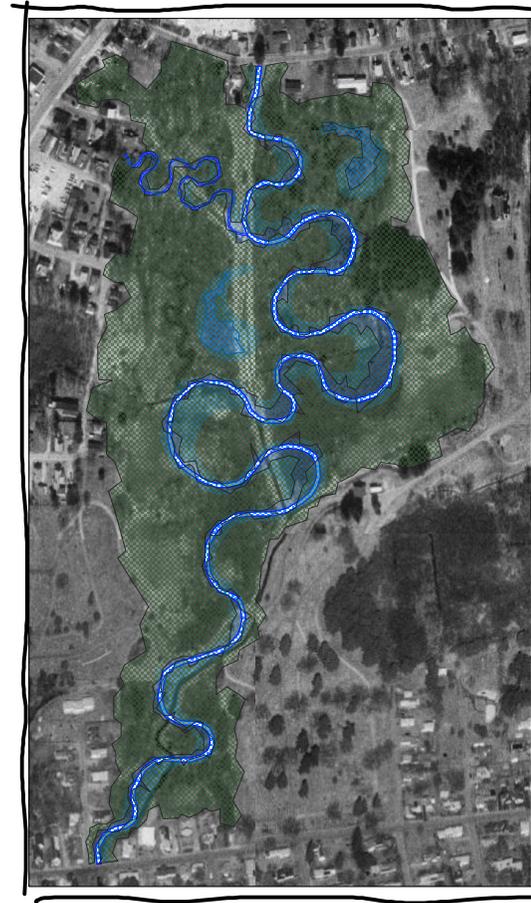


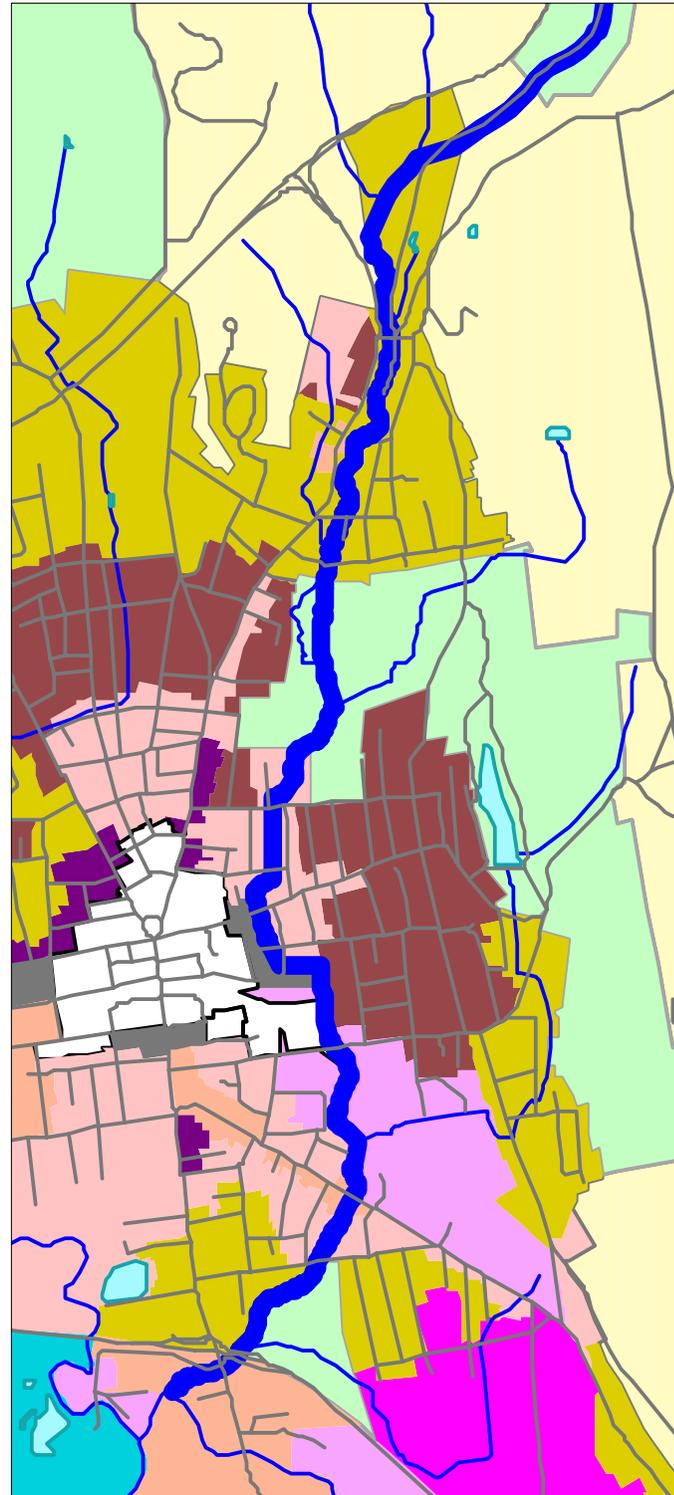
# **EXHIBIT 30**

# BEAVER BROOK WATERSHED REMEDIATION PLAN

## CONCEPTUAL DRAWINGS



CITY OF KEENE ZONING DISTRICTS



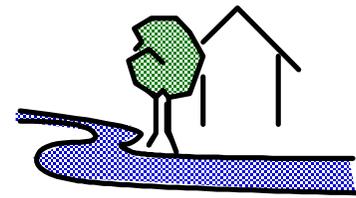
- AGRICULTURE
- CENTRAL BUSINESS
- CENTRAL BUSINESS LTD.
- COMMERCE
- COMMERCE LTD.
- CONSERVATION
- CORPORATE PARK
- HEALTH CARE
- HIGH DENSITY
- HIGH DENSITY 1
- INDUSTRIAL
- INDUSTRIAL PARK
- LOW DENSITY
- LOW DENSITY 1
- MEDIUM DENSITY
- OFFICE
- RURAL

- Roads
- Beaver Brook
- Ponds and Lakes
- Other Streams

THE FOLLOWING PAGES WILL ILLUSTRATE SOME SOLUTIONS FOR MANAGING STORMWATER IN THE VARIOUS ZONING DISTRICTS. THE AFFECT OF SUCH INTERVENTIONS WOULD BE AN IMPROVEMENT IN THE HABITAT QUALITY FOR FISH AND THE ORGANISMS THAT SUPPORT THEIR EXISTENCE. THESE ILLUSTRATIONS ARE NOT AN EXHAUSTIVE CATALOG OF DESIGNS, NOR DO THEY OFFER SUFFICIENT DETAIL FOR SITE SPECIFIC APPLICATIONS. THEY ARE INTENDED TO STIMULATE INDIVIDUALS, ORGANIZATIONS AND LEGISLATIVE BODIES TOWARDS ACTION.

