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Summary of the Washington Department of Ecology (WDOE)  
Six Step Process for Integrating LID Code Revision

<b>STEP 1: Who</b>		<b>Assemble the Project Team</b>
February 2014	Completed	
<b>STEP 2: What</b>		<b>Understand General Topics to Address</b>
April 2014	Completed	
<b>STEP 3: Where</b>		<b>Review Existing Codes and Standards</b>
May 2014	Completed	
<b>STEP 4: Fill the Gaps</b>		<b>Amend Existing Codes and Propose New Technical Committee Involvement</b>
June 2014 – February 2015	Underway	
<b>STEP 5: Review &amp; Adopt</b>		<b>Public Review and Adoption Process</b>
March 2015 – December 2015	Open House	
<b>STEP 6: Implement</b>		<b>Ensure Successful Implementation</b>
2016		

# Summary of the Washington Department of Ecology (WDOE) Six Step Process for Integrating LID Code Revision

How to Use the Guidebook:

THE SECTIONS ARE ORGANIZED AS FOLLOWS:



## WHY LID?

### Why Integrate LID into Codes?

Explains the reasons behind integrating LID into local codes and standards.



## STEP 1 (WHO):

### Assemble the Project Team

Discusses *Who* needs to be included to make the project team comprehensive, such as key internal participants and potential key external parties who need to be brought into this process.

## STEP 2 (WHAT):

### Understand General Topics to Address

Links the *Who* in Step 1 to the *Where* in Step 3 and identifies the topics to be addressed.

## STEP 3 (WHERE):

### Review Existing Codes and Standards

Identifies *Where* general LID topics are found in codes and standards, and how to perform a gap analysis to determine where changes are needed.

## STEP 4 (FILL THE GAPS):

### Amend Existing Codes and Develop New Codes

Describes the site analysis process and explains how to translate that process into codes and standards by *Filling the Gaps* in existing codes and standards or presenting recommendations for new codes and standards.

## STEP 5 (REVIEW & ADOPT):

### Public Review and Adoption Process

Explains the importance of identifying and engaging stakeholders early in the *Public Review and Adoption Process*, presents an overview of the code modification process, and reviews the timing and steps in the public review process.

## STEP 6 (IMPLEMENT):

### Ensure Successful Implementation

Discusses how to *Implement the Changes* successfully through permit review procedures, ongoing training and education, establishing maintenance procedures for LID facilities, and enforcement.



## APPENDIX

The Appendix provides citations to additional information on LID and links to websites.



## Why are we updating codes and standards for LID?

Stormwater runoff has been found to be a leading contributor of pollution to Puget Sound. Low impact development (LID) has been identified as an approach to site development that can help minimize the effects of development on the health of the environment. Acknowledging this, the Washington Department of Ecology recently included provisions in the 2013-2018 *Western Washington Phase II Municipal Stormwater Permit* that require revisions to the City's codes and standards to make low impact development the "preferred and commonly-used approach to site development".

## What does the project include?

The revisions need to be designed to minimize impervious surfaces, native vegetation loss, and stormwater runoff in all types of development situations and will have some impact on most every City line of business. Specifically, by December 2016, the permit will require the City to:

1. Review, revise and make effective local development-related codes, rules, standards, or other enforceable documents to incorporate and require LID principles and LID best management practices (BMPs).
2. Adopt a drainage manual equivalent to Ecology's 2012 Stormwater Management Manual for Western Washington.

*Low Impact Development is a stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation, and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design.*

## How will the code updates be accomplished?

The Permit specifies that the code evaluations and process should be consistent with the guidance document prepared by Puget Sound Partnership titled *Integrating LID into Local Codes: A Guidebook for Local Governments*. The guidebook outlines a six step code revision process that begins with choosing a project team, continues through a comprehensive code analysis and revisions, and ends with adoption (Attachment A). In order for the code update project to be successful, the team should be comprehensive and inclusive of all affected City departments. This approach ensures that the expertise of individual departments is sought early in the process, before moving forward to the review, adoption, and implementation phases.

Water Resources staff proposes to take the lead in drafting code and standard revisions. A broad cross-section of codes and standards will be affected by the incorporation of LID principals and best management practices and input and direction from various departments and lines of business will be required. The project team will meet monthly to discuss example code language, identify possible code or policy conflicts and determine proposed draft language. Training will be provided to bring the project team up to a common level of understanding about LID approaches and techniques. Water Resources

staff will develop appropriate training for the project team.

**How will the public be involved?**

Throughout the code revision drafting and public review process, staff will develop periodic project updates to communicate the project’s progress to interested parties. The e-updates will be used in conjunction with a project website to provide the public access to project news, draft code language, LID research, and the ability to share their thoughts via email to staff and sign-up for the project newsletters.

A technical committee comprised of local development experts will review and critique staff recommendations for code revisions. After draft code and standard revisions is developed, staff will hold an Open House. The Open House will provide an opportunity for members of the public to ask questions, express concerns, react to what is being proposed, and make suggestions to the technical experts.

Following the Open House, the Utility Advisory Committee will review the draft revisions and make suggestions. After incorporating all necessary revisions, a Recommended Draft will be forwarded to the Planning Commission for public hearing, deliberations and their recommendation to City Council. City Council will likely hold an additional public hearing and ultimately pass revised codes and standards for LID.

**What is the timeline for this project?**

The Phase II permit mandates that all codes and standards are updated for LID by December 2016. However, the City plans to complete the revisions by the end of 2015.

Low Impact Development Code Revisions-  
Project Schedule and Outreach

Project Steps	2014												2015												2016			
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN			
1. Assemble Project Team	█																											
2. Understand General Topics to Address				█																								
3. Review Existing Codes and Standards					█																							
4. Amend Existing Codes and Develop New Codes						█																						
5. Public Review & Adoption Process																█												
6. Ensure Successful Implementation																									ongoing			

Outreach Tools

Project Webpage							●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Project e-newsletter										●			●		●		●		●		●		●		●
Utility Bill Insert								●									●		●		●				
Technical Workgroup									●				●		●										
Project Display- Second Floor Permitting Area														●	●	●	●	●	●	●	●	●	●	●	●
Open House/Symposium																		●							
Utility Advisory Committee		●											●	●	●	●	●	●	●						
Planning Commission						●							●					●	●	●					
City Council						●				●				●					●	●	●				

Citywide ●  
 Technical Reviewers ●  
 Interested Parties ●  
 Decision-makers & Advisory Committees ●  
 (version 12/29/14)

## Low Impact Development – Issues and Regulatory Changes

Issue	Potential Regulatory Changes	Code
Stormwater Management	<ul style="list-style-type: none"> <li>▪ “Make LID the preferred and commonly used approach to site development”</li> </ul>	DDECM
Landscaping, Native Vegetation and Street Landscaping	<ul style="list-style-type: none"> <li>▪ Retain existing native vegetation</li> <li>▪ Emphasize use of native plant species</li> <li>▪ Modify tree tract requirements to include retaining native vegetation and soil</li> <li>▪ Develop landscape standards compatible with bioretention facilities</li> <li>▪ Establish right-of-way maintenance responsibilities</li> </ul>	OMC 18.36 OMC 16.60 OMC 16.54
Impervious Surface Standards	<ul style="list-style-type: none"> <li>▪ Reduce impervious surfaces</li> <li>▪ Require the equivalent of permeable pavements for all paved surfaces excluding arterial and collector roadways</li> <li>▪ Adopt permeable pavement standards</li> <li>▪ Define “impervious surface” consistently throughout codes</li> </ul>	OMC EDDS DDECM GSP
Bulk and Dimensional Standards (Heights and Setbacks)	<ul style="list-style-type: none"> <li>▪ Reduce maximum impervious lot coverage</li> <li>▪ Allow increased building heights and reduced setbacks to meet LID standards</li> <li>▪ Allow greater flexibility to allow LID</li> <li>▪ Allow LID best management practices within setbacks</li> <li>▪ Consider increased densities in appropriate locations</li> </ul>	OMC 18
Street Standards (widths, block spacing, permeable pavements)	<ul style="list-style-type: none"> <li>▪ Reduce street widths and cul-de-sac footprints</li> <li>▪ Reduce block spacing</li> <li>▪ Consider sidewalks on only one side</li> <li>▪ Adopt permeable pavement standards</li> <li>▪ Adopt bioretention (ditch) standards</li> <li>▪ Allow shared driveways</li> </ul>	EDDS Ch 4
Parking Standards	<ul style="list-style-type: none"> <li>▪ Consider fewer, smaller parking spaces</li> <li>▪ Allow flexibility in parking requirements</li> <li>▪ Require permeable surfacing</li> </ul>	OMC 18.38
Subdivision Standards	<ul style="list-style-type: none"> <li>▪ Require open space/native vegetation retention</li> <li>▪ Require LID site analysis</li> <li>▪ Establish plat restrictions to protect tree tracts and LID best management practices</li> </ul>	OMC 17
Site Plan Review	<ul style="list-style-type: none"> <li>▪ Require that a LID site analysis be performed</li> <li>▪ Establish submittal standards to demonstrate LID compliance</li> </ul>	EDDS DDECM
Clearing and Grading	<ul style="list-style-type: none"> <li>▪ Protect subsurface hydrologic function by retaining more native soil</li> <li>▪ Reduce site clearing and soil compaction</li> <li>▪ Reduce cuts and fills</li> <li>▪ Conform development (roadways and foundations) to terrain</li> </ul>	OMC 16.48 OMC <i>new</i>
Building Standards	<ul style="list-style-type: none"> <li>▪ Encourage use of vegetated roofs, rainwater harvesting and minimum excavation foundations</li> </ul>	IBC

### References

OMC	Olympia Municipal Code
EDDS	Engineering Design and Development Standards
DDECM	Drainage Design and Erosion Control Manual for Olympia
GSP	General Special Provisions
IBC	International Building Code

## ***Bioretention Infeasibility Criteria:***

The following criteria describe conditions that make bioretention or rain gardens not required. If a project proponent wishes to use a bioretention or rain garden BMP though not required to because of these feasibility criteria, they may propose a functional design to the local government.

Note: Criteria with setback distances are as measured from the bottom edge of the bioretention soil mix.

Citation of any of the following infeasibility criteria must be based on an evaluation of site-specific conditions and a written recommendation from an appropriate licensed professional (e.g., engineer, geologist, hydrogeologist):

- Where professional geotechnical evaluation recommends infiltration not be used due to reasonable concerns about erosion, slope failure, or down gradient flooding.
- Within an area whose ground water drains into an erosion hazard, or landslide hazard area.
- Where the only area available for siting would threaten the safety or reliability of pre-existing underground utilities, pre-existing underground storage tanks, pre-existing structures, or pre-existing road or parking lot surfaces.
- Where the only area available for siting does not allow for a safe overflow pathway to the municipal separate storm sewer system or private storm sewer system.
- Where there is a lack of usable space for rain garden/bioretention facilities at re-development sites, or where there is insufficient space within the existing public right-of-way on public road projects.
- Where infiltrating water would threaten existing below grade basements.
- Where infiltrating water would threaten shoreline structures such as bulkheads.

