



GI/LID Implementation in CT: Status & Forecast

*NOAA Green Infrastructure Workshop
May 23, 2017*

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Today's Agenda:



- **State of LID**
 - regulations/policies
 - obstacles/barriers
- **LID Forecast**



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COLLEGE OF AGRICULTURE, HEALTH AND NATURAL RESOURCES

...to provide information and assistance to land use decision makers and other audiences in support of better land use decisions, healthier natural resources, and more resilient communities.

CLEAR Program Areas



Water



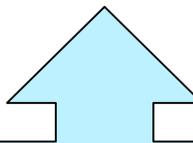
Land Use & Climate
Resiliency



Geospatial Tools &
Training



STEM Education &
Local Conservation

- 
- Applied research
 - Geospatial technology
 - Extension outreach

CLEAR Program Areas



Water



Land Use &
Climate
Resiliency



Geospatial Tools
& Training



Secondary
School STEM



- NEMO Program: MS4 support
- Rain garden training & smartphone app
- LID on campus

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State of LID Research

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The State of Low Impact Development in Connecticut

A story map by Manon Lefèvre, David Dickson, Chet Arnold, and Kerrin Kinnear

This story map presents the findings of a review of 85 Connecticut municipalities' low impact development policies, included in Plans of Conservation and Development, Zoning and Subdivision regulations, and stormwater and LID design manuals. Our goal is not only to show a snapshot of LID throughout the state, but to provide a resource for municipalities hoping to incorporate more low impact development.

Low impact development (LID), also increasingly referred to as green infrastructure or green stormwater infrastructure, is designed to reduce the negative impacts of traditional development on our water resources. The goal of LID is to preserve the predevelopment hydrology of a site, move away from conventional underground drainage systems, preserve natural landscape features, and minimize **imperviousness** to create functional and appealing site drainage that treats stormwater as a resource.

Low impact development can lower flood risk, replenish groundwater reserves, reduce urban heat island effect, lower building energy demands, protect water resources, limit erosion, and reduce stress on municipal sewer systems. There are many site-level practices used in LID, including **bioretention**, **green roofs**, **rain gardens**, and **permeable pavements**. LID can be applied to new development, redevelopment, or as retrofits to existing development, in both highly urban and rural settings.

The **Connecticut Nongovernment Education for Municipal Officials (NEMO) program** created a **Low Impact Development Atlas** to highlight innovative LID practices at the local and national levels. Here, you can find specific examples of LID projects near you, and contribute your own.

Project Phase I: LID Review

Using a framework of 14 LID practices and design criteria found in the 2009 and 2010's 2009 documents, *Understanding Low Impact Development*, as required by Plans of Conservation and Development, Zoning, and Subdivision Regulations, and Stormwater and LID guides of 25 Connecticut towns, [www.ct.gov](#). The review was conducted through fall 2016 with some final data review in 2017 and published to ensure that the review was up-to-date. Updates to the 2009 and 2010's 2009 documents, as well as a wide range of jurisdiction and economic demographics. Subsets generated by the review could not be extrapolated from these data, but will occur after further data collection. No municipalities represented the review were found and identified.

In addition to the 14 practices found in the 2009 documents, we looked to see if low impact LID in general, including engineering software or particular who mentioned in other places, etc.

14 out of 25 towns have a LID policy in their plans or regulations.
55 out of 85 practices mentioned in the review were found in at least one town's plan or regulations.
(Note: Some towns had multiple LID policies and some had no LID policies.)

Click [here](#) to see a breakdown of presence of LID policies for each Connecticut municipality reviewed. Click on a town to see its name and number of policies found.

If you would like to contribute information on LID in your town, you can fill out our [Survey Form](#) [here](#).

Click [here](#) to go back to the map of CT municipalities reviewed.

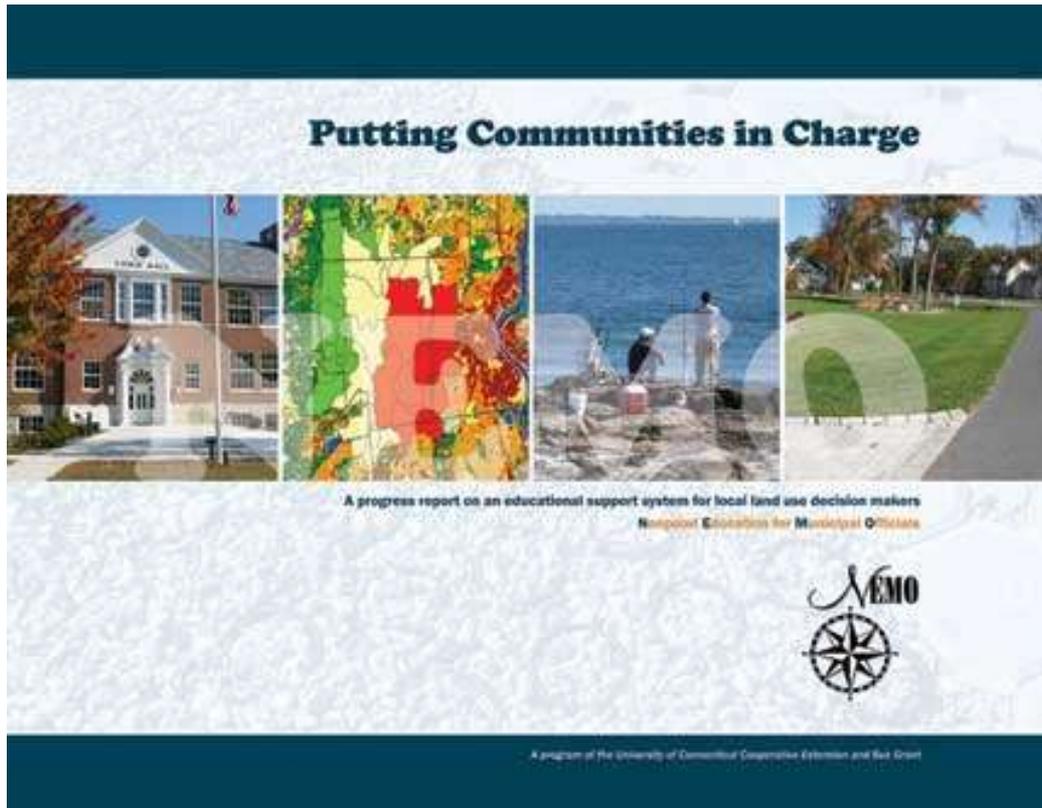
Analysis

What LID policies are most common in CT?
(Note: LID policies are more difficult to see on this map than others as indicated by the percentages below. This was a pilot review and more detail



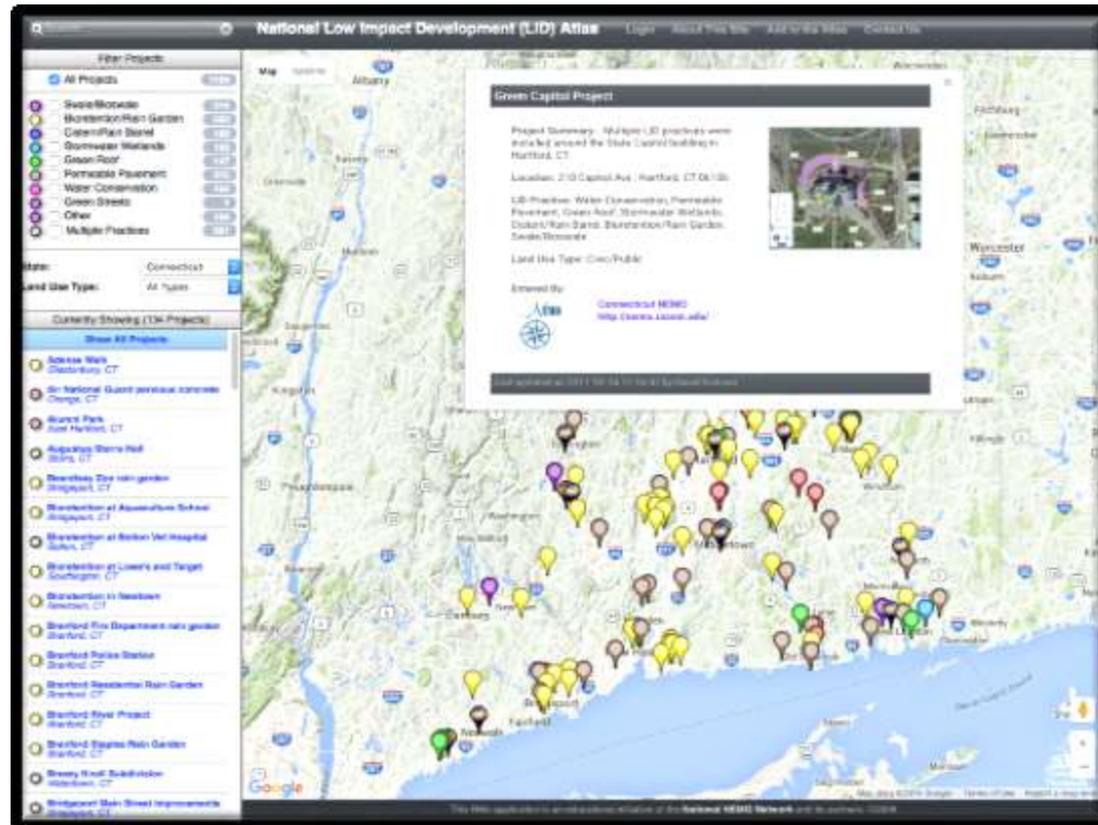
<http://s.uconn.edu/stateoflid>

Why Bother?



