









# **Placer County**

# LOW IMPACT DEVELOPMENT (LID) GUIDEBOOK

March 2012

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# **ACKNOWLEDGEMENTS**

### PROJECT SPONSORS AND FUNDING

This project was made possible by a grant from the Sierra Nevada Conservancy. Additional funding and in-kind services were provided by Placer County, and in-kind services were provided by the Technical Advisory Committee members, Sierra Business Council, cbec eco engineering, inc., and CKB Environmental Consulting, Inc.

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### **DEVELOPMENT OF THE GUIDEBOOK**

In 2004, Placer County identified Low Impact Development (LID) as a mitigation strategy for the County Aquatic Resource Program - a comprehensive strategy for state and federal environmental regulatory compliance on projects covered by the Placer County Conservation Plan. The County sought and secured grant funding from the Sierra Nevada Conservancy to develop this guidebook to describe application and adaptation of LID techniques to the county's unique environmental conditions, and to promote more widespread use of LID throughout the County.



TAC Members at Homewood Pilot Study Design Workshop, June 2010

The County retained the Sierra Business Council (SBC) and a team of technical consultants to prepare the document, with advice and assistance by County planning and engineering staff. SBC established a Technical Advisory Committee (TAC) of local stakeholders and technical professionals to provide oversight and direction to the effort.TAC workshops were conducted at various locations in the study area during development of the Guidebook to build awareness, share knowledge, create the tools included in the guidebook, and review and comment on draft versions of the document.

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# Chapter 1

# INTRODUCTION TO THE GUIDEBOOK

### 1.1 PURPOSE OF THE GUIDEBOOK

The Placer County Low Impact Development (LID) Guidebook provides planning and design guidance to promote and encourage the application of appropriate and cost effective LID principles and strategies for new and redevelopment projects in the Sierra Nevada.

## 1.2 INTRODUCTION TO LID

There are numerous definitions of LID and some people refer to LID as a particular type of best management practice (BMP) designed to solely infiltrate and reduce stormwater runoff. For the purposes of this Guidebook, LID is considered more holistically. It is a total site design philosophy and approach that conserves and uses existing natural site features and systems integrated with distributed, small-scale stormwater management controls (BMPs) to mimic or recreate the natural water balance for a site. A single BMP or system of BMPs can serve one function or several: control sources of pollution, reduce runoff, and/or treat runoff before it leaves the site.

### Guidebook Vision:

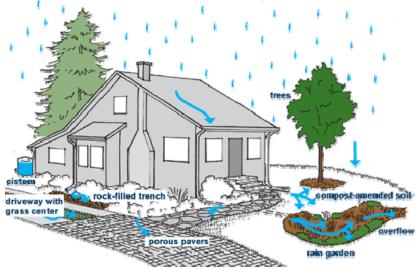
To protect and enhance the natural environment of Placer County in the Yuba, Truckee and American River watersheds through the promotion of innovative stormwater and water quality management and other techniques applicable to the Sierra Nevada.

Placer County LID Guidebook Technical Advisory Committee, 2010

# What is LID?

Low Impact Development is a total site design approach that conserves and uses existing natural site features and systems integrated with distributed, small-scale stormwater controls to mimic or recreate the natural water balance for a site.

Placer County LID Guidebook Technical Advisory Committee, 2010



Source: Seattle Public Utilities Residential Rainwise Program, 2011

LID opportunities may occur throughout the planning, design, and construction phases. When implemented early in the planning and design process, LID strategies allow owners, developers, builders and designers to address multiple objectives with qualitative environmental benefits in a single site design, including:

- runoff reduction
- pollution reduction
- groundwater recharge
- natural watershed function
- water quality/habitat protection

#### **How Does LID Work?**

LID controls are small-scale, distributed stormwater management devices that have the capability to meet multiple stormwater management objectives, including peak flow attenuation, volume reduction, and water quality improvement. LID controls use unit processes of the natural hydrologic cycle to meet these objectives. By making use of hydrologic cycle processes, LID attempts to mimic the natural function of the developed landscape. These unit processes are essential to natural stormwater management and LID controls:

- *Infiltration* the downward movement of water into the soil via percolation through pore spaces.
- Evapotranspiration the combined effects of evaporation and transpiration in reducing the volume of water in a vegetated area during a specific period of time.
- *Interception* a form of detention and retention storage that occurs when leaves, stems, branches, and leaf litter catch rainfall.
- Conveyance the transport of surface runoff, from where a raindrop falls to where it enters the receiving body of water.
- Detention the temporary storage of stormwater, so that the maximum outflow is less than maximum inflow; water is released soon after the maximum inflow has occurred.
- Retention the capture of a volume of stormwater for a significantly longer period than detention facilities; water may be released after a storm has ended or retained for a longer period for other uses such as recreation, surface water supply or groundwater recharge.
- Reuse capture of rainwater for later use by other processes such as non-potable water applications.
- Recharge entry of water (through detention and/or infiltration through subsurface layers) into a groundwater aquifer.

