



## Opportunities to Benefit Multiple Stakeholder Groups Using LID Practices

Image courtesy of City of Fort Collins

Adams County Planning Partners Conference  
December 2, 2016



# Presenters



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# Presentation Overview

- Low Impact Development (LID) Overview
- LID Principles
- LID Benefits
- Case Studies
- An Agency Perspective
- Discussion



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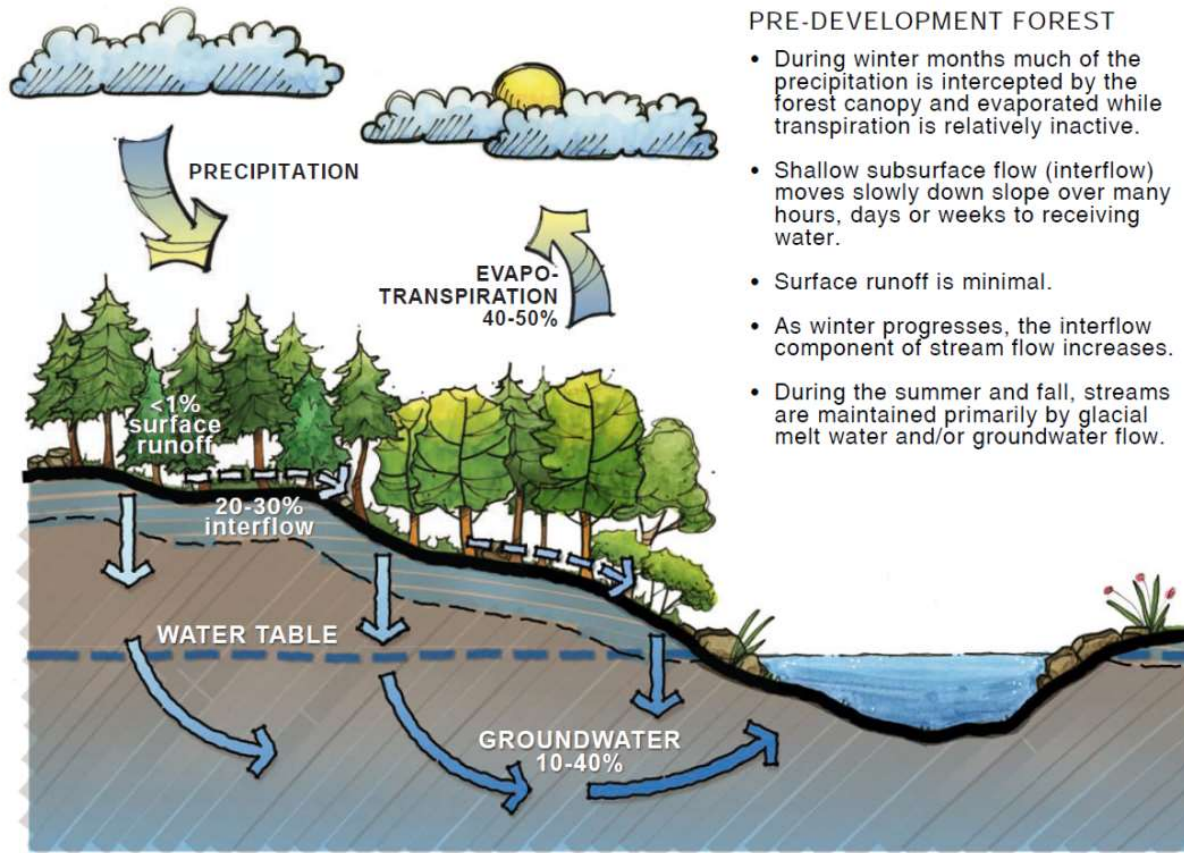
# Low Impact Development (LID) Overview

- Purpose: Utilize the natural relationships of water, soil, and vegetation to reduce the impacts of development on watershed resources. Commonly used for stormwater management.



# LID Overview

- Pre-Development Hydrology (a.k.a. the Water Cycle)



## PRE-DEVELOPMENT FOREST

- During winter months much of the precipitation is intercepted by the forest canopy and evaporated while transpiration is relatively inactive.
- Shallow subsurface flow (interflow) moves slowly down slope over many hours, days or weeks to receiving water.
- Surface runoff is minimal.
- As winter progresses, the interflow component of stream flow increases.
- During the summer and fall, streams are maintained primarily by glacial melt water and/or groundwater flow.

Image courtesy of LID Technical Guidance Manual for Puget Sound

# LID Overview

- Post-Development Hydrology (a.k.a. the Water Cycle)