The following criteria can be cited as reasons for a finding of infeasibility without further justification (though some require professional services):

- Within setbacks from structures as established by the local government with jurisdiction.
- Where they are not compatible with surrounding drainage system as determined by the local government with jurisdiction (e.g., project drains to an existing stormwater collection system whose elevation or location precludes connection to a properly functioning bioretention facility).
- Where land for bioretention is within area designated as an erosion hazard, or landslide hazard.
- Where the site cannot be reasonably designed to locate bioretention facilities on slopes less than 8%.
- Within 50 feet from the top of slopes that are greater than 20% and over 10 feet of vertical relief.
- For properties with known soil or ground water contamination (typically federal Superfund sites or state cleanup sites under the Model Toxics Control Act (MTCA)):
  - Within 100 feet of an area known to have deep soil contamination;
  - Where ground water modeling indicates infiltration will likely increase or change the direction of the migration of pollutants in the ground water;
  - Wherever surface soils have been found to be contaminated unless those soils are removed within 10 horizontal feet from the infiltration area;
  - Any area where these facilities are prohibited by an approved cleanup plan under the state Model Toxics Control Act or Federal Superfund Law, or an environmental covenant under Chapter 64.70 RCW.
- Within 100 feet of a closed or active landfill.



### ***Bioretention Infeasibility Criteria:***

- Within 100 feet of a drinking water well, or a spring used for drinking water supply.
- Within 10 feet of small on-site sewage disposal drainfield, including reserve areas, and grey water reuse systems. For setbacks from a “large on-site sewage disposal system”, see Chapter 246-272B WAC.
- Within 10 feet of an underground storage tank and connecting underground pipes when the capacity of the tank and pipe system is 1100 gallons or less. (As used in these criteria, an underground storage tank means any tank used to store petroleum products, chemicals, or liquid hazardous wastes of which 10% or more of the storage volume (including volume in the connecting piping system) is beneath the ground surface.
- Within 100 feet of an underground storage tank and connecting underground pipes when the capacity of the tank and pipe system is greater than 1100 gallons.
- Where the minimum vertical separation of 1 foot to the seasonal high water table, bedrock, or other impervious layer would not be achieved below bioretention or rain gardens that would serve a drainage area that is: 1) less than 5,000 sq. ft. of pollution-generating impervious surface, and 2) less than 10,000 sq. ft. of impervious surface; and, 3) less than ¾ acres of pervious surface.
- Where the a minimum vertical separation of 3 feet to the seasonal high water table, bedrock or other impervious layer would not be achieved below bioretention that: 1) would serve a drainage area that meets or exceeds: a) 5,000 square feet of pollution-generating impervious surface, or b) 10,000 square feet of impervious surface, or c) three-quarter (3/4) acres of pervious surfaces; and 2) cannot reasonably be broken down into amounts smaller than indicated in (1).
- Where the field testing indicates potential bioretention/rain garden sites have a measured (a.k.a., initial) native soil saturated hydraulic conductivity less than 0.30 inches per hour. If the measured native soil infiltration rate is less than 0.30 in/hour, this option should not be used to meet the requirements of MR#5. In these slow draining soils, a bioretention facility with an underdrain may be used to treat pollution- generating surfaces to help meet Minimum Requirement #6, Runoff Treatment. If the underdrain is elevated within a base course of gravel, the bioretention facilityit will also provide some modest flow reduction benefit that will help achieve Minimum Requirement #7.

## ***Permeable Pavement Infeasibility Criteria:***

These are conditions that make permeable pavement not required. If a project proponent wishes to use permeable pavement - though not required to because of these feasibility criteria - they may propose a functional design to the local government.

These criteria also apply to impervious pavements that would employ stormwater collection from the surface of impervious pavement with redistribution below the pavement.

Citation of any of the following infeasibility criteria must be based on an evaluation of site-specific conditions and a written recommendation from an appropriate licensed professional (e.g, engineer, geologist, hydrogeologist)

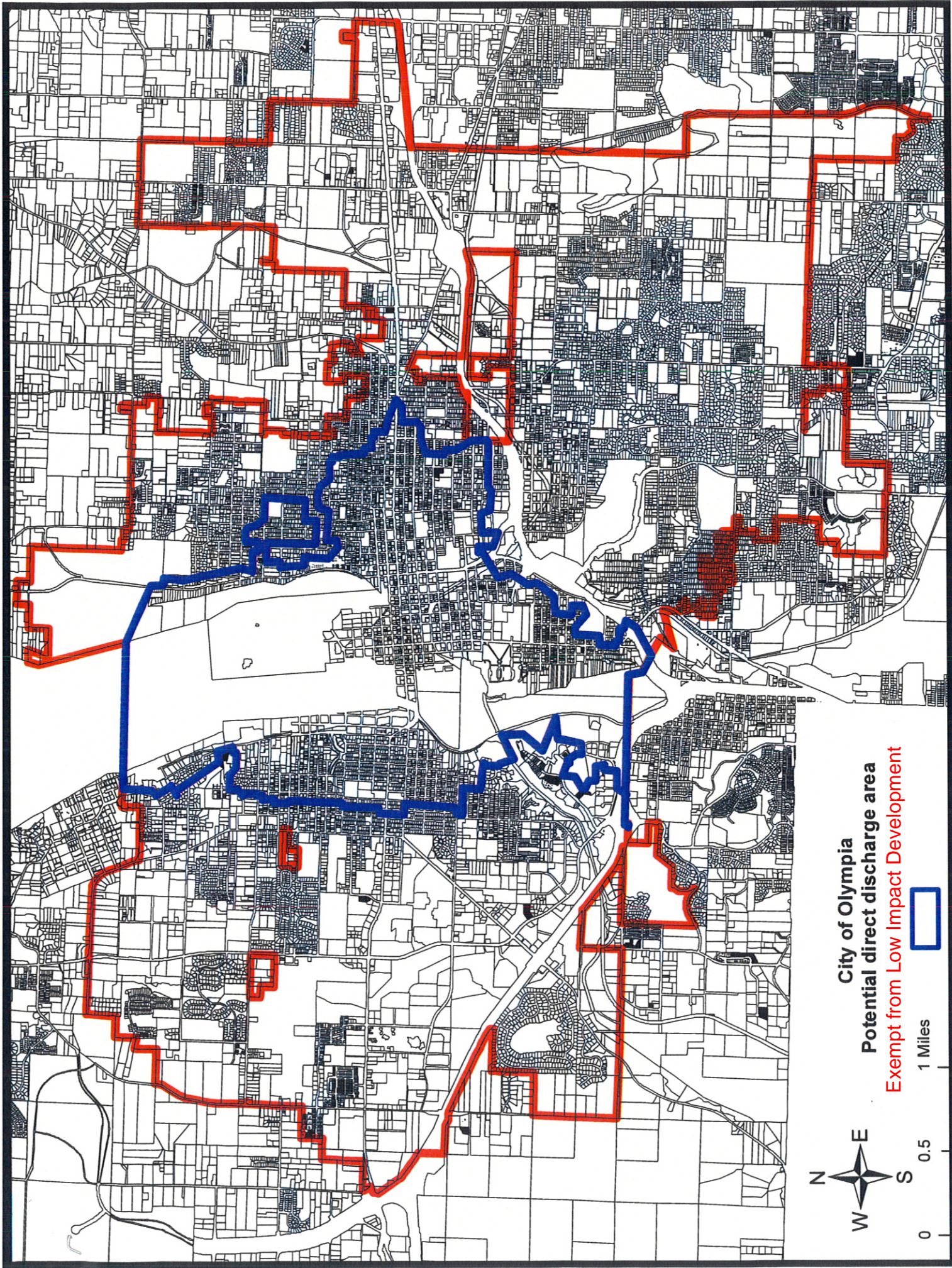
- Where professional geotechnical evaluation recommends infiltration not be used due to reasonable concerns about erosion, slope failure, or down gradient flooding.
- Within an area whose ground water drains into an erosion hazard, or landslide hazard area.
- Where infiltrating and ponded water below new permeable pavement area would compromise adjacent impervious pavements.
- Where infiltrating water below a new permeable pavement area would threaten existing below grade basements.
- Where infiltrating water would threaten shoreline structures such as bulkheads.
- Down slope of steep, erosion prone areas that are likely to deliver sediment.
- Where fill soils are used that can become unstable when saturated.
- Excessively steep slopes where water within the aggregate base layer or at the sub-grade surface cannot be controlled by detention structures and may cause erosion and structural failure, or where surface runoff velocities may preclude adequate infiltration at the pavement surface.
- Where permeable pavements cannot provide sufficient strength to support heavy loads at industrial facilities such as ports.
- Where installation of permeable pavement would threaten the safety or reliability of pre-existing underground utilities, pre-existing underground storage tanks, or pre-existing road sub-grades.

The following criteria can be cited as reasons for a finding of infeasibility without further justification (though some require professional services to make the observation):

- Within an area designated as an erosion hazard, or landslide hazard.
- Within 50 feet from the top of slopes that are greater than 20%.
- For properties with known soil or ground water contamination (typically federal Superfund sites or state cleanup sites under the Model Toxics Control Act (MTCA)):
- Within 100 feet of an area known to have deep soil contamination;
- Where ground water modeling indicates infiltration will likely increase or change the direction of the migration of pollutants in the ground water;
- Wherever surface soils have been found to be contaminated unless those soils are removed within 10 horizontal feet from the infiltration area;
- Any area where these facilities are prohibited by an approved cleanup plan under the state Model Toxics Control Act or Federal Superfund Law, or an environmental covenant under Chapter 64.70 RCW.
- Within 100 feet of a closed or active landfill.