FOR MORE INFORMATION ON THE HEADWATERS OF THESE IDEAS REFER TO THE FOLLOWING ORGANIZATIONS WEBSITES

- [bestmp.com](http://bestmp.com)
- [ewrinstitute.org](http://ewrinstitute.org)
- [urbancreeks.org](http://urbancreeks.org)
- [harvesth2o.com](http://harvesth2o.com)
- [raingardennetwork.com](http://raingardennetwork.com)
- [lowimpactdevelopment.org](http://lowimpactdevelopment.org)
- [groups.yahoo.com/group/bioretention/](http://groups.yahoo.com/group/bioretention/)
- [des.nh.gov/organization/divisions/water/wmb/repp/innovative\\_land\\_use](http://des.nh.gov/organization/divisions/water/wmb/repp/innovative_land_use)



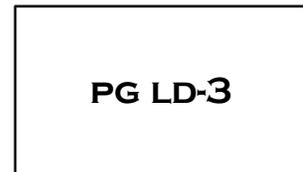
LOW DENSITY



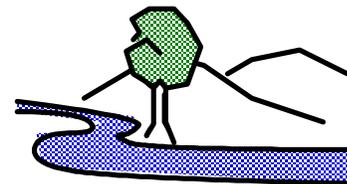
House



Apartment



Neighborhood



CONSERVATION



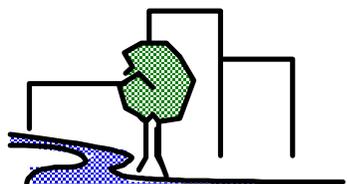
Cemetery



Carpenter Field



Baker Field



INDUSTRIAL - HIGH DENSITY



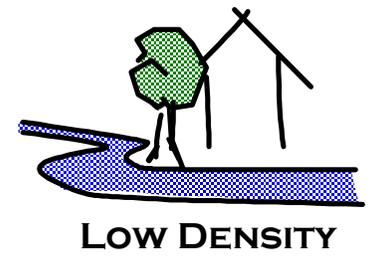
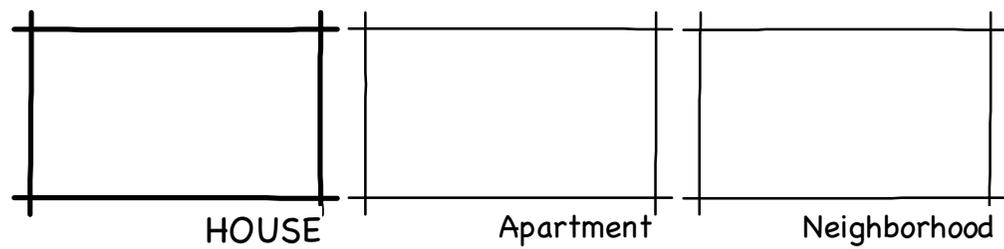
Auto Repair



Assited Living



Kingsbury

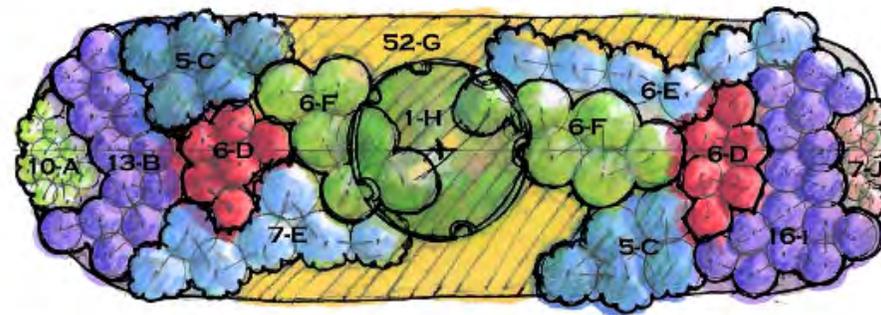


**IMAGE**

**CONCEPTUAL PLAN**



**SAMPLE PLANTING PLAN**



**RAINWATER COLLECTION**

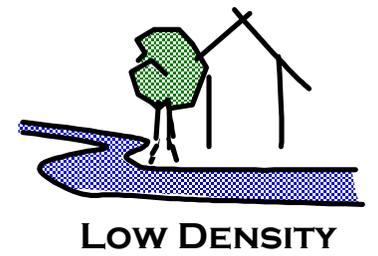
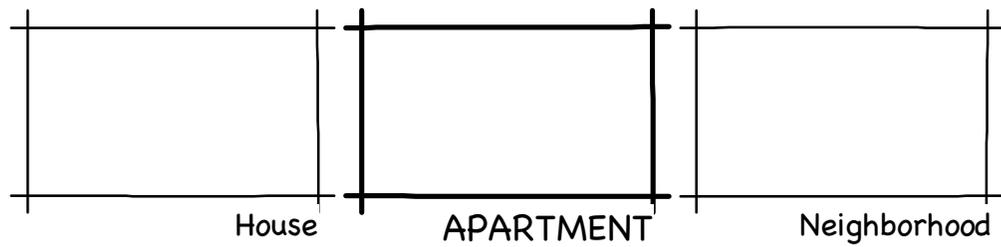


**RAINWATER GARDENS**



**PRINCIPLES**

- Chose plants that are appropriate for environment
- Favor non invasive native vegetation
- Develop city wide resource for homeowners and contractors

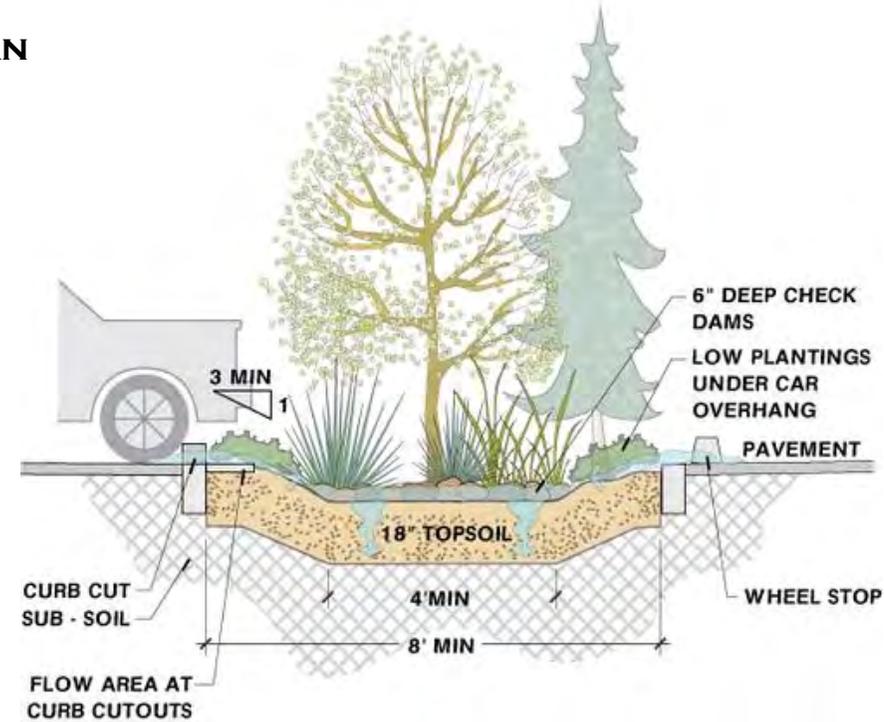


**IMAGE**



**CONCEPTUAL PLAN**

**BIORETENTION PLAN**



**PRINCIPLES**

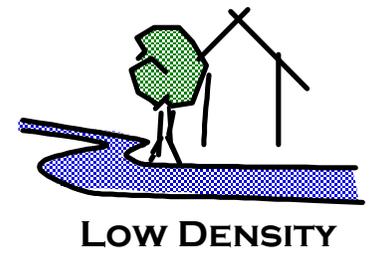
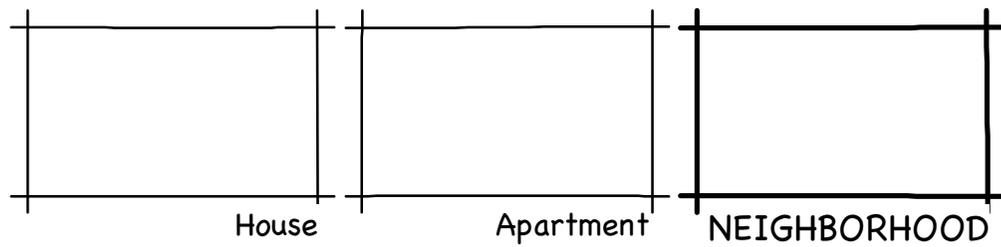
- Rainwater collection must be sized on a site specific basis
- Bioretention swales and devices can reduce f bod impact on brook
- Filtering of toxins from roof and pavement support habitat health