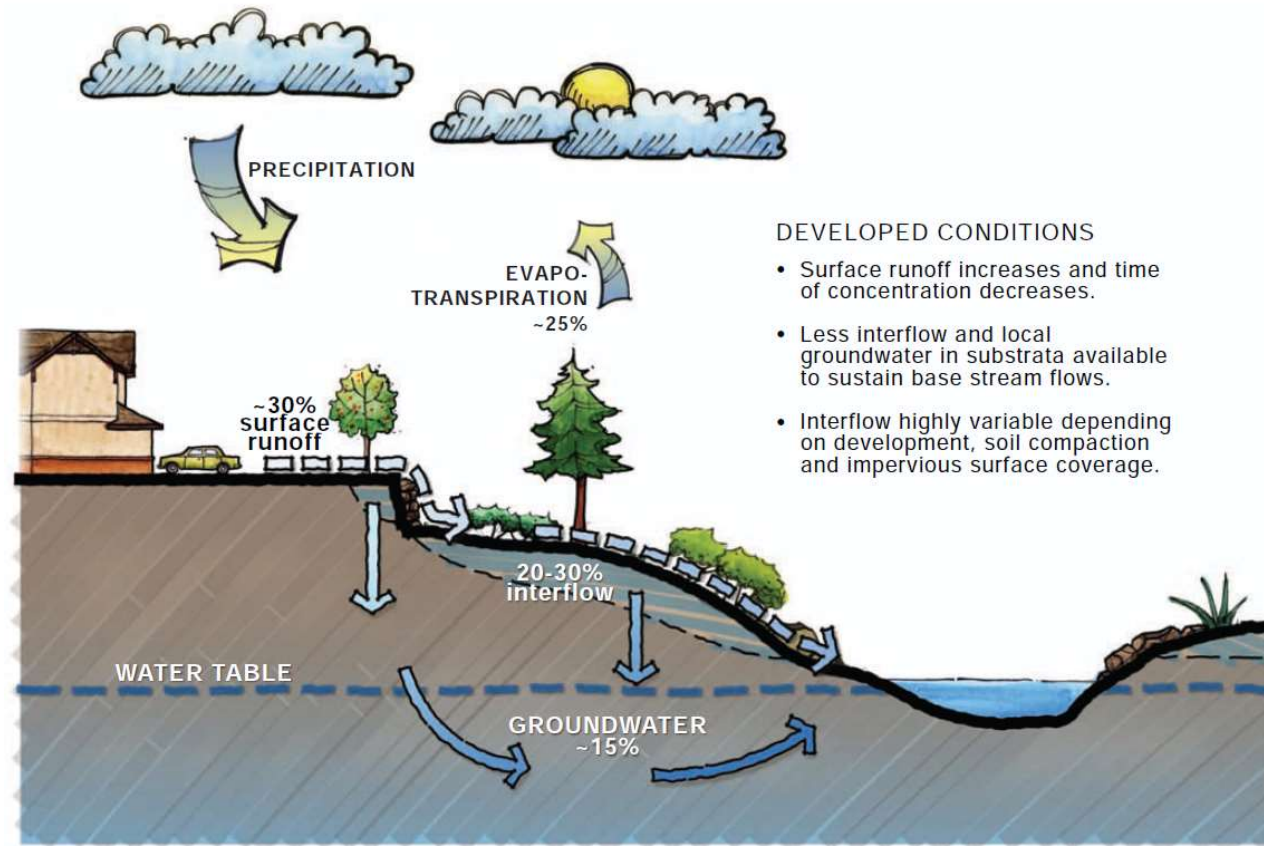


Image courtesy of LID Technical Guidance Manual for Puget Sound

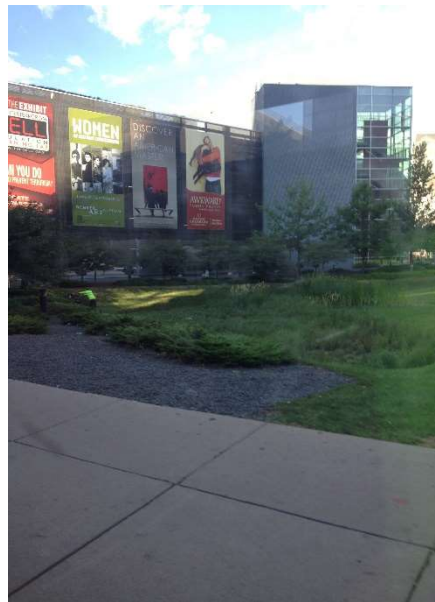
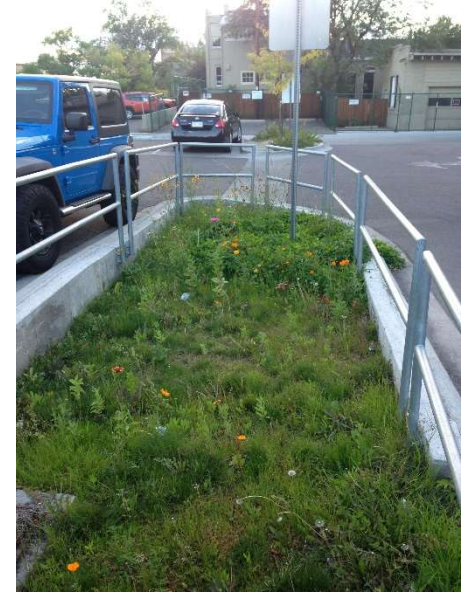
# LID by Another Name

- Green Stormwater Infrastructure (GSI or GI)
- On-site Stormwater Management
- Environmental Site Design (ESD)
- Natural Drainage Systems (NDS)
- LID Best Management Practices (BMPs)



# LID Practices

- Rain Garden
- Bioretention Cells and Planters
- Bioswale
- Stormwater Wetlands
- Infiltration Trench
- Drywell
- Permeable Pavements
- Vegetated Filter Strip
- Tree Box Filters
- ....





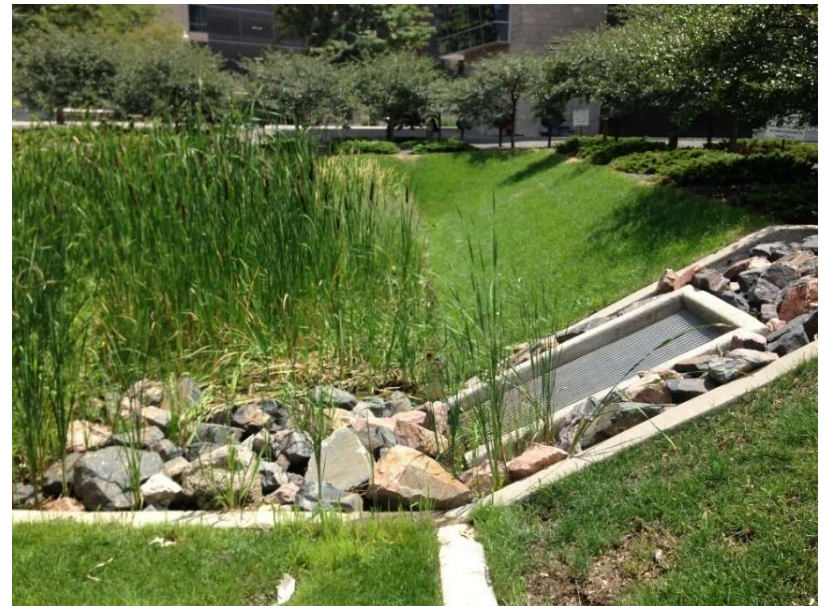
# LID Principles

- Conserve Resources
- Minimize Impact
- Optimize Water Infiltration
- Create Areas for Local Storage and Treatment
- Build Capacity for Maintenance



# LID Benefits

- Improve Water and Air Quality
- Reduce Floods
- More resilient Cities and Infrastructure
- Reduce Municipal Investment in Infrastructure
- Recharge Groundwater
- Lower Construction Costs
- Increase Property Values
- Preserve Natural Spaces with Aesthetic Value
- Increase Habitat and Biodiversity
- Mitigate Climate Change
- Lower Urban Temperatures
- Reduced Energy Consumption
- Lower Irrigation Demands



