacs
  - Sidewalks to nowhere
  - Lots of turf
  - Curb and gutter
  - Ponds
- Non-residential
  - Big parking lots
  - Minimum parking ratios
  - Large stall dimensions

**LID**
- Site fingerprinting
  - Preserve natural areas
  - Retain key pervious areas
- Residential
  - Narrow streets
  - Alternative turnarounds
  - Smart sidewalks
  - Shared driveways
  - Reduced setbacks
  - Open section roads
  - Downspout disconnection
- Non-residential
  - Pervious spillover parking
  - Maximum parking ratios
  - Shared parking
  - Reduced stall dimensions

**BMPs**
- Preserve natural areas
- Retain key pervious areas
- Narrow streets
- Alternative turnarounds
- Smart sidewalks
- Shared driveways
- Reduced setbacks
- Open section roads
- Downspout disconnection
- Pervious spillover parking
- Maximum parking ratios
- Shared parking
- Reduced stall dimensions
Which of these is not LID?

A
B
C
D

Which of these is not LID?

A
B
C
D
Which of these is not LID?
Which is not considered LID?

A

B

C

D

LID Practice Variants *Bioretention*
LID Practice Variants: Bioretention

LID Practice Variants: Rain gardens
Bioretention or a Rain Garden?

• Bioretention involves:
  - Amended soils;
  - Complex sizing calculations (e.g. modeling);
  - Detailed engineering specifications;
  - Sophisticated conveyance devices (flow splitters, underdrains, overflow inlets, etc).

• Rain Garden:
  - Generally doesn’t involve the above- usually a shallow depression in native soils, or modestly amended soils (but might contain some of the above features)

Beware of what something is called: One person’s Bioretention is another person’s Rain Garden

LID Practice Variants: Planters
LID Practice Variants: *Porous Pavement*
LID Practice Variants: *Infiltration*
LID Practice Variants: *Infiltration*

LID Practice Variants: *Swales*
LID Practice Variants: Sand Filters

LID Practice Variants: Gravel wetlands
LID Practice Variants: Others

- Downspout disconnection
- Pervious area restoration/soil amendments
- Urban reforestation
- Municipal pollution source control (street sweeping)

Feasibility Assessment of Local Regulations to Accommodate Green Infrastructure Practices

- Post-construction stormwater control measures
- New draft NDPES MS4 permit requirements
- Process for evaluating local procedures and regulations
  - Stormwater criteria for new construction and redevelopment
  - Street design and parking guidelines
  - Code barriers to green infrastructure implementation
    - Green roofs, infiltration practices, rainwater harvesting
  - Development approval process
- Additional Resources
Post-Construction Stormwater Management Control Measures

**Purpose**

_The new draft permits state:_

_The objective of this control measure is for the hydrology resulting from new development to mirror the pre-development hydrology of the site or to improve the hydrology of a redeveloped site and reduce the discharge of stormwater._

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**New Stormwater Approach**

- Small scale stormwater management
- Non-structural techniques
- Better site planning
- Mimic natural hydrology
- Minimize the impact of development
- Conserve natural features
- Minimize impervious surfaces
- Slow down runoff
- Infiltrate and evapotranspire
- Innovative technologies

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**Traditional Centralized Detention Pond**

**Small Scale, Integrated Green Infrastructure**
2.4.6.1 Stormwater program for projects disturbing \( \geq 1 \) acre OR \( < 1 \) acre if part of a larger common plan of \( \geq 1 \) ac

2.4.6.3 Ordinance or regulatory mechanism

\[ \checkmark \quad 2.4.6.4 \quad \text{Amend regulations for compliance with Standards 3, 4, 5, 6, and 7 of MASWMS regardless of proximity to wetlands (within 2 yrs)} \]

\[ \checkmark \quad 2.4.6.5 \quad \text{Procedures to prevent or minimize WQ impacts} \]

\[ \checkmark \quad 2.4.6.6 \quad \text{As-builts and long-term O&M provisions} \]

\[ \checkmark \quad 2.4.6.7 \quad \text{Assessment of street design and parking lot guidelines (within 2 yrs)} \]

\[ \checkmark \quad 2.4.6.8 \quad \text{Assessment of local regs. to determine the feasibility of making green infrastructure practices allowable (3 yrs)} \]

\[ \checkmark \quad 2.4.6.9 \quad \text{Directly Connected Impervious Cover} \]

\( \checkmark \) indicates a previous requirement from the 2003 MS4 permit

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### Process for Evaluating Feasibility

1. Review existing codes and ordinances:
   - Zoning bylaws and subdivision regs
   - Stormwater regulations
   - Wetland By-laws/regs
   - Typical specifications/details
   - Building and plumbing codes
   - Fire and safety code
   - Development approval process

2. Identify barriers, gaps, and opportunities

3. Develop recommendations for code change

4. Gain consensus from a diversity of local stakeholders*

5. Refine recommendations based on input*

6. Propose schedule for changes

7. Enact code changes*

8. Include progress reports in MS4 annual reports

* Not required by permit
Massachusetts North Coastal and MIMSC

Adopt standards of MASWMS for all projects ≥1 acre, regardless of proximity to wetlands

Standard #3. Post-development = Pre-development recharge. MASWMS recharge requirements range from 0.1”-0.6” depending on soil type

#4. Remove 80% TSS

#5. Source control and pollution prevention at Land Uses with Higher Potential Pollutant Loads (LUHPLs)

#6. Special standards for discharges in water supply and other critical areas

#7. Redevelopment standard compliance

*The permit encourages permittees to go beyond MASWMS to encourage capture of 1-inch storm via infiltration, evap./trans., or harvesting

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Process for Evaluating Feasibility

Stormwater Requirements

1. Evaluate existing codes & standards that affect the creation of impervious cover to determine if changes can be made to support LID options;