**GREEN ROOF**



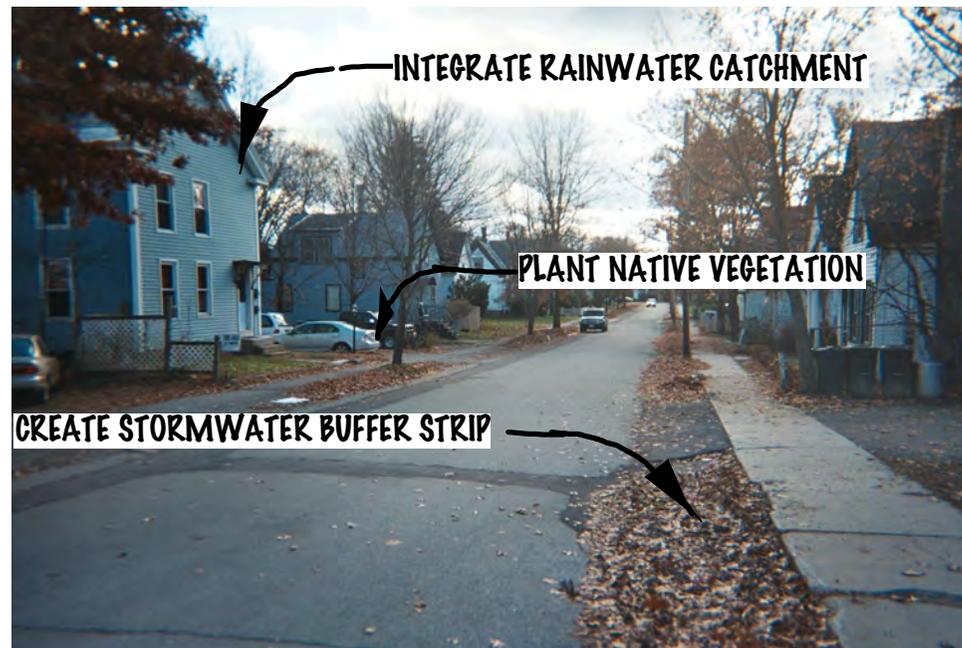
**RAINWATER COLLECTION**



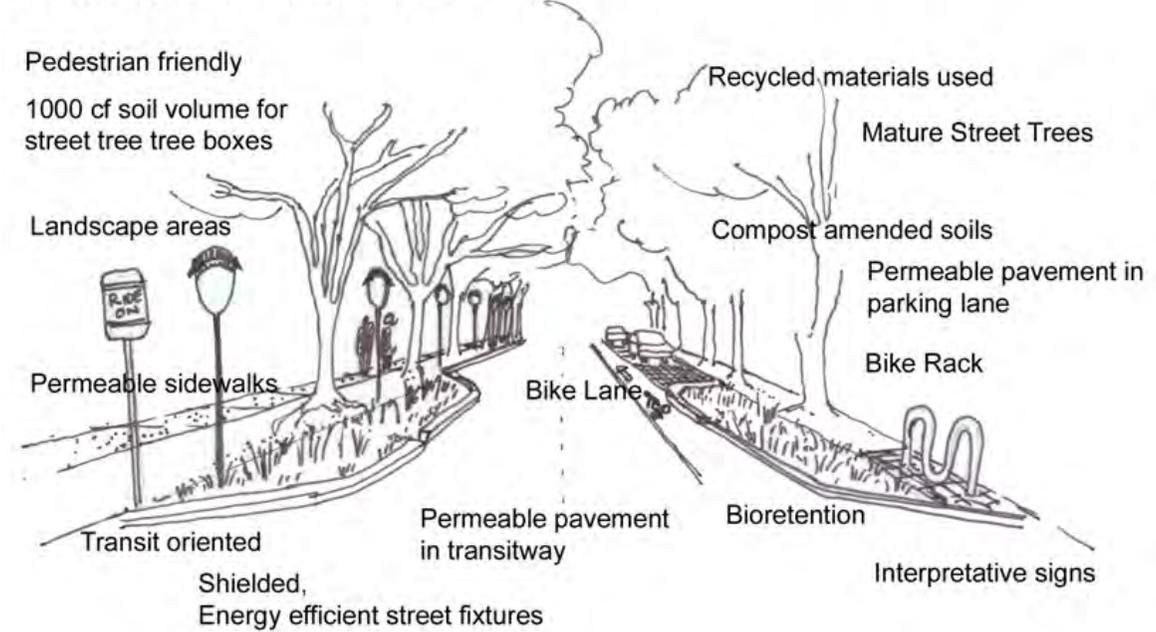


**IMAGE**

**CONCEPTUAL PLAN**

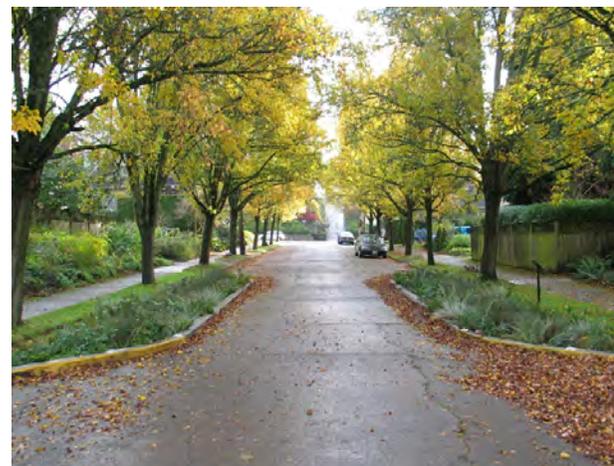


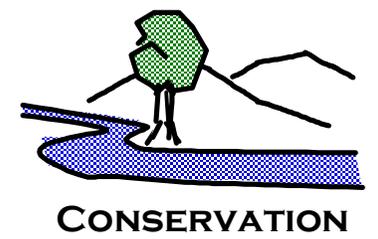
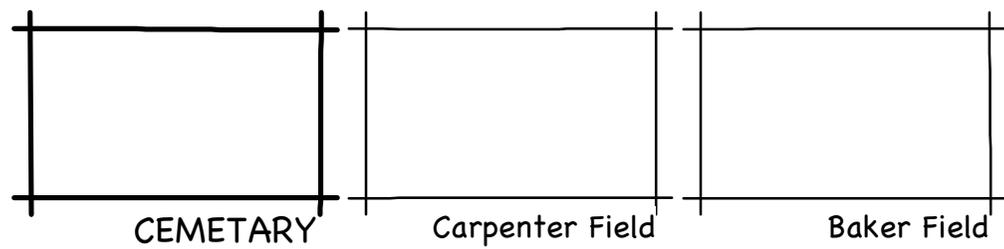
**Anatomy of a Green Street**