# LID Practitioners



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# Case Study: Barton CSO, King County WA

## Stakeholders:

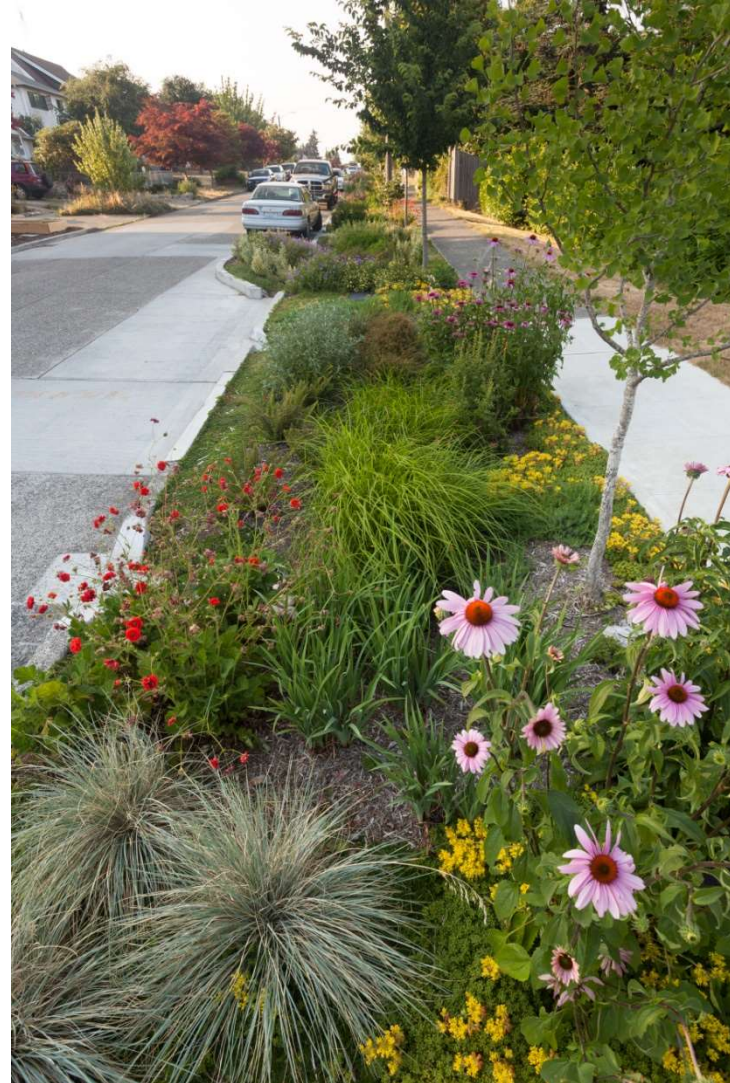
- County Wastewater Treatment Division
- City Transportation and Public Utilities
- Neighborhood Representatives

## Core Benefits:

- **Lower Cost Option**
- Eliminated Need for Land Acquisition
- Combined Sewer Overflow Reduction
- Shared Maintenance Responsibility



# Before & After



# Case Study: Georgetown Raingardens, Seattle WA

## Stakeholders:

- **Street Use**
- Stormwater Utility
- Community Volunteers
- Non-Profit Organizations

## Core Benefits:

- **Community Identity**
- Cleaner Water
- More Diverse and Interesting Streetscape
- Reduce Localized Flooding





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# Case Study: Winslow Way Reconstruction, Bainbridge Island, WA

## Stakeholders:

- City Transportation and Utilities
- Business District
- Bike / Ped Non-profits

## Core Benefits:

- **Large Trees**
- Human Scale Stormwater Management
- Catalytic Investment
- Festival Street







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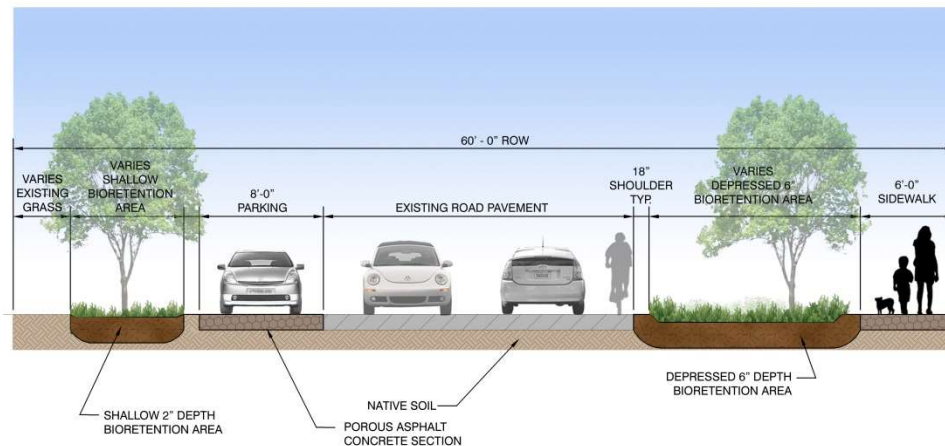
# Case Study: Green Streets, Shoreline WA

## Stakeholders:

- **State Grant**
- City Transportation
- City Stormwater Utility
- Community Members

