

Appendix I:

Additional LID Resources & Information

General Information About LID

The following websites are excellent sources of information about low impact development (LID) in general, and often serve as clearinghouses for LID knowledge, developments and issues. Some sites are focused on green infrastructure or stormwater best management practices (BMPs), which also apply to LID. Additionally, most the manuals and technical guides listed in the next section contain a wealth of low impact development information.

Low Impact Development Center— a non-profit organization dedicated to the advancement of Low Impact Development technology. Has a wealth of projects, research, publications and web links to pull from. <http://www.lowimpactdevelopment.org/>

U.S. Environmental Protection Agency

- *Low Impact Development (LID)*, <http://www.epa.gov/nps/lid/>
- *Managing Wet Weather with Green Infrastructure*, http://cfpub.epa.gov/npdes/home.cfm?program_id=298
- “Green Infrastructure Municipal Handbook,” <http://cfpub.epa.gov/npdes/greeninfrastructure/munichandbook.cfm>
- “Case Studies for Stormwater Management on Compacted, Contaminated Soils in Dense Urban Areas,” April 2008. <http://www.epa.gov/brownfields/publications/swcs0408.pdf>
- “Reduce Runoff: Slow It Down, Spread It Out, Soak It In,” online video. <http://www.epa.gov/owow/nps/lid/video.html>
- Green infrastructure photo gallery, by Abby Hall of the USEPA. <http://picasaweb.google.com/buildgreeninfrastructure>

The Conservation Fund, Green Infrastructure Program

- Green infrastructure website, <http://www.greeninfrastructure.net/>
- “Green Infrastructure: Smart Conservation for the 21st Century,” by Mark A. Benedict and Edward T. McMahon, <http://www.sprawlwatch.org/greeninfrastructure.pdf>

Natural Resources Defense Council— “Stormwater Strategies: Community Responses to Runoff Pollution,” Chapter 12, Low Impact Development. May 1999. <http://www.nrdc.org/water/pollution/storm/chap12.asp>

The Green Infrastructure Center— assists communities in developing strategies for protecting and conserving their ecological and cultural assets through environmentally-sensitive decisions planning. <http://www.gicinc.org/>

Center for Neighborhood Technology—website contains information on a number of green infrastructure projects. <http://www.cnt.org/natural-resources/>

Greenroofs.com— news portal that promotes green roofs. Has a significant green roofs project database. www.greenroofs.com

Manuals and Technical Guides

The following manuals and technical guides provide valuable information on how other cities approach low impact development and contain research on effective stormwater best management practices. Most of these publications also have introductory information about low impact development, green infrastructure and stormwater BMPs. Some also contain technical information on specific projects.

California

County of Los Angeles

- Green Building Program, <http://planning.lacounty.gov/green>
 - “Low Impact Development Standards Manual,” January 2009. http://planning.lacounty.gov/assets/upl/project/green_la-county-lid-manual.pdf
 - “Green Building and Sustainability Guidelines for the County of Los Angeles,” 2008 Edition. http://planning.lacounty.gov/assets/upl/project/green_20080507-rpc-attachment-6.pdf
 - “Drought-Tolerant Plant List,” http://planning.lacounty.gov/assets/upl/project/green_drought-tolerant-plants.pdf
- Department of Public Works
 - “Development Planning for Storm Water Management: A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP),” September 2002 Revision. http://ladpw.org/wmd/NPDES/table_contents.cfm
 - *Methodology For Prioritizing Structural BMP Implementation*, overview webpage. <http://ladpw.org/WMD/bmpmethod/overview.shtm>
 - “Los Angeles County-Wide Structural BMP Prioritization Methodology: A Guidance Manual for Strategic Storm Water Quality Project Planning,” 2006. <http://ladpw.org/WMD/bmpmethod/manual.shtm>
 - “Hydrology Manual,” January 2006. http://dpw.lacounty.gov/wrd/publication/engineering/2006_Hydrology_Manual/2006%20Hydrology%20Manual-Divided.pdf

City of Santa Monica— “Santa Monica Residential Green Building Guide.” http://greenbuildings.smgov.net/pdf/Residential_GB_Guidelines.pdf

TreePeople— “Rainwater as a Resource: A Report on Three Sites Demonstrating Sustainable Stormwater Management.” Description, cost assessments, maintenance schedules and schematics for three projects in Los Angeles. <http://www.treepeople.org/vfp.dll?OakTree~getPage~&PNPK=207>