**PRINCIPLES**

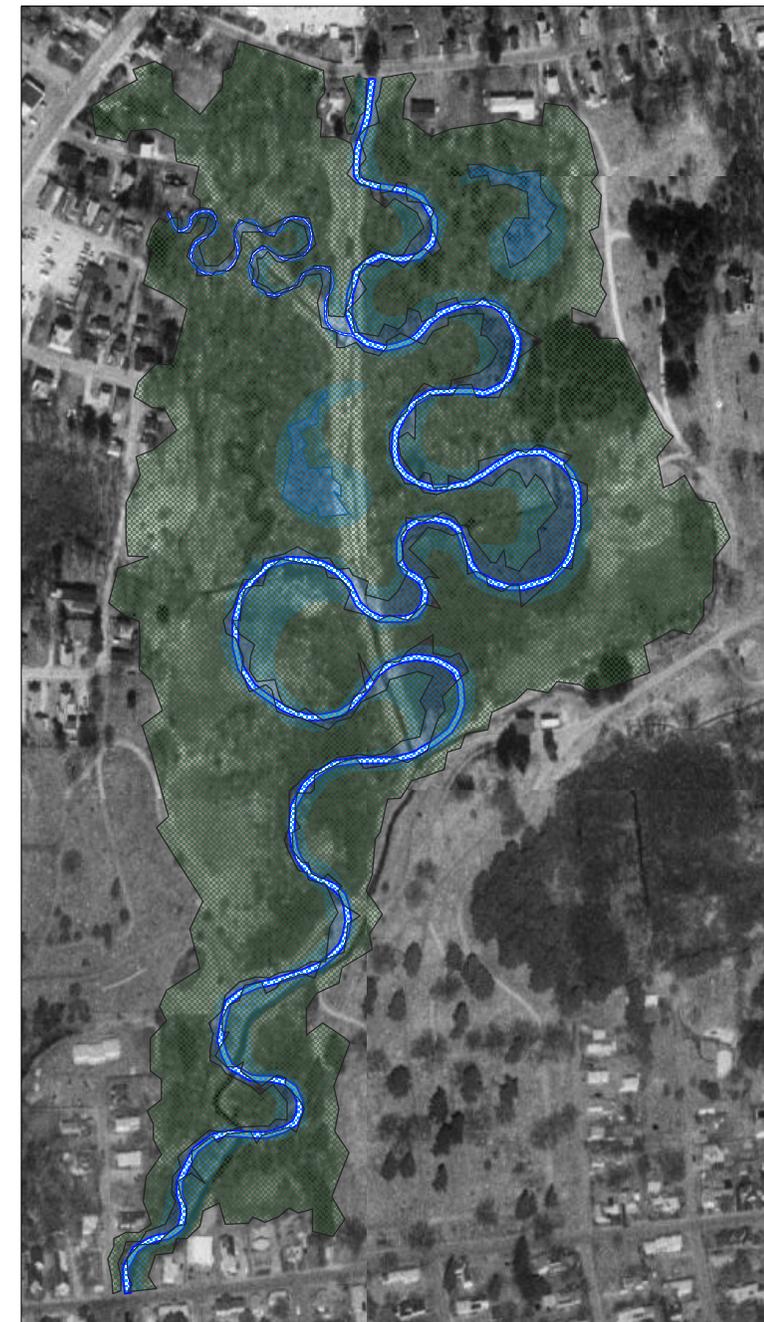
- Requires neighborhood and municipal participation
- Greater impact of neighborhood scale projects
- Net result is attractive, low maintainance, functional landscape





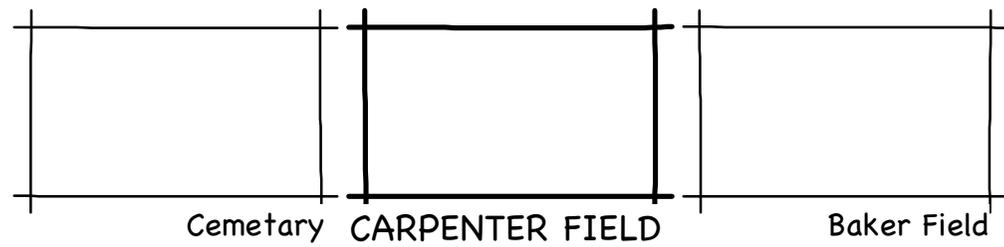
**IMAGE**

**CONCEPTUAL PLAN**



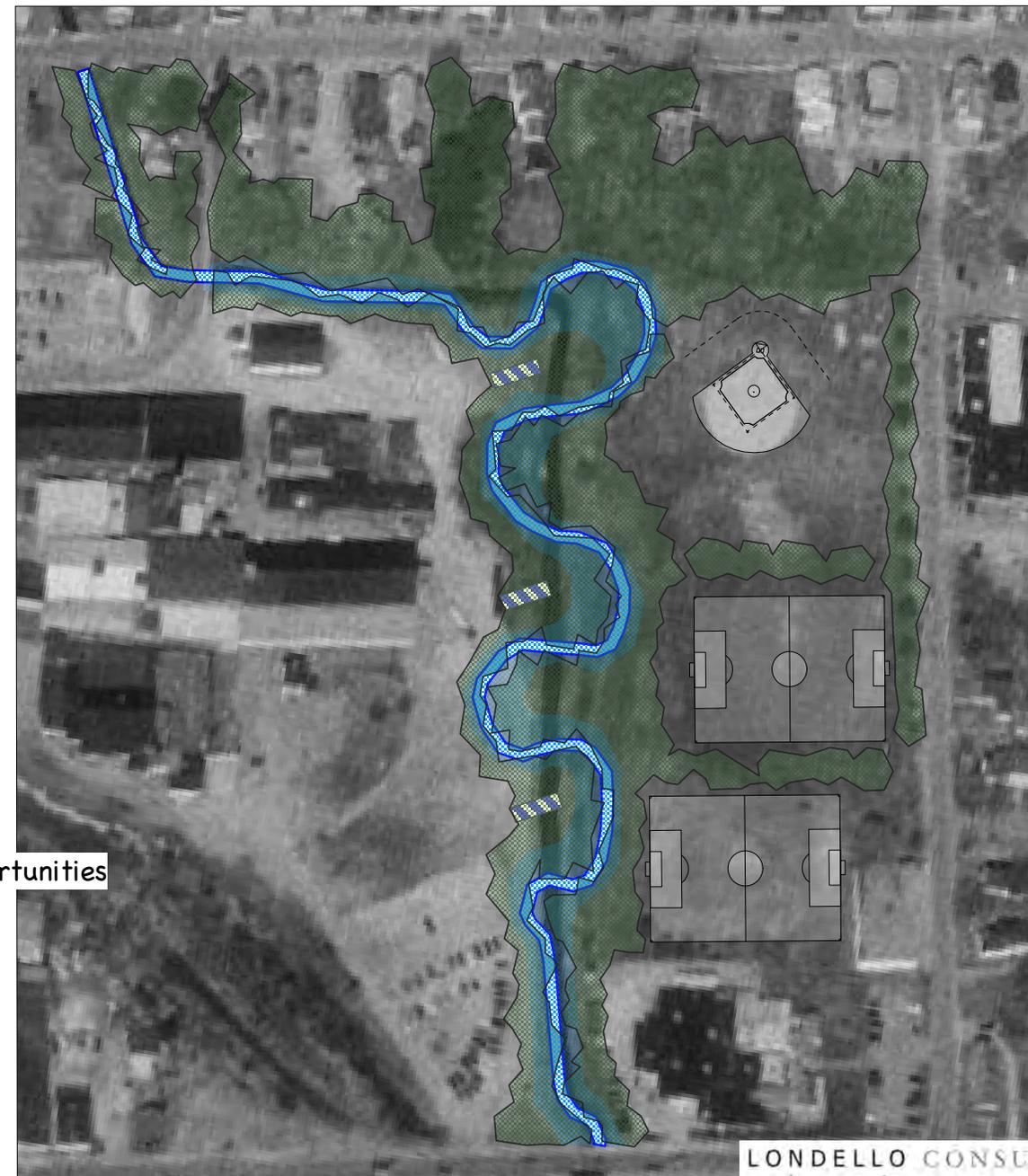
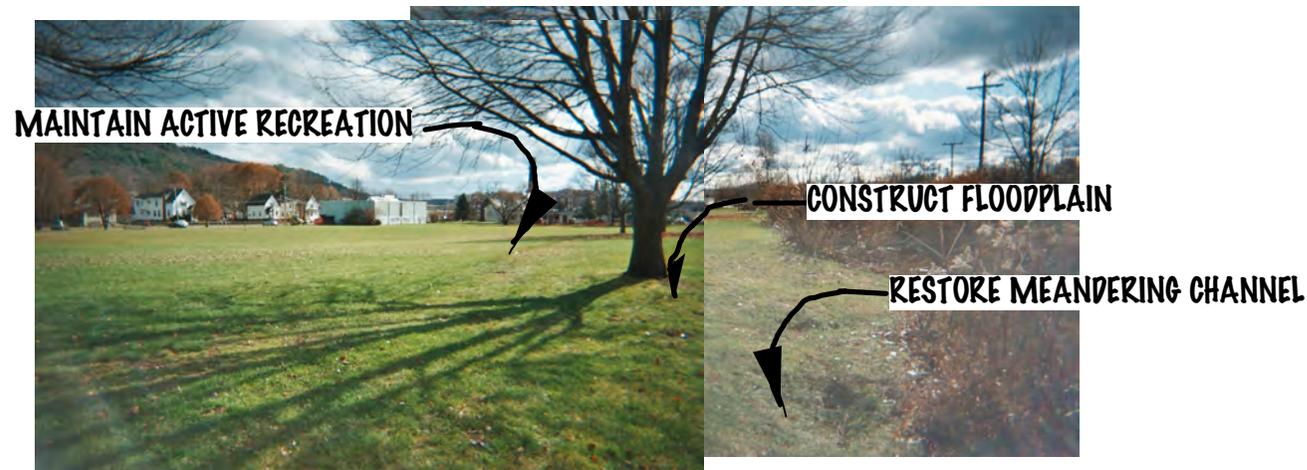
**PRINCIPLES**