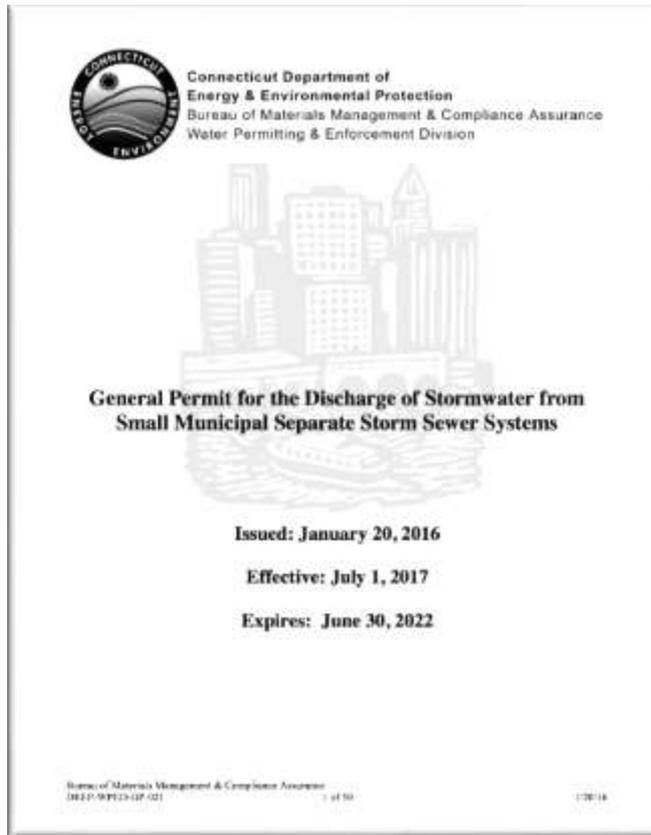
Schlepping to town hall since 1991

Why Bother?



LID examples/awareness growing

Why Bother?



- Remove LID barriers in regs.
- Require LID as 1st option
- Reduce DCIA by 1% per year with retrofits

New MS4 general permit

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Step 1: Regulation Review



NEMO

Developing A Sustainable Community

A Guide to Help Connecticut Communities Craft Plans and Regulations that Protect Water Quality



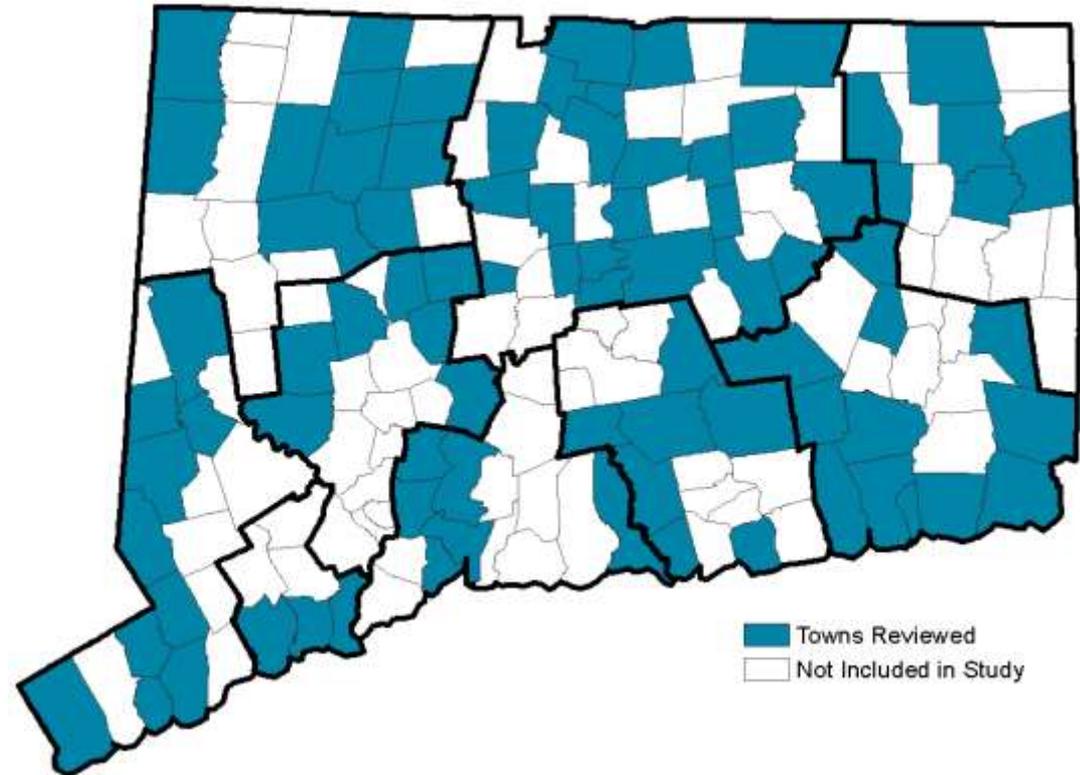




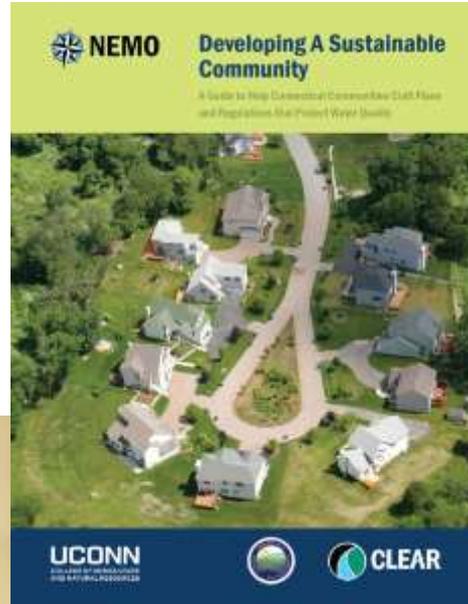
LID Practice	
1. Street Width	Design residential streets for the minimum required pavement width needed to support travel lanes, on-street parking, emergency services and maintenance access. (26 out of 85 towns)
2. Cut-De-Sacs	Minimize the number of residential cut-de-sacs and, where they do exist, incorporate landscaped areas to reduce impervious cover and encourage infiltration of stormwater runoff. (21 out of 85 towns)
3. Road Drainage	Where density, topography, soil and slopes permit, vegetated swales should be used in the street right-of-way to convey and treat stormwater runoff, replacing curb and gutter drainage systems. (34 out of 85 towns)
4. Parking Size	Required parking ratios governing a particular land use or activity should be enforced as both a maximum and a minimum in order to curb excess parking construction. Further, reduce the overall imperviousness associated with parking lots by minimizing stall dimensions and incorporating efficient parking lanes. (44 out of 85 towns)
5. Parking Runoff	Whenever possible, provide stormwater treatment for parking lot runoff using bioretention areas, filter strips and/or other practices that can be integrated into required landscaping areas and traffic islands. (41 out of 85 towns)
6. Conservation/Open Space Subdivision	Encourage development designs that minimize total impervious area, reduce total construction costs, conserve natural areas, and provide community recreational space and promote watershed protection. (78 out of 85 towns)
7. Setbacks and Frontages	Relax side yard setbacks and allow narrower frontages to reduce total road length in the community and overall site imperviousness. Relax front yard setback requirements to minimize driveway lengths and reduce lot imperviousness. (20 out of 85 towns)
8. Sidewalks	Promote more flexible design standards for residential sidewalks on only one side of the street and provide common walkways linking pedestrian areas, use permeable pavement. (44 out of 85 towns)
9. Driveways	Reduce overall lot imperviousness by promoting alternative driveway surfaces and shared driveways that connect two or more homes together. (28 out of 85 towns)
10. Roof Runoff	Direct roof runoff to pervious areas such as yards, open channels, or vegetated areas and avoid routing rooftop runoff to the roadway and the stormwater conveyance system. (20 out of 85 towns)
11. Stormwater Management Plan	As a minimum, a stormwater management plan should be required for sites that have disturbance equal to or greater than one acre, as proposed by the CT Stormwater Quality Manual. The purpose of the plan is to identify potential water quality and quantity impacts of the proposed development, and to propose selected source controls and treatment practices to mitigate against those impacts. (65 out of 85 towns)
12. Riparian Buffers	Riparian Buffers: Create a naturally vegetated buffer along all water resources that also encompasses critical environmental features such as the 100-year floodplain, steep slopes, and wetlands, which should be preserved or restored with native vegetation. (39 out of 85 towns)
13. Clearing and Grading	Clearing and grading of forests and native vegetation at a site should be limited to the minimum amount needed to build lots, allow access, and provide fire protection. (43 out of 85 towns)
14. Tree Conservation	Conserve trees and other vegetation at each development by protecting trees and other vegetation during construction and by planting additional vegetation, clustering tree areas, minimizing native vegetation disturbance, and promoting the use of native plants. (71 out of 85 towns)

Selecting Towns

- not randomized
- towns we knew
- urban/suburban/rural
- median home price
- geographic distribution
- 9 “regions”