City of Emeryville— “Stormwater Guidelines for Green, Dense Redevelopment,” December 2005. Department of Planning & Building. http://www.ci.emeryville.ca.us/planning/pdf/stormwater_guidelines.pdf

County of San Diego— “Low Impact Development Handbook: Stormwater Management Strategies,” December 31, 2007. Department of Planning and Land Use. <http://www.co.san-diego.ca.us/dplu/docs/LID-Handbook.pdf>

Other States / National

U.S. Environmental Protection Agency— “Storm Water Technology Fact Sheet—Vegetated Swales,” September 1999. <http://www.epa.gov/npdes/pubs/vegswale.pdf>

U.S. Department of Defense— “United Facilities Criteria (UFC): Low Impact Development,” October 25, 2004. http://www.wbdg.org/ccb/DOD/UFC/ufc_3_210_10.pdf

Prince George’s County (MD)— Department of Environmental Resources, Programs and Planning Division.

- “Low Impact Development Design Strategies: An Integrated Approach,” June 1999. www.lowimpactdevelopment.org/pubs/LID_National_Manual.pdf
- “Low-Impact Development Hydrologic Analysis,” July 1999. http://www.lowimpactdevelopment.org/pubs/LID_Hydrology_National_Manual.pdf

State of Maryland— *Maryland Stormwater Design Manual—Volumes I & II*, effective October 2000. Department of the Environment. http://www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/stormwater_design/index.asp

Puget Sound Area (WA)— “Low Impact Development: Technical Guidance Manual for Puget Sound,” January 2005. Puget Sound Action Team, Washington State University Pierce County Extension. www.psp.wa.gov/downloads/LID/LID_manual2005.pdf

City of Portland (OR)— “City of Portland Stormwater Management Manual,” Revision 4, July 1, 2008. Bureau of Environmental Services. <http://www.portlandonline.com/bes/index.cfm?c=47952&>

Fairfax County (VA)— “Fairfax County – LID BMP Fact Sheets” February 28, 2005. These fact sheets contain detailed information about the specific stormwater BMPs (purpose, costs, benefits, effectiveness, maintenance requirements, technical drawings, LEED credits, etc.). Includes bioretention systems, filtering technologies, permeable pavements, site design strategies, soil amendments, vegetative systems and water conservation measures. <http://www.lowimpactdevelopment.org/fairfax.htm>

City of Chicago (IL)—

- “The Chicago Green Alley Handbook.” http://egov.cityofchicago.org/webportal/COCWebPortal/COC_EDITORIAL/GreenAlleyHandbook.pdf
- “A Guide to Stormwater Best Management Practices: Chicago’s Water Agenda,” 2003. http://egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/GuideToStormwaterBMPs.pdf

State of Idaho— Department of Environmental Quality

- “Stormwater: Catalog of Stormwater BMPs for Idaho Cities and Counties,” September 2005. http://www.deq.state.id.us/water/data_reports/storm_water/catalog/
 - “Volume 3. Low Impact Development Techniques,” http://www.deq.state.id.us/water/data_reports/storm_water/catalog/vol_3.pdf

Implementing LID in Los Angeles

The following resources investigate important issues pertaining to the implementation of low impact development specifically in Los Angeles.

Community Conservancy International— “The Green Solutions Project” report, March 2008. Assesses the benefits of using LID on public lands in Los Angeles. <http://www.ccint.org/greensolution.html>

USC Center for Sustainable Cities— <http://college.usc.edu/geography/ESPE/>

- “Transforming Alleys into Green Infrastructure for Los Angeles,” June 2008. http://college.usc.edu/geography/ESPE/documents/alleyreport_final_reduced.pdf

Greenforall.com— “Job Implications in Los Angeles’ Green Building Sector,” by Signalle Rosner, May 2006. <http://www.greenforall.org/resources/job-implications-in-los-angeles-green-building>

Los Angeles & San Gabriel Rivers Watershed Council (LASGRWC)

- *L.A. Basin Water Augmentation Study*. The Groundwater Water Augmentation Model (GWAM) was developed by the U.S. Bureau of Reclamation and the LASGRWC for the Los Angeles Basin Water Augmentation Study. By performing a soil moisture accounting, the model provides an estimate of the amount of infiltration, runoff and deep percolation under current conditions and the potential for greater groundwater recharge if various capture strategies are implemented. <http://www.lasgrwc.org/WAS.htm>

