

The Implementation of Low Impact Development (LID) Practices along the South Carolina Coast



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Low Impact Development (LID) Practices



Property of the City of North Charleston

- **Definition:** A stormwater management approach that integrates the use of a network of Best Management Practices (BMPs) to disperse stormwater throughout the site.
- **Purpose:** Promote infiltration, recharge groundwater sources, and mimic pre-development hydrologic conditions

Examples of LID Practices



Bioretention swale,
Oak Terrace Preserve



Green roof,
Bowens Island



Pervious pavers,
Oak Terrace Preserve



Pervious walkway,
Oak Terrace Preserve



Rain barrel,
Oak Terrace Preserve



Green roof, Circular
Congregational Church

LID Efficiencies

Stormwater Treatment System	Reference	Stormwater	TSS	Phosphorus	Nitrogen
Retention Pond	UNH Stormwater Ctr, 2007	81% (peak flow)	72%	16% (Total)	54% (DIN)
Single Detention Pond	Messersmith, 2007	7.5% (volume)	19%	-6% (Total)	-2.5% (Total)
Series of Detention Ponds	Messersmith, 2007	-9% (volume)	88%	71% (Total)	39% (Total)
Bioretention Swale	UNH Stormwater Ctr, 2007	82-85% (peak flow)	97-99%	5% (Total)	29-44% (DIN)
	Davis et al., 2007	49-58% (peak flow)	47%	76% (Total)	83% (Nitrate)
Porous Pavement	UNH Stormwater Ctr, 2007	68% (peak flow)	99%	38% (Total)	n/a
Cumulative use of LIDs	EPA, 2000	n/a	91%	3% (Total)	42% (Total)