## ***Permeable Pavement Infeasibility Criteria:***

- Within 100 feet of a drinking water well, or a spring used for drinking water supply, if the pavement is a pollution-generating surface.
- Within 10 feet of a small on-site sewage disposal drainfield, including reserve areas, and grey water reuse systems. For setbacks from a “large on-site sewage disposal system”, see Chapter 246-272B WAC.
- Within 10 feet of any underground storage tank and connecting underground pipes, regardless of tank size. As used in these criteria, an underground storage tank means any tank used to store petroleum products, chemicals, or liquid hazardous wastes of which 10% or more of the storage volume (including volume in the connecting piping system) is beneath the ground surface.
- At multi-level parking garages, and over culverts and bridges.
- Where the site design cannot avoid putting pavement in areas likely to have long-term excessive sediment deposition after construction (e.g., construction and landscaping material yards).
- Where the site cannot reasonably be designed to have a porous asphalt surface at less than 5 percent slope, or a pervious concrete surface at less than 10 percent slope, or a permeable interlocking concrete pavement surface (where appropriate) at less than 12 percent slope. Grid systems upper slope limit can range from 6 to 12 percent; check with manufacturer and local supplier.
- Where the native soils below a pollution-generating permeable pavement (e.g., road or parking lot) do not meet the soil suitability criteria for providing treatment. See SSC-6 in Section 3.3.7 of Volume III. Note: In these instances, the local government has the option of requiring a six-inch layer of media meeting the soil suitability criteria or the sand filter specification as a condition of construction.
- Where seasonal high ground water or an underlying impermeable/low permeable layer would create saturated conditions within one foot of the bottom of the lowest gravel base course.
- Where underlying soils are unsuitable for supporting traffic loads when saturated. Soils meeting a California Bearing Ratio of 5% are considered suitable for residential access roads.
- Where appropriate field testing indicates soils have a measured (a.k.a., initial) native soil saturated hydraulic conductivity less than 0.3 inches per hour. (Note: In these instances, unless other infeasibility restrictions apply, roads and parking lots may be built with an underdrain, preferably elevated within the base course, if flow control benefits are desired.)
- Roads and areas that bear more than very low traffic volumes or very low truck traffic. Roads classified as arterial or collector (See RCW 35.78.010, RCW 36.86.070, RCW 47.05.021, and the WSDOT Functional Classification Map) generally receive more than very low traffic volumes or very low truck traffic. Residential access roads generally receive only very low traffic volume and very low truck traffic. Note: This infeasibility criterion does not extend to sidewalks and other non-traffic bearing surfaces.
- Where replacing existing impervious surfaces unless the existing surface is a non-pollution generating surface over an outwash soil with a saturated hydraulic conductivity of four inches per hour or greater.
- At sites defined as “high use sites” in Volume I of the this manual.
- In areas with “industrial activity” as identified in 40 CFR 122.26(b)(14).
- Where the risk of concentrated pollutant spills is more likely such as gas stations, truck stops, and industrial chemical storage sites.
- Where routine, heavy applications of sand occur in frequent snow zones to maintain traction during weeks of snow and ice accumulation.



City of Olympia

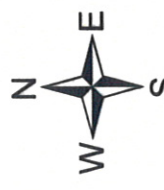
Potential direct discharge area  
Exempt from Low Impact Development



1 Miles

0.5

0



Low Impact Development Elements and Issue Papers

LID Element	Objective	Preliminary Staff Recommendations
1-Definitions	Make definitions of low impact development, impermeable areas, etc. consistent throughout regulations.	Revise all codes and standards to make definitions consistent in regards to low impact development. Use definitions from the 2012 SWMMWW as the standard.
2-Adopt new Drainage Design and Erosion Control Manual	Adopt a drainage manual equivalent to the 2012 Stormwater Management Manual for Western Washington to provide the guidance for implementation of LID regulations.	Revise the DDECM to integrate the new requirements of the 2012 SWMMWW and extend revisions to include key issues requiring correction or clarification.
3-Minimize site disturbance	Preserve a site’s natural hydrology by minimizing soil compaction and disturbances to existing vegetation and habitat.	Minimize site clearing and grading to that necessary for development.
4-Retain and Plant Native Vegetation	Provide flow control via interception, transpiration, and increased infiltration. Additional environmental benefits include improved air quality, carbon sequestration, reduced heat island effect, pollutant removal, and habitat preservation or formation.	Staff recommends that ‘native vegetation’ encompass those species that occur naturally, but also those that are well adapted to current and anticipated environmental conditions. All landscaped and open space areas including multifamily and some commercial development be preserved or planted with native vegetation.
5-Disconnect impervious surfaces on a site	Allow rainfall to infiltrate on site rather than be conveyed as runoff to a centralized location for management, reduce heat island effects.	Use all open space to accommodate stormwater. In large developments this will result in dispersed stormwater management.

Low Impact Development Elements and Issue Papers

LID Element	Objective	Preliminary Staff Recommendations
6-Bioretenion street section	Improve infiltration and pollution removal	Develop bioretention street sections with maximum swale widths. Use on one side for local access; two sides for arterials and collectors; and in the median for collector boulevards. Limit swales to established width and those locations deemed feasible by Ecology standards.
7-Stormwater use of landscaping	Increase infiltration in landscaped areas, particularly in parking lots.	Integrate stormwater management into the design of parking lots rather than as an 'add on' feature.
8-Downspout infiltration systems	Improve infiltration through use of infiltration trenches and rain gardens.	Adopt roof downspout controls equivalent to those required in the 2012 Stormwater Management Manual for Western Washington.
9-Zoning District Bulk and Dimension Standards (clustering)	Utilize flexibility for setbacks and heights, and allow clustering of buildings and minimizing building footprints as an approach to maintain natural hydrologic functions and native vegetation. Increased residential densities may be offered in exchange for reducing impervious surfaces or managing stormwater on-site beyond what is required.	Provide opportunities for demonstration or experimental development forms that if successful could form the foundation for community acceptance and later standard requirements. Eliminate a detached housing form – the 3' sideyard – that has generated solid waste, utility access, drainage and other design problems.
10-Restrict maximum impervious surface coverage	Reduce the amount of impervious surface on a lot.	Decrease maximum impervious surfaces (and commensurate maximum building area if necessary) to remove 'excess' impervious surfaces and reduce total townhome coverage to same limit as other housing in the zoning district.

Low Impact Development Elements and Issue Papers

LID Element	Objective	Preliminary Staff Recommendations
11-Minimize size and use of cul-de-sacs	Reduce impervious surface	Revise Engineering Design and Development Standards to maintain existing cul-de-sac radius size but increase the radius (to be determined) of the center traffic island with trees, landscaping ground cover or low growing plants. Allow flexibility for the center traffic island to be utilized as a bio-retention stormwater treatment area if low impact development standards cannot be achieved. Use permeable pavement where feasible.
12-Minimize street widths	Reduce impervious surface	Current standards are already consistent with LID; further revision not advised.
13-Increase street block spacing	Reduce impervious surface	Multimodal transportation benefits outweigh stormwater benefits, therefore larger block perimeters are not recommended.
14-Require sidewalks on only one side of the street where appropriate	Reduce impervious surface	Allow sidewalks on one side of the street in Residential Low Impact zones or on streets within a designated sensitive drainage basin where there is no transit service and pedestrian access is provided in an alternative location. Use porous materials.
15-Require permeable pavement where feasible	Improve infiltration and pollution removal	City staff will develop standards to allow construction of traditional pavement over an underdrain reservoir system equivalent to permeable pavement for use in very limited circumstances. Permeable pavements can be used for sidewalks and driveways.

Low Impact Development Elements and Issue Papers

LID Element	Objective	Preliminary Staff Recommendations
16-Impervious pavement with underdrains equivalent to permeable pavement	Improve infiltration and pollution removal	Provide an underdrain system, located under the edges of a roadway, to help store stormwater that exceeds the capacity of an adjacent bioretention system. The underdrain rock gallery would be located where it will not conflict with underground utilities.
17-Minimize driveway surface	Reduce impervious surface	To be determined.
18-Reduce impervious surface associated with on-site parking	Reduce impervious surface	Reduce parking in specific highly developed areas. Require permeable pavement.
19-Incorporate green roofs into building design	Reduce peak flows during storm events	Adopt the 'International Green Construction Code,' in whole or in part, including provisions for 'green roofs' thereby allowing its use.
20-Utilize cisterns to store rainwater for reuse	Reduces peak flows during storm events	Allow roof run-off storage and re-use as provided by the International Green Construction Code.
21-Low impact foundation technology	Preserve the natural soil profile within the footprint of the structure, as well as the hydrologic properties of the native soil.	Adopt the 'International Green Construction Code,' in whole or in part, including provisions for minimal excavation foundations.
22-Site plan review	Require detailed initial site inventory and assessment for LID feasibility. Establish information required to be submitted to evaluate LID implementation.	Revise the Drainage Design and Erosion Control Manual for Olympia to address additional information needed for LID evaluation. Resolve other checklists for pre-submission, land use, engineering, etc. by including reference to the DDECM.



Low Impact Development Elements and Issue Papers

LID Element	Objective	Preliminary Staff Recommendations
23-Pre- and during construction inspections	Ensure proper installation and function of project components.	Revise the Stormwater Erosion and Sediment Control Inspection Policy and Olympia’s Construction Inspector Training Manual, including related forms, inserting language specific to inspection of LID elements of a project.
24-Maintenance standards, maintenance inspections	Facilities function as designed, annual inspections are performed according to proper standards.	Incorporate an edited version of the State guidance document as an appendix to the Drainage manual.
25-Variances, Deviations, Exceptions, etc.	Variations from codes and standards are minimized as much as possible.	Develop a single variance (OMC), deviation (EDDS) and exception (Drainage Manual) process that would apply to all change requests related to low impact development.

- DDECM Drainage Design and Erosion Control Manual for Olympia (2009)
- OMC Olympia Municipal Code
- EDDS City of Olympia Engineering Design and Development Standards
- Comp Plan Comprehensive Plan For Olympia and the Olympia Growth Area
- CPD Plng Community Planning and Development planning staff
- CPD Bldg Community Planning and Development building staff
- PW Eng Public Works Engineering (includes former CPD engineering staff)
- PW WR Public Works Water Resources
- PW Trans Public Works Transportation
- OFD Olympia Fire Department
- GSP City of Olympia General Special Provisions
- IBC International Building Code
- IRC International Residential Code

**LID Element:**

Retain and Plant Native Vegetation

**LID Objective:**

Provide flow control via interception, transpiration, and increased infiltration. Additional environmental benefits include improved air quality, carbon sequestration, reduced heat island effect, pollutant removal, and habitat preservation or formation.

**Codes and Standards Reviewed:**

DDECM Vol 2, DDECM Vol 5, OMC 16.60 (tree protection), OMC 18.36 (landscaping), OMC 18.32 (critical areas), and the proposed Comprehensive Plan Update

**Background:**

The retention of native vegetation on new and existing development sites is currently primarily achieved through regulations requiring the preservation of critical areas and associated buffers (OMC 18.32). Regulations addressing tree protection and replacement (OMC 16.60) are also a means to preserve existing mature stands of trees; however, the requirements specifically do not extend to protecting the critical understory vegetation. (Areas of intact native vegetation can be protected as a result of prohibiting any activities, including clearing and grading, within the tree tract that would potentially damage the trees' critical root zones; however, it is not an explicit regulatory requirement in OMC 16.60 or the primary intent of the ordinance.) Trees are also not required to be protected in stands (or tracts) in multi-family or commercial projects; instead, trees are often retained individually, which is more difficult than and often not as successful as preserving trees in existing stands.