- Restore historic sections of meandering channels
- Requires engineering and landscape studies and design for functional product
- Can have great positive impact on habitat restoration and f bod attenuation



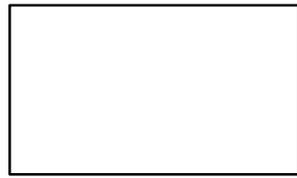
**IMAGE**

**CONCEPTUAL PLAN**



**PRINCIPLES**

- Balance the prior uses with habitat restoration
- Need citezen support in planning to maintaining and expanding recreational opportunities
- Bioretention and fltration on west side parking lots



Cemetary



Carpenter Field

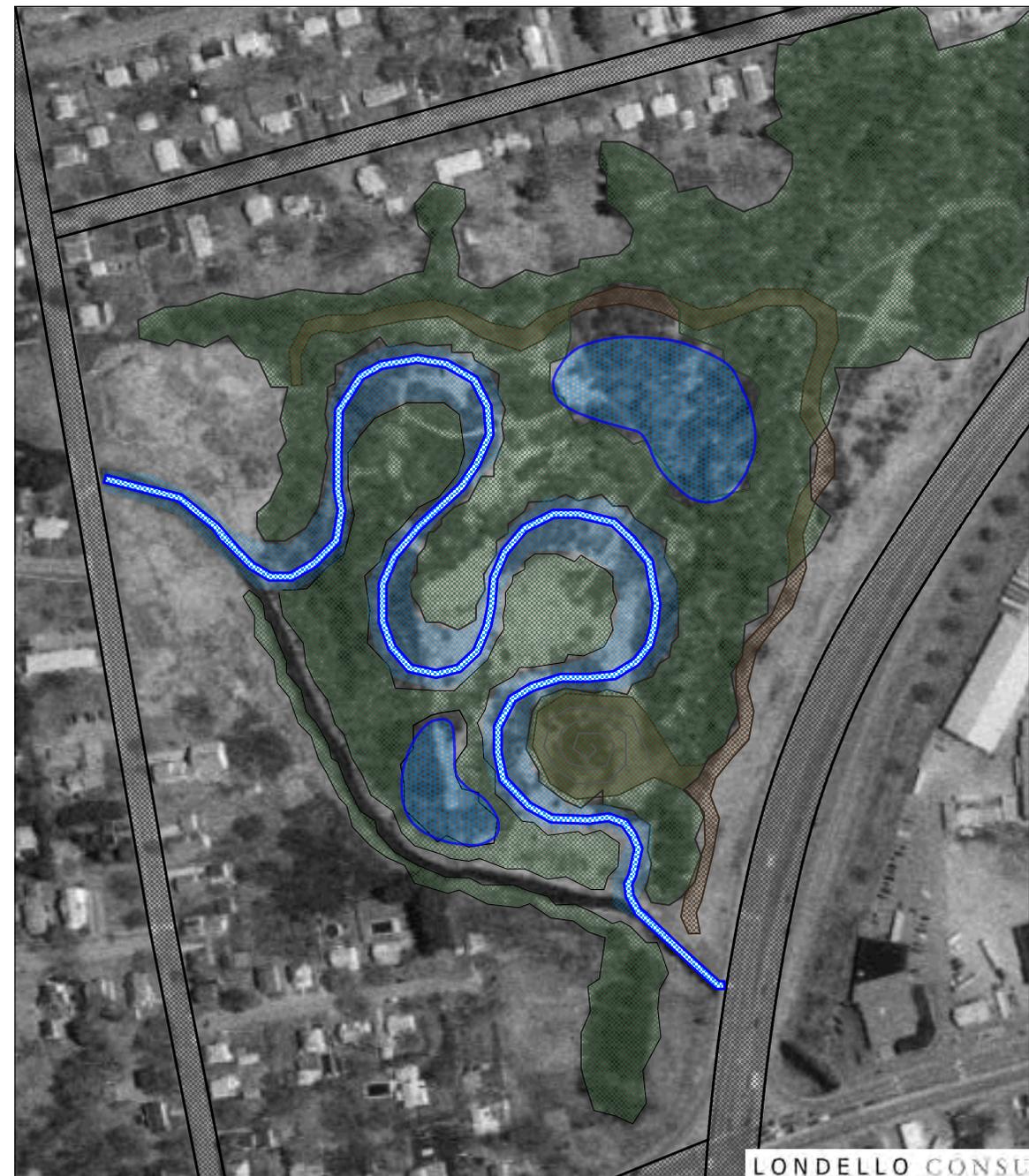


BAKER FIELD



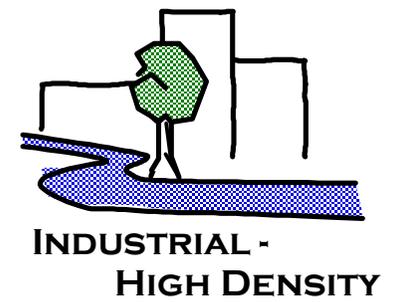
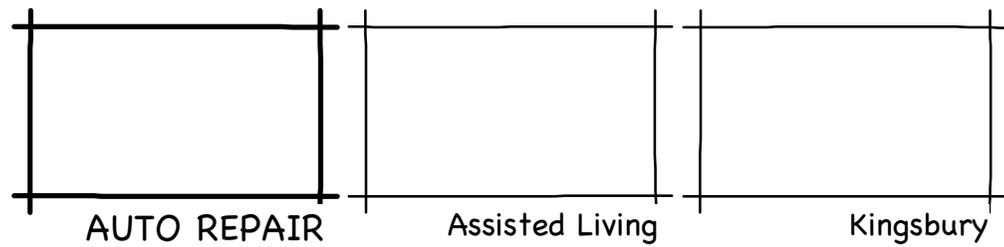
## IMAGE