## Core Benefits:

- **Traffic Calming**
- Reduce Localized Flooding
- Lower Cost





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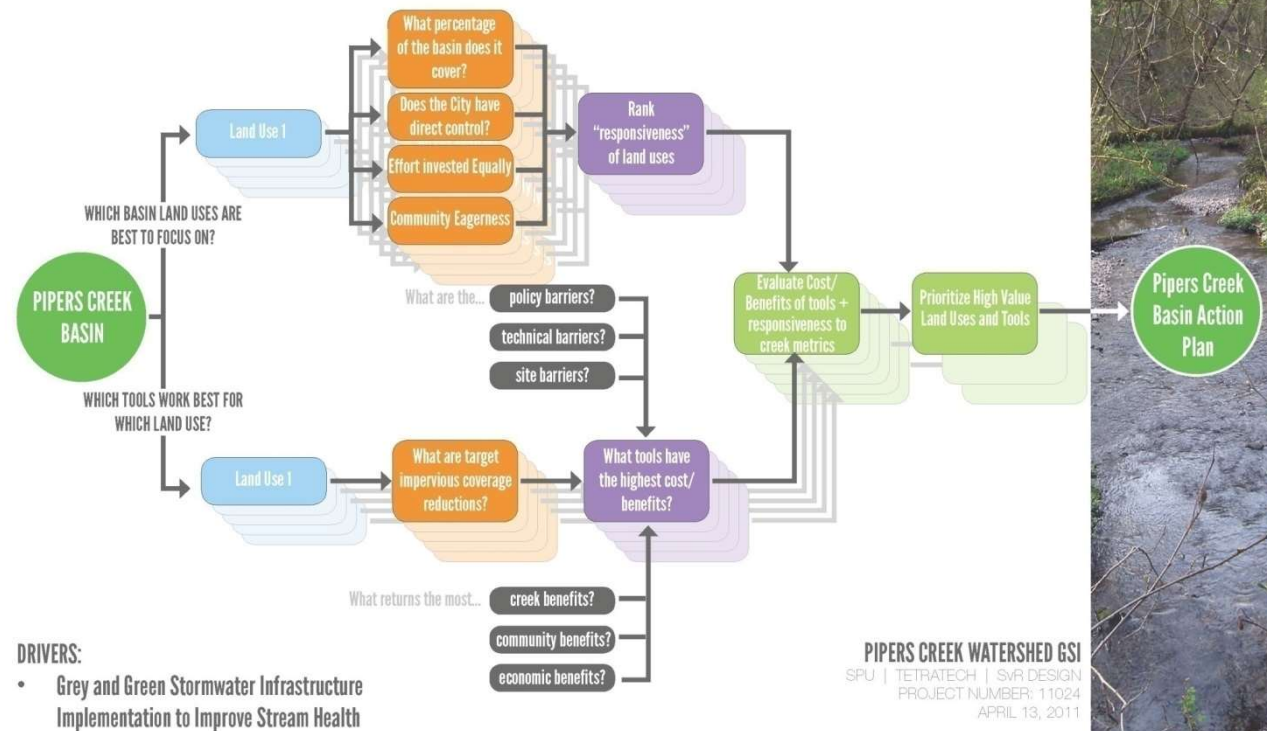
# Case Study: Piper's Creek Restoration, Seattle WA

## Stakeholders:

- **Environmental Non-Profits**
- City Stormwater Utility
- City Creek Restoration

## Core Benefits:

- **Restore In-stream Flows**
- Cool Stormwater Runoff
- Reduce Localized Flooding
- Reduce Erosion



# Case Study: Thornton Creek Water Quality Channel, Seattle WA

## Stakeholders:

- **Developers**
- City Stormwater Utility
- Creek Stewardship Partners
- Educational Institutions

## Core Benefits:

- **Iconic Neighborhood Amenity**
- Filter Creek Runoff
- Habitat Creation
- Development Catalyst





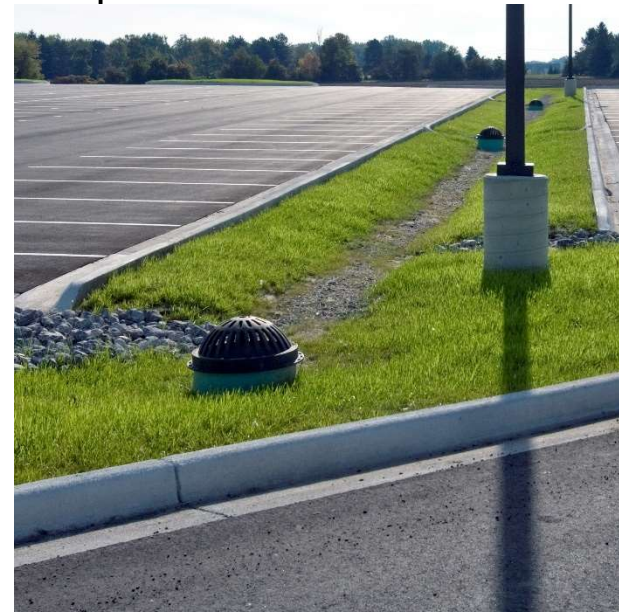
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# Case Study: Delta College South Campus Improvements

## Stakeholders:

- **FEMA**, Floodplain Management
- University Leadership
- Students and Faculty
- Bay County Drain Commission





## Core Benefits:

- Porous Asphalt Soaks up Rainwater
- Enhanced Habitat Provided by Drainage Channel
- Preserved Vegetation
- Parking Lot Cooling Effects



# Case Study: 21<sup>st</sup> Street, Paso Robles CA

## Stakeholders:

- **State Regional Water Board**
- City Stormwater, Sewer and Transportation
- Neighborhood Groups

## Core Benefits:

- **Reduce and Convey Floodwaters**
- Iconic Neighborhood Amenity
- Complete Street for Bike and Ped



Before



After



At Pine St



At Riverside Avenue

# Case Study: Mitchell Block, Fort Collins, CO

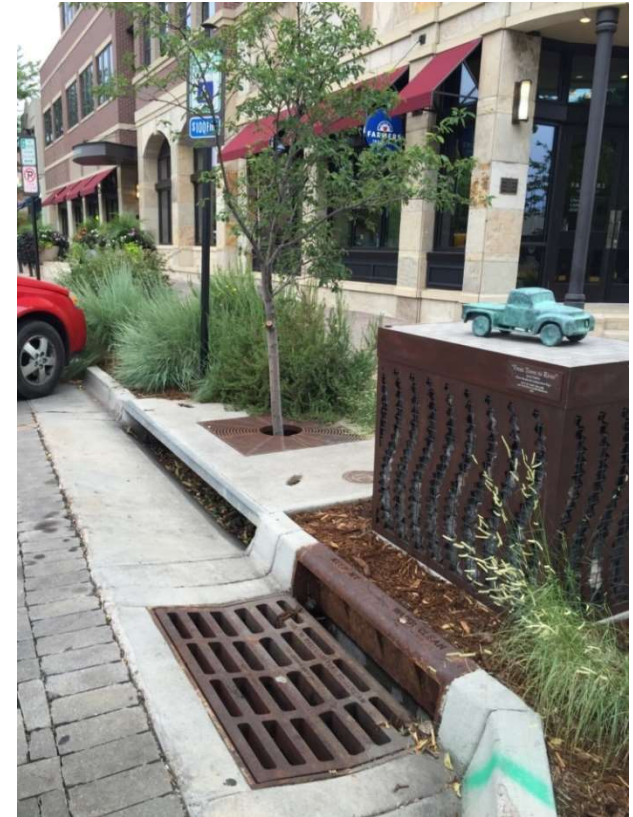


## Stakeholders:

- City Transportation
- City Stormwater Utility
- Business Community

## Core Benefits:

- **Education**
- Reduced runoff volume
- Cleaner Stormwater
- Monitoring
- Match Neighborhood Character



