

**CEEn-2017CPST-007**

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## **LID Study for Bluffdale City**

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# Introduction

- **BYU Capstone Project**
- **Project for graduating Engineers to gain real world experience**
- **Assigned to work with Bluffdale creating a manual on LID**



## Introduction

- **“By March 1, 2019, new development or redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale must manage rainfall on-site, and prevent the off-site discharge of the precipitation from all rainfall events less than or equal to the 90th percentile rainfall event.” (Utah DEQ)**
- **In Bluffdale, the 90<sup>th</sup> percentile 24-hour event is approximately 0.67 inches.**

## Design, Analysis & Results

- Reviewed dozens of scholarly articles on LID
- Reviewed several state, county, and agency LID Manuals
- Reviewed dozens of University, EPA, and other agency studies on LID



*Bioretention at Daybreak, Utah.*



*StormTech Infiltration System Installation*



# LID techniques fit into four main categories

- 1. Infiltration
- 2. Evapotranspiration
- 3. Treatment
- 4. Capture and Re-use



*Bioretention rain garden located on the north side of North Salt Lake City building.*

# Infiltration LID

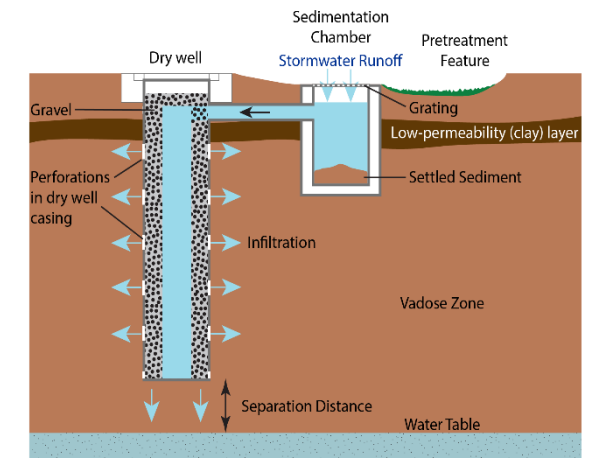
- StormTech
- R-Tanks
- Dry Wells



<http://www.stormtech.com/>



<https://www.acfenvironmental.com/products/>



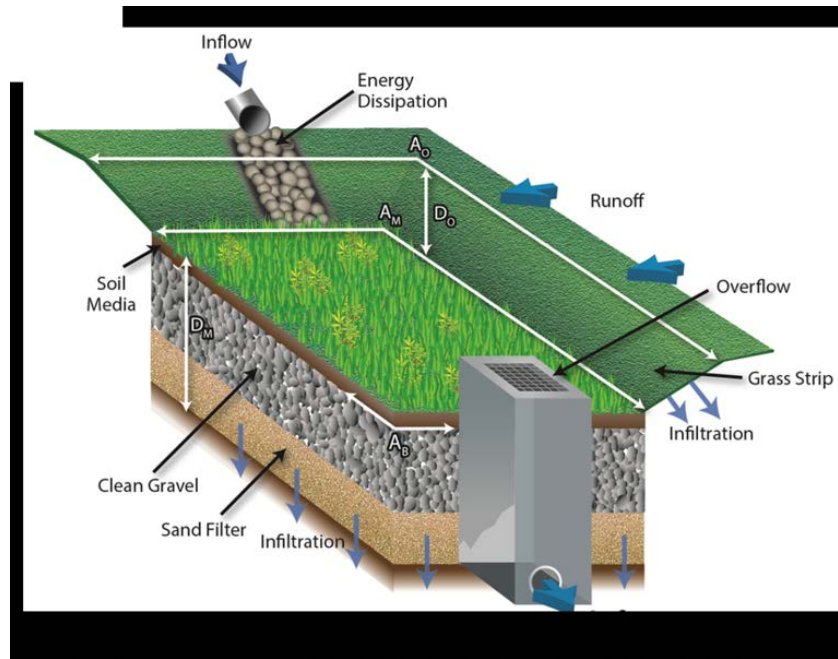
<https://www.americangeosciences.org/critical-issues/factsheet/dry-wells-stormwater-management>

Infiltration LID are considered Class V UIC Storm Water Drainage Wells. Owners of all UIC Class V wells are required by federal and state regulation to submit inventory information, including a \$180 inventory review fee. (Utah Department of Environmental Quality, 2018).