City of Los Angeles—

- “Porous Pavement Report,” May 21, 2008. “CF: 05-0752 Alternative Street Surfacing Materials.” Interdepartmental correspondence, to: Energy and the Environment Committee, from: Department of Public Works and Environmental Affairs Department. http://www.lacity.org/ead/greenbuilding/eadgreenbuilding298555988_10022008.pdf
- *Elmer Avenue: A Model Stormwater Green Street*. Department of Public Works, Stormwater Program. http://www.sga-inc.net/BACKUP/LA_newsletter/Elmer_Avenue.html *Coming to a Neighborhood Near You - Disconnected Downspouts*. Department of Public Works, Stormwater Program. http://www.sga-inc.net/BACKUP/LA_newsletter/Coming_to_a_Neighborhood_Near_You.html

- “Los Angeles River Revitalization Master Plan,” April 2007. Bureau of Engineering. http://www.lariverrmp.org/CommunityOutreach/masterplan_download.htm
- “RIO Fact Sheet: River Improvement Overlay District,” July 2007. Department of City Planning. http://cityplanning.lacity.org/Code_Studies/Rioprotect/factsheet.pdf
- “Integrated Resources Plan (IRP): A New Strategy for LA’s Water Infrastructure—Information Sheet,” January 26, 2006. Department of Public Works, Bureau of Sanitation. <http://www.lacity.org/SAN/irp/documents/factsheet012006.pdf>

County of Los Angeles—

- “Los Angeles County BMP Effectiveness Study,” August 2005. Department of Public Works. http://dpw.lacounty.gov/wmd/NPDES/1994-05_report/Appendices/Appendix%20H-BMP%20Effectiveness.pdf
- “Watershed Management Techniques: Economic Valuation Model,” February 28, 2005. Report prepared by the Natelson Company, Inc. for the Department of Public Works, Watershed Management Division. Presents a methodology for cost-benefit analysis.

California State Water Resources Control Board— “A Review Of Low Impact Development Policies: Removing Institutional Barriers to Adoption,” December 2007. Prepared by the Low Impact Development Center. http://www.waterboards.ca.gov/water_issues/programs/low_impact_development/docs/ca_lid_policy_review.pdf

California Department of Water Resources— Office of Water Use and Efficiency Transfers.

- *Updated Model Water Efficient Landscape Ordinance AB 1881*, overview webpage. <http://www.owue.water.ca.gov/landscape/ord/updatedOrd.cfm/>
- “Modified Text of Proposed Regulation,” California Code of Regulations, Title 23, Sections 490 - 495 regarding the Model Water Efficient Landscape Ordinance. November 26, 2008. http://www.owue.water.ca.gov/docs/Modified_Text_of_Proposed_Regulation.pdf

Evaluating the Effectiveness of LID

Reports and articles regarding the effectiveness of LID for controlling water flows and mitigating pollution levels. Some of these are case studies that included monitoring and evaluation.

County of Los Angeles— “Los Angeles County BMP Effectiveness Study,” August 2005. Department of Public Works. http://dpw.lacounty.gov/wmd/NPDES/1994-05_report/Appendices/Appendix%20H-BMP%20Effectiveness.pdf

Los Angeles & San Gabriel Rivers Watershed Council (LASGRWC)— *L.A. Basin Water Augmentation Study*. The Groundwater Water Augmentation Model (GWAM) was developed by the U.S. Bureau of Reclamation and the LASGRWC for the Los Angeles Basin Water Augmentation Study. By performing a soil moisture accounting, the model provides an estimate of the amount of infiltration, runoff and deep percolation under current conditions and the potential for greater groundwater recharge if various capture strategies are implemented. <http://www.lasgrwc.org/WAS.htm>

U.S. Environmental Protection Agency— “Urban Stormwater BMP Performance Monitoring: A Guidance Manual for Meeting the National Stormwater BMP Database Requirements,” April 25, 2002. <http://www.epa.gov/guide/stormwater/files/montch1and2.pdf>

City of Portland (OR)— “Flow Test Report: Siskiyou Curb Extension, August 4th 2004.” Bureau of Environmental Services. <http://www.portlandonline.com/shared/cfm/image.cfm?id=63097>

Prince George’s County (MD)— “Final Technical Report: Pilot Projects for LID Urban Retrofit Program in the Anacostia River Watershed, Phase III,” December 30, 2006. Department of Environmental Resources. http://www.co.pg.md.us/Government/AgencyIndex/DER/ESG/pdf/Final%20Technical%20Report_Phase%20III.pdf

Costs of Implementing LID & Funding Strategies

The reports, articles and web pages listed below analyze the economic costs and benefits of LID projects and programs. They also contain strategies for funding LID efforts.