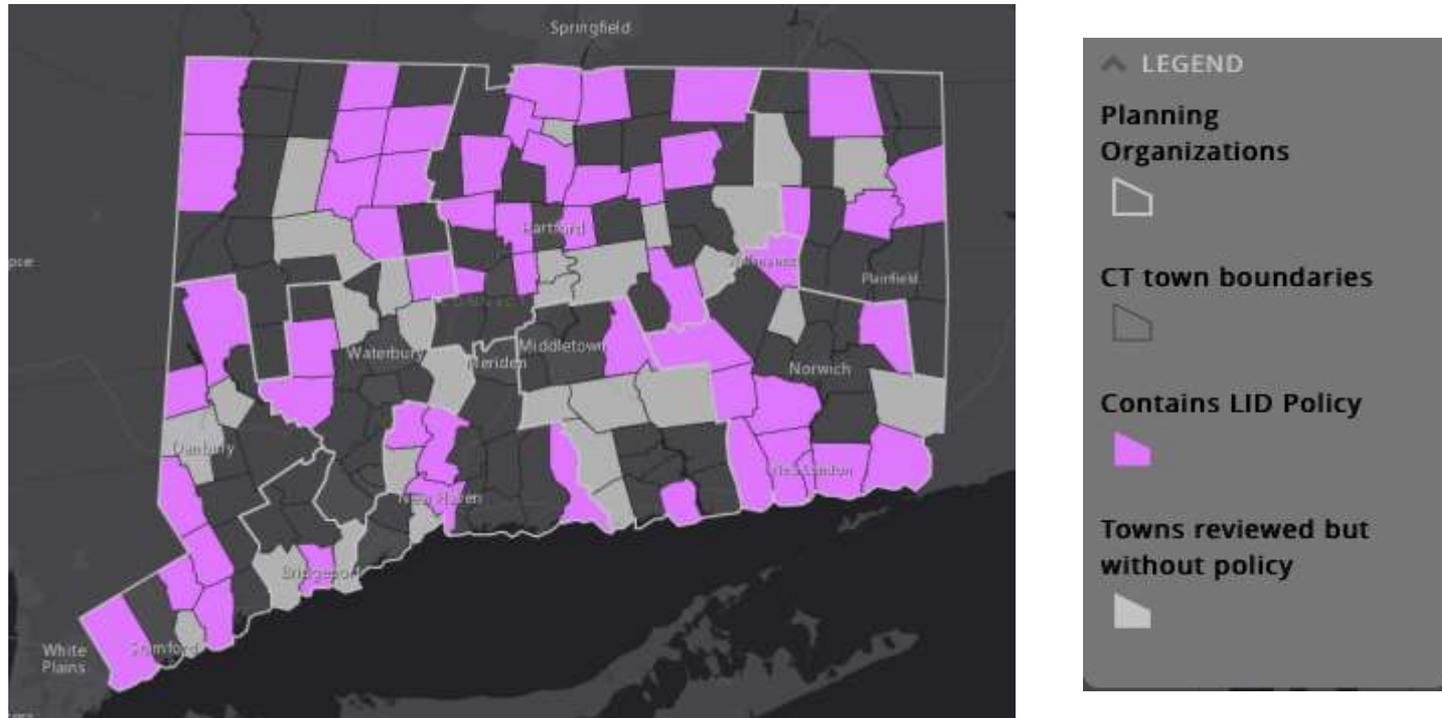
Interns are wonderful



Scoured town websites for:

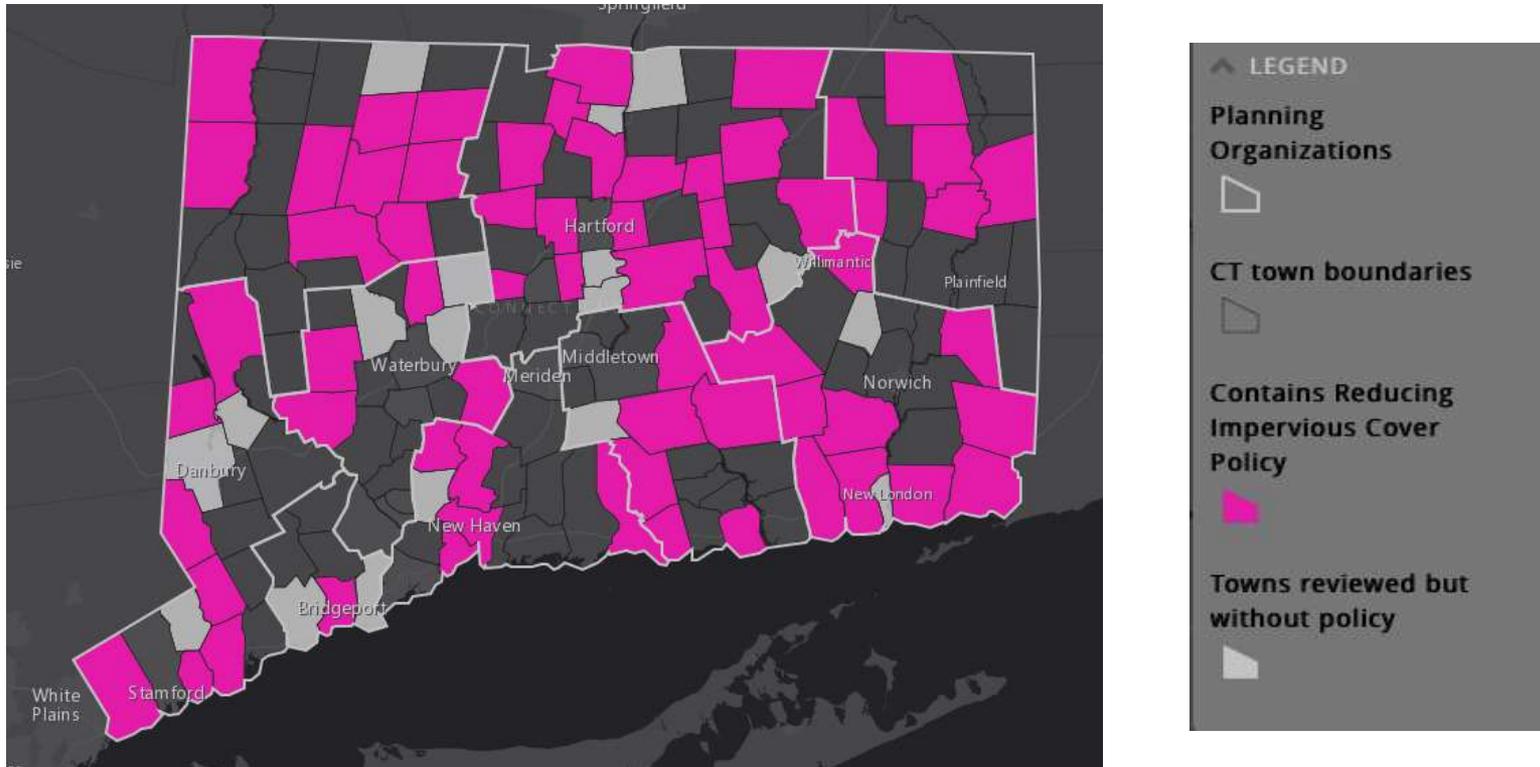
- POCDs
- Zoning regulations
- Subdivision regulations
- Inland/wetlands regulations
- Stormwater plans/other