# Case Study: Permeable Alleys, Longmont CO

## Stakeholders:

- City Engineering
- Downtown Development Agency

## Core Benefits:

- Recaptured Under-utilized Space
- City Saves on Stormwater Infrastructure
- Catalytic Investment
- Enjoyable Pedestrian Connections





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# Case Study: LID Pilot, Westminster CO

## Stakeholders:

- **Private Property Owner**
- City Building Code Compliance
- City Stormwater Code Compliance

## Core Benefits:

- **Work Around Challenging Site Constraints**
- Maintain Infiltration Capacity
- Partnership Opportunity
- Catalytic Location

Before



After



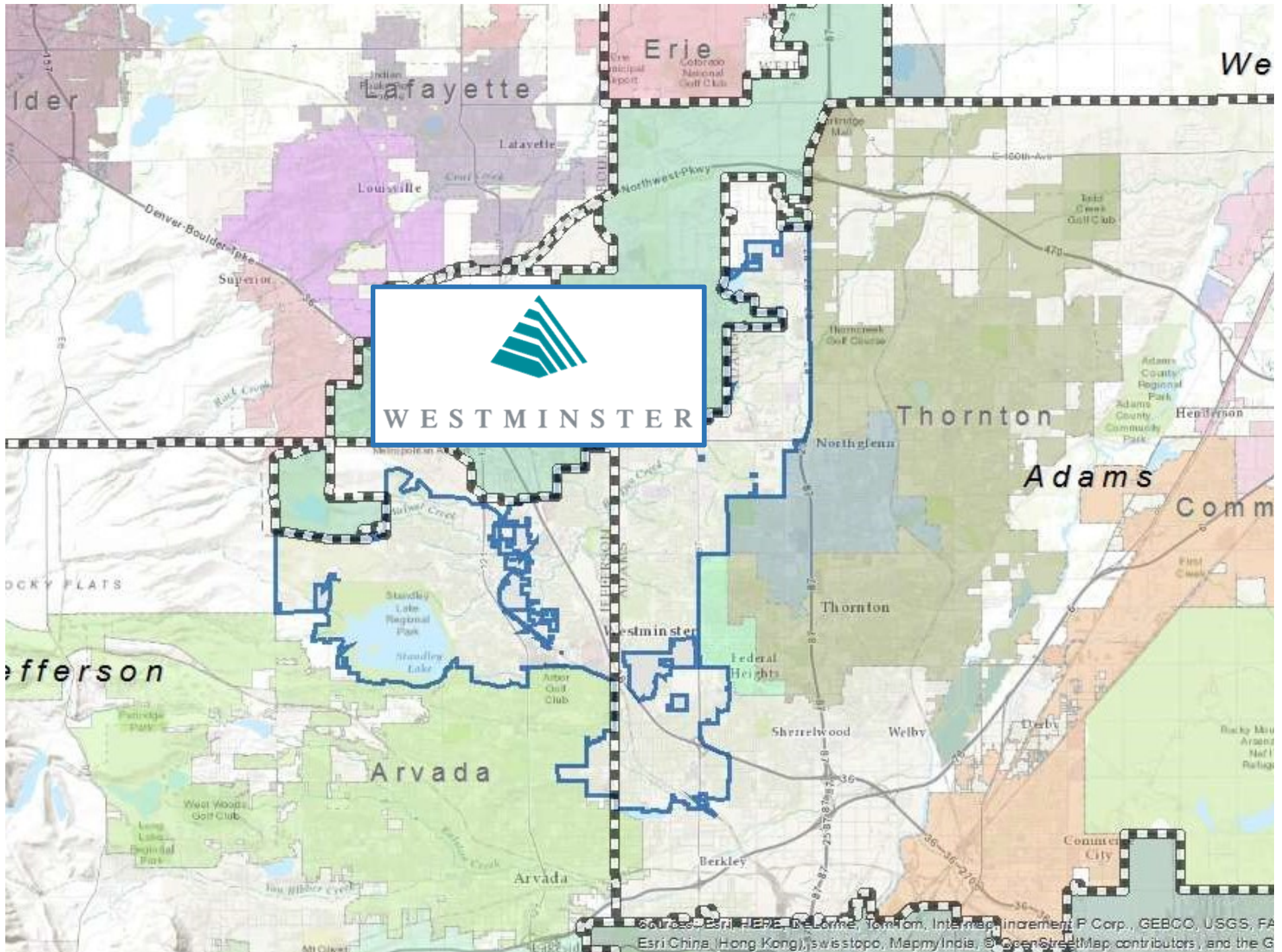
# An Agency Perspective



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Why is it beneficial for us to encourage LID?