See Chapter 2 for more details about the impacts of urbanization on the natural hydrologic cycle and how LID can help recreate the natural water balance on a development site.

-Adapted from "LID Strategies and Tools for Phase II NPDES Communities", Low Impact Development Center, <u>www.lowimpactdevelopment.org</u>. Definitions for detention and retention are consistent with the Placer County Stormwater Management Manual.

In addition to environmental benefits, an integrated design approach can result in cost savings for the developer, long-term economic benefits to property owners such as reduced maintenance costs and enhanced market value, and community benefits such as improved aesthetics and recreational amenities. These and other benefits are listed in Table 1-1 and explained in more detail in Chapter 2.

Table 1-1. Benefits of Low Impact Development\*

Item	Benefit
Environmental Protection and Compliance with Environmental Regulations	<ul> <li>Improved water quality and protection of beneficial uses of receiving waters</li> <li>Compliance with stormwater regulations and permits</li> <li>Reduced potential for downstream erosion and habitat degradation</li> <li>Control of hydromodification impacts</li> <li>Protection of sensitive ecological resources on site, such as streams and riparian habitats, as well as trees and vegetation</li> <li>Improved ecological health of terrestrial and aquatic habitat in receiving waters</li> <li>Improved air quality</li> </ul>
Stormwater Management and Flood Control	<ul> <li>Potential for flood mitigation</li> <li>Reduced stormwater infrastructure (and associated capital and maintenance costs</li> </ul>
Economic Benefits	<ul> <li>Lower construction and maintenance costs (largely due to reduced need for stormwater infrastructure)</li> <li>Potential for more buildable space to increase lot yields and community marketability</li> <li>Potential for reduced utility costs</li> <li>Potential for increased property value and tax revenue</li> </ul>
Sustainability Benefits (Adaptation to Climate Change)	<ul> <li>Reduced energy demand</li> <li>Water conservation</li> <li>Greenhouse gas reduction (carbon sequestration)</li> <li>Groundwater recharge through infiltration (geologic conditions permitting)</li> </ul>
Community Benefits	<ul> <li>Improved quality of life</li> <li>Enhanced aesthetics</li> <li>Expanded recreational opportunities and protection of recreational beneficial uses of waterways (e.g., fishing, swimming, boating)</li> <li>Heat island mitigation</li> <li>Improved public health</li> <li>Improved community livability with Green Infrastructure</li> </ul>

<sup>\*</sup>This is a brief summary; see Chapter 2 for a detailed discussion of the benefits.

### 1.3 SCOPE AND APPLICATION OF THE GUIDEBOOK

The Guidebook is a compilation of planning and design guidance for development and redevelopment projects in the High Sierra region of Placer County above 5,000 feet elevation (see Figure 1-1). While it is not specifically intended for use in other parts of the county - including the Placer County portion of the Lake Tahoe Basin or the west slope areas of the County below 5,000 feet- it will serve as a useful general reference for those areas. (In cases of conflict with other local requirements, the other requirements shall prevail). Also, during the development of the Guidebook, a pilot redevelopment project in the Tahoe Basin (Homewood) was selected and used by the Technical Advisory Team to apply, study and refine the various planning and design tools included in the Guidebook (Appendix B presents the results of the pilot study). This Guidebook is not intended to be an exhaustive resource on LID; other sources of information are listed in the References section and Appendix E.