Process Map

Federal and State legislation



Local Comprehensive Plan



Zoning Ordinance



Parcel Identified for Development



Land Plan



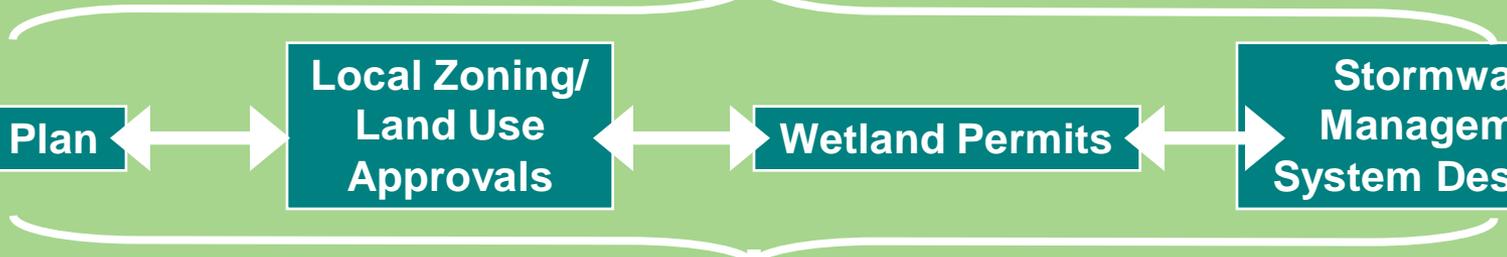
Local Zoning/
Land Use
Approvals



Wetland Permits



Stormwater
Management
System
Designed



Stormwater Management System Permitted



Stormwater Management System Constructed



Inspections, Approvals, Enforcement



Maintenance Agreement

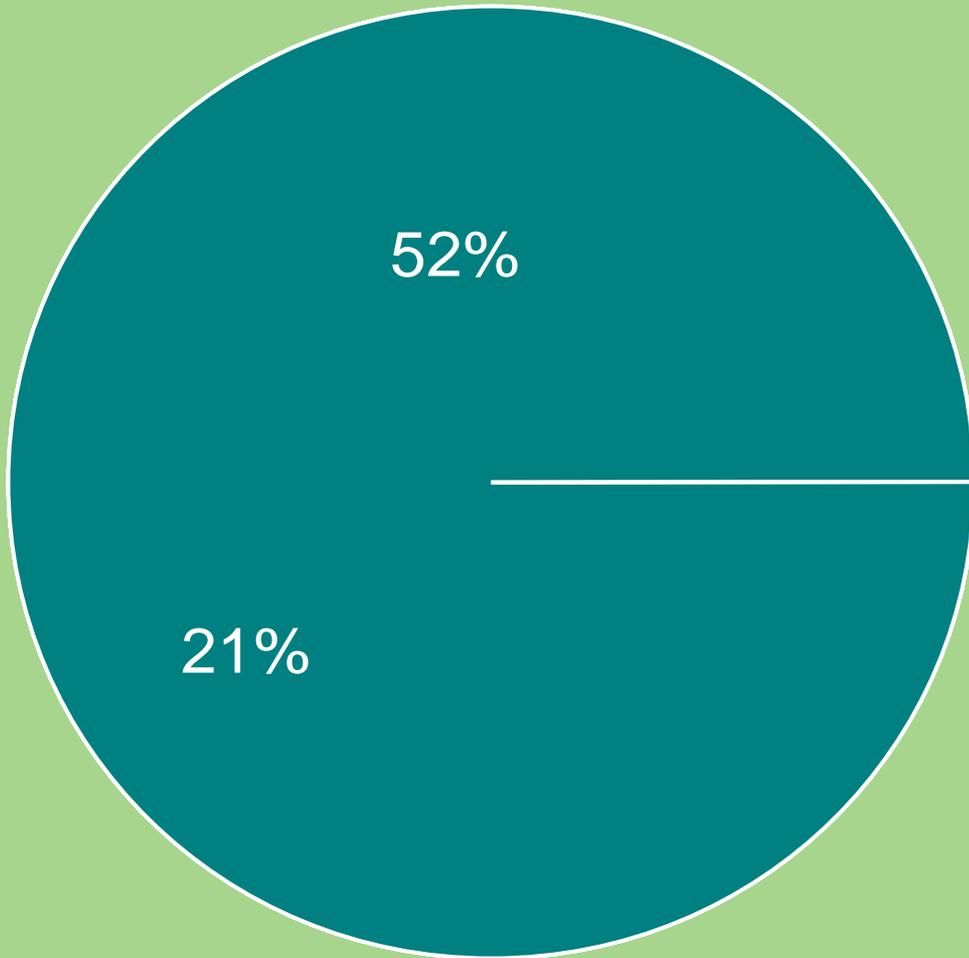


Long-term Inspections and Enforcement

Interview Questions

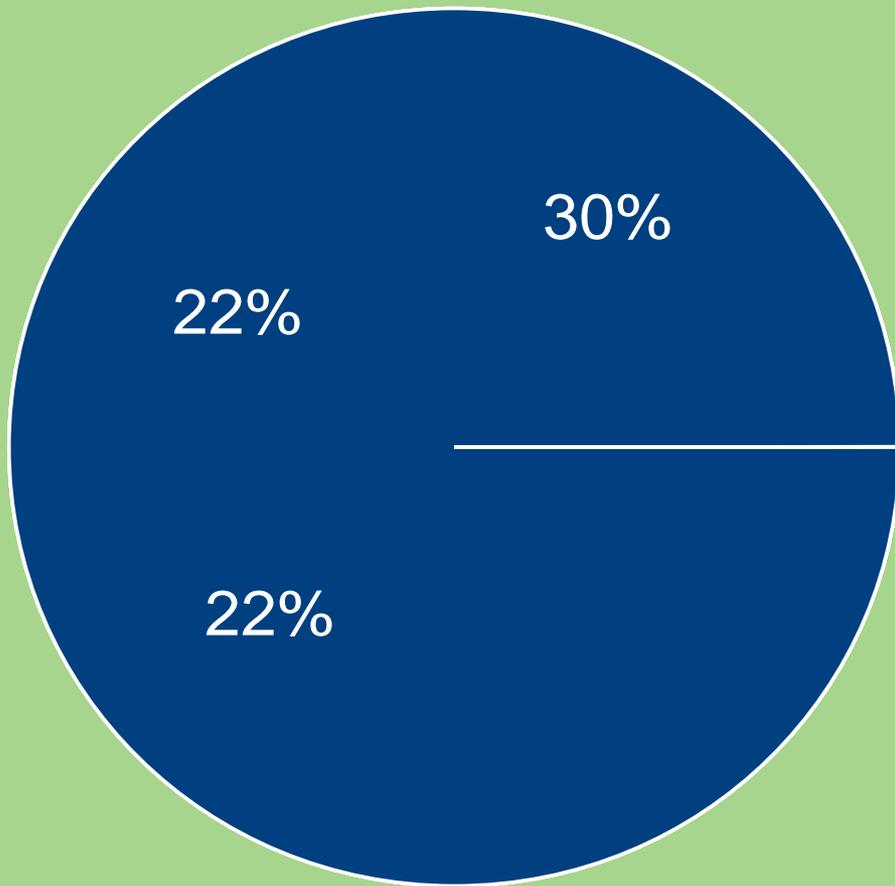
- Have all the critical steps in the process been identified?
- Who are the key decision-makers in each step?
- What does the term Low Impact Development (LID) practices mean to you?
- Are there stormwater practices that you would consider lower impact (than stormwater ponds) and if so what are some examples?
- How would you describe the advantages of LID in terms of managing stormwater?
- How would you describe the disadvantages of LID in terms of managing stormwater?
- How prevalent are LIDs in the SC coastal region?
- From your perspective, where in the process do road blocks or constraints to utilizing LID exist?
- What do you think needs to be done to increase the number of LIDs that are constructed in the coastal region?
- What stakeholder in the process would have the greatest influence on the number of LIDs installed in the area?

