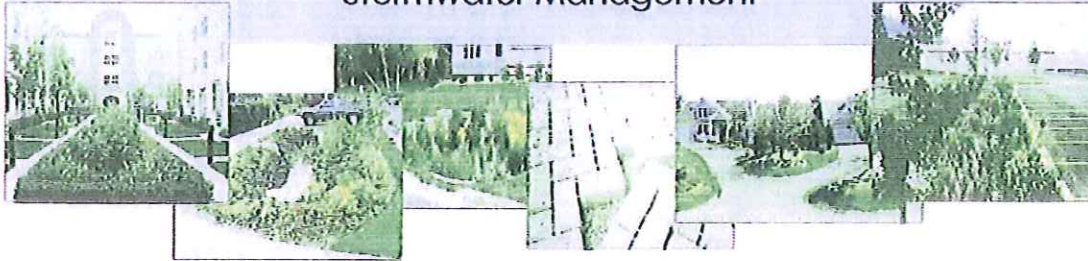


# Low Impact Development (LID)

## A Sensible Approach to Land Development and Stormwater Management

CALIFORNIA WATER &  
LAND USE PARTNERSHIP



An educational program for land use decision makers that addresses the relationship between land use and natural resource protection.

### What is Low Impact Development (LID)?

LID is an alternative method of land development that seeks to maintain the natural hydrologic character of the site or region. The natural hydrology, or movement of water through a watershed, is shaped over centuries under location-specific conditions to form a balanced and efficient system. When hardened surfaces such as roads, parking lots, and rooftops are constructed, the movement of water is altered; in particular, the amount of runoff increases and infiltration decreases. This results in increased peak flow rate and volume, and pollution levels in stormwater runoff. LID designs with nature in mind: working with the natural landscape and hydrology to minimize these changes. LID accomplishes this through source control, retaining more water on the site where it falls, rather than using traditional methods of funneling water via pipes into local waterways. Both improved site design and specific management measures are utilized in LID designs. LID has been applied to government, residential, and commercial development and redevelopment, and has proven to be a cost-efficient and effective method for managing runoff and protecting the environment.

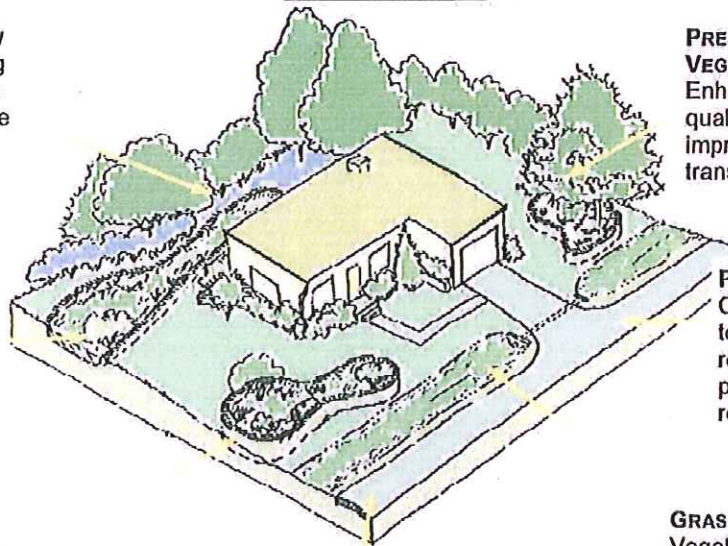
### Using LID Tools in Residential Development

**NATURAL DRAINAGE FLOW**  
Reduces need for grading and constructed drainage systems by building house in a location that permits preservation of natural pattern of stormwater drainage

**BIORETENTION CELL OR RAIN GARDEN**  
Depressions that contain soil amendments that promote infiltration of stormwater

**AMENDED SOIL**  
Soil enriched with sand and organic materials increases the capacity of soil to infiltrate water

**REDUCED HARDSCAPE**  
Narrower streets, sidewalks, and driveways increases pervious areas and open spaces



**PRESERVED NATIVE VEGETATION**  
Enhances the aesthetic quality of community and improves the evaporation-transpiration rate

**POROUS PAVEMENT**  
Concrete that allows rain to infiltrate, thereby reducing runoff and promoting groundwater recharge