## CONCEPTUAL PLAN



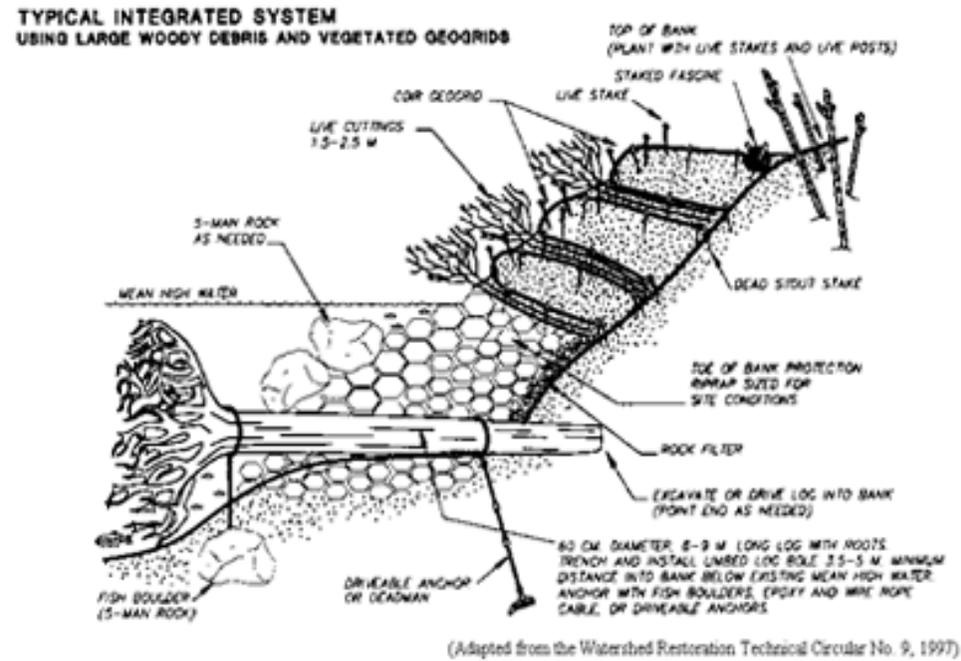
## PRINCIPLES

- Require engineer and landscape design
- High visual impact from RT 101
- Great space for creative design



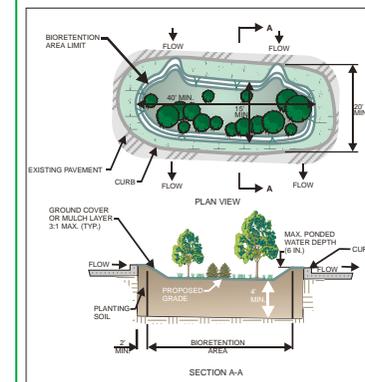
**IMAGE**

**CONCEPTUAL PLAN**



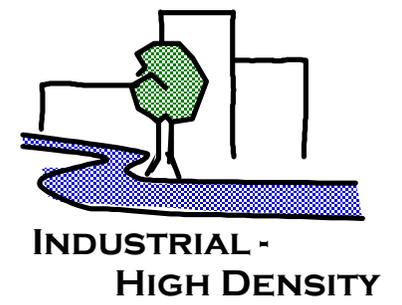
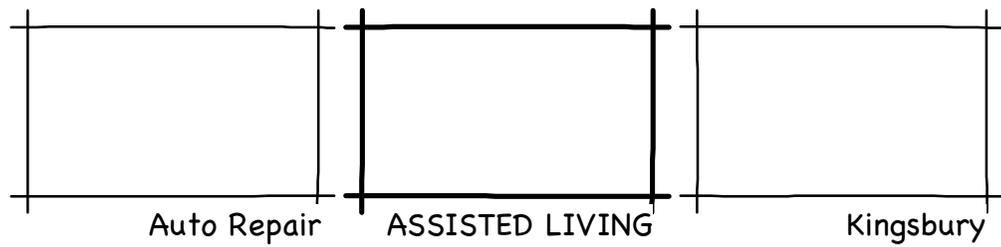
**PRINCIPLES**

- Maintain water quality through bioretention systems
- Provide incentives for property owners to participate
- Bank stabilization and flow deflection to support channel integrity



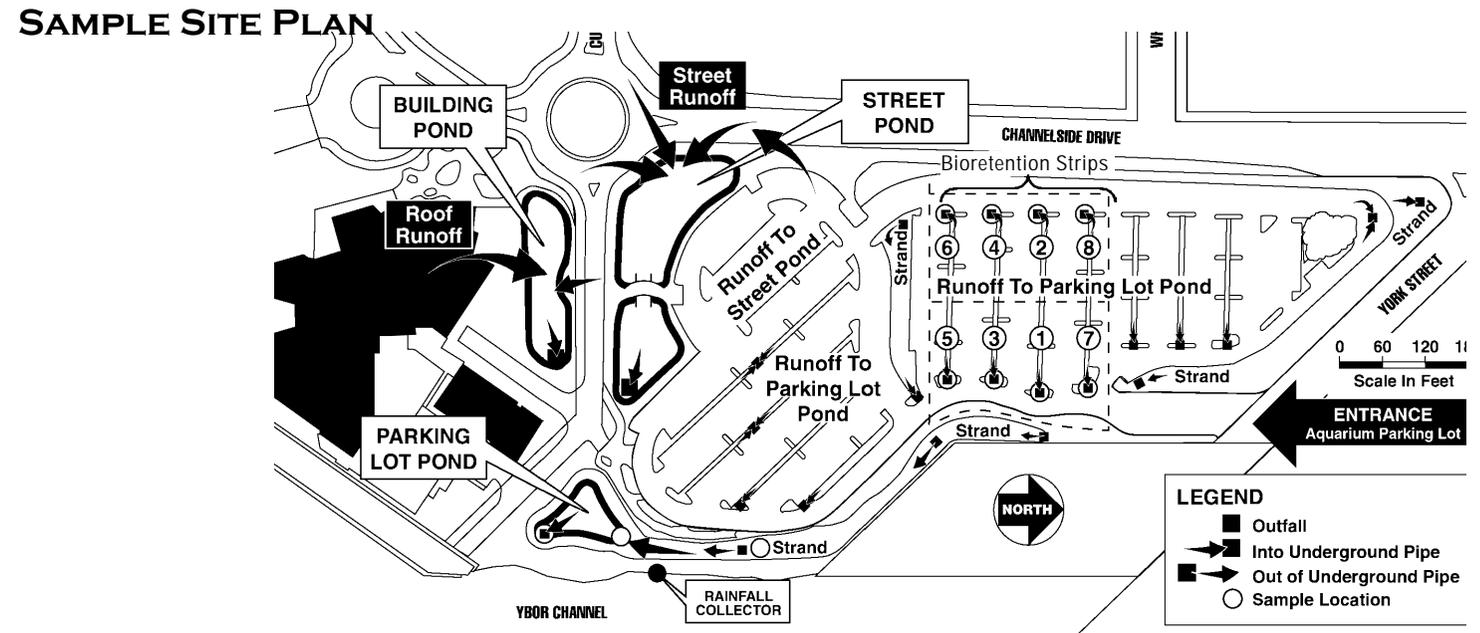
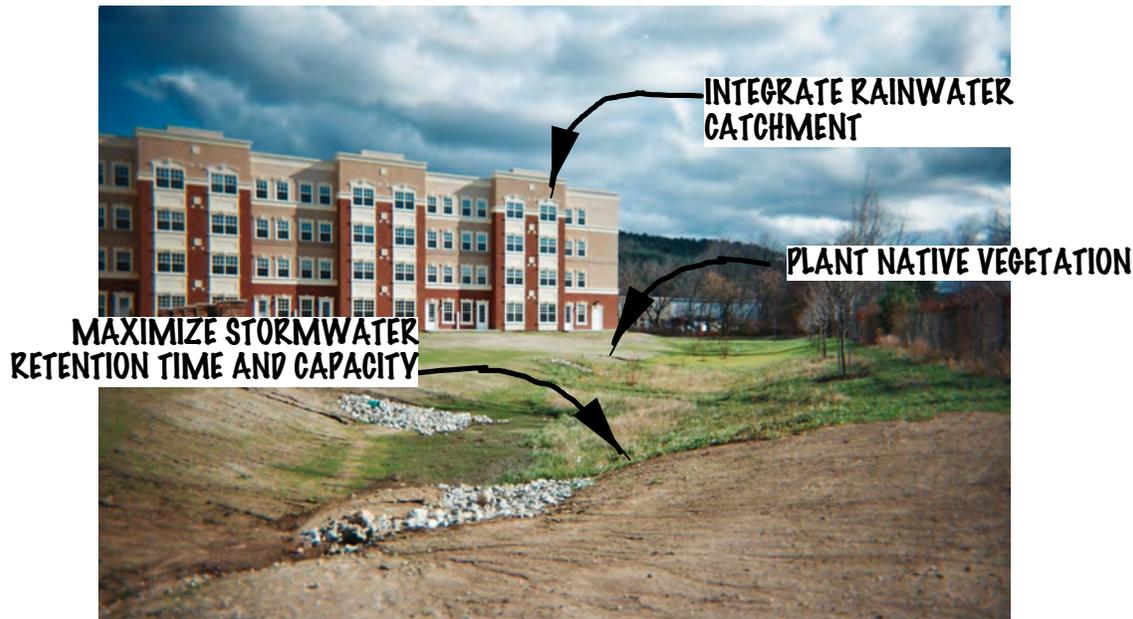
The diagram to the left shows a typical design of a bioretention system for use adjacent to a parking lot. In this application, precast car stops with gaps between them are used. An alternative is to use curbing with cuts to allow for water flow into the bioretention system (see photograph on Page 3).