Other mandatory landscaping encourages native vegetation, but does not require it. Retention of native vegetation for stormwater flow control is not a significant element of the intent of the existing Landscaping Code (OMC 18.36). Landscaping is primarily required to provide visual and physical buffers between uses and to lessen or improve impacts from new development.

The retention and planting of existing native vegetation in almost all cases of new development is encouraged. The assumption is that it will be suitable to regional climate conditions and subsequently require less of a dependence on labor, water and chemicals. However, often due to one or more of the following existing challenges, voluntary and successful retention of or planting of native vegetation can be difficult to achieve:

**Small Sites.** Due to the City implementing the policies of the Washington State Growth Management Act, our residential design standards have been updated over the past two decades to promote and in many cases require small lot sizes. Placing buildings and related infrastructure (driveways, walkways, utilities, etc.) on a small developable site leaves less area for retaining native vegetation. Attempts to preserve native soils and vegetation on small sites

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without adequate protective measures have resulted in stripped and compacted soils that no longer support high quality vegetation or infiltration.

Mature, native tree preservation on small sites is particularly challenging, because isolating trees that once grew as a stand can expose the remaining trees to conditions that it has not had time to adapt to, severely weakening or killing the tree and creating a hazardous condition. Mature native trees also require extensive protected areas around the base of the tree to prevent compaction of the critical root zone. Damage like compaction or regarding beyond just a couple inches in depth will destroy the tree's roots and cause severe weakening or death.

**Development Investment and Cost.** Incorporating into a project's site design native plant retention will require specialized knowledge and analysis of site soils, drainage, climate and other factors, as well as the ability to apply this analysis to a design that is physically, aesthetically and economically viable.

This requires a highly trained team of designers, engineers and consultants who are engaged in the site design process early and continuously. The team can then identify and address potential areas of conflict in advance of the City's land use review process, or be prepared to adapt and address issues quickly in collaboration with City staff during the review process. Currently, this is not often the case, as requirements are often addressed piecemeal or only after having been highlighted by City staff.

There may be a higher cost at the beginning of the process to acquire this level of expertise, continuity, and responsiveness; however, it can result in a site design that meets the City's regulations with very little (and costly) delays or requests for revisions.

**Site Design.** Considering all elements impacting site design thoroughly is critical to successful native vegetation retention. Applicants will need to take into consideration existing site characteristics when determining where to allocate preserved native vegetation. Currently, the City requires a Tree Plan be submitted with nearly all Land Use Applications, as well as identification of all critical areas and critical area buffers. Retention areas for native vegetation would potentially be in addition to these already existing requirements.

Similar to the process for identifying where there are viable and mature trees suitable for preservation, the site design will need to reconcile the areas to be developed with suitable areas for native vegetation. This requires an in-depth analysis and understanding of existing site conditions. For example, the existing soils may be in poor condition or not conducive to supporting native shrubs or trees without extensive remediation or amendments. Due to significant impacts already, the existing vegetation may be sparse, of extremely poor quality, or predominantly comprised of invasive species. Grading in clearing in one area may adversely affect hydrology patterns in another, resulting in conditions unsuitable for native vegetation.

Lastly, site design would also need to address potential future conflicts with other desirable activities that require space or solar access, such as urban gardening, children's play structures, and siting for solar power.

**Long-term Viability.** To fully realize the benefits intended through preserving or planting native vegetation, the vegetation that is preserved or planted needs to become established and remain viable in the long-term. Significant attention needs to be paid in determining suitable plant species, protecting or installing the vegetation correctly, and ensuring proper on-going management.

#### *Plant Selection*

Plants native to this region are accustomed to growing in specific environmental conditions, so it is critical to understand those conditions and to avoid significantly impacting or destroying them during the construction phases of a project. For example, changes in drainage patterns, soil compaction, or exposure to wind and sun can make some native plant communities less likely to survive throughout construction, or will greatly increase their vulnerability to invasive species, pests and diseases.

Climate change in the Pacific Northwest will likely cause warmer winters with more rainfall, and hotter summers, as well as more extreme storms and drought. These are not the conditions native vegetation necessarily evolved under and will increase stress on plant communities. Plants need to be selected that have shown an ability to either thrive in or adapt to changing climate conditions in the future.

#### *Plant Protection*

Mature trees are often lost during the construction process today due to a lack of proper or effective protection. Fencing may be installed initially, but over time its level of effectiveness is diminished if the project manager is not held accountable for its condition. Native vegetation, if not protected properly and in particular in constricted construction areas on small lots, will be destroyed during construction.

#### *Maintenance*

Retained and planted areas of native vegetation are vulnerable to whole host of threats during establishment or after. Most critically is whether or not the area is properly maintained. "Natural" areas are no longer natural in the sense that they will thrive on their own; continual management is necessary to prevent the area from the benefits of the native vegetation area from being diminished or lost entirely.

The value or intent of natural vegetation areas may not be understood by property owners, and so they may be damaged or overused for other uses, such as recreation. There may also be less of an interest or community will for paying the cost of on-going maintenance needs or ensuring

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that the maintenance that is done is appropriate. Very often, native vegetation will be maintained the same as a formal landscape, with hedge trimmers and a lawnmower.

Lastly, development will likely increase the perimeter length, or edge, of retained vegetation areas, and create soil disturbance. Both allow for greater and quicker establishment of invasive plants, which decrease the aesthetic appeal of the site. Their removal and replacement with native plants can be time-consuming and significantly increase maintenance costs. However, if not addressed, many of the benefits of the preserved area are slowly lost over time.

**Existing Culture.** For areas of natural vegetation to be established, preserved, and managed, those responsible need to understand and become champions for the benefits that are offered by these areas. The likelihood of this continues to evolve in our community, and there are still some outstanding cultural belief systems that shape what many property owners desire for the landscapes they exercise control over.

Property owners expect to have freedom of choice on how to use their property. Requiring the retention and maintenance of native vegetation areas in perpetuity contradicts this expectation, and may be resisted or ignored by property owners.

Native trees, shrubs, and groundcovers can be perceived as messy, weedy and unkempt. Their natural growing forms may be perceived to block light or visibility, creating dark, dangerous, and unsafe conditions. Their seeds, leaves, or berries may be a constant maintenance issue.

Also, relative to grassy lawns, areas with native vegetation may have limited passive uses, preventing desirable active recreation. Areas with a significant understory left intact don't allow for throwing a Frisbee or playing soccer. In some cases, natural areas can also become too highly used by dog-walkers, people cutting through, paintball guns, BMX bikes, or mountain bikes. Over-use by some activities can compact the soils and destroy the understory vegetation.

### Options Considered:

The preservation and planting of native vegetation should be addressed as two separate questions:

1. How do we define 'native vegetation?'

Option 1: *A native plant species is one "that occurs naturally in [Olympia]...without direct or indirect human actions" (Federal Plant Conservation Alliance, 1994).*

Option 2: *Native vegetation encompasses those species that occur naturally, but also those that are well adapted to current and anticipated environmental conditions in Olympia, such as low water availability in the summer.*

2. To what extent do we require retention or planting of native vegetation retention on new development sites?

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Option 1: *No change to the existing regulations; native vegetation is preserved and planted in tree tracts (as it applies to trees only), shorelines, critical areas, and critical areas buffers.*

Option 2: *Require that all areas under which the City currently requires landscaping or the allocation of open space to be appropriately landscaped with preserved or planted native vegetation. Also, allow for open space credits to be gained from landscaped stormwater facilities. Examples would include parking lot islands, screening, stormwater facilities, common spaces, right-of-way planting strips, and the understory of tree tracts. This requirement would not extend to private yards on single-family residential lots or areas allocated voluntarily to decorative landscaping by a developer (see option 4).*

Option 2A: *In addition to Option 2 as noted above, expand the requirements for preservation of native vegetation and soils in designated areas or tracts to include all multi-family and some commercial developments (as appropriate by existing commercial zoning districts).*

Option 3: *Expand the amount of area currently required as preserved natural vegetation within new development sites. Preferably 65% or more of a development site would be protected for purposes of retaining or planting natural vegetation, similar to what is achieved through implementation of the existing Green Cove Basin zoning district.*

Option 4: *All existing native vegetation in good condition shall be retained and/or planted, except where necessary to construct roads, sidewalks, driveways, stormwater facilities, and buildings. Native vegetation shall be required in all landscaped areas on public and private property, including private yards and private tracts that are jointly owned by multiple property owners or an association.*

### **Analysis:**

#### *Defining Native Vegetation*

The conservation and use of native on-site soil and vegetation for stormwater management is a central principle of LID design. The intent of updating our regulations would be to ensure that native soils and vegetation are preserved in good condition and enhanced when needed to effectively manage stormwater by capturing, storing, filtering, and evapotranspiring stormwater runoff. Preserved areas also maintain existing natural hydrologic processes, provide critical habitat, and open space.

These benefits are not limited to native species; native species are considered an optimal choice because they are adapted to local conditions, subsequently requiring less maintenance, water, and pesticides to maintain. However, there is a widening palette of well-behaved non-native plants that thrive just as well under local climate conditions as native species. Allowing for a greater diversity of plants can ensure thoughtful and appropriate site selections, as well as promoting some creativity, variety, and aesthetic interest in our community's landscapes. These factors can lead to greater community or personal investment in a landscaped area over the long-term.

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Technical professionals and training in plant selection will be critical, however, to ensure that selected species are site-appropriate and will require minimal future maintenance. Plants to be cautious of are those that may out-compete or dominate native species, spread voraciously, or provide little or no habitat value for local wildlife.

### *Preserving and Planting Native Vegetation*

A study done by City of Olympia staff in 2011 cited that many cities are opting for an approach to LID that incorporates a mix of both voluntary and regulatory tools to implement changes; however, results have shown a greater impact is realized through regulation. All of the options noted above for retaining and planting native vegetation emphasize a regulatory approach; the question is to what *extent* do we regulate retention of native vegetation?

A significant emphasis of native vegetation retention for LID is on mature tree retention. Option 1 continues implementing Olympia's existing tree preservation and replacement requirements, which have been in place for nearly three decades, in addition to protections for critical areas. Both requirements have preserved extensive native vegetated areas in both residential and commercial developments.

Option 2, however, acknowledges that there are areas where the current regulations may be readily expanded for greater effectiveness in preserving and planting specifically native vegetation. OMC 16.60 can be revised to preserve soils and understory vegetation, and to include soil and vegetation preservation areas in multi-family and some commercial projects. Credit towards landscaping requirements can be expanded to stormwater treatment areas, and all landscaped areas shall be comprised of preserved or planted native vegetation.

These requirements will be relatively straightforward and feasible to implement as the areas impacted are already required to be set aside by an existing regulatory mechanism. The requirements would also continue to be implemented primarily by the development community and City staff on property that will either be deeded to the City as right-of-way or owned or maintained by an association, and not individual homeowners.