Advantages of LID



-  Water quality/quantity
-  Cost-savings
-  Aesthetics
-  Marketing tool
-  Alternative to ponds

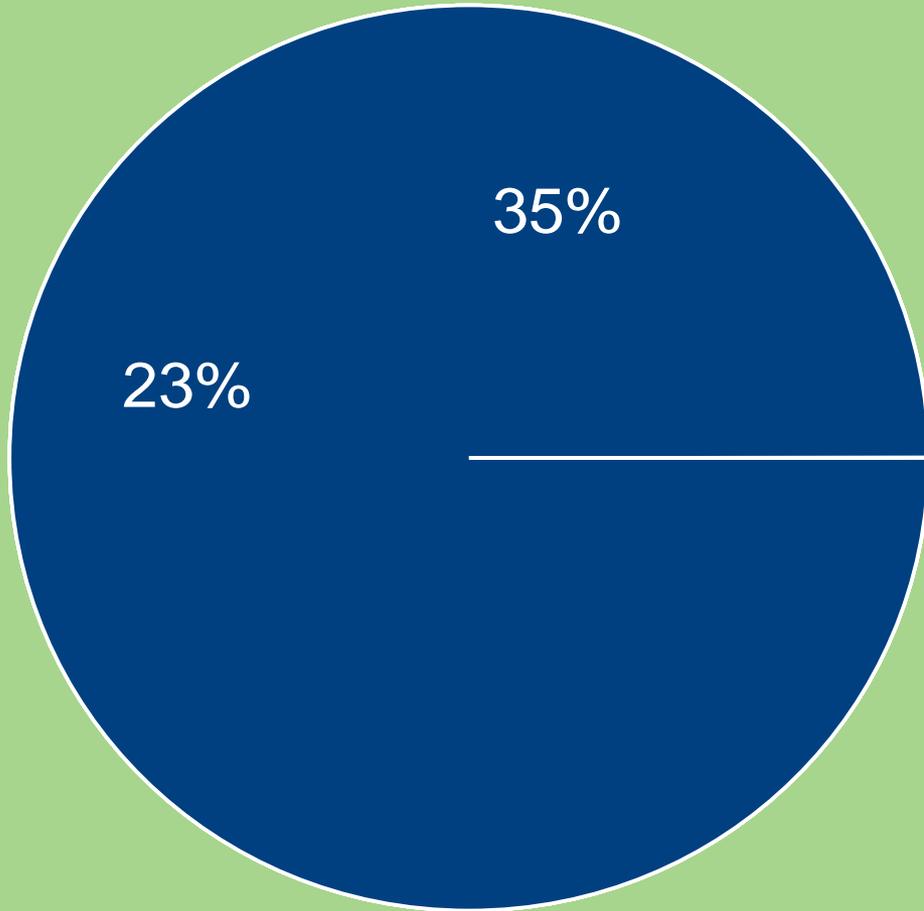
Disadvantages of LID



“There is a need for a cultural change which includes personal stewardship and education [of municipal officials and consumers]”