General Support for LID



54 of 85 towns
mention **LID** in regs

General Support for LID

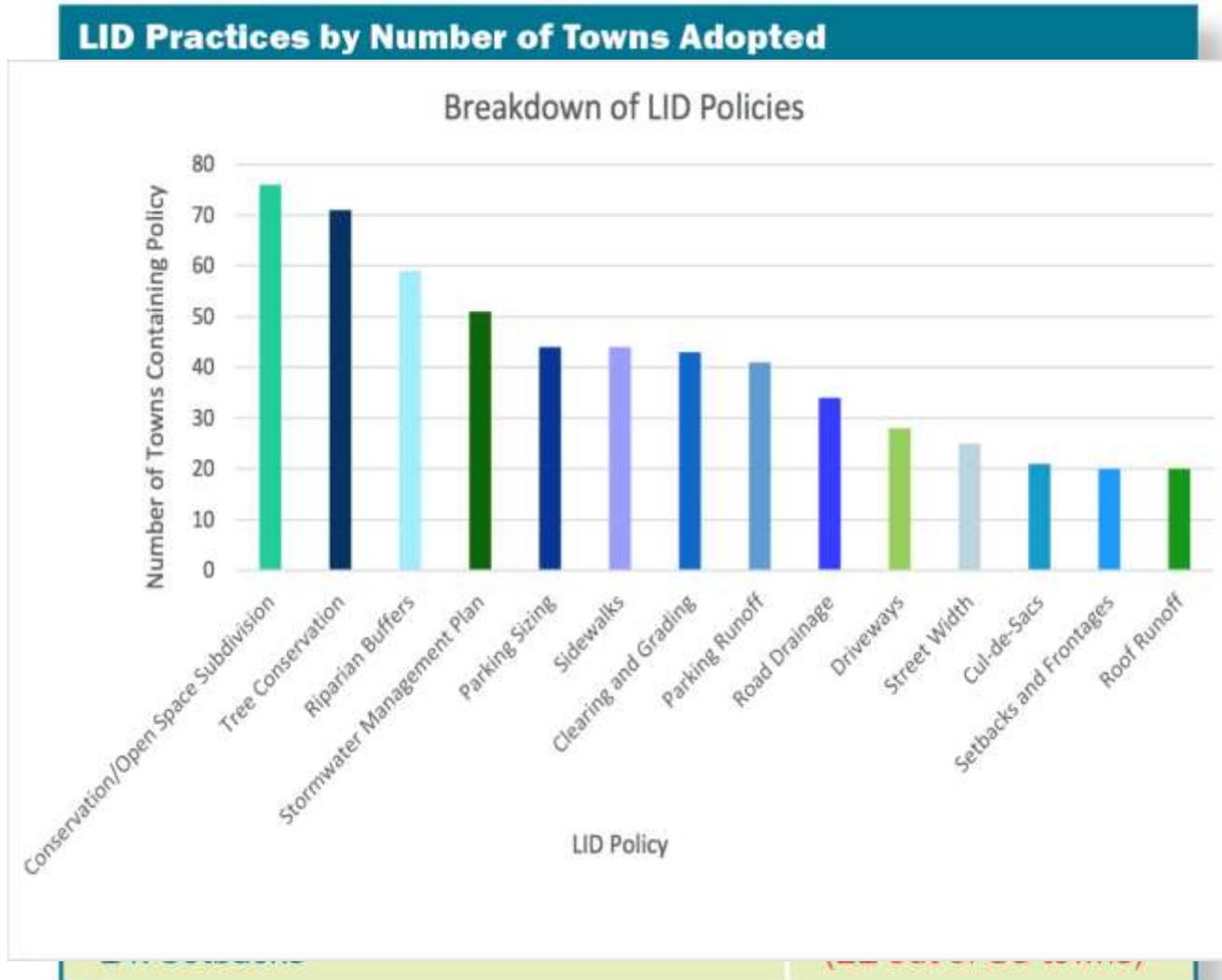


65 of 85 towns mention
reducing impervious surfaces

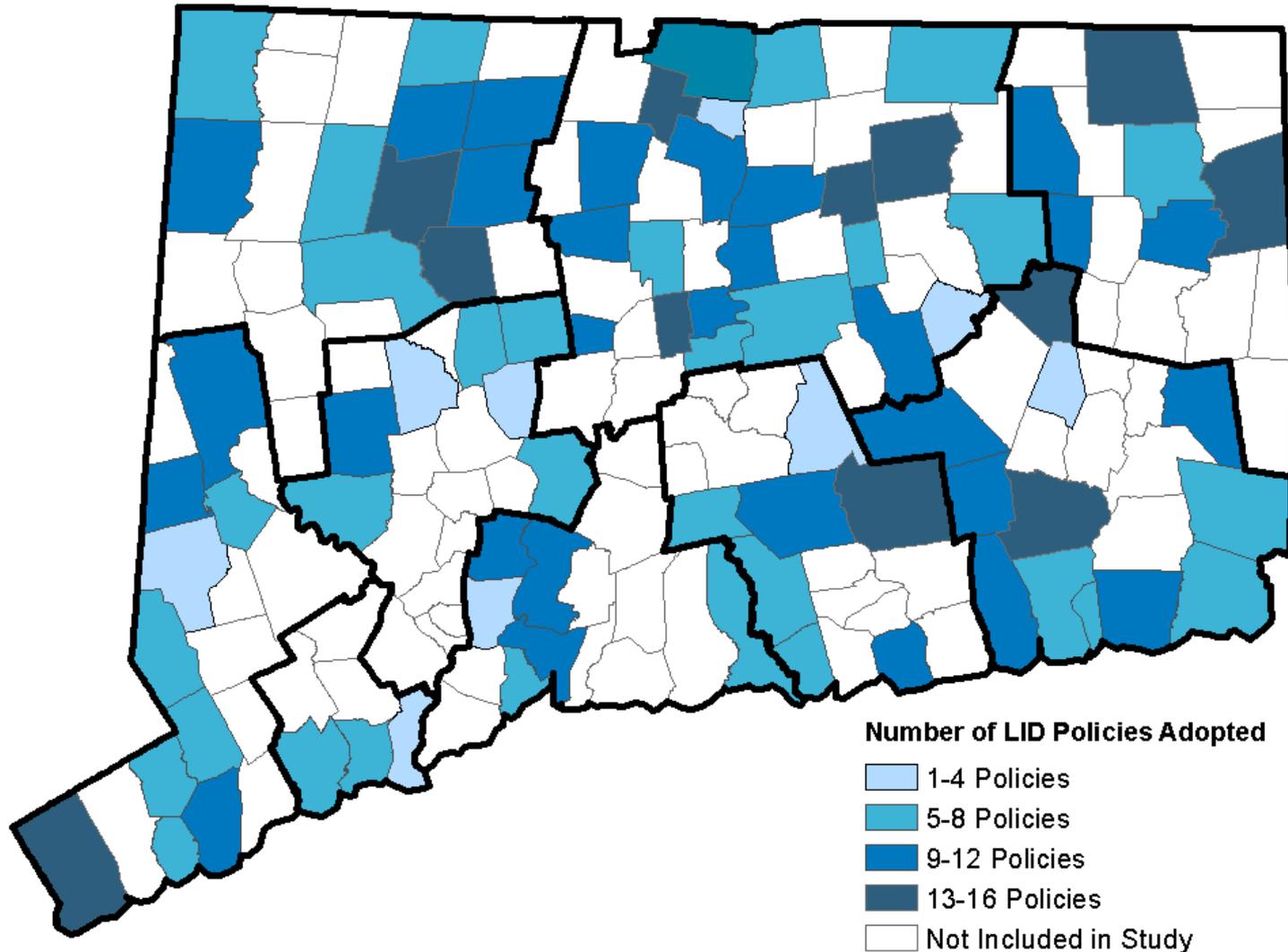
Specific Regulations

landscape scale

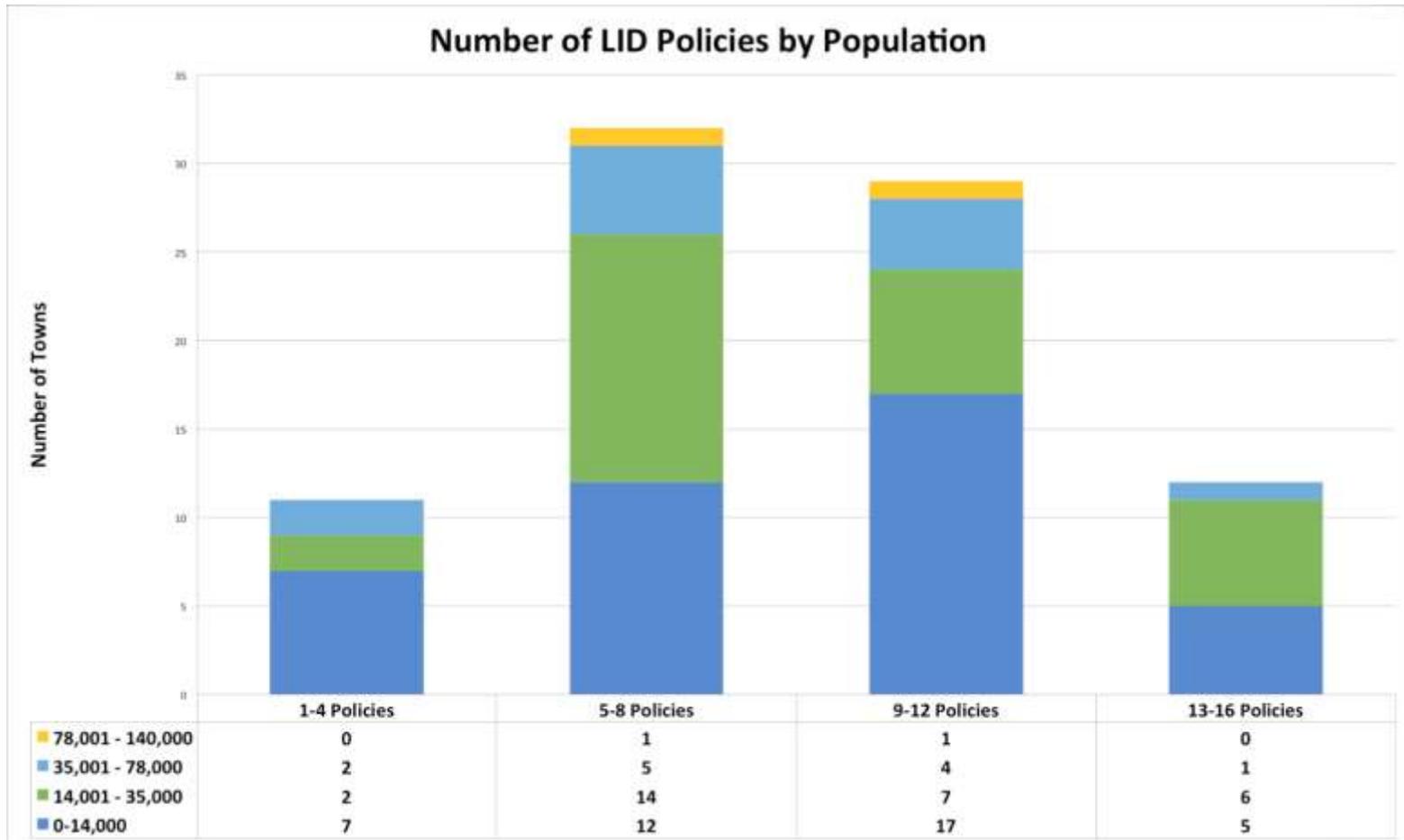
site scale



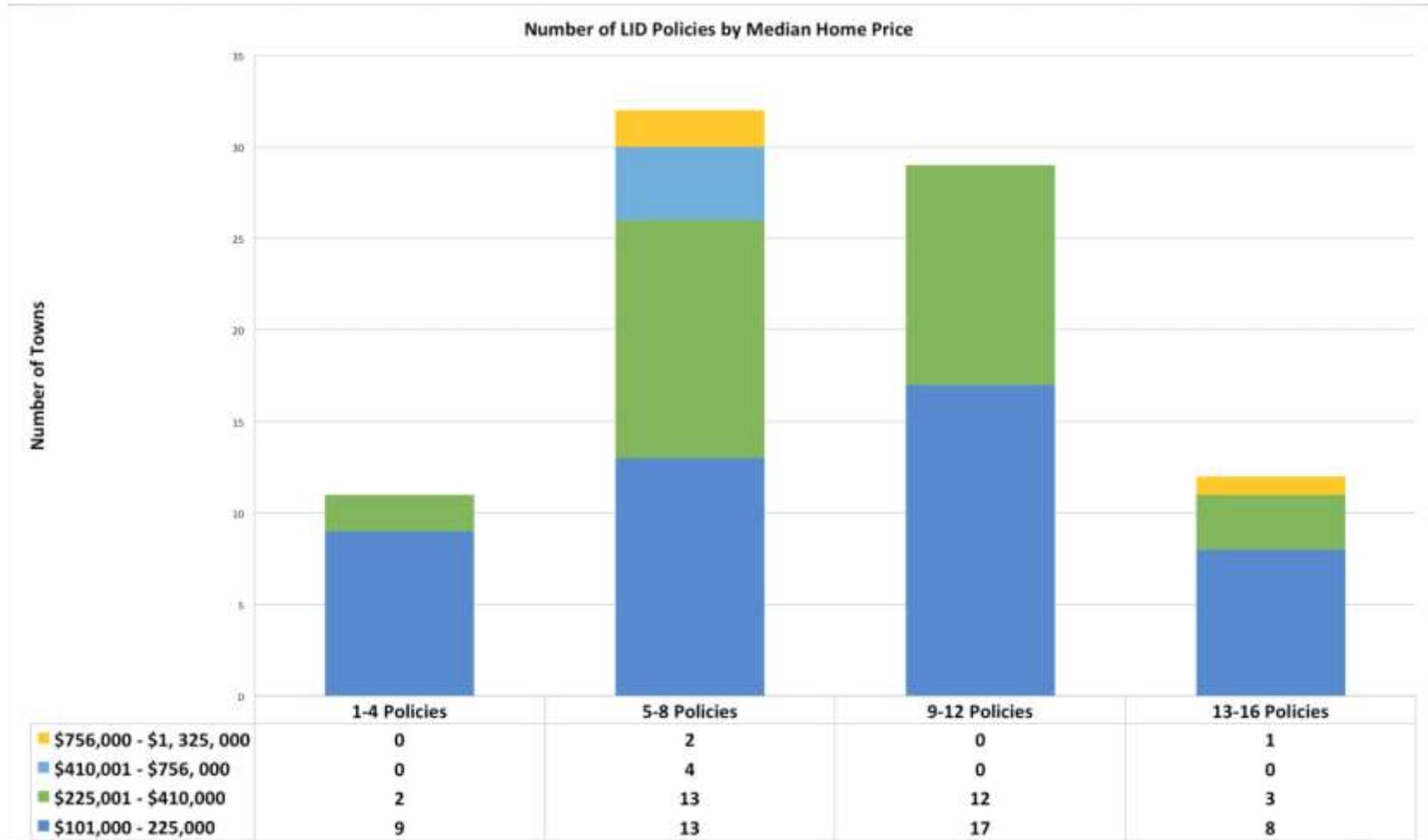
Policies Adopted by Town



Does size matter?