The short-term and long-term effectiveness of Option 2 will require improved and expanded training for private developers, construction companies, and City staff to ensure proposed vegetation is site-appropriate and protected or planted properly during construction. There will also need to be an improved system for ensuring plant survival and establishment after the initial growing season. Education will be critical for ensuring parties responsible for future on-going maintenance of protected areas are doing so correctly, consistently, and in perpetuity.

Option 3 references a level of tree and vegetation preservation that is currently applied only to the Residential Low-Impact (RL-I) zoning district in the City. A 1998 study of the Green Cove Creek Drainage Basin completed jointly by the City of Olympia and Thurston County found that there was more that could and should be done to protect this critical watershed within the City and Urban Growth Area

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(UGA). The study's findings resulted in the adoption of a special Green Cove zoning district, which requires that approximately 60% of a new development site in the basin be set aside as preserved area.

Green Cove was targeted as a largely intact and functioning basin with emerging evidence that local wetlands and streams were being impacted by new development. Potential scenarios for minimizing future impacts were modeled, and the results indicated that more aggressive tree retention regulations would have the greatest positive impact on maintaining the current condition of the basin.

Option 3 will expand those regulations citywide, and has the greatest potential to retain significant soil and vegetation preservation areas. The impact would be even greater if coupled with recommendations to minimize site clearing and grading and maintain existing topographical features. However, additional analysis will be required to determine if the Green Cove standards will be appropriately, feasible, and effective in other areas of the City where soil, topographic, and current levels of development differ.

There have also been significant challenges in implementing the mandatory subdivision and individual parcel LID requirements. A lack of understanding or investment in the LID principles by developers and builders has made it extremely difficult to retain the preservation areas during construction and to ensure the soils that were replaced on the lots was amended to the extent needed to capture stormwater runoff.

Homeowners have also not maintained soil and vegetation areas in rear and side yards, and attempts at installing and maintaining rain gardens failed due to small lot sizes and a desire on the part of homeowners for traditional lawns. Lastly, the neighborhoods developed under the standards are plagued with parking issues; impervious streets and driveways are very narrow, allowing for far less vehicle parking than an average suburban neighborhood.

Option 4 is the farthest reaching regulatory option, and potentially the most difficult to implement. The greatest challenge will be in ensuring protection of native vegetation and soils on small, individual lots from failed protection fencing, compacted soils, heavy equipment damage, misunderstandings among multiple project leads or contractors on site, and other common construction site pitfalls.

As noted in Option 2, extensive education and training, and improved inspection processes will be needed, and just as critical will be community member outreach to impact cultural beliefs. Option 4 significantly shifts the intent of a yard as a personal space to landscape and manage as a property owner sees fit, to a space that functions as vital community infrastructure and that requires adherence to a set of prescriptive management approaches. As has been the experience in the Green Cove Basin, cultural beliefs are extremely difficult to change.

### **Staff Recommendation:**

Staff recommends that 'native vegetation' encompass those species that occur naturally, but also those that are well adapted to current and anticipated environmental conditions, such as low water availability (Question 1; Option 2).



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Staff recommends that all areas under which the City currently requires landscaping or the allocation of open space be appropriately landscaped with preserved or planted native vegetation (Question 2; Option 2A), and that the requirement for native vegetation and soil protection areas be extended to all multi-family and some commercial development where appropriate.

**Staff Involved:**

*Todd Stamm, Stacey Ray, Eric Christensen, Alan Murley, and Joe Roush*

EXAMPLE



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## LOW IMPACT DEVELOPMENT – BARRIERS ANALYSIS

City of Olympia • March 2011



*Olympia Woodland Trailhead: Features a living roof, a rain garden, and porous pavement.*

## Introduction

This report identifies barriers to low impact development (LID) in Olympia and proposes ideas for removing those barriers, as required by the Phase II Municipal Stormwater Permit (Permit). Condition S9.E.4 of the Permit requires permittees to submit with their 2010 Annual Report an analysis of low impact development that includes:

- A summary of identified barriers to the use of low impact development (LID) within the area covered by the permit and measures to address the barriers. (S9.E.4.a)
- A report describing (S9.E.4.b):
  - LID practices that are currently available and that can reasonably be implemented within this permit term.
  - Potential or planned non-structural actions and LID techniques to prevent stormwater impacts.
  - Goals and metrics to identify, promote, and measure LID use.
  - Potential or planned schedules for the Permittee to require and implement the non-structural and LID techniques on a broader scale in the future.

The Permit defines low impact development as,

*A stormwater management and land development strategy applied at the parcel and subdivision scale that emphasizes conservation and use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely mimic pre-development hydrologic functions.*

This analysis will aid the city in developing a policy for furthering LID implementation in public and private development projects and in prioritizing regulatory policy changes and outreach and education activities. This work dovetails with staff's broader work effort to develop a comprehensive program that promotes and increases the use of LID techniques in Olympia.

## Identified Barriers and Measures to Address Them – S9.E.4.a

The following table outlines identified obstacles to the broader implementation of LID techniques in Olympia. Future actions to remove those barriers are also identified and categorized as ongoing, short or long-term tasks. This list may not be exhaustive; however, it aims to capture the most pressing obstacles in Olympia today.

### Action Item Designations

- Ongoing task
- Short term task (1-2 years)
- Long term task (3 or more years)

Barrier Type	Barrier Description	Measures to Address Barriers
Physical Environment	Poor soil conditions (poorly draining till)	<ul style="list-style-type: none"> <li>▪ Analysis of which LID techniques work best for our soil conditions and topography. Make this information available to the development community.</li> </ul>
	High groundwater conditions	<ul style="list-style-type: none"> <li>▪ Ensure that LID techniques implemented have proper separation from groundwater table.</li> </ul>
Regulatory	Development regulations require reduced street block lengths and call for large cul-de-sac radii (47 ft.) resulting in increased pavement	<ul style="list-style-type: none"> <li>• Evaluate trade-offs between transportation system goals for interconnected streets and water resource goals for minimizing impervious surfaces.</li> <li>• 17 foot landscape islands in cul-de-sacs are allowed, but not required. Investigate requiring them.</li> <li>• Investigate the possibility of decreasing cul-de-sac radii to 35 feet. Evaluate Fire Department ability to provide access and appropriate hose runs with smaller cul-de-sacs.</li> </ul>
	Permeable pavement is generally not permitted within the right-of-way	<ul style="list-style-type: none"> <li>• Permit use of permeable paving for road shoulders and parking lanes in residential areas, with use of conventional paving for traffic lanes only.</li> <li>• Ensure that private development provides appropriate pervious pavement design, installation and maintenance.</li> </ul>

<p>Drainage via vegetated swales is an option, but not the standard</p>	<ul style="list-style-type: none"> <li>○ Determine if there are situations where swales can be required.</li> <li>○ Re-evaluate the swale street section to include functionality for all uses (stormwater, street trees, street lights, etc).</li> <li>○ Identify trees suitable for planting in swales.</li> <li>○ Understand the social challenges of open drainage channels in residential right-of-ways and yards of small urban lots.</li> <li>○ Evaluate additional costs of maintenance of swales vs. piped systems.</li> <li>○ Evaluate whether maintenance of swales installed within the right-of-way can be the responsibility of the adjacent property owner.</li> <li>○ Consider requiring or allowing more curb cuts and associated designs to direct flows to adjacent vegetated areas.</li> </ul>
<p>Sidewalks are required on both sides of the street (except in RLI zone), resulting in increased impervious area.</p>	<ul style="list-style-type: none"> <li>● Evaluate trade-offs between the environmental benefits of adequate pedestrian services vs. stormwater minimization.</li> <li>● Promote the use of pervious sidewalk and/or infiltration of sidewalk runoff in adjacent vegetated areas.</li> </ul>
<p>Parking ratios for office buildings may be higher than necessary</p>	<ul style="list-style-type: none"> <li>● Evaluate the possibility of decreasing the ratio to 3 spaces per 1,000 sf GFA or less.</li> <li>● If development is approved for a parking increase, require environmental enhancement on a per space basis.</li> </ul>
<p>Currently no incentive for developers to provide structured parking rather than surface lots.</p>	<ul style="list-style-type: none"> <li>○ Evaluate the possibility of adding incentive to the Olympia Municipal Code (e.g., density bonus).</li> <li>○ Incentive may include expedited review for projects with “green infrastructure” components.</li> <li>○ Encourage the use of pervious surfaces in parking lots.</li> </ul>

	<ul style="list-style-type: none"> <li>○ Consider allowing parking lot landscaping islands to function as rain gardens.</li> <li>○ Continue to allow and encourage the sharing of parking areas between adjacent properties (e.g., offices and churches).</li> </ul>
Minimum required driveway widths are 20 ft. (one lane) and 24 ft. (two lane)	<ul style="list-style-type: none"> <li>● Evaluate trends in residential vehicle ownership.</li> <li>● Further investigate the relationship between garage parking, driveway parking, on-street parking and event (e.g., holiday) parking needs.</li> </ul>
In some instances, LID is silently allowed and not overtly permitted or encouraged in city codes and standards	<ul style="list-style-type: none"> <li>● Prepare information for the public addressing LID practices that are allowed and encouraged.</li> <li>● As feasible, provide standard engineering guidelines and plans for LID techniques.</li> </ul>
WDOE Drainage Manual provides increasingly demanding stormwater detention, infiltration, treatment requirements; difficult to meet the requirements with soft technologies.	<ul style="list-style-type: none"> <li>○ Continue to pursue grants for LID projects that include monitoring.</li> </ul>
Small lots (less than 7,000 sf) often do not have enough room for on-site infiltration and to accommodate infiltration setbacks	<ul style="list-style-type: none"> <li>○ Consider discouraging building practices that construct crawl spaces.</li> </ul>
Uncertain and potentially higher maintenance costs (landscaping, pervious pavement cleaning, media replacement, etc.)	<ul style="list-style-type: none"> <li>○ Continue to quantify costs and associated maintenance needs.</li> <li>○ Continue to investigate cost effective cleaning techniques for pervious pavements.</li> <li>○ Define performance standards and associated maintenance and rehabilitation costs for LID techniques.</li> <li>○ Acknowledge maintenance needs and seek mechanisms to establish private/public responsibilities and funding.</li> </ul>
Bioswales are more difficult for the City to clean/maintain because of compost amended soils	<ul style="list-style-type: none"> <li>○ Purchase appropriate mowing equipment for bioswales.</li> <li>○ Train maintenance staff on swale locations and appropriate maintenance techniques.</li> </ul>