- Educational need
- Lack of information
- Cost
- Geographic/hydrologic challenges
- Regulatory process is harder
- Ponds are easier

Obstacles to utilizing LID



“Regulations make innovation impossible”

- Educational need
- Regulatory process
- Lack of information
- Cost
- Geographic/hydrologic challenges
- Maintenance apprehension

Additional Implementation Obstacles

- Contractor lack of knowledge

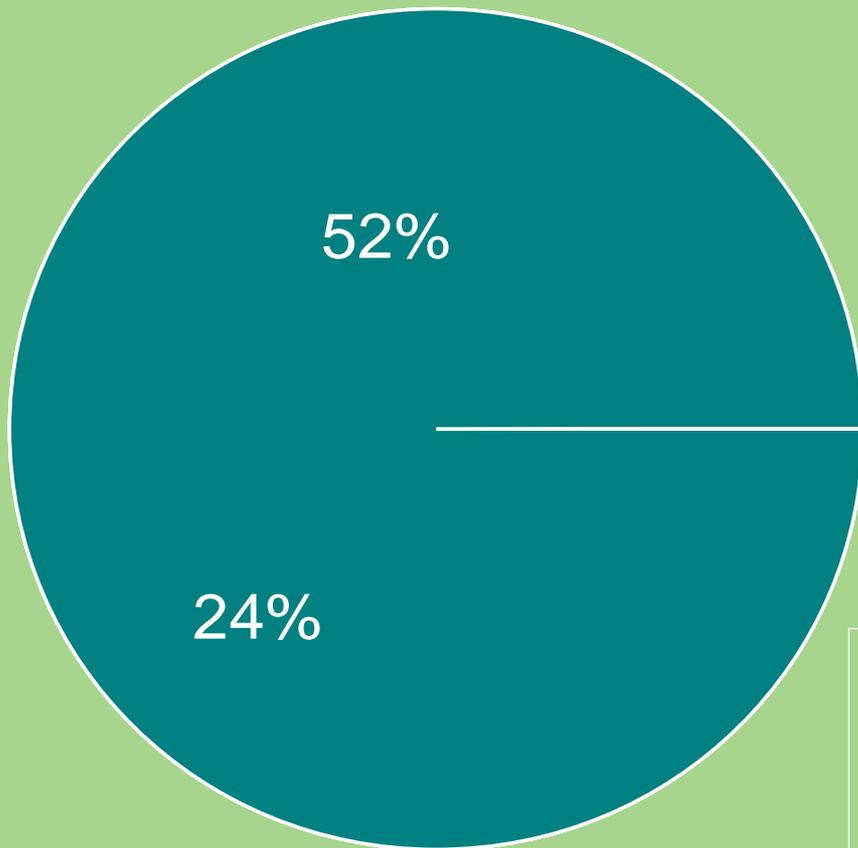


Installation



Sediment Control

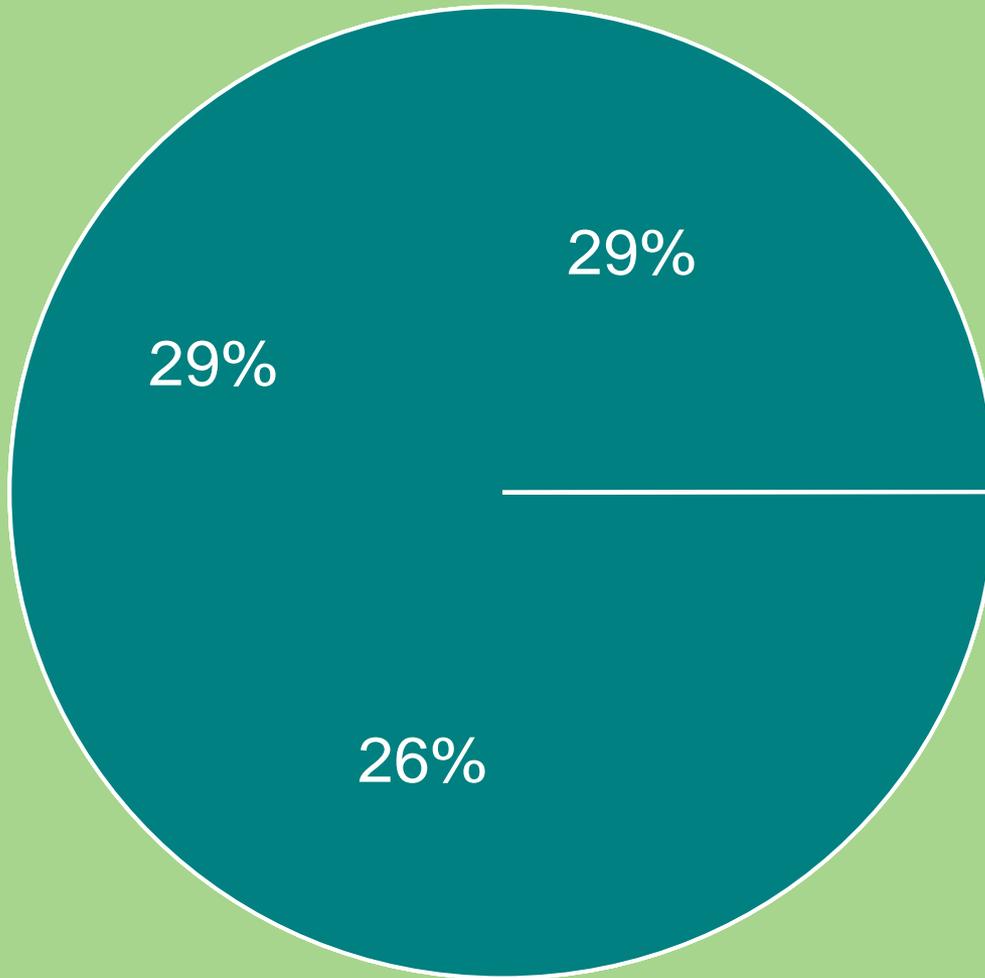
Stakeholders that have the biggest influence



“There are so many regulations and approvals needed that the development strategy becomes how to get through the regulatory process”

- Regulatory agencies (state and municipal)
- Developer
- Engineer
- Consumer
- Local stakeholder