California

County of Los Angeles— “Watershed Management Techniques: Economic Valuation Model,” February 28, 2005. Report prepared by the Natelson Company, Inc. for the Department of Public Works, Watershed Management Division. Presents a methodology for cost-benefit analysis.

UC Riverside, Department of Environmental Sciences—

- “Costs and Infiltration Benefits of the Watershed Augmentation Study Sites,” by Autumn DeWoody, W. Bowman Cutter, David Crohn. April 17, 2006. Five non-residential land uses located in Los Angeles County were equipped with infiltration BMPs. Study estimated the groundwater recharge benefits relative to total costs. http://www.lasgrwc.org/WAS/Documents/UCR_LASGRWC_041806.pdf
- “Capturing Urban Stormwater Runoff: A Decentralized Market-Based Alternative,” by Kenneth A. Baerenklau, W. Bowman Cutter, Autumn DeWoody, Ritu Sharma, and Joong Gwang Lee. *Policy Matters*, Volume 2, Issue 3. Fall 2008. Investigates the cost-effectiveness of implementing parcel-level BMPs in a Los Angeles area watershed using competitive bidding. <http://policymatters.ucr.edu/pmatters-vol2-3-water.pdf>
- “Costs and Benefits of Capturing Urban Runoff With Competitive Bidding for Decentralized Best Management Practices,” by W. Bowman Cutter, Kenneth A. Baerenklau, Autumn DeWoody, Ritu Sharma, and Joong Gwang Lee. *WaterResources Research*, September 6, 2008. Investigates the cost effectiveness of implementing BMPs in a Los Angeles area watershed with two voluntary incentive mechanisms: competitive bidding and a fixed subsidy. <http://www.agu.org/pubs/crossref/2008/2007WR006343.shtml>

Kolozsvari, Douglas and Donald Shoup— (2003). *Turning Small Change Into Big Changes*. Article about parking increment financing. <http://www.walkablestreets.com/meter.htm>

Institute For Local Government— (2005) *Funding Open Space Acquisition Programs: A Guide for Local Agencies in California*, “Chapter 8: Creating Benefit Assessment Districts.” http://www.cacities.org/resource_files/23925.ILG_OpenSpace_Ch8.pdf

City and County of San Francisco—*Press Room: Press Release*. “Mayor Newsom Unveils First-Ever City Carbon Offsets to Fight Global Warming,” December 18, 2007. http://sfgov.org/site/mayor_index.asp?id=72509

Other States/National

U.S. Environmental Protection Agency

- *Fact Sheet: Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices*, December 2007. <http://www.epa.gov/owow/nps/lid/costs07/factsheet.html>
- “Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices,” December 2007. EPA Document #EPA 841-F-07-006. <http://www.epa.gov/owow/nps/lid/costs07/documents/reducingstormwatercosts.pdf>
- “Managing Wet Weather with Green Infrastructure: Municipal Handbook - Funding Options.” 2008. http://www.epa.gov/npdes/pubs/gi_munichandbook_funding.pdf

Keely, Melissa— “Using Individual Parcel Assessments to Improve Stormwater Management.” *Journal of the American Planning Association*, Vol. 73, No. 2, Spring 2007.

The Trust For Public Land— *Benefit Assessment Districts*. How benefit assessment districts can be used for conservation finance. http://www.tpl.org/tier3_cd.cfm?content_item_id=1058&folder_id=825

ECONorthwest— “The Economics of Low Impact Development: A Literature Review,” November 2007. http://www.econw.com/reports/ECONorthwest_Low-Impact-Development-Economics-Literature-Review.pdf

City of Seattle (WA)— *Drainage Rate Schedule*. Stormwater drainage fees for 2009. http://www.ci.seattle.wa.us/util/Services/Drainage_&_Sewer/Rates/DrainageRates/RateSchedule/index.htm

City of Minneapolis (MN)— *Stormwater Utility Fee: Frequently Asked Questions*.
http://www.ci.minneapolis.mn.us/stormwater/fee/stormwater_faq.asp

City of Portland (OR)— *1% for Green* funding program. Portland Bureau of Environmental Sciences.
<http://www.portlandonline.com/bes/index.cfm?c=48702&>

Colorado Carbon Fund— *Project C: We Have The Power*. Website for the State of Colorado’s carbon offset sales program.
<http://www.coloradocarbonfund.org/>

LID-Related Performance & Rating Systems

The following websites and article highlight rating systems that were created or are in development to help implement LID and green infrastructure practices in a systematic way.