Maintenance

Lack of knowledge and acceptance

Unproven efficacy of some LID techniques and risk of failure in the short or long term.	<ul style="list-style-type: none"> <li>○ Encourage the use of well-designed LID techniques in appropriate applications with associated monitoring.</li> <li>○ Better understand regional and national LID research.</li> <li>○ Require a contingency plan for flows in case property owners' on-site BMP fails; however, this is more expensive for the developer.</li> </ul>
Unproven durability of pervious asphalt	<ul style="list-style-type: none"> <li>○ Continue to install pervious asphalt, privately and publicly, in relatively low risk applications (e.g., parking lots, moderate use City streets) and monitor both structural and infiltration performance.</li> <li>○ Continue annual allocation of \$50,000 to a fund dedicated to correcting unforeseen problems associated with the pervious pavements.</li> </ul>
Lack of regulatory agreement on what constitutes LID	<ul style="list-style-type: none"> <li>● Define techniques suitable for use in Olympia; both mandated by current regulation or implemented on a voluntary basis.</li> </ul>
Inherent conflict between growth management/density and LID	<ul style="list-style-type: none"> <li>● Research and understand appropriate LID applications for urban-scale development.</li> </ul>
Unknown life cycle and replacement costs	<ul style="list-style-type: none"> <li>○ Continue to research and follow the research of others.</li> <li>● Encourage effective structural and infiltration monitoring of applications.</li> <li>● Maintain City "insurance fund" to help resolve unforeseen problems.</li> <li>● Seek to incorporate life cycle costs into the decision-making processes.</li> </ul>
LID designs are site specific; don't have engineered specifications	<ul style="list-style-type: none"> <li>○ Appreciate the site specific nature of many LID designs.</li> <li>○ Seek to increase our understanding of natural, technical, and social constraints and potential generic solutions.</li> </ul>
Streets are viewed as transportation infrastructure	<ul style="list-style-type: none"> <li>○ Infiltrating runoff under roadways is challenging and</li> </ul>



Community acceptance and understanding	and utility corridors, there is reluctance to allow stormwater under the roadway	<ul style="list-style-type: none"> <li>○ potentially detrimental to structural integrity.</li> <li>○ Institute franchise utility agreements to coordinate better.</li> </ul>
	Lack of public knowledge regarding LID techniques	<ul style="list-style-type: none"> <li>● Expand public awareness through demonstration projects, development-related information, and the City webpage.</li> <li>● Provide training to CP&amp;D staff about LID techniques available to the public.</li> </ul>
	Residents' lifestyles may not adjust to support LID techniques (e.g., narrower streets vs. increasing vehicle ownership, rain gardens vs. grassed yard)	<ul style="list-style-type: none"> <li>○ Acknowledge residents' interests for using available lot areas for purposes other than stormwater management and their concerns with standing water near homes.</li> <li>○ Use outreach to convey the reasons for on-site LID practices.</li> <li>○ Develop appropriate LID technologies for small lot development.</li> <li>○ Use of LID techniques needs to be at an appropriate scale for the property and long-term ownerships.</li> <li>○ Develop maintenance checklists for LID techniques.</li> </ul>
	Public is not always clear about what LID measures are appropriate for their project and don't understand the review and approval process.	<ul style="list-style-type: none"> <li>● Develop a clear LID policy, in coordination with other city departments, which clarifies use, process, and outreach.</li> <li>● Develop outreach materials.</li> <li>● Investigate trainings for public, development community and/or staff.</li> </ul>

## LID Practices, Goals, Planned Actions and Timelines – S9.E.4.b

### LID Practices Currently Available and Reasonable to Implement Soon

Low impact development is for the most part allowed by current city zoning, engineering and stormwater regulations; however, it is often not clearly identified or promoted as such. For instance, Olympia’s zoning code includes such regulations as impervious surface maximums, parking maximums, and reduced setback requirements. Engineering design standards allow narrow streets and the City of Olympia’s 2009 *Drainage Design and Erosion Control Manual* Appendix III-C allows the LID techniques addressed in the *Low Impact Development Technical Guidance Manual for Puget Sound*. While the City’s codes and standards are for the most part LID-supportive, there are some adjustments and additions that could be made and many of those have been identified above. Additionally, the City has to this point not promoted or marketed a comprehensive LID program, but plans to begin more prominently promoting the City’s LID projects and developing outreach and educational materials.

The City is currently in the process of developing or adopting a number of plans that contain facets of low impact development. These include:

- Olympia Shoreline Master Plan (planned adoption mid-2011)
- Olympia Comprehensive Plan (planned adoption mid-2012)

### Potential or planned non-structural actions and LID techniques

Using the barrier identification exercise, the city staff plans to investigate implementation of the measures identified in the table above. It will take a number of years to work through the list. Staff has identified those actions on the list that are more easily achievable or higher in priority and have slated those for implementation over the next couple of years. The remaining items will be implemented further out.

The City plans to continue installation of the following structural LID techniques when appropriate:

- Pervious sidewalks
- Pervious parking lots
- Rain gardens
- Public stormwater facilities with LID features (e.g., Yauger)

### Goals and metrics to identify, promote, and measure LID use

Goal 1: Increase public understanding and use of LID.

*Metric:* Redesign the LID page on the city's website to better answer the public's questions about LID and to promote the LID projects within the city.

*Metric:* Develop at least one LID outreach tool every year (e.g., brochure, pilot project, public event or training).

*Metric:* Track the number of LID projects installed in the city (see Goal 4).

Goal 2: Work toward regional design and performance standards for LID techniques.

*Metric:* Work with the region to develop standards within five years.

Goal 3: Implement appropriate and effective LID techniques to the extent possible.

*Metric:* Provide technical assistance and funding in some cases.

*Metric:* Meet performance standards (see Goal 2).

Goal 4: Maintain an inventory of all LID installations and associated map.

*Metric:* Create an Olympia database and associated map.

Goal 5: Perform inspections and surveys of LID installations to review their efficacy.

*Metric:* Storm and Surface Water staff will review LID projects prior to final inspection to ensure compliance with plans and specifications.

*Metric:* Annual inspection of LID projects by Storm and Surface Water staff.

### Schedules to require or implement the non-structural and LID techniques

The Department of Ecology has been working over the past couple of years to develop LID requirements for inclusion in the next Phase II Municipal Stormwater Permit to be issued in 2012. Those permit requirements and implementation timelines will shape much of the City's LID

direction in the coming years. The City will comply with the deadlines in the next permit and endeavor to steadily address the barriers to LID in Olympia as identified in this report.

## Low Impact Development –Regulatory Documents

Document	Section/Page	Code
<a href="#">2013-2018 Western Washington Phase II Municipal Stormwater Permit</a>	S5.C.4.f., Page 29	Requires permittees to review, revise and make effective their local development-related codes, rules, standards, or other enforceable documents to incorporate and require LID principles and LID BMPs by No later than December 31, 2016. The intent of the revisions shall be to make LID the preferred and commonly-used approach to site development.
	<a href="#">Appendix I</a>	Establishes the minimum technical requirements for new development and redevelopment. Defines LID terms. Establishes LID performance standards and LID BMP lists that must be assessed during development and implemented unless determined to be infeasible.
2012 Stormwater Management Manual for Western Washington	<a href="#">Volume I</a> Throughout Chapter 2, but primarily Section 2.5.5	Revised definitions, requirements, supplemental guidance, etc. to correspond to the changes in the Municipal Stormwater Permits and for new LID requirements. Outlines minimum requirements for new development and redevelopment. Establishes LID performance standards and LID BMP lists that must be assessed during development and implemented unless determined to be infeasible.
	<a href="#">Volume II</a> Section 3.3.3, Page 3-26	Added Element 13 to Construction Stormwater Pollution Prevention Plans (SWPPP) requiring the protection of LID BMPs from erosion and sediment during construction
	<a href="#">Volume III</a> Section 2.5.5 App III-B and App. III-C	Adds guidance for flow control design using LID performance standard and BMPs including bioretention and permeable pavements. Revises soil investigation requirements for design infiltration rate. Adds guidance for field tests, WWHM modeling, and implementation of LID BMPs.
	<a href="#">Volume IV</a>	No LID-related changes
	<a href="#">Volume V</a> Section 5.3.1,	Revises and/or adds treatment BMPs consistent with LID goals. Specifically revises BMPs including Full Dispersion , Concentrated Flow Dispersion, Sheet Flow Dispersion and adds BMPs including Rain Gardens Bioretention, Permeable Pavements, Tree Retention and Tree Planting, Vegetated Roofs, Reverse Slope Sidewalks, Minimal Excavation Foundations, and Rainwater Harvesting
<a href="#">Integrating LID into Local Codes, A Guidebook for Local Governments</a>	Throughout	Provides the process and guidance required to be followed in reviewing, revising and making effective local development-related codes, rules, standards, or other enforceable documents to incorporate and require LID principles and LID BMPs.
<a href="#">Low Impact Development Technical Guidance Manual for Puget Sound</a>	Throughout	Provides LID goals, objectives, and specifications for individual practices. Includes flow reduction and water quality treatment modeling credits. Also provides research and data related to LID practices to help make decisions regarding their adaptation in Olympia.
<a href="#">DRAFT Guidance Document – Western Washington Low Impact Development Operation and Maintenance</a>	Throughout	Provides recommendations on LID operations and maintenance (O&M) to help ensure that LID BMPs continue to function as intended in the long-term and is intended to support municipal stormwater permittees in implementing their LID maintenance programs.

## Reference Documents Quick Links

Available at: [olympiawa.gov/LIDcode](http://olympiawa.gov/LIDcode)

### [2013-2018 Western Washington Phase II Municipal Stormwater Permit](#)

Requires permittees to review, revise and make effective their local development-related codes, rules, standards, or other enforceable documents to incorporate and require LID principles and LID BMPs. The intent of the revisions shall be to make LID the preferred and commonly-used approach to site development.

### [2013-2018 Western Washington Phase II Municipal Stormwater Permit Appendix I](#)

Establishes the minimum technical requirements for new development and redevelopment. Defines LID terms. Establishes LID performance standards and LID BMP lists that must be assessed during development and implemented unless determined to be infeasible.

### [2012 Stormwater Management Manual for Western Washington](#)

Establishes the minimum requirements for stormwater management for development and redevelopment including roadways. Provides low impact development best management practices and the guidance for their design.

### [Integrating LID into Local Codes: A Guidebook for Local Governments](#)

Provides the process and guidance required to be followed in reviewing, revising and making effective local development-related codes, rules, standards, or other enforceable documents to incorporate and require LID principles and LID BMPs.

### [Low Impact Development Technical Guidance Manual for Puget Sound](#)

Provides LID goals, objectives, and specifications for individual practices. Includes flow reduction and water quality treatment modeling credits. Also provides research and data related to LID practices to help make decisions regarding their adaptation in Olympia.

### [Guidance Document - Western Washington Low Impact Development Operation and Maintenance](#)

Provides recommendations on LID operations and maintenance (O&M) to help ensure that LID BMPs continue to function as intended in the long-term and is intended to support municipal stormwater permittees in implementing their LID maintenance programs.