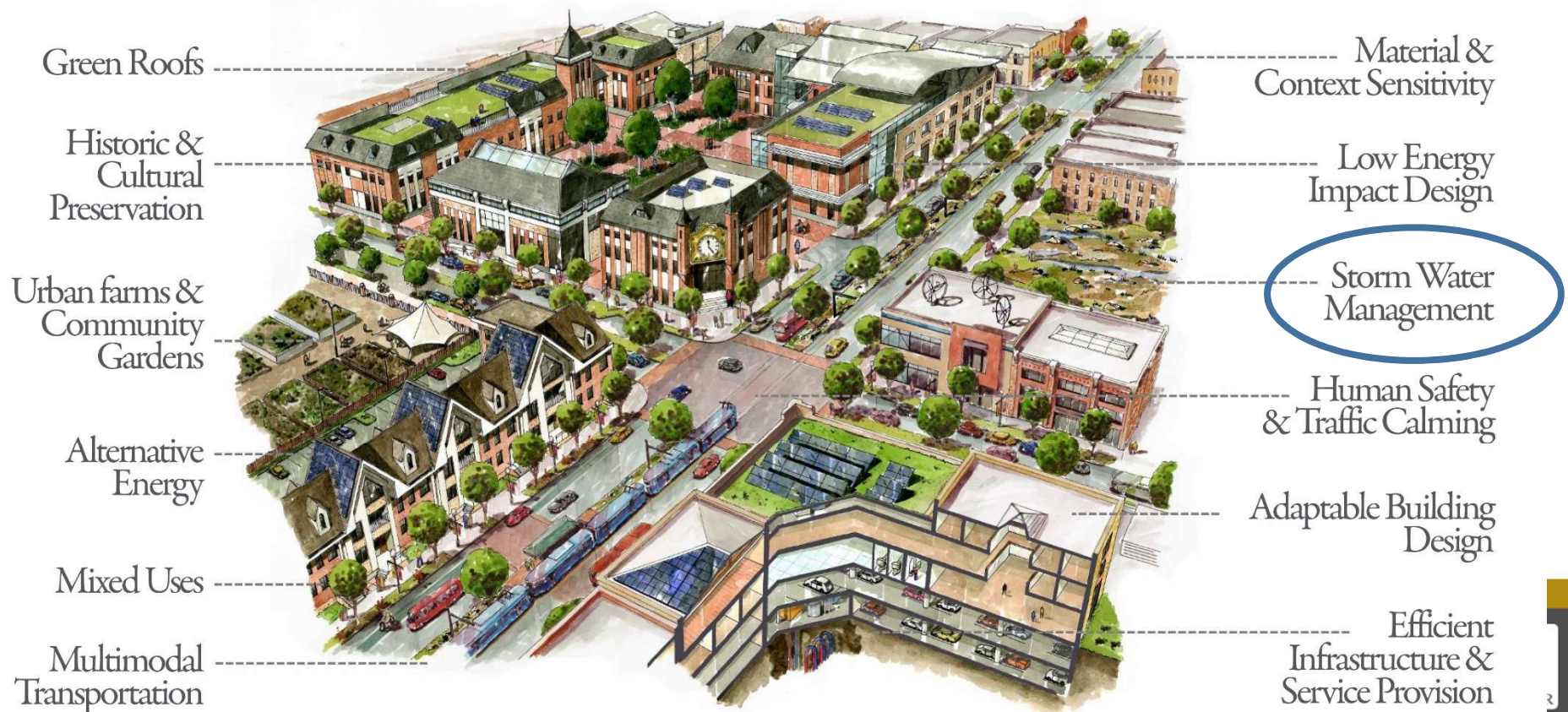
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“...one of the most sustainable cities in America”

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## Best Practices in Sustainable Urban Design



# Inspired by local success stories...

- Urban Drainage and Flood Control District
- City of Fort Collins
- Auraria Campus, Denver