**Bioretention System for use in Parking Lots**



**IMAGE**

**CONCEPTUAL PLAN**

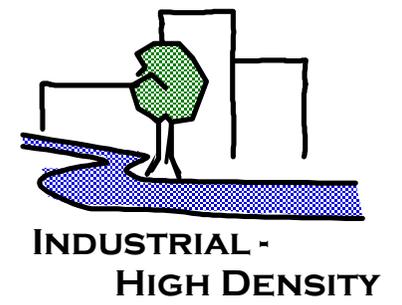


**PRINCIPLES**

- Provide incentives/regulations for new development
- Engineered rainwater collection on large scale projects

**BIORETENTION STRIPS**





**IMAGE**

**CONCEPTUAL PLAN**



**NATIVE PLANT HERBS**



**RESTORATION IN PROGRESS**



**PRINCIPLES**

- Develop planting palette for restoration projects
- Contract nursery to grow and sell plant material
- Make it easy for property owners to concur with restoration objectives

# What is Low Impact Development (LID)?

Ever wish you could simultaneously lower your site infrastructure costs, protect the environment, and increase your project's marketability? With LID techniques, you can. LID is an ecologically friendly approach to site development and storm water management that aims to mitigate development impacts to land, water, and air. The approach emphasizes the integration of site design and planning techniques that conserve the natural systems and hydrologic functions of a site.



Residential Lot with Bioretention

Somerset Development  
Prince George's County, MD

## LID Benefits

In addition to the practice just making good sense, LID techniques can offer many benefits to a variety of stakeholders.

### Developers

- Reduce land clearing and grading costs
- Potentially reduce infrastructure costs (streets, curbs, gutters, sidewalks)
- Reduce storm water management costs
- Potentially reduce impact fees and increase lot yield
- Increase lot and community marketability

### Municipalities

- Protect regional flora and fauna
- Balance growth needs with environmental protection
- Reduces municipal infrastructure and utility maintenance costs (streets, curbs, gutters, sidewalks, storm sewer)
- Increase collaborative public/private partnerships

### Environment

- Preserve integrity of ecological and biological systems
- Protect site and regional water quality by reducing sediment, nutrient, and toxic loads to water bodies
- Reduce impacts to local terrestrial and aquatic plants and animals
- Preserve trees and natural vegetation

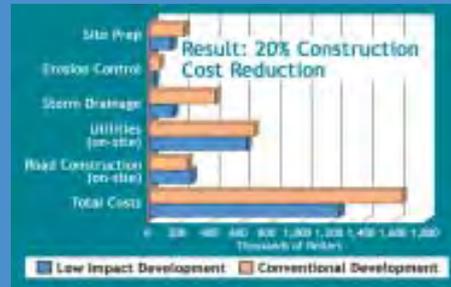
Cover Photo: R. Arendt

# Case Study

Kensington Estates is a conventional development on 24 acres consisting of 103 single-family homes in Pierce County, WA. A study was conducted to redesign the site using a new state storm water model and to illustrate the full range of LID practices and technologies available to developers.

Overall, the redesigned LID site could have:

- Resulted in construction cost savings of over 20%;
- Preserved 62% of the site in open space;
- Maintained the project density of 103 lots;
- Reduced the size of storm pond structures and eliminated catchments and piped storm conveyances; and
- Achieved "zero" effective impervious surfaces.



Cost Comparison: LID vs. Conventional Development

## For More Information

- Low Impact Development Center  
<http://www.lowimpactdevelopment.org>
- Prince George's County, Maryland  
<http://www.goprincegeorgescounty.com>
- NAHB Research Center Toolbase Services  
<http://www.toolbase.org>
- U.S. EPA  
<http://www.epa.gov/owow/nps/urban.html>



\*Assumes paving costs of \$15/sq. yd. Printed on recycled paper with soy ink



# Builder's Guide to Low Impact Development

Would you be interested in saving upwards of \$70,000\* per mile in street infrastructure costs by eliminating one lane of on-street parking on residential streets?

Did you know that communities designed to maximize open space and preserve mature vegetation are highly marketable and command higher lot prices?

Are you aware that most homeowners perceive Low Impact Development practices, such as bioretention, as favorable since such practices are viewed as additional builder landscaping?

Did you know that by reducing impervious surfaces, disconnecting runoff pathways, and using on-site infiltration techniques, you can reduce or eliminate the need for costly storm water ponds?

# LID Site Planning and Design Concepts

Successful LID projects simultaneously reduce land development and infrastructure costs while protecting a property's natural resources and functions. During the development process, the designer, developer, and reviewing agency should work together to identify solutions that integrate the following concepts:

- Preserve Open Space and Minimize Land Disturbance;
- Protect and Incorporate Natural Systems (wetlands, stream/wildlife corridors, mature forests) as Design Elements;
- Utilize Neo-Traditional Street and Lot Layouts and Designs; and
- Decentralize and Micromanage Storm Water at its Source Using LID Storm Water Management Practices.

## LID and Storm Water Management

LID aims to mimic natural hydrology and processes by using small-scale, decentralized practices that infiltrate, evaporate, and transpire rainwater. Specifically, LID aims to:

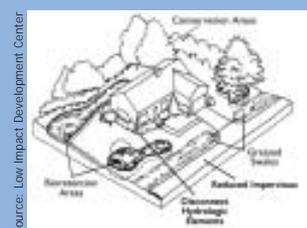
- Minimize impervious surfaces;
- Disconnect hydrologic elements (roofs, downspouts, parking areas);
- Maintain/increase flow paths and times; and
- Utilize decentralized treatment practices.