### [Cost Analysis For Western Washington LID Requirements And Best Management Practices](#)

Provides a comparison of the cost of stormwater control measures required for developments in Western Washington based on the requirements of both the 2005 Stormwater Management Manual for Western Washington and the revised 2012 Stormwater Management Manual for Western Washington (LID Requirements).

# Integrating LID into Local Codes:

## A GUIDEBOOK FOR LOCAL GOVERNMENTS

*Final  
July 2012*

*Prepared by AHBL for the Puget Sound Partnership*



# Low Impact Development

Technical Guidance Manual for Puget Sound



December 2012

WASHINGTON STATE UNIVERSITY  
EXTENSION

**PugetSoundPartnership**

LEADING PUGET SOUND RECOVERY



# COST ANALYSIS REPORT

## COST ANALYSIS FOR WESTERN WASHINGTON LID REQUIREMENTS AND BEST MANAGEMENT PRACTICES

Prepared for  
Washington State Department of Ecology

Prepared by  
City of Puyallup  
Washington Stormwater Center  
Herrera Environmental Consultants, Inc.



# GUIDANCE DOCUMENT

## WESTERN WASHINGTON LOW IMPACT DEVELOPMENT (LID) OPERATION AND MAINTENANCE (O&M)

Prepared for  
Washington State Department of Ecology  
Water Quality Program

Prepared by  
Herrera Environmental Consultants, Inc.  
and  
Washington Stormwater Center



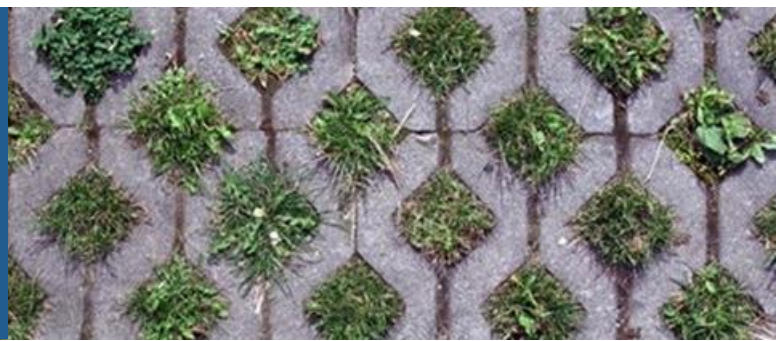
# Low Impact Development Code Update and Integration Toolkit

Worksheets and resources to help Phase II jurisdictions integrate Low Impact Development into local codes, rules, standards, and other enforceable documents



DEPARTMENT OF  
**ECOLOGY**  
State of Washington

JULY 2014



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# Introduction

## About this toolkit

The new Municipal Stormwater National Pollutant Discharge Elimination System (NPDES) general permits require widespread adoption of Low Impact Development (LID) techniques into local development codes. These new practices and codes require significant changes in the way the private development community plans, designs, and builds sites, as well as the way the public sector enforces, operates, maintains, and inspects stormwater facilities.

To help jurisdictions comply with the new NPDES permits, the Washington State Department of Ecology is offering eight **LID Code Update and Integration** trainings throughout the state. These trainings are designed to help Western Washington Phase II jurisdictions update and revise their codes to require and allow for the use of LID. In Eastern Washington, trainings will provide an opportunity for Phase II jurisdictions to voluntarily update their codes and better understand how to incorporate LID into future projects.

This toolkit was assembled to accompany these **LID Code Update and Integration** trainings. The following pages provide jurisdictional staff with tools such as worksheets, sample codes, and other resources to ease the integration process of LID into local codes, rules, standards, and other enforceable documents.

## How to use this toolkit

This toolkit is organized into six sections designed to assist jurisdictional staff and streamline the code update process:

- **Implementation Worksheet for Integrating LID into Local Codes** – This checklist identifies the six steps described in the *Integrating LID into Local Codes: A Guidebook for Local Governments*, and provides a list of easy to follow actions for each of the steps.
- **Code Review Form Template** - This form provides a template for tracking the review process for integrating LID into local codes, rules, standards, and other enforceable documents.
- **Subtopic Focus Sheets**- These focus sheets provide additional information on the importance of each subtopic and include questions to consider during the review process. These sheets should be used in conjunction with the **Code Review Form**.

- **Code and Ordinance References** – This section provide examples of regional and national codes and ordinances divided by relevance for Eastern and Western Washington jurisdictions.
- **Communicating with Your Elected Officials and City Managers** – This section provides tips and talking points for engaging elected officials and city managers in the code update and adoption process.
- **Resource List for Jurisdiction Staff** – This list includes other relevant resources developed to help jurisdictions integrate LID including case studies.

## Implementation Worksheet for Integrating LID into Local Codes

### Six Steps to LID Integration



### Purpose of the Worksheet

The purpose of this checklist is to identify key concepts from *Integrating LID into Local Codes: A Guidebook for Local Governments*<sup>1</sup> (“the Guidebook”) for Phase II municipal stormwater managers in Washington as they incorporate low impact development (LID) into local codes, rules, standards, and other enforceable documents. The checklist identifies the six steps described in the Guidebook and provides a list of easy to follow actions for each of the steps. The six steps are:

**Step 1 – {Who}** Assemble the Project Team

**Step 2 – {What}** Understand General Topics to Address

**Step 3 – {Where}** Review Existing Codes and Standards

**Step 4 – {Fill the Gaps}** Amend Existing Codes and Develop New Codes

**Step 5 – {Review and Adopt}** Public Review and Adoption Process

**Step 6 – {Implement}** Ensure Successful Implementation

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<sup>1</sup> Puget Sound Partnership, 2012, *Integrating LID into Local Codes: A Guidebook for Local Governments*, prepared by AHBL for the Puget Sound Partnership, July 2012.



## Step 1 – {Who} Assemble the Project Team

### *Who should be part of your Project Team?*

A comprehensive project team of key internal team members and potential key external stakeholders is critical to the process of integrating and adopting LID into local codes. The initial review and update of existing codes and regulations will largely be conducted by internal team members. External stakeholders will be involved in providing comments and feedback on the proposed changes to help facilitate the adoption process. Certain external stakeholders may also be involved in the initial review state. In addition, consider involving participants (internal and external) who have expressed reservations about LID as they will help the team identify and address concerns and barriers early in the process. The size of your team will vary depending on the size of your jurisdiction and the extent of your required updates.

- Designate a project team lead

### Internal Team (review & update codes)

- Identify internal team members involved in the following:
  - Public Works (stormwater, street, grading and site work, public buildings)
    - Stormwater engineering review
    - Streets/roads engineering
    - Public facility operations
    - Maintenance and inspection
  - Planning
    - Development review
    - Policy
    - Construction inspection
  - Fire and public safety (police) (street widths, access for emergency response, street layouts, and street surfacing)
  - Building Department (green roofs, minimal excavation foundations, rainwater re-use systems)
    - Inspection and review
- Consider adding an internal team member from each of the following:
  - Council members or commissioners, including planning commission
  - City manager or equivalent
  - Natural resources
  - Parks department
  - Legal department

## External Stakeholders (comment & facilitate approval process)

- Consider involving external stakeholders from groups such as:
  - State/local health department
  - Utility providers (water, sewer, etc.)
  - Agencies owning and maintaining streets (County, WSDOT)
  - Site designers/engineers
  - Major property owners/developers
  - Citizen’s or neighborhood groups
  - Environmental groups
  - Special districts

- Fill in the following table with your project team:

Name	Job title	Department	Contact Information	Role on Team

- Bring the internal project team up to a common level of understanding of LID and the code update objectives by attending trainings and using the resources listed in the *Guidebook*

### Step 2 – {What} Understand General Topics to Address

*What topics should your project team review?*

Once the project team is assembled and a common level of understanding of LID has been established among internal project team members, the next step is to establish a work program that identifies **what** topics of a jurisdiction’s codes, policies, standards, and enforceable documents need to be updated to integrate LID. Topics will vary from jurisdiction to jurisdiction. Examples of topic areas that affect the use of LID are described in the table below (see Table 1. Major Topic Areas, Associated Review Categories, and Recommended Subtopics). The table should be modified to suit the needs of each jurisdiction. Once the table is complete, the topic areas and subtopics will be used to review existing code, policies, standards, and enforceable documents in Step 4.

### Review Categories

The Western Washington National Pollutant Discharge Elimination System (NPDES) Phase II Permit (Phase II Permit) requires your report to the Washington Department of Ecology (Ecology) to be organized into the following three review categories:



Measures to minimize impervious surfaces



Measures to minimize loss of native vegetation



Other measures to minimize stormwater runoff

The Guidebook provides a list of major topic areas that should be reviewed. Each of these major topic areas falls into one or more of the review categories outlined in the NPDES Phase II Permit (see graphic above). Recommended subtopics for review are identified under each of the major topic areas listed below.

- Review and modify the table below to identify additional topics areas and subtopics that may be relevant to your jurisdiction. Each topic area and subtopic listed in the table below will help you identify areas of your code (and other documents) that need to be updated to integrate LID. **(See Subtopic Focus Sheets to learn more about each subtopic)**

**Table 1. Major Topic Areas, Associated Review Categories, and Recommended Subtopics**

**Site Planning and Assessment**



- Building locations
- Parking area locations
- Stormwater treatment/flow control BMP/facility locations
- (add subtopic as necessary)

**Healthy Soils**



- Protecting and restoring healthy soil
- Compost amendments
- Compaction
- (add subtopic as necessary)

**Landscaping, Native Vegetation, and Street Landscaping**



- Tree preservation
- Screening
- Landscaping requirements for street frontages
- Landscaping requirements for parking lots
- (add subtopic as necessary)

**Hard and Impervious Surfaces**



- Maximum impervious surface allowances
- Shared driveways
- Minimum driveway width
- Use of permeable pavement for driveways
- Two-track driveway design
- (add subtopic as necessary)

**Bulk and Dimensional Considerations**



- Building setbacks
- Height limits
- Maximum square footage
- Clustering
- (add subtopic as necessary)

**Clearing and Grading**



- Protecting existing infiltration
- Conserving native vegetation/soils
- Construction sequencing
- (add subtopic as necessary)

**Streets and Roads**



- Travel lane widths
- Right-of-way (ROW) widths
- Use of permeable pavement for streets and roads
- Placement of utilities under paved areas in the ROW
- Required turn around area (e.g., Fire, USPS)
- Sidewalk widths
- Sidewalk slope
- Minimum cul-de-sac radius
- Alternatives to cul-de-sacs
- (add subtopic as necessary)

**Parking**



- Minimum/maximum parking ratios
- Use of permeable pavement for parking lots (e.g., parking stalls, driving aisles)
- Parking stall dimensions
- Driving aisle dimensions
- Off-street parking regulations
- (add subtopic as necessary)

**Design Guidelines and Standards**



- Trees and bioretention
- Continuous curb requirements
- Curb radii
- (add subtopic as necessary)

**Stormwater Management and Maintenance**



- Maintenance provisions
- Inspection access (covenants, easements)
- Enforcement
- (add subtopic as necessary)

**Subdivision and Planned Unit Development**



- Individual open space requirements
- Passive vs. active open space requirements
- Opportunities for Performance Based Designs (PUDs)
- (add subtopic as necessary)

**Critical Areas and Shoreline Management**



- Allowance of LID best management practices (BMPs) in critical areas/shorelines when compatible
- (add subtopic as necessary)

**(Add Topic Area as necessary)**

- (Add review category symbol(s))
- (Add subtopics as necessary)

*Note – the discussion of topic areas and subtopics in Step 2 will typically include comments from various team members on specific jurisdictional codes and documents. The team lead (or designee) should take notes during the Step 2 discussions to expedite the review process in Step 3.*

## Step 3 – {Where} Review Existing Codes and Standards

### *Where are the gaps?*

Once your internal team members identify **what topics** should be addressed to fully integrate LID in Step 2, the next step is to determine **where those topics occur** in a jurisdiction's policies, regulatory code, and standards. This step focuses on the review of codes and standards against the identified topics from Step 2 to determine where changes are needed for LID integration of LID. You may want to consider reviewing the LID report submitted to Ecology as part of your 2011 Annual Report to revisit barriers to LID that your jurisdiction has already identified.