Options for increasing LID use



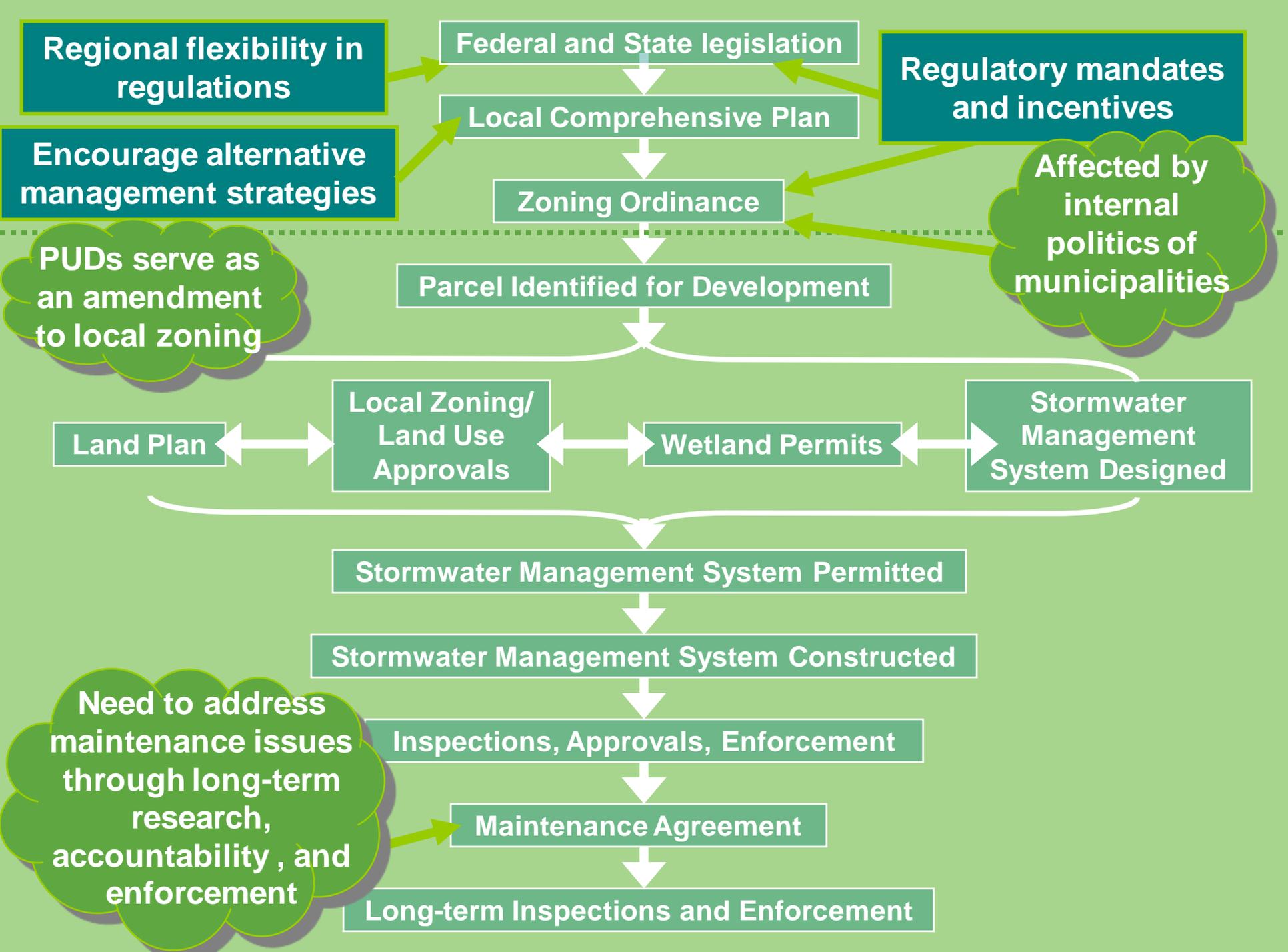
“When developing the mindset is:
1) easier is better and 2) what
incentives are there to develop one
way versus another”

- Regulatory mandates
- Education
- Incentives
- Research
- Success stories

LEED certification as a marketing tool for LID practices

- “People want green to say they are saving the world, but they don’t understand what it really is”
- “LEED is a branding, the stormwater portion is not”
- “Buyers are interested in the visible, tangible things associated with LID, they don’t notice the advantages of stormwater LID practices”





Regional flexibility in regulations

Federal and State legislation

Regulatory mandates and incentives

Encourage alternative management strategies

Local Comprehensive Plan

Affected by internal politics of municipalities

Zoning Ordinance

PUDs serve as an amendment to local zoning

Parcel Identified for Development

Land Plan

Local Zoning/ Land Use Approvals

Wetland Permits

Stormwater Management System Designed

Stormwater Management System Permitted

Stormwater Management System Constructed

Inspections, Approvals, Enforcement

Maintenance Agreement

Need to address maintenance issues through long-term research, accountability, and enforcement