Does wealth matter?



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Step 2: Interviews



1. Does your community encourage/require the use of **low impact development or green infrastructure** to manage stormwater? If so, in what ways?
2. What are the **factors driving** your community to encourage or not encourage LID?
3. What are the **biggest obstacles** to implementing LID regulations or practices in your town?

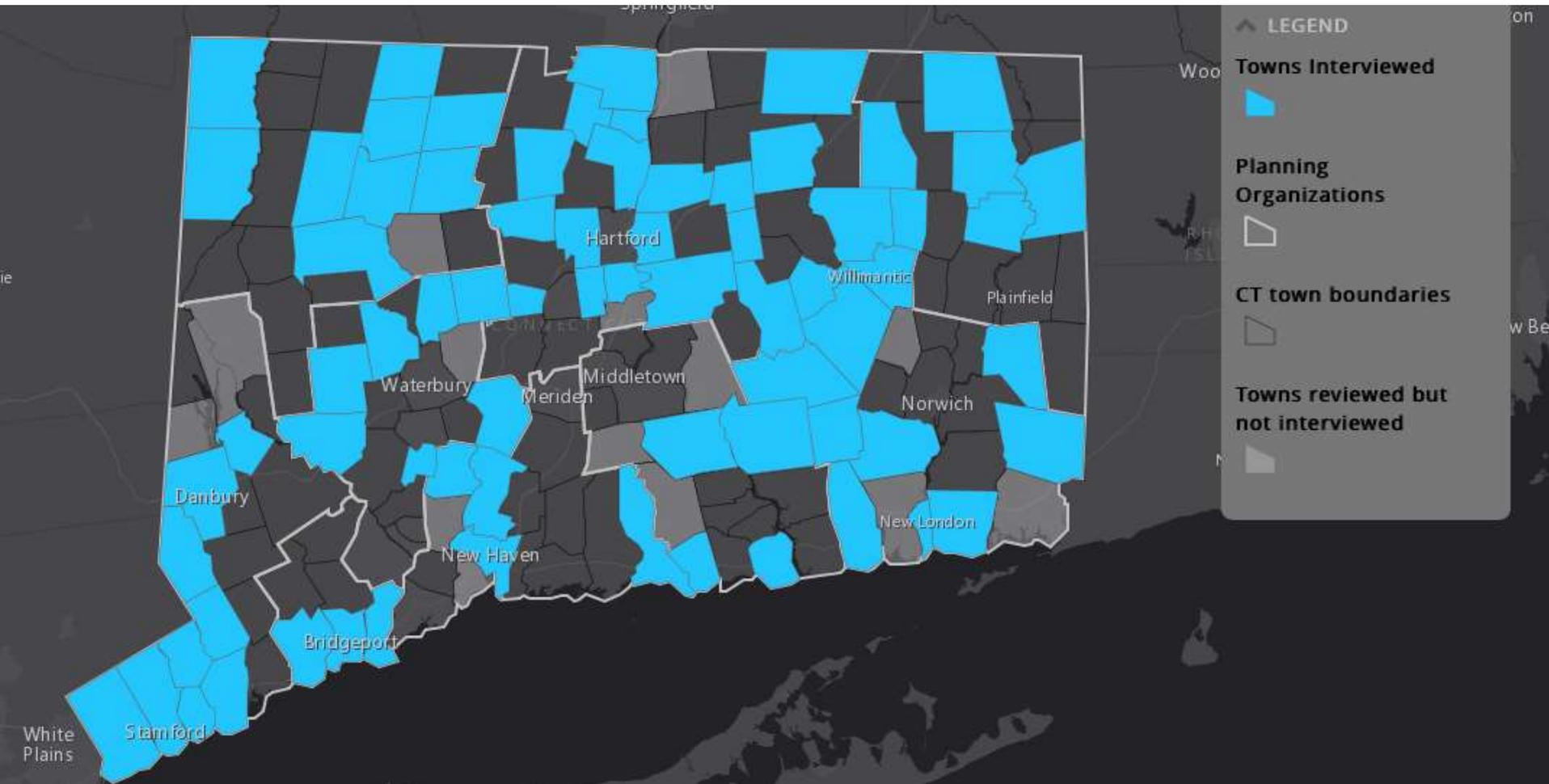
An aside about Terminology

LID vs green infrastructure



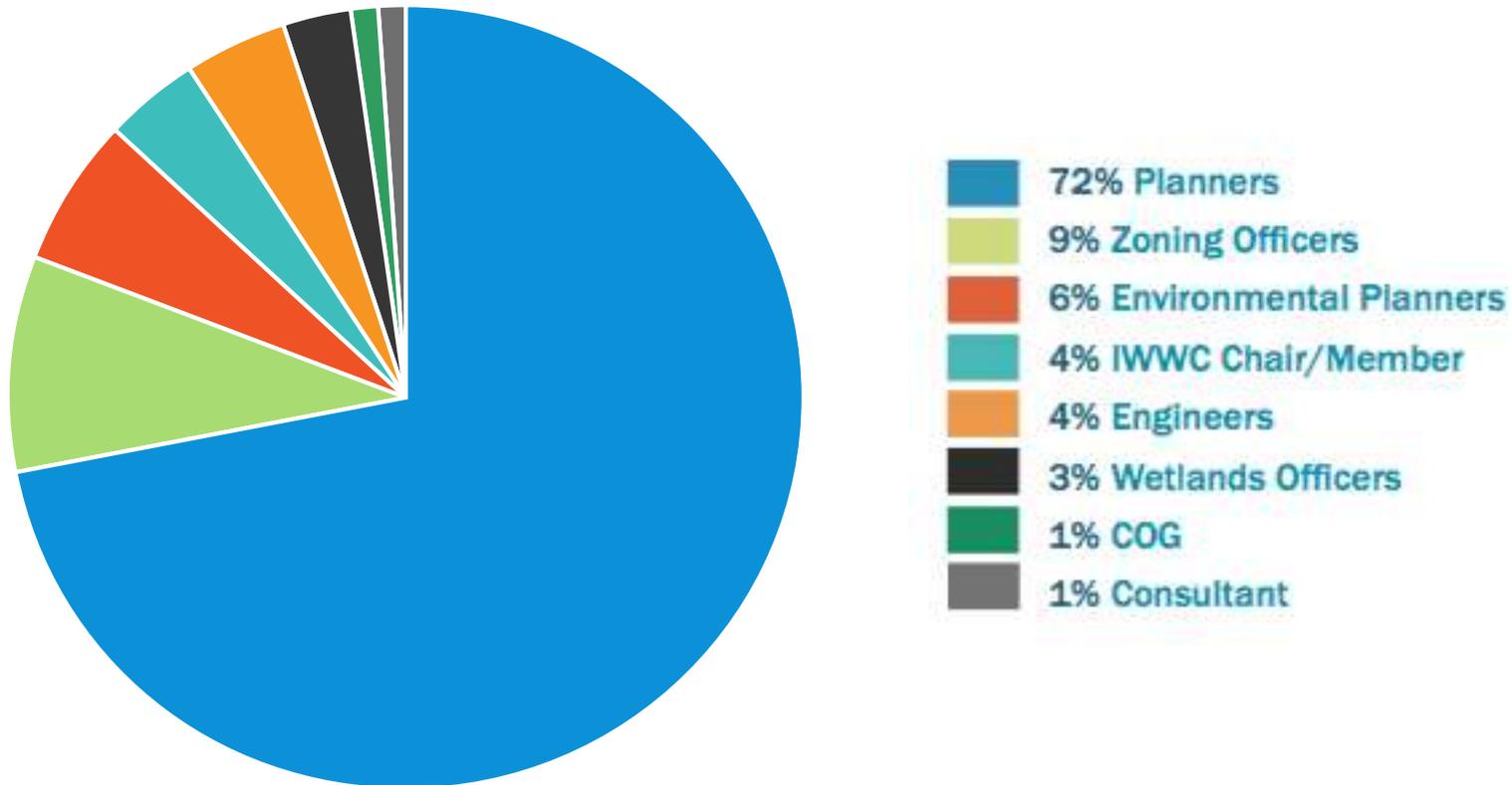
- Often used interchangeably
- Federal & state agencies using green infrastructure
- LID used at local level – so we used LID

Who'd we talk to?