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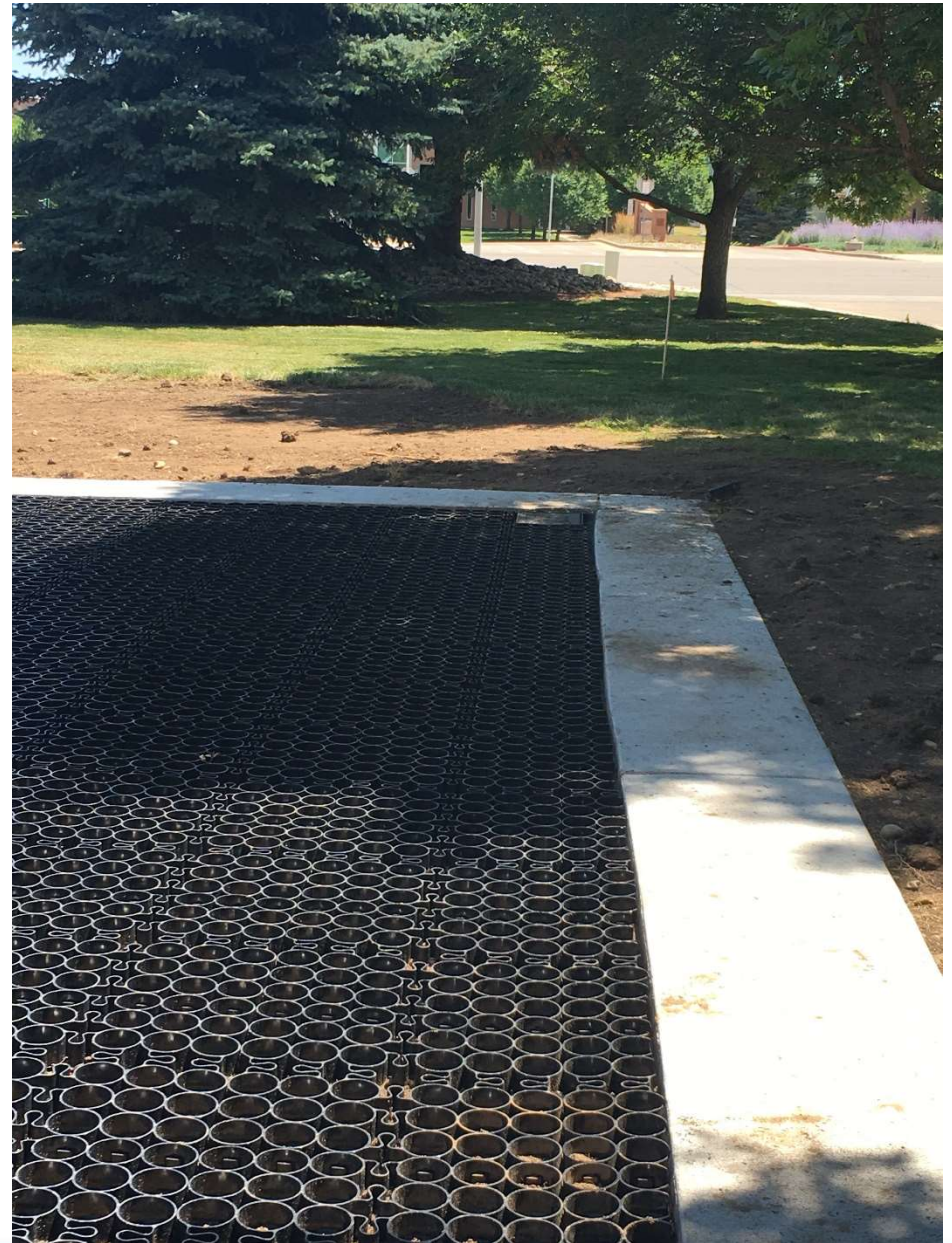
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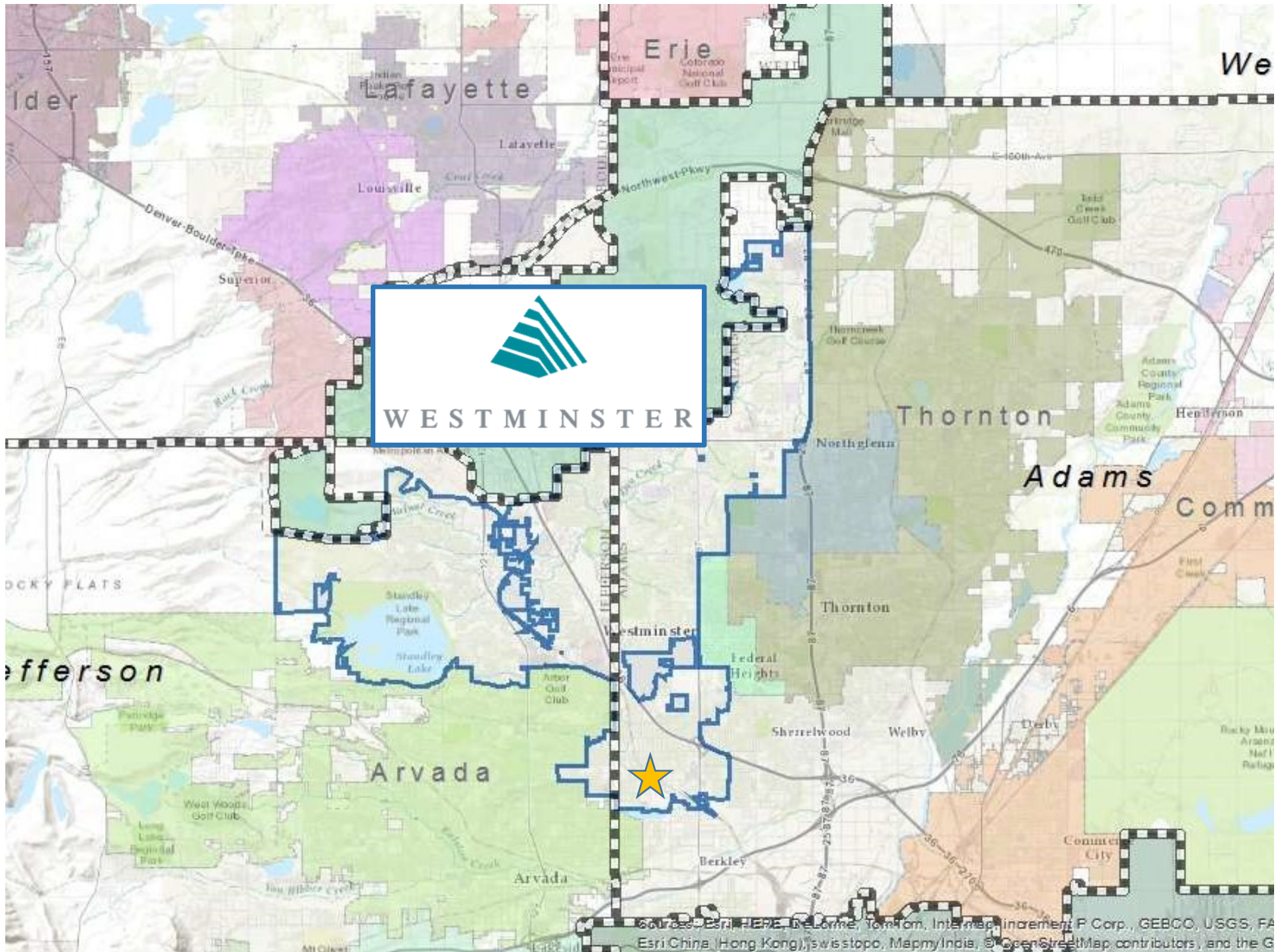
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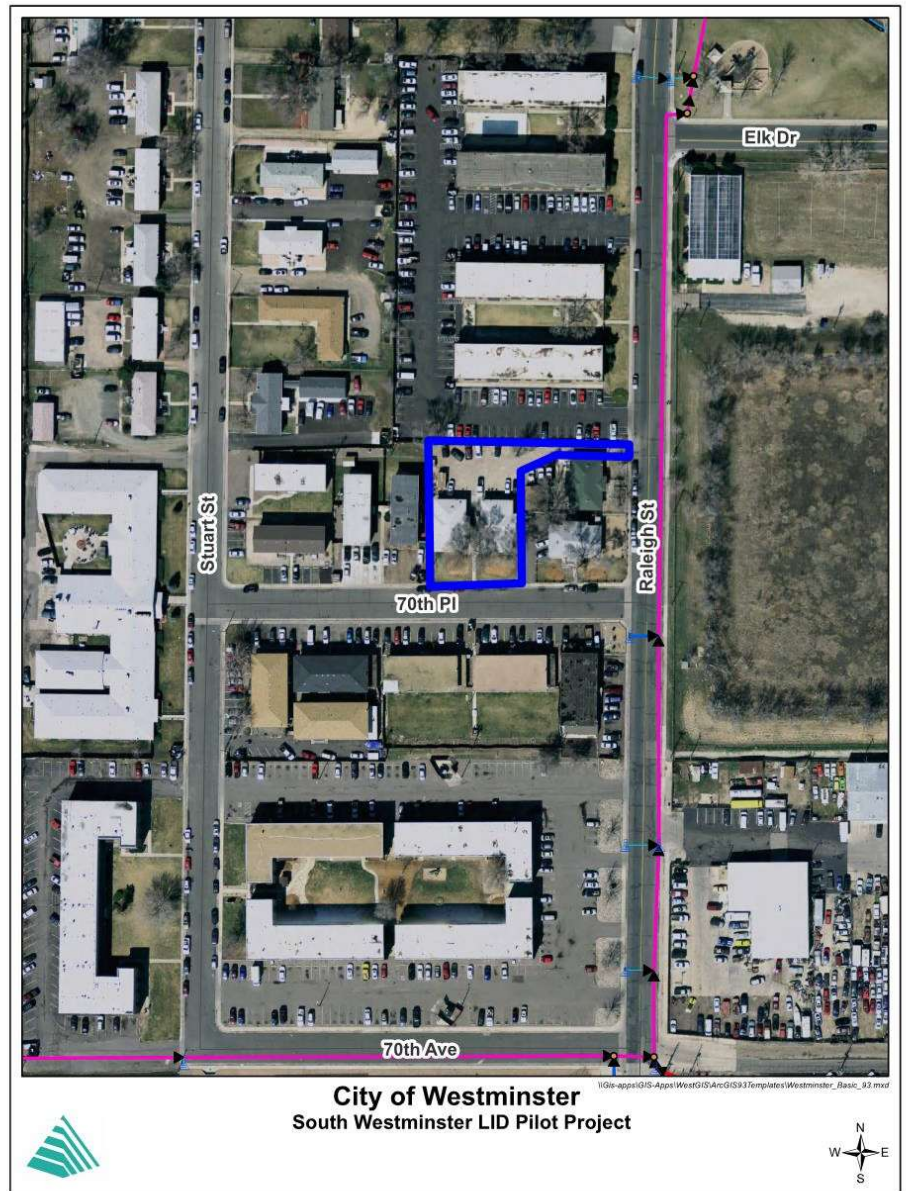
# Westminster is building an LID pilot project