# Infiltration LID

- Infiltration Trenches



[https://stormwater.pca.state.mn.us/index.php?title=File:Infiltration\\_trench\\_Detailed\\_Cross\\_Section\\_2.png](https://stormwater.pca.state.mn.us/index.php?title=File:Infiltration_trench_Detailed_Cross_Section_2.png)

- Permeable Pavement



<https://nacto.org/publication/urban-street-design-guide/street-design-elements/stormwater-management/permeable-pavement/>

It is important to maintain infiltration LID so that sediment does not accumulate in the system, preventing effective infiltration.

# Evapotranspiration LID

- Bioretention
- Rain Gardens
- Wetlands



<http://epicenter.okstate.edu/training-workshops/bioretention-rain-gardens>



<https://deq.utah.gov/legacy/permits/water-quality/utah-pollutant-discharge-elimination-system/low-impact-development.htm>



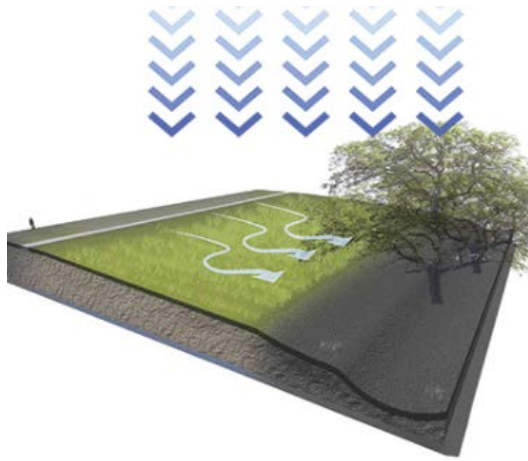
<http://urbanwater.melbourne.vic.gov.au/industry/treatment-types/constructed-wetlands/>

Evapotranspiration LID are also effective for infiltration, and extremely effective at removing pollutants



# Treatment LID

- Vegetative Filter Strips
- Bioswales
- Tree Filters
- Hydrodynamic Separators



<http://www.h-gac.com/community/low-impact-development/lid-toolbox.aspx>



<https://www.livingconceptslandscape.com/2015/09/bioswales/>



<https://www.flickr.com/photos/mocobio/8816807664/in/set-72157633663354666>



<http://www.conteches.com/Products/Stormwater-Management/Treatment/CDS.aspx>

Treatment LID remove pollutants and aid in infiltration in some cases. Treatment LID are best used in conjunction with other LID features to treat water before it is infiltrated.

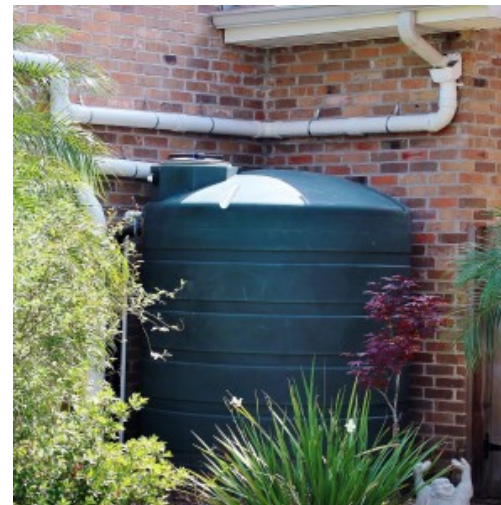


# Capture and Re-use LID

- Rain Barrels
- Cisterns
- Pop-up Emitters



[https://www.rwaterlady.com/store/p29/Rain\\_Barrel\\_-\\_Chester\\_Conservation\\_Commission.html](https://www.rwaterlady.com/store/p29/Rain_Barrel_-_Chester_Conservation_Commission.html)



<http://ecourbanllc.com/cisterns/>



<https://www.bobvila.com/articles/pop-up-drain-emitter/>

According to Senate Bill 32 (2010), a person registered with the Division of Water Rights may collect and store no more than 2,500 gallons of rainwater. If unregistered, no more than two containers may be used, and the maximum storage capacity of any one container shall not be greater than 100 gallons.

# Conclusions and Recommendations

- We have developed a manual detailing LID methods applicable in Bluffdale
- The manual includes entries on 14 LID that can be implemented in Bluffdale

## Bluffdale City Low-Impact Development Manual

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## Questions?