### Bioretention Areas

Storm water directed to these shallow topographic depressions in the landscape is filtered, stored, and infiltrated into the ground using specialized vegetation and engineered soils.

### Grassed Swales

Water moving through these systems is slowed, filtered, and percolated into the ground. These systems can act as low cost alternatives to curbs, gutters, and pipes.



Source: Low Impact Development Center

LID Lot Level Source Controls

## Preserve Open Space and Minimize Land Disturbance



Source: Bielinski Homes

Community Open Space

Bielinski Homes  
Waukesha, WI

## Decentralize and Micromanage Storm Water at its Source using LID Storm Water Management Practices



Source: Low Impact Development Center

Grassed Swales

Somerset Development  
Prince George's County, MD



## Protect and Incorporate Natural Systems as Design Elements



Source: Applied Ecological Services, Inc.

Wetland System

Prairie Crossing  
Grayslake, IL

## Utilize Neo-Traditional Street and Lot Layouts and Designs



Source: DPZ & Co.

Bowman Park

Vermillion Community  
Vermillion, NC

From Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks, by Randall G. Arendt. Copyright (©) 1996 by Island Press. Reprinted by permission of Island Press, Washington, D.C. and Covelo, CA.

# What is Low Impact Development (LID)?

LID is an ecologically friendly approach to site development and storm water management that aims to mitigate development impacts to land, water, and air. The approach emphasizes the integration of site design and planning techniques that conserve natural systems and hydrologic functions on a site. The practice has been successfully integrated into many municipal development codes and storm water management ordinances throughout the United States. Specifically, LID aims to:

- Preserve Open Space and Minimize Land Disturbance;
- Protect Natural Systems and Processes (drainage ways, vegetation, soils, sensitive areas);
- Reexamine the Use and Sizing of Traditional Site Infrastructure (lots, streets, curbs, gutters, sidewalks) and Customize Site Design to Each Site;
- Incorporate Natural Site Elements (wetlands, stream corridors, mature forests) as Design Elements; and
- Decentralize and Micromanage Storm Water at its Source.



Source: City of Portland, BES

## Courtyard with Bioretention Areas

Buckman Heights Community  
Portland, OR

Cover Photo: R. Arendt

# Questions and Answers

Information on the most frequently asked low impact development questions.

## Public Safety

- Q. I am aware that in some instances, LID advocates the reduction of street widths and the reduced use of sidewalks to decrease impervious surfaces. Isn't this a threat to public safety?
- A. No. Studies have shown that reduced street widths still provide all the functions of access, parking, and circulation for residents and emergency vehicles alike. Depending on density, minimizing the use of sidewalks may help to reduce development costs, increase housing affordability, and reduce impervious surfaces.
- Q. Don't LID storm water management practices increase the likelihood of flooding?
- A. No. LID designs provide adequate conveyance of storm water by using designs that maintain predevelopment volumes and rates of runoff. Since bioretention areas are designed to completely drain within a specified period of time, they do not provide breeding grounds for mosquitos. Overflow controls within bioretention areas control the risk of flooding.

## Public Perception

- Q. Aren't homeowners concerned about maintaining storm water controls on their properties?
- A. Environmental stewardship is everyone's responsibility. Most homeowners view these systems as additional landscaping and once they are aware of the benefits that these systems provide to local hydrology, few remain opposed.

## Maintenance

- Q. LID practices sound great, but who maintains all of the open space and various storm water controls?
- A. Communities designed using LID practices often rely on a combination of homeowner stewardship and maintenance agreements. When designed correctly, most homeowners perceive these systems as value-added builder amenities and actively provide for their maintenance.

# For More Information

- Low Impact Development Center  
<http://www.lowimpactdevelopment.org>
- Prince George's County, Maryland  
<http://www.goprincegeorgescounty.com>
- NAHB Research Center Toolbase Services  
<http://www.toolbase.org>
- U.S. EPA  
<http://www.epa.gov/owow/nps/urban.html>



\*Assumes paving costs of \$15/sq. yd. Printed on recycled paper with soy ink.



# Municipal Guide to Low Impact Development

Would you be interested in saving upwards of \$70,000\* per mile in street infrastructure costs by eliminating one lane of on-street parking on residential streets?

Did you know that communities designed to maximize open space and preserve mature vegetation are highly marketable and command higher lot prices?

Are you aware that most homeowners perceive Low Impact Development practices, such as bioretention, as favorable since such practices are viewed as additional builder landscaping?

Did you know that by reducing impervious surfaces, disconnecting runoff pathways, and using on-site infiltration techniques, you can reduce or eliminate the need for costly storm water ponds?



Source: Low Impact Development Center

## Grassed Swale and Narrow Street

Montgomery County, MD



Source: Applied Ecological Services, Inc.

## Bioretention with Native Vegetation

Prairie Crossing  
Grayslake, IL

# LID Benefits

In addition to the practice just making good sense, low impact development techniques can offer many benefits to a variety of stakeholders.

## Municipalities

- Protect regional flora and fauna
- Balance growth needs with environmental protection
- Reduce municipal infrastructure and utility maintenance costs (streets, curbs, gutters, sidewalks, storm sewer)
- Increase collaborative public/private partnerships

## Developers

- Reduce land clearing and grading costs
- Potentially reduce infrastructure costs (streets, curbs, gutters, sidewalks)
- Reduce storm water management costs
- Potentially reduce impact fees and increases lot yields
- Increase lot and community marketability

## Environment

- Preserve integrity of ecological and biological systems
- Protect site and regional water quality by reducing sediment, nutrient, and toxic loads to water bodies
- Reduce impacts to local terrestrial and aquatic plants and animals
- Preserve trees and natural vegetation

# Case Study

Somerset is an 80-acre development in Prince George's County, Maryland consisting of 199 homes on 10,000-square-foot lots. During its creation, the developer used LID practices to reduce the storm water management burden. By using LID, the developer:

- Eliminated the need for storm water ponds by using bioretention techniques saving approximately \$300,000;
- Gained six additional lots and their associated revenues; and
- Reduced finished lot cost by approximately \$4,000.



Lot with Bioretention



Grassed Swale and Street without Curb and Gutter



Bioretention Area and Open Space

Photos: Low Impact Development Center

Description	Conventional Design	Bioretention System
Engineering Redesign	0	\$110,000
Land Reclamation (6 lots x \$40,000 Net)	0	<\$240,000>
Total Costs	\$2,457,843	\$1,541,461
Total Costs (-Land Reclamation + Redesign Costs)	\$2,457,843	\$1,671,461
Total Cost Savings = \$916,382		
Cost Savings Per Lot = \$4,604		

Cost Comparison: Conventional Design vs. Bioretention



Aerial View of Somerset Development Site Plan, Prince George's County, MD

## Hydrologic Comparison between Conventional Storm Water Management and LID

Hydrologic alterations within the landscape occur whenever land is developed. Conventional development approaches to storm water management have used practices to quickly and efficiently convey water away from developed areas. Usually these practices are designed to control the peak runoff rate for pre-determined storm events, usually the 2- and 10-year storms. While these systems have worked to some degree, they still have not accounted for the increased runoff rates and volumes from smaller, more frequent storms, nor have they addressed the larger watershed functions of storage, filtration, and infiltration.

In contrast, LID utilizes a system of source controls and small-scale, decentralized treatment practices to help maintain a hydrologically functional landscape. The conservation of open space, the reduction of impervious surfaces, and the use of small-scale storm water controls, such as bioretention, are just a few of the LID practices that can help maintain predevelopment hydrological conditions.