#### 1.4 USING THE GUIDEBOOK

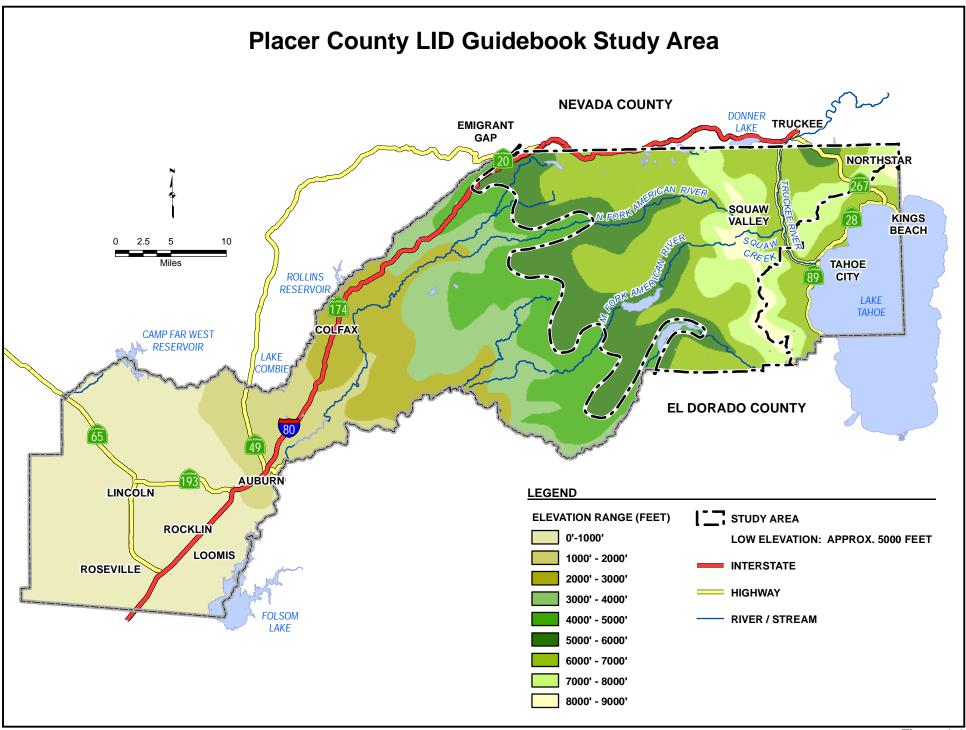
Placer County developed the LID Guidebook to promote and encourage the application of appropriate and cost effective LID principles and strategies to new and redevelopment projects in the Sierra Nevada. LID strategies are recommended (and in some areas, required) by federal and state regulatory agencies as an effective way to protect natural resources as communities develop. This holistic design approach is becoming more widespread throughout the country as communities strive to become more sustainable and satisfy environmental permit requirements.

The Guidebook provides planning and design guidance applicable to all scales and types of development

and redevelopment in Placer County. Though it can function as general guidance for any location, the Guidebook includes specific information applicable to the High Sierra elevations above 5,000 feet with snow and freeze/thaw conditions that can sometimes make use of LID challenging. Concepts and techniques are presented in a format that will facilitate dialogue among developers, engineers, designers, and regulatory agencies. The intent is to encourage integration of these strategies into site design at the earliest possible stage.



This Guidebook includes specific LID information for High Sierra elevations above 5,000 feet subject to snow and freeze/thaw conditions (Credit: University of Washington)



Regulatory agencies and local government agencies in California are encouraging LID design features as a means of reducing pollutants in urban runoff and reducing site runoff to maintain healthy receiving streams with optimal sediment balances. In some communities, State stormwater permits mandate that LID be required as a condition of development project approval; this will likely be the case in Placer County in the future. In fact, some of these techniques are already in use in the Lake Tahoe basin due to more stringent regulatory mandates related to reducing/infiltrating site runoff and preserving lake clarity. For projects in those areas, the Guidebook should be considered supplemental guidance and is not intended to supersede other adopted plans and requirements. In all cases, the project applicant should consult with the local permitting agency early in the design process.

#### 1.5 NEXT STEPS FOR IMPLEMENTING LID IN PLACER COUNTY

Creation of this Guidebook is considered the first of several steps necessary to support more widespread use of LID in Placer County in the future. It is anticipated that future NPDES stormwater permits and other environmental regulations will require LID implementation in the county, at least on new and redevelopment projects, as is the case in other California communities. When this happens, Placer County and other local municipalities will need to adopt policies, codes, ordinances, and development standards to address LID. The Guidebook was created in a modular format with stand-alone fact sheets and flow charts to provide flexibility in how the document can be used and to facilitate updating the document in the future in response to changes in State regulations. Placer County will be responsible for future updates.

As communities begin to plan more with watershed health in mind, many of our planning tools may need to be changed, refined or augmented to achieve the water protection that is vital to the future of our environment, our economy and our lives.

In many cases, these changes simply require looking back 100 years to the way our communities were originally constructed. Some of the fundamental characteristics that make small towns throughout the Sierra vital and coveted places to live and visit are the same characteristics that reduce the impact of development on water resources. Narrows streets, compact city centers and a mix of residential and commercial neighborhoods are examples of such qualities.

-Planning for Water-Wise Development in the Sierra, Local Government Commission and Sierra Nevada Alliance, 2008.

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