Long-term Inspections and Enforcement

Regional flexibility in regulations

Federal and State legislation

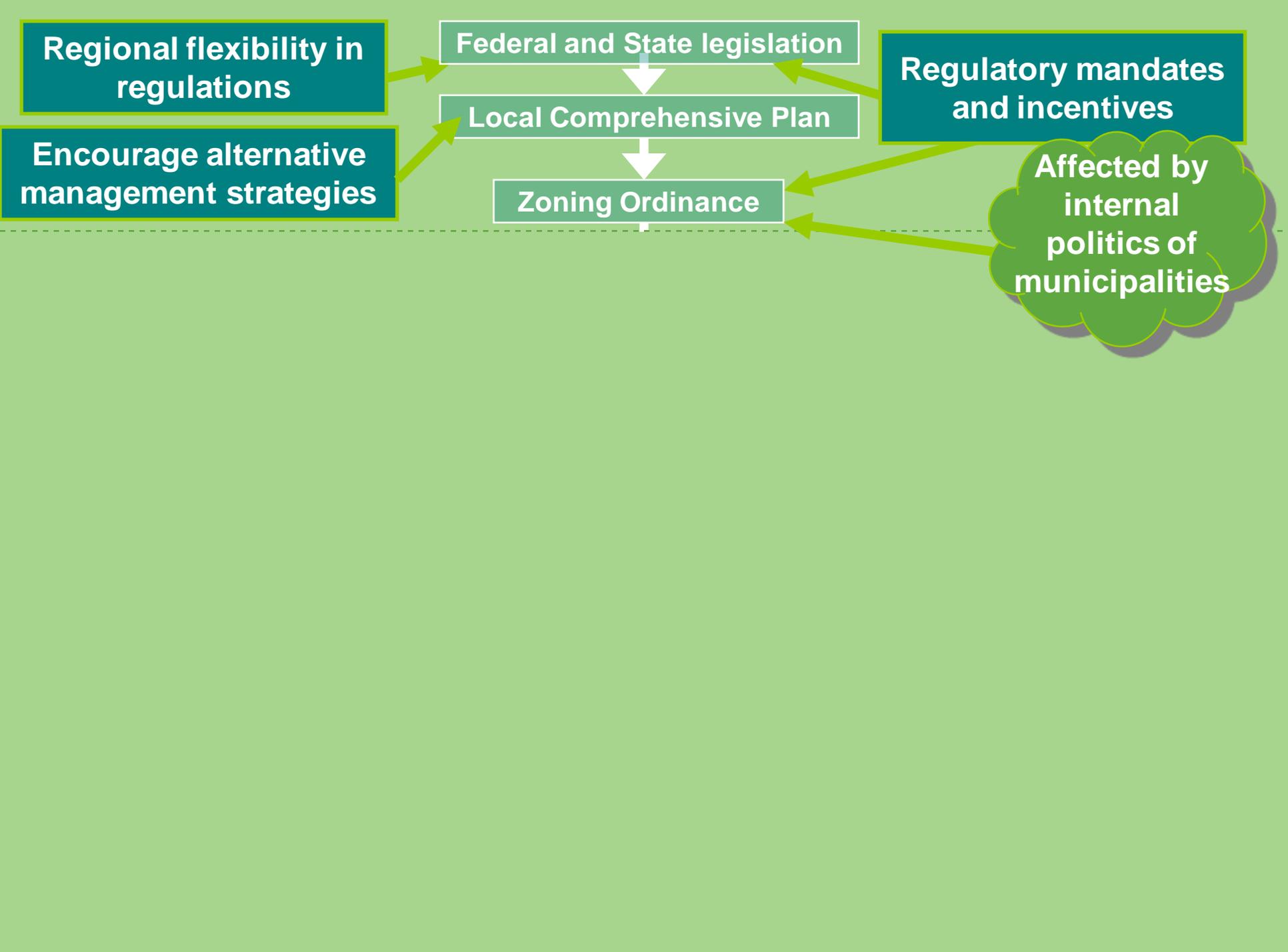
Regulatory mandates and incentives

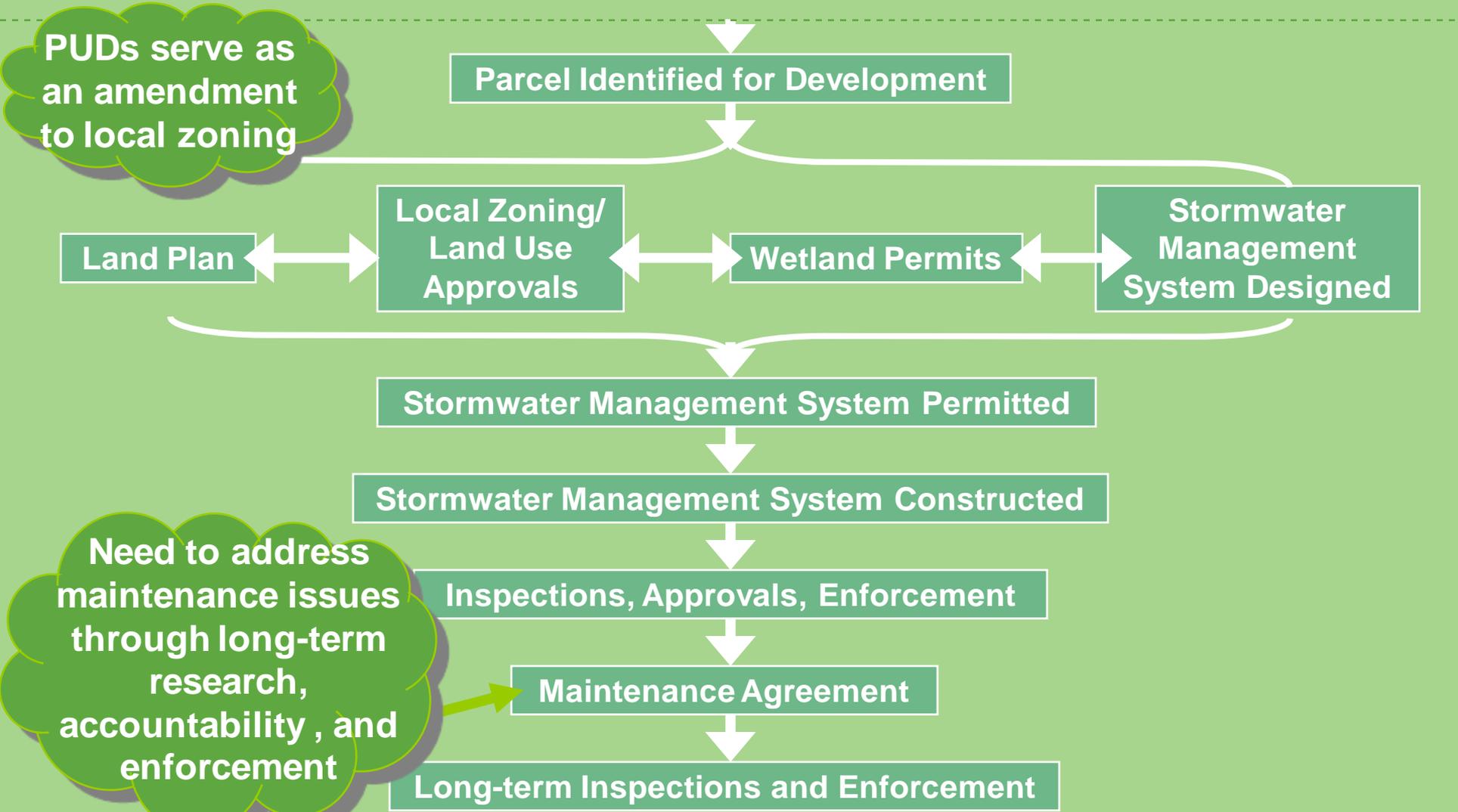
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Opportunities for addressing obstacles

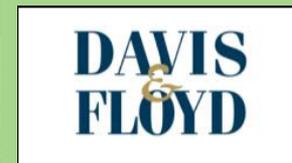
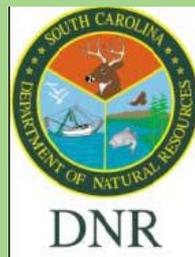
- Regulatory suggestions
 - Flexibility in Federal and State regulations
 - LID mandates
 - Incentives for LID (e.g., tax incentive, reduced impact fees, bonus density, expedited review)
 - Include LID in local comprehensive plans
- Regional research needs
 - Long-term performance and efficiency
 - Development of models and standards
 - Identification of long-term maintenance standards
 - Success stories

Opportunities for addressing obstacles

- Educational needs
 - Regulators, Municipal officials, Contractors, Engineers, Developers, Consumers/Homeowners
 - Forums: ULI, ASCE, ASLA, APA, AIA, Sustainability Institute, Municipal association
 - College level education (engineers)
 - Homeowner education (maintenance)
- Additional comments
 - Refine definition of LID
 - Stormwater a larger component of LEED certification
 - Consumer market has to support LID practices

Next Steps

- Final assessment report with identification of obstacles and suggestions for solutions
 - Knowledge dissemination





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