2. Consult with local engineers, planners, fire chief, public works staff, developers, health department, and other applicable municipal staff to identify potential code changes that would promote or require:
   - Reduced street widths for local access roads
   - Alternative cul-de-sac standards (hammerhead; pervious pavers; reduced radii; island bioretention)
   - Reduced frontages and lot setbacks
   - Maximum/median parking ratios based on local demands
   - Reduced stall dimensions
   - Pervious paving for spillover parking
   - Credits for shared parking/mass transit situations

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Process for Evaluating Feasibility

Road Design and Parking Standards
Process for Evaluating Feasibility

Road Design and Parking Standards

3. Propose schedule for changes
4. Update codes, design standards, and details *(Not required under permit)*
5. Report on assessment and/or updates by YR 2 from effective date of permit

see EPA technical support document for more detail

Process for Evaluating Feasibility

**Code Barriers to Green Infrastructure**

- Infiltration practices
- Rainwater harvesting
- Green and/or blue roofs
Process for Evaluating Feasibility

**Code Barriers to Green Infrastructure**

<table>
<thead>
<tr>
<th>Alternative Roofs</th>
<th>Other Practices</th>
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<tbody>
<tr>
<td>• Green Roofs</td>
<td>• Submerged Gravel Wetlands</td>
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<tr>
<td>• Blue Roofs</td>
<td>• Bioretention</td>
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<tr>
<td>• Disconnection of Rooftop Runoff</td>
<td>• Rain Gardens</td>
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<td>• Enhanced Filters</td>
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<td>• Soil Compost Amendments</td>
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<td>• Expanded Tree Pits</td>
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<td>• Stormwater Curb Extensions</td>
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<td>• Foundation Planters</td>
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<td>• Reforestation</td>
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**Rainwater Harvesting**

- Cisterns
- Rain barrels
- Underground Storage Chambers

**Infiltration**

- Infiltration Basins
- Infiltration Trenches
- Dry Wells
- Permeable Pavements

Define Green Infrastructure and use consistent terminology throughout codes

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**Practice**

- **Green/blue roofs**
  - Building code material specifications that exclude standard green/blue roof construction materials/vegetation
  - Fire safety and access requirements that prohibit vegetative cover or temporary water storage

- **Infiltration**
  - Required curbing, sidewalk, and utility placement which limits stormwater options in road ROW
  - Parking requirements that generate excess impervious cover and limit available space for stormwater management
  - Landscape requirements that limit integration of stormwater management

**Barriers**

- Credit as green/open space in high density zones
- Allow increased building heights or density incentives when using green/blue roofs
- Tie into LEED certification

**Opportunities**

- Specify practices allowable in surface parking landscaping requirements
- Establish maximum parking ratios based on local demand
- Include a list of pre-approved permeable pavement options which meet local fire access requirements
- Provide permeable pavement and reinforced turf standards
- Encourage use of permeable surfaces or reinforced turf in lieu of impervious
<table>
<thead>
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<th>Barriers</th>
<th>Opportunities</th>
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| Rainwater Harvesting  | • Plumbing codes that prohibits reuse of rainwater  
  • Concerns with blocking of fire access  
  • Accessory structure limitations that hinder addition of cisterns                                                                                              | • State that some rain barrels/cisterns can fit under decks, underground, or in conjunction with steps, terraces, and porches as long as blocking of fire access is avoided.  
  • Revise plumbing codes for rainwater use for irrigation and/or non-potable uses.  
  • Allow below ground cisterns in ROW and as exemptions to accessory structure requirements.  
  • Allow rainwater harvesting storage within inner courts or storage structures within buildings.                                                                 |
| Other Vegetated       | • Street and parking standards, and lot setbacks that reduce available space for stormwater practices  
  • Mowing and weed control requirements  
  • Drainage codes and/or nuisance regulations that prohibit temporary ponding of water                                                                 | • Require stormwater practices in street ROW landscape strips when possible and provide enough ROW width for expanded tree pits and other practices.  
  • Minimum sizes of planting islands and other landscaping areas should be large enough to allow for these practices.  
  • Increase % green area requirements and allow vegetated practices to count towards requirements.  
  • Increase shade/tree canopy requirements.  
  • Require that bioretention tree pits be large enough to support tree health.  
  • Specify disconnection & drainage of impervious area into landscaped area.                                                                                             |

**Process for Evaluating Feasibility**

**Development Approval Process**

Review approval process to determined if the following are issues:

- Stormwater management is not required to be addressed at a site concept stage (where other site elements are defined).
- Site plans and details submitted to different agencies for review do not always show the proposed locations of stormwater BMPs or drainage infrastructure.
- Resource inventories do not specify areas on a development site that may be appropriate locations for stormwater management.
- Limited guidance exists for plan review staff to shape the selection and design of appropriate green infrastructure practices.
- Additional permitting requirements and variances necessary for approval of green infrastructure designs.
- Standard checklists and narratives related to LID do not exist, or are not properly used by applicants.
Additional Resources

- **Better Site Design**: A handbook for changing development rules in your community
  [www.cwp.org](http://www.cwp.org)

- **LID Local Codes Checklist**: [www.mapc.org/LID](http://www.mapc.org/LID)

- **Parking Spaces/Community Places**: Finding the balance with smart growth solutions
  [www.epa.gov/smartgrowth/pdf/EPAParkingSpaces06.pdf](http://www.epa.gov/smartgrowth/pdf/EPAParkingSpaces06.pdf)

- **Sustainable Neighborhood Road Design**: A guidebook for Massachusetts Cities and Towns

- **Massachusetts Smart Growth/Smart Energy Toolkit**

- **2011 Rhode Island LID Site Planning and Design Guidance Document**