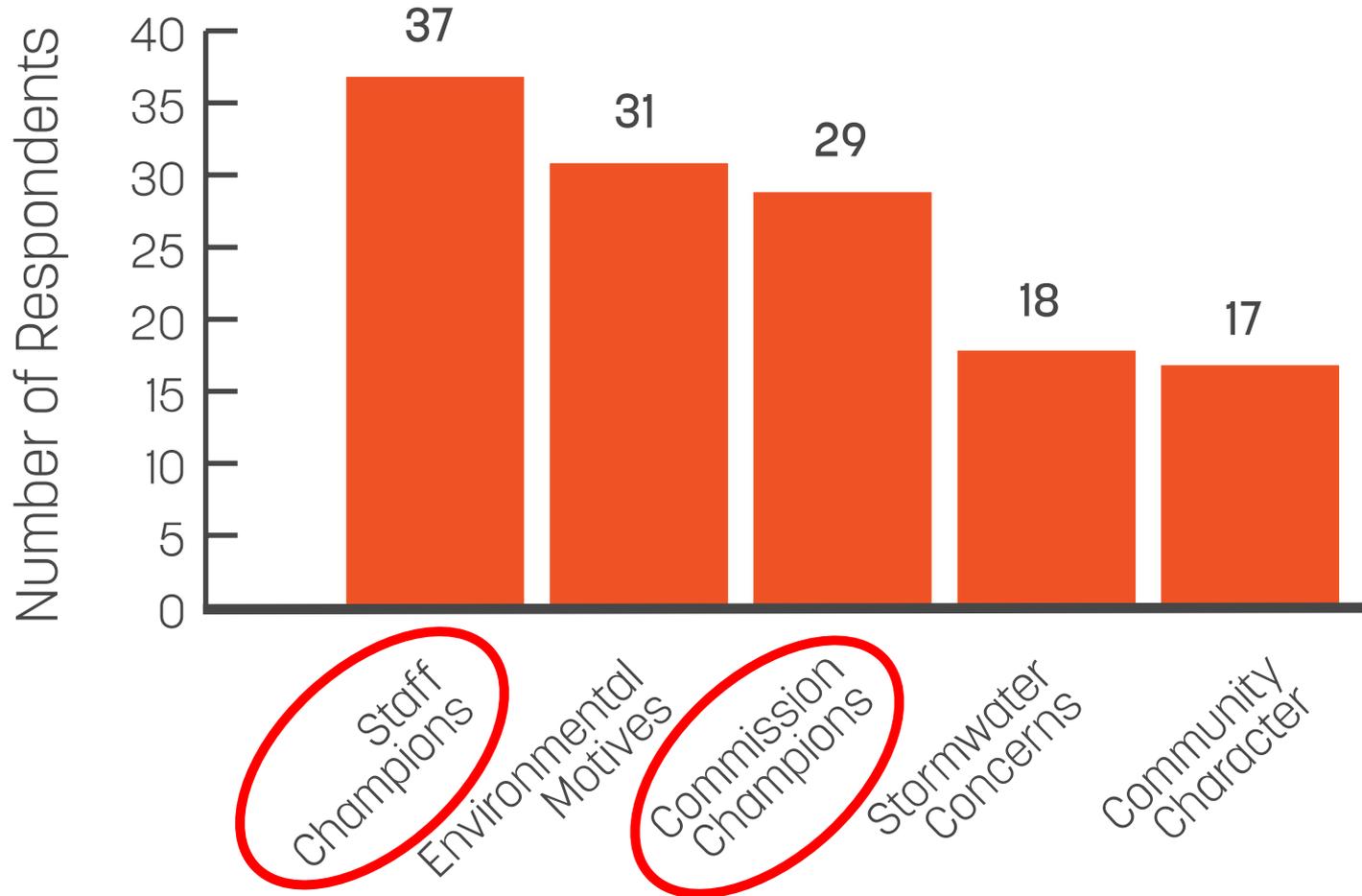
Interviewed 78 people in 74 of 85 towns reviewed

Who'd we talk to?