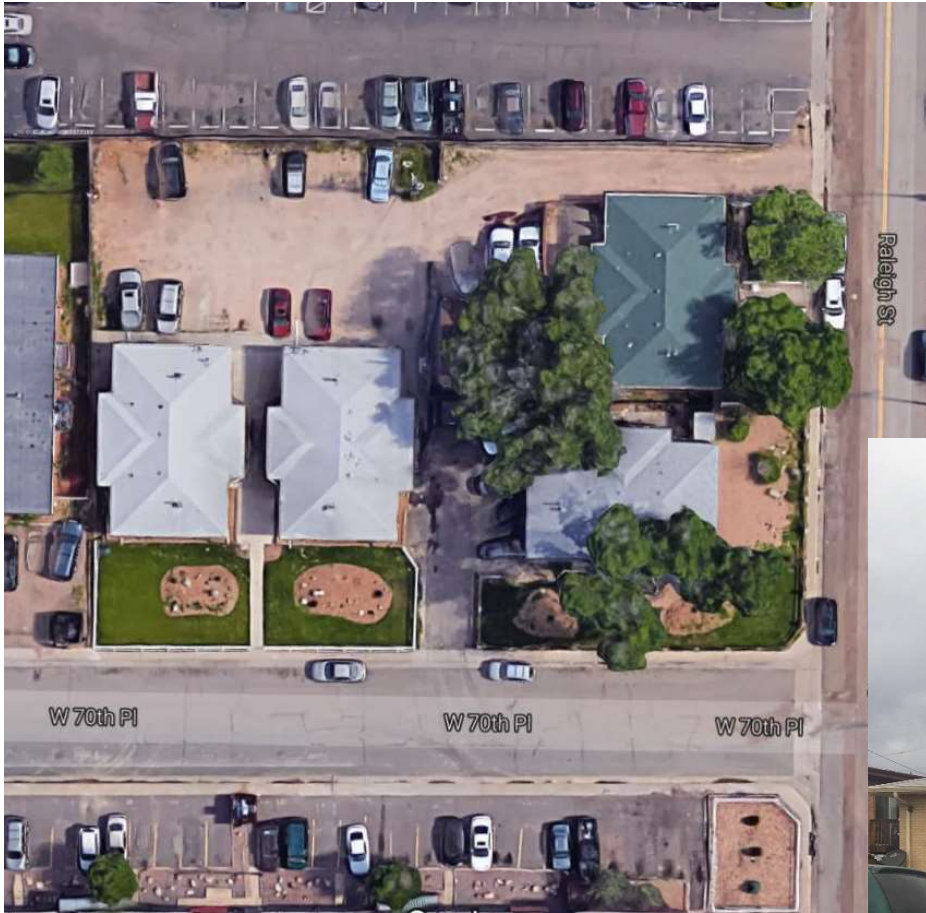
## Problems:

- Rental housing code violation
- Poor drainage after rain and snow
- “Traditional solution” – cost vs benefit

## Goals:

- Code compliance
- Environmental water quality improvement
- Realistic cost estimates for site
- Demonstrate feasibility (or not) of LID to solve a common infill/redevelopment problem





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# An Agency Perspective



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## NEXT STEPS

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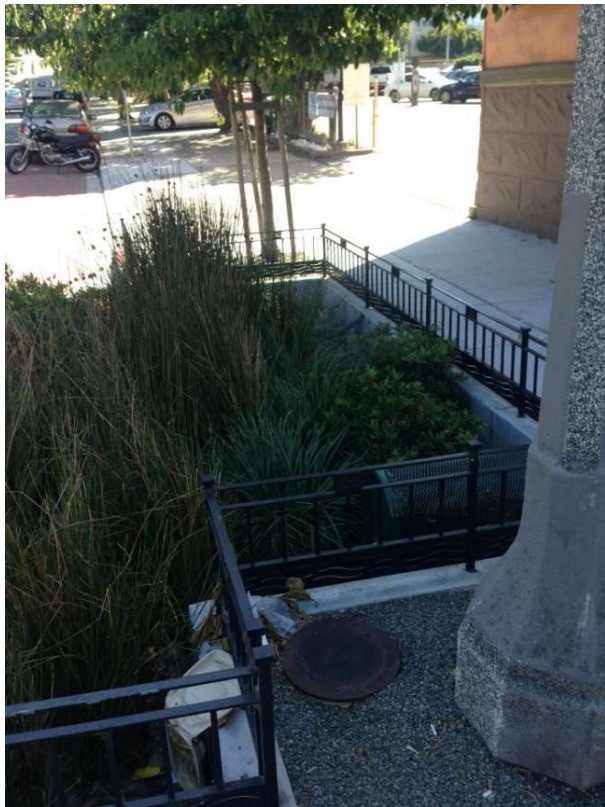
# Breakout Discussion Questions

1. If your Agency has a program (or is thinking of starting a program) to actively promote LID, what are the benefits you hope to achieve?
2. What are some barriers to LID implementation that you have experienced or thought about?
3. Brainstorm research needs and/or stakeholders that your Agency might potentially partner with to overcome these barriers.



# Activity Question

- Please Share your Thoughts



# Q & A

## Follow-up Questions:

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