U.S. Green Building Council— LEED (Leadership in Energy and Environmental Design) green building rating system.
<http://www.usgbc.org/DisplayPage.aspx?CategoryID=19>

Sustainable Sites— a system proposed by landscape architects to certify the ecological design of outdoor spaces, separate from buildings. www.sustainable-sites.org

City of Seattle (WA)— *Seattle Green Factor: What is the Seattle Green Factor?* Department of Planning & Development.
<http://seattle.gov/dpd/permits/greenfactor/Overview/>

Keely, Melissa— “Using Individual Parcel Assessments to Improve Stormwater Management.” *Journal of the American Planning Association*, Vol. 73, No. 2, Spring 2007. Article discusses the Green Area Ratio as a way to assess how “green” properties are.

Examples of LID Programs & Projects

Listed below are links to low impact development programs and projects happening in other cities. The earlier section on “Manuals and Technical Guides” and the items featured in Appendix II also contain references to programs in other cities.

Wise, Steve— “Green Infrastructure Rising: Best Practices in Stormwater Management.” *Planning*, the magazine of the American Planning Association. August/September 2008. Pages 14-19. Article describes a wide variety of projects from around the United States.

County of Los Angeles— Green Building Program, Department of Regional Planning. <http://planning.lacounty.gov/green>

City of Santa Monica— Energy & Green Building Programs. <http://greenbuildings.smgov.net/index.html>

Village Homes (Davis, CA)— *About Village Homes*. <http://www.villagehomesdavis.org/public/about>

City of Portland (OR)—

- *A Sustainable Approach to Stormwater Management*, <http://www.portlandonline.com/bes/index.cfm?c=34598>
- “NE Siskiyou Green Street Project: Project Summary,” April 2005. Bureau of Environmental Services. <http://www.portlandonline.com/bes/index.cfm?a=78299&c=45386>
- *Hyperlocalizing Hydrology in the Post-Industrial Urban Landscape*. February 18, 2008. An independent blog that features excellent photos of the NE Siskiyou Street project. <http://pruned.blogspot.com/2008/02/hyperlocalizing-hydrology-in-post.html>

City of Seattle (WA)— *Street Edge Alternatives (SEA Streets) Project*. Public Utilities Commission.
http://www.seattle.gov/UTIL/About_SPU/Drainage_&_Sewer_System/Natural_Drainage_Systems/Street_Edge_Alternatives/index.asp

City of Chicago (IL)— Green Alleys program, Department of Transportation.
http://egov.cityofchicago.org/city/webportal/portalContentItemAction.do?BV_SessionID=@@@@1030171822.1233726916@@@@&BV_EngineID=cccdadeggjimijcefecelldffhdfhm.0&contentOID=536946345&contentType=COC_EDITORIAL&topChannelName=Dept&blockName=Transportation%2FGreen+Alleys%2FI+Want+To&context=dept&channelId=0&programId=0&entityName=Transportation&deptMainCategoryOID=-536883915

City of Boston (MA)— *Low Impact Development Tool Kit*. Boston Metropolitan Area Planning Council.
<http://www.mapc.org/LID.html>

City of Vancouver (Canada)—

- Green Streets Program, Department of Engineering Services.
<http://vancouver.ca/engsvcs/streets/greenstreets/index.htm>
- Sustainable Streets and “Country Lanes” programs, Department of Engineering Services.
<http://vancouver.ca/ENGsvcs/streets/design/enviro.htm>
- *Streets: Environmentally Sustainable Options*. Department of Engineering Services.
<http://vancouver.ca/ENGsvcs/streets/design/enviro.htm>
- Green Streets and Adopt-A-Street Garden programs, <http://vancouver.ca/engsvcs/streets/greenstreets/index.htm>