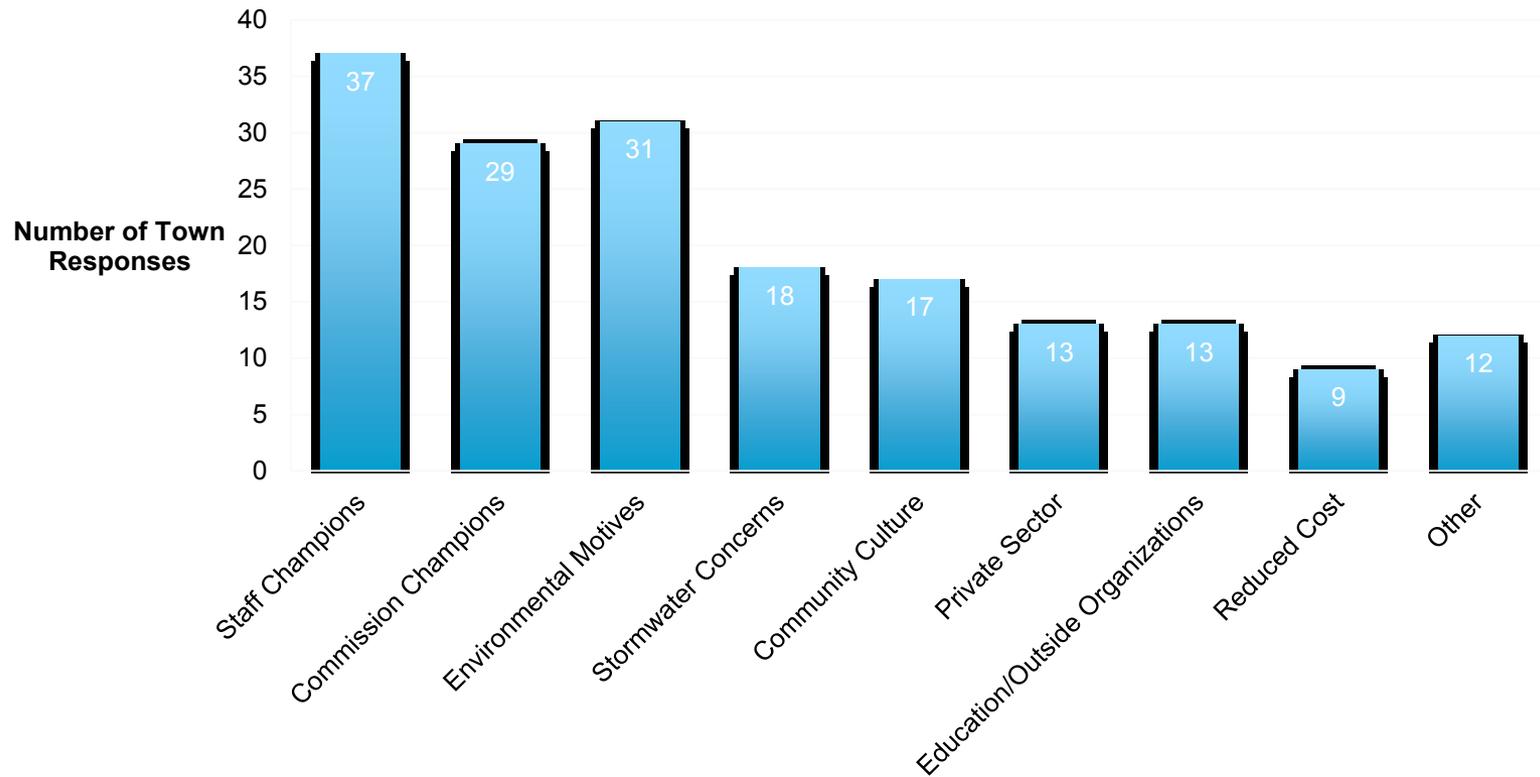


**78 interviews over
2 months**

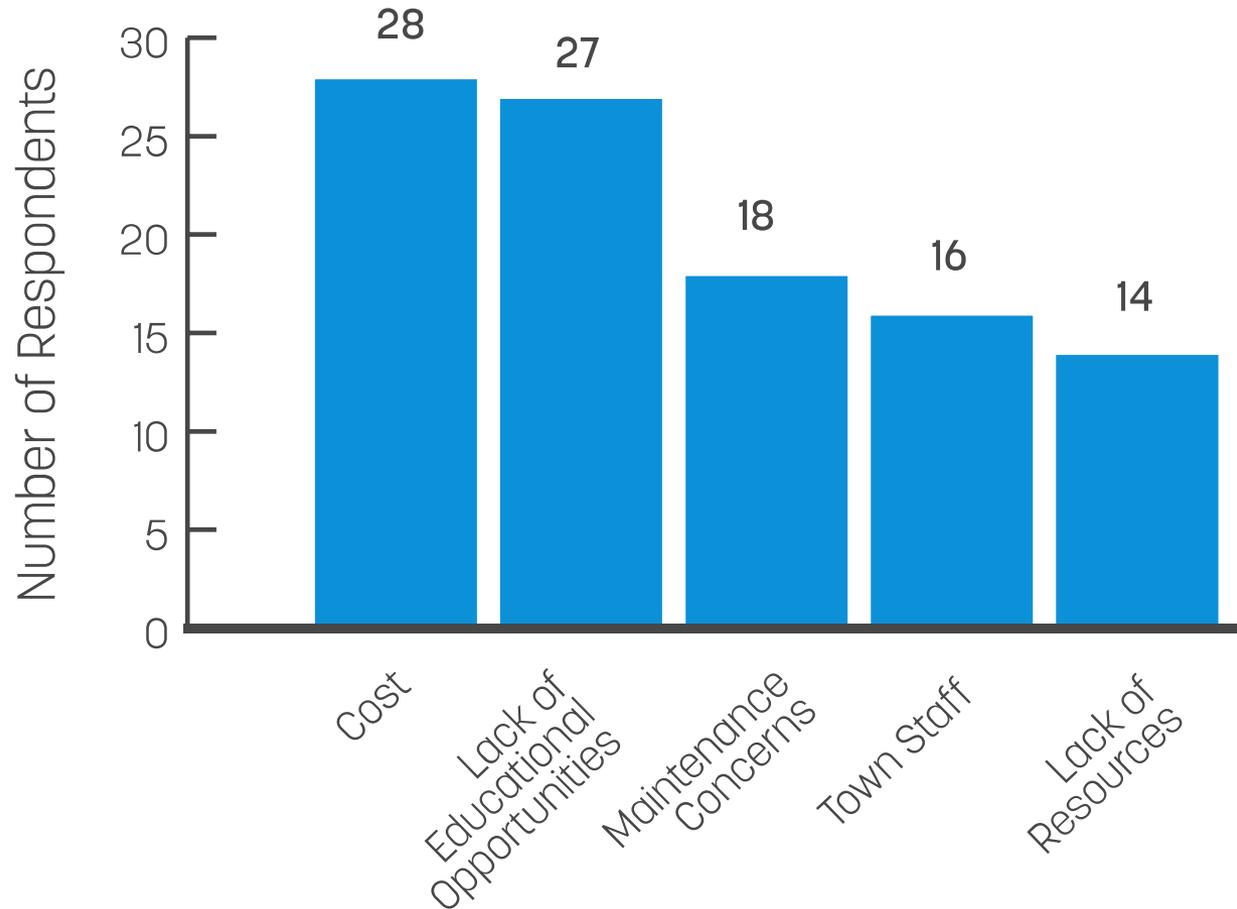
Top 5 LID Drivers



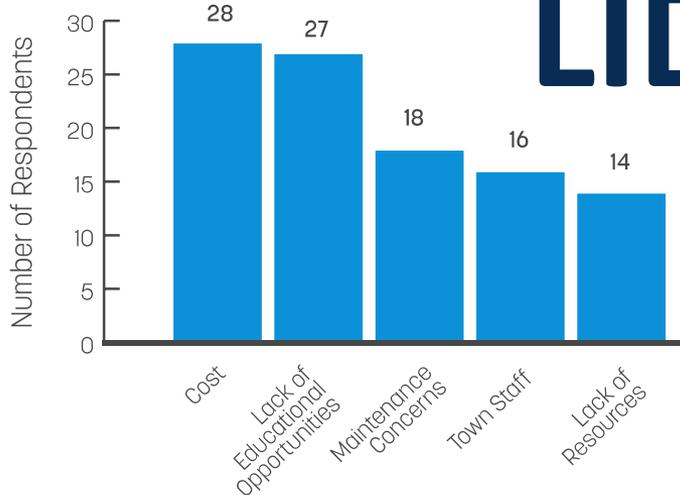
All LID Drivers



Top 5 LID Barriers



LID Barriers

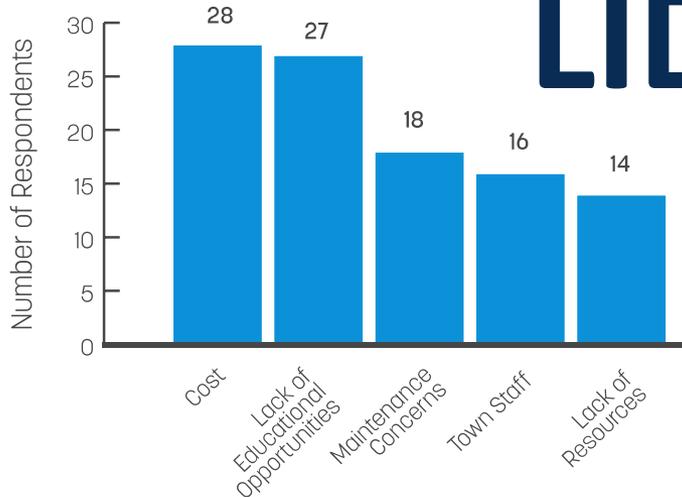


Cost: to developers/applicants, to town, to residents

Lack of ed: commissioners, community/homeowners, contractors, developers, nurseries, private engineers, town engineers, planners, staff

Maintenance: difficult to keep track of LID, maintenance concerns

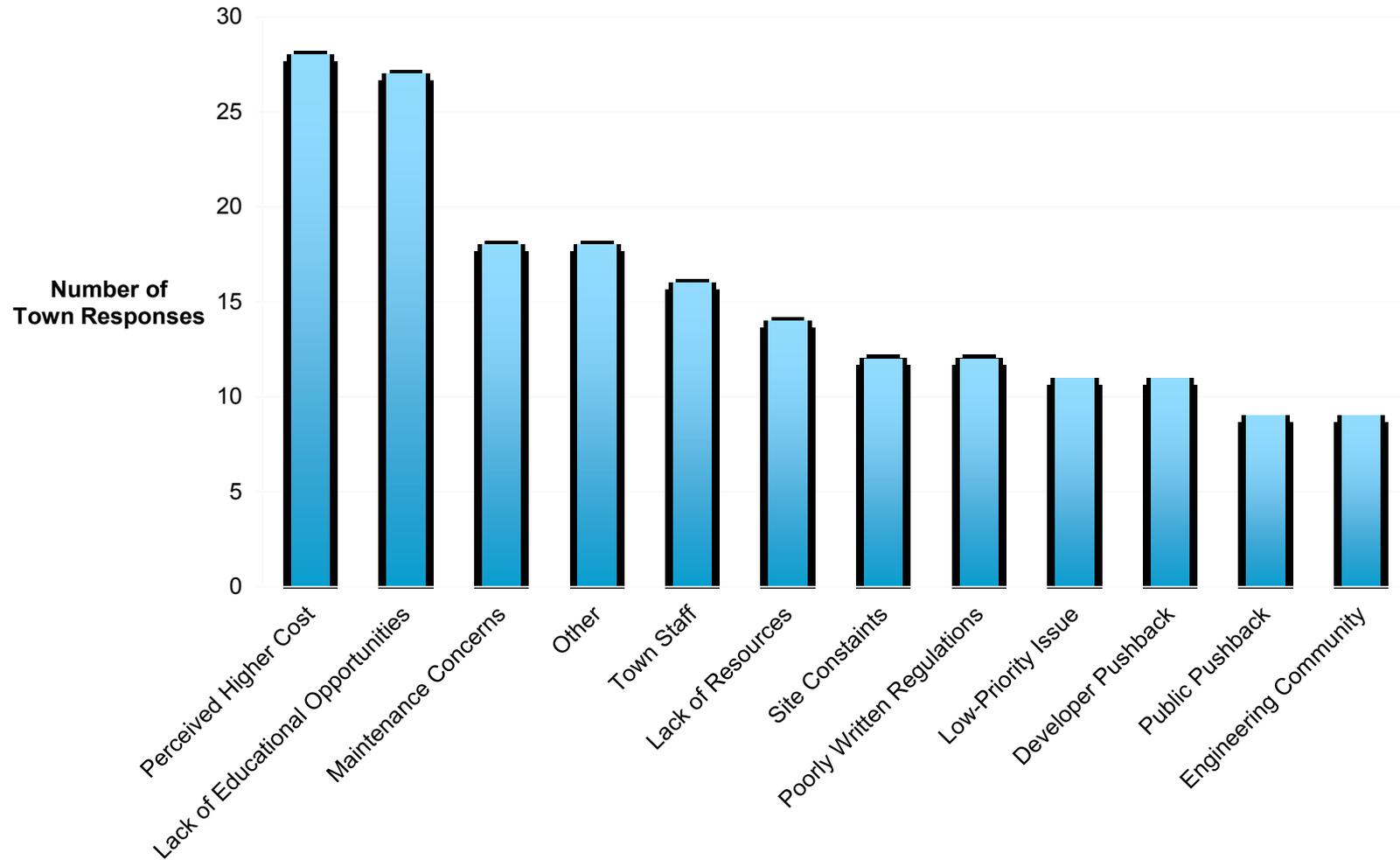
LID Barriers



Town staff: lack of coordination between planning and public works, planner, public safety (fire department, etc.), public works, town engineer

Lack of resources: lack of funding/resources, no in-house engineer, time constrains (Staff/Volunteers)

All LID Barriers



What it all means

- Education is still key – finding champions & removing obstacles
- Many barriers are an education issue
- Maintenance challenge – who is responsible?

State of LID StoryMap



<http://s.uconn.edu/stateoflid>

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From carrots to sticks

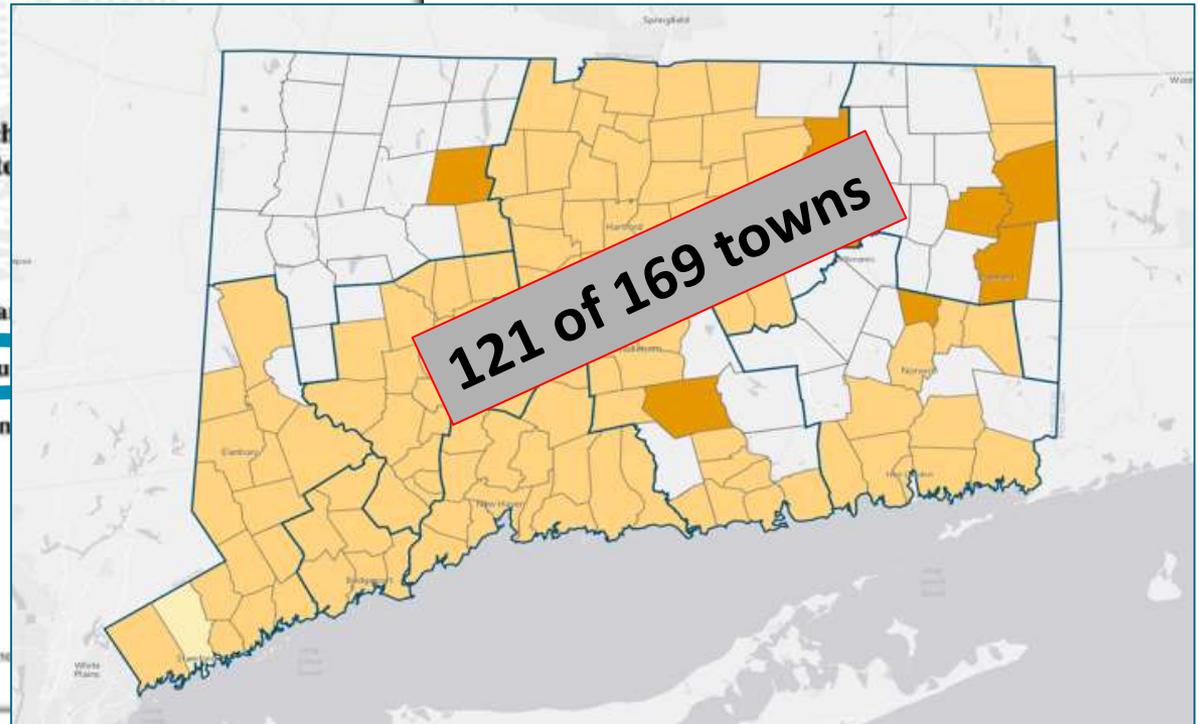


Connecticut Department of
Energy & Environmental Protection
Bureau of Materials Management & Compliance Assurance
Water Permitting & Enforcement Division