**GRASSY SWALE**  
Vegetated channels that slow stormwater runoff and promotes infiltration, traps sediment, and helps treat pollutants

Diagram adapted from Prince George's County Maryland Low-Impact Development Design Strategies



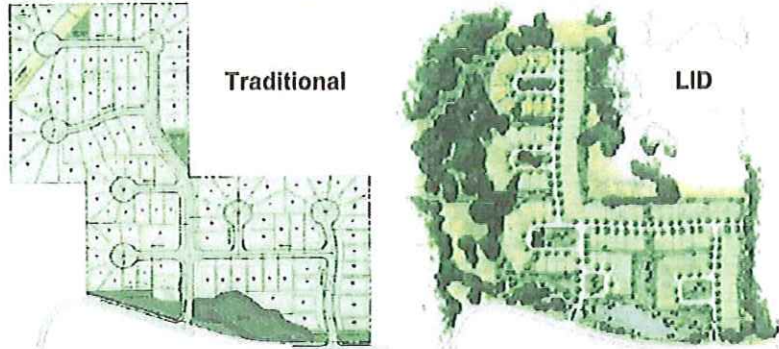
## LID as a Design Strategy

LID is more than a collection of engineered tools. It is a comprehensive design technique incorporating site planning and integrated management measures.

LID design principles include:

- Extensive site assessment of hydrology, topography, soils, vegetation and water features;
- Higher density, clustered housing, preserving open spaces to facilitate infiltration and protect habitats;
- Street layout that minimizes road length and width, calming traffic while allowing safe access of emergency vehicles.

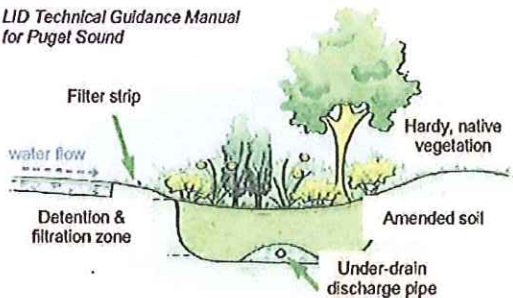
*LID Technical Guidance Manual for Puget Sound*



In this example, LID design reduces imperviousness by changing the cul-de-sac design, reducing street width and lot size, and instead clustering houses around common green spaces that also serve as infiltration sites and preserving natural features.

## Examples of LID

*LID Technical Guidance Manual for Puget Sound*



### Basic Components of a Bioretention Cell

To see how to engineer bioretention cells with the proper gradient and components visit:

[www.lowimpactdevelopment.org/epa03/biospec.htm](http://www.lowimpactdevelopment.org/epa03/biospec.htm)



Rain Gardens and grass swales between houses are used at Douglas Ranch, Granite Bay, CA to catch and filter runoff from roofs and driveways before entering a local stream.



Curb Cuts permit stormwater to flow into grassy swales to reduce roadway contaminants that flow into nearby waterways. They can also be used in *existing* landscaped areas.



Hollywood Driveways have a dividing strip of grass in order to reduce the amount of impervious surface. Another way to reduce driveway space is to share one with a neighbor.

### Online Resources

Low Impact Development Center  
 U.S. Environmental Protection Agency  
 Stormwater Manager's Resource Center  
 National NEMO Network  
 LID Urban Design Tools  
 National Association of Home Builders  
 California Stormwater Quality Association

[www.lowimpactdevelopment.org](http://www.lowimpactdevelopment.org)  
[www.epa.gov/owow/nps/urban.html](http://www.epa.gov/owow/nps/urban.html)  
[www.stormwatercenter.net](http://www.stormwatercenter.net)  
[www.nemonet.uconn.edu](http://www.nemonet.uconn.edu)  
[www.lid-stormwater.net](http://www.lid-stormwater.net)  
[www.toolbase.org/index-toolbase.asp](http://www.toolbase.org/index-toolbase.asp)  
[www.cabmphandbooks.com](http://www.cabmphandbooks.com)

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CA WALUP is an educational program for land use decision makers addressing the relationship between land use and natural resource protection. The CA WALUP is a Charter Member of the National NEMO Network. CA WALUP website: <http://cawalup.usc.edu>