General Permit for the Discharge of
Pollutants from Small Municipal Separate
Sanitary Sewerage Systems

Issued: January 1, 2015
Effective: July 1, 2015
Expires: June 30, 2020

Bureau of Materials Management & Compliance Assurance
DEEP-WPED-GP-021 1 of 30



Removing LID barriers



Towns must:



“identify and, where appropriate, reduce or eliminate existing local regulatory barriers to implementing LID and runoff reduction practices”



LID - 1st option

Towns must require that:



“a developer or contractor seeking the permittee’s approval **shall consider the use of low impact development (“LID”)** and runoff reduction site planning and development practices **prior to** the consideration of **other practices”**

Retrofit Program



Towns must:

- reduce **directly connected impervious area (DCIA) by 2%** by 2022
- develop a plan for meeting 2% goal
- track reductions & additions
- 5 year look back to 2012





Retention Standard

On sites greater than 1/2 acre towns must require:

New development

- retain 1" on site

Redevelopment

- DCIA less than 40% - 1" on site
- DCIA greater than 40% - 1/2" on site

So . . .

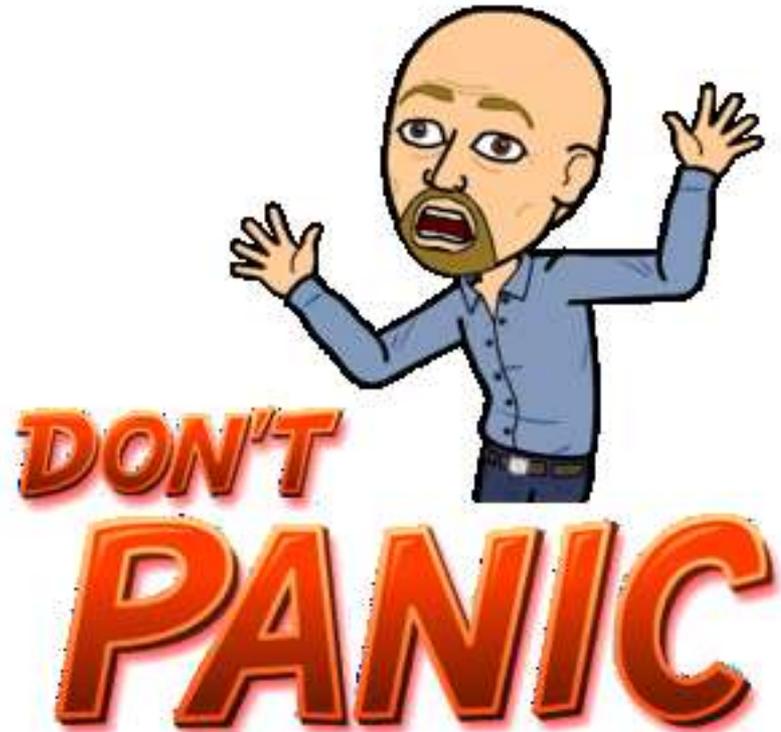


So . . .

wut



So . . .



NEMO MS4 Support



- circuit rider
- website
- workshops & webinars
- regulation/policy templates

UCONN CENTER FOR LAND USE EDUCATION AND RESEARCH & CT NEMO

Connecticut MS4 Guide

NEMO

Home Basics SWM Plan Implementation Tools About MS4 News FAQs NEMO CLEAR

MS4 Basics
About stormwater, the new MS4 permit, & deadlines

Stormwater Management Plan
Developing your stormwater management plan

Implementation
Implementing the 6 minimum control measures in your plan

News & Updates

What's the latest?

NEMO's MS4 Circuit Rider is Here!
Confused about the new MS4 permit? Wondering what DCMA is and how you calculate it? Filed someone ...
Jan 11, 2017 4:58 PM
wp.ms4.uconn.edu

Welcome to the CT MS4 Guide!
The NEMO program at UConn's Center for Land Use Education and Research (CLEAR) is pleased to brin...
Jan 9, 2017 9:32 PM
wp.ms4.uconn.edu

MS4 Map

Map of Connecticut showing MS4 watersheds.

http://s.uconn.edu/stateoflid

The screenshot shows a web browser displaying the 'The State of Low Impact Development in Connecticut' application. The browser address bar shows the URL: uconnclear.maps.arcgis.com/apps/MapJournal/index.html?appid=47a784117e33490683354e19f63337ca. The application title is 'The State of Low Impact Development in Connecticut' and it features the CLEAR logo. A green notification box states 'No issues detected'. The sidebar contains the following text:

encourage infiltration or stormwater runoff.
21 out of 85 towns.

3. Road Drainage: Where density, topography, soil and slopes permit, vegetated swales should be used in the street right-of-way to convey and treat stormwater runoff, replacing curb and gutter drainage systems.
34 out of 85 towns.

4: Parking Sizing: Required parking ratios governing a particular land use or activity should be enforced as both a maximum and a minimum in order to curb excess parking construction. Further, reduce the overall imperviousness associated with parking lots by minimizing stall dimensions and incorporating efficient parking lanes.
44 out of 85 towns.

5: Parking Runoff: Wherever possible, provide stormwater treatment for parking lot runoff using bioretention areas, filter strips and/or other practices that can be integrated into required landscaping areas and traffic islands.
41 out of 85 towns.

Lot Development

Click on the category title below to see a map of towns that have implemented that policy. Over on the map - click on a colored tower to find a citation and link to that policy. Click on the link to the appropriate documents in the box. *Note: Towns that were reviewed but do not include the policy are light gray.*

6. Conservation/Open Space Subdivision: Encourage development designs that minimize total impervious area, reduce total construction costs, conserve natural areas, and provide community recreational space and promote watershed protection.

The main map area shows a map of Connecticut with various towns highlighted in blue. A pop-up window is open over the Haddam town area, displaying the following text:

Haddam

Haddam's plans/reg's mention infiltrating parking lot runoff in zoning section 21.6, 21.8, 21.9. Click on the document link(s) below and search for the indicated section(s).

Note: All other links will return you to the main page. Do not click them.

- [POCD](#)
- [Zoning](#)

The map also includes a 'BACK' button, a legend, and a scale bar. The bottom right corner of the map area features the text 'Powered by esri' and 'Link | Home | Contact | About | Privacy | Terms of Use'.

http://lidmap.uconn.edu

Low Impact Development Atlas About Add Contact Nat'l Map

Search [x]

Filter Projects

- All Projects 155
- Swale/Bioswale 19
- Bioretention/Rain Garden 86
- Cistern/Rain Barrel 5
- Stormwater Wetlands 3
- Green Roof 19
- Permeable Pavement 48
- Water Conservation 2
- Green Streets 0
- Other 7
- Multiple Practices 17

State: CONNECTICUT

Town: All

Land Use Type: All Types

Currently Showing (155 Projects)

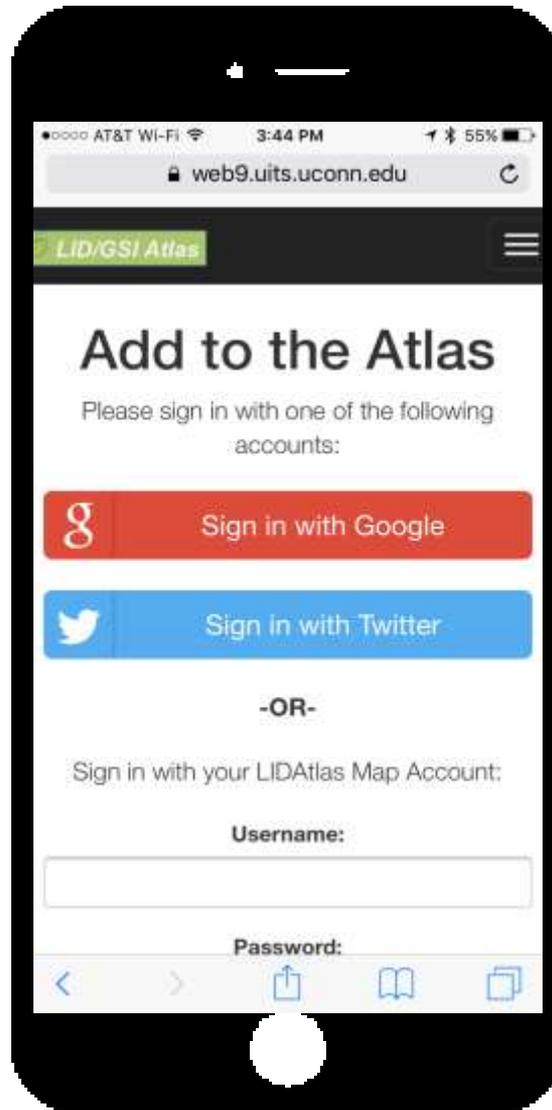
- Adenas Walk**
Glastonbury, CT
- Air National Guard pervious concrete**
Orange, CT
- Alumni Park**
East Hartford, CT
- Amistad High School Tree Surrounds**
New Haven, CT
- Ashford Elementary School Rain Garde**
Ashford, CT
- Augustus Storrs Hall**
Storrs, CT
- Beardley Zoo rain garden**
Bridgeport, CT
- Beardley Zoo Bioretention Garden**
North Bridgeport, CT
- Bioretention at Aquaculture School**
Bridgeport, CT

Map Satellite

Map data ©2017 Google Terms of Use Report a map error

This Web application is an educational initiative of the **National NEMO Network** and its partners. ©2008

http://lidmap.uconn.edu



Thanks

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<http://clear.uconn.edu>