- Develop a list of codes, rules, standards, and enforceable documents for review (**Complete Table 2. Document Review – Existing Codes and Standards below**). Examples include:
  - Comprehensive or Planning Documents
    - Stormwater Comprehensive or Management Plans
    - City or County-wide Comprehensive Plan
  - Standard Details
    - Standard Plans and Specifications
  - Engineering and Street Standards
  - Development Design Guidelines and Requirements
  - Zoning, Development, and Subdivision Code
    - Street and Sidewalk Use
    - Stormwater Code
    - Land Use Code
    - Building Code
    - Mechanical Code
    - Plumbing Code
    - Housing Code
    - Subdivision Code
    - Grading Code
    - Fire Code
    - LID Code
    - Tree and Vegetation Management Requirements
    - Landscaping Requirements
    - Right-of-Way Requirements
- Assign internal team members specific documents to conduct an initial review using the topics identified in Step 2 and fill out a review form for **each** code, rule, standard, or enforceable document from the list you have created above (**See Review Form**)

*Look at the  
Subtopic Focus  
Sheets for further  
detail*

- ☐ When reviewing each code, rule, standard, or enforceable document, make sure to reference the following LID Considerations:

Document Name	LID Considerations
<b>Comprehensive or Planning Documents</b>	<ul style="list-style-type: none"> <li>- Goals and policies should promote LID</li> <li>- Goals and policies that present barriers to LID should be modified or removed</li> <li>- Policies that support dual use of landscaping or open space and LID should be added</li> <li>- Policies should support minimizing impervious areas</li> </ul>
<b>Subdivision Code</b>	<ul style="list-style-type: none"> <li>- Allow or require use of LID, where feasible</li> <li>- Include measures to preserve on-site natural features, native vegetation, open space, sensitive environmental areas</li> <li>- Encourage clustering and minimizing impervious areas</li> <li>- Require applicants to conduct LID Site Analysis</li> <li>- Include soil testing for individual facility design</li> </ul>
<b>Zoning Code</b>	<ul style="list-style-type: none"> <li>- Include native vegetation retention standards based on land use and density</li> <li>- Include plant lists, replanting standards, management plan specifications, and maintenance requirements for vegetation</li> <li>- Include tree protection, conservation, and planting standards</li> <li>- Promote preservation of open space where possible</li> <li>- Include impervious surface standards for a range of zoning classifications</li> <li>- Include building footprint, height limits, and setbacks that help meet density goals</li> <li>- Site Plan Review Code should include LID site analysis components</li> <li>- Parking Code should allow permeable/pervious surfaces in parking areas and should look for opportunities to reduce the number and/or size of parking spaces</li> <li>- Encourage clustering development</li> </ul>
<b>Engineering and Street Standards</b>	<ul style="list-style-type: none"> <li>- Outline construction sequencing methods, phasing, and/or bonding for protecting LID BMPs during construction</li> <li>- Include maintenance responsibilities for any LID BMPs</li> <li>- Include provisions for including LID on small residential sites where flow control and/or treatment of stormwater may not be required</li> <li>- Eliminate requirement for approval of variances or deviations to accommodate LID in the public right-of-way</li> <li>- Should not present a barrier to LID (for example, require curb and gutter on all streets)</li> <li>- Include standard to minimize impervious surface and provide opportunity to manage stormwater using LID techniques</li> <li>- Should not conflict with other goals or code (such as International Fire Code, native vegetation retention, minimizing site disturbance)</li> </ul>
<b>Standard Details</b>	<ul style="list-style-type: none"> <li>- Include street sections that shows LID facilities, parking lanes, driving lanes, and sidewalks</li> <li>- Include cul-de-sac plan that includes pervious sidewalks and bioretention islands or other LID facilities</li> <li>- Include details for curb cuts, vertical curb with breaks</li> <li>- Include location of hydrants and other utilities within an LID road right-of-way</li> <li>- Include landscape planting templates for sidewalks and curb extensions,</li> <li>- Include plans and details for LID facilities incorporated into curb extensions, bioretention facilities, swales, permeable pavement, and other LID facilities</li> </ul>

- Meet with others on your internal team to discuss the review results
- Finalize review forms based on input from your internal team
- Consider presenting your results to Council or external stakeholders
- Fill in the following table with your list of documents and the date that the initial and final reviews were completed (this information is useful to track so that it can be incorporated into your report to Ecology):

**Table 2. Document Review – Existing Codes and Standards**

Document Name	Date	Initial Review Completed	Final Review Completed	Name & Title

**Step 4 – {Fill the gaps} Amend Existing Codes and Develop New Codes**

*Take steps to FILL THE GAPS*

After the project team identifies **where** there are gaps and barriers in existing codes and standards, the next step is to **fill the gaps** and remove any barriers by amending existing codes and developing new code language.

- Refer to the LID considerations listed under Step 3, the subtopic focus sheets, and the examples in the step 4 of the Guidebook to redline and update each code, standard, and enforceable document to integrate LID
- Update the Review Form to reflect what actions were taken to address gaps and barriers
  - Amend existing code
  - Develop new code
  - Decided not to incorporate any changes (and why)
- Fill in Table 3. Address the gaps with your list of documents and the actions that were taken to address gaps and barriers (this information is useful to track so that it can be incorporated into your report to Ecology):



**Table 3. Addressing the Gaps**

Document Name	Brief Summary of Revisions Made

- Consider presenting your results to Council or external stakeholders

**Step 5 – {Review and Adopt} Public Review and Adoption Process**

*Make sure that codes and standards have been thoroughly reviewed before starting the adoption process*

Once the project team has developed new codes or modified existing codes and standards to **fill the gaps** in addressing LID, the next step is to **review and adopt** the new codes and standards. Each jurisdiction has their own process for reviewing and adopting codes and standards, so only the basic steps are provided here.

- Understand the amendment process schedule
- Begin amendment process early to allow for rounds of internal and external review

**Internal Review:**

- Department Managers should review proposed changes to the standards
- Planning commissions should be briefed on the proposed changes to the standards

**External Review:**

- Stakeholder input:** Provide an informal review opportunity for external team members and stakeholders (identified in Step 1) of proposed code changes prior to adoption. Provide background information and proposed code changes. Make any changes to amendments based on input.
- Public Review:** Conduct a formal public review according to your jurisdiction’s specific formal public review process. Consider using a variety of outreach and communication tools to reach different target audiences.

## Step 6 – {Implement} Ensure Successful Implementation

### *Implement the changes*

After the new regulations have completed the public review and adoption process and standards have been administratively updated, the next step is to **implement** the new regulations and standards successfully.

- Identify and prioritize a list of implementation needs including training, internal and external outreach, application materials, enforcement mechanisms, and any other needs identified by the team
- Create a timeline to ensure that staff have adequate time to address LID project review, implementation, and ongoing maintenance
- Consider sharing training resources and successful approaches with other local jurisdictions
- Train internal staff on key changes to codes, rules, standards, and enforceable documents
- Train external applicants, designers, and contractors on key changes to codes, rules, standards, and enforceable documents
- Review and revise application materials, permit review bulletins, process flow charts, and permitting information available to the public

# Review Form Example Template

Name of Document/Code/Policy Reviewed: \_\_\_\_\_

**Purpose of Review Form:** The purpose of this review form is to provide a template for tracking the review process for integrating low impact Development (LID) into local codes, rules, standards, and other enforceable documents. A separate form is recommended for each code chapter (or subsection) and document that is reviewed. The form is organized into the major topic categories identified in *Integrating LID into Local Codes: A Guidebook for Local Governments*. Recommended subtopics for review are identified under each of the major topic categories. Refer to the **Subtopic Focus Sheets** for more information on the importance of each subtopic and questions to consider during the review process. A similar form was successfully used by the City of Seattle and the City of Arlington during their review processes. This form is not required to be used for permit compliance and can be modified, as needed, to incorporate additional review topics or tracking items.

Step 1 **Step 2—{WHAT}** **Step 3—{WHERE}** **Step 4—{Fill the GAPS}** Step 5 Step 6

WHAT topics did you review?		WHERE are the gaps?				What steps have you taken to FILL THE GAPS?
Topic/Sub Topics	Topic Reviewed	Conflict/Gap Identified	Section/Page Reference	Summary of Existing Text	Summary of Conflict/Gap	Steps Taken

## Topic: Site Planning and Assessment

Building locations	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Parking area locations	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Stormwater treatment/flow control BMP/facility locations	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :

## Topic: Healthy Soils

Protecting and restoring healthy soil	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
---------------------------------------	--	--	--	--	--	--

Step 1

Step 2—{WHAT}

Step 3—{WHERE}

Step 4—{Fill the GAPS}

Step 5 Step 6

WHAT topics did you review?		WHERE are the gaps?				What steps have you taken to FILL THE GAPS?
Topic/Sub Topics	Topic Reviewed	Conflict/Gap Identified	Section/Page Reference	Summary of Existing Text	Summary of Conflict/Gap	Steps Taken
Compost amendments	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Compaction	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :

**Topic: Landscaping, Native Vegetation, and Street Landscaping**

Tree preservation	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Screening	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Landscaping requirements for street frontages	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Landscaping requirements for parking lots	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :

Step 1

Step 2—{WHAT}

Step 3—{WHERE}

Step 4—{Fill the GAPS}

Step 5 Step 6

WHAT topics did you review?		WHERE are the gaps?				What steps have you taken to FILL THE GAPS?
Topic/Sub Topics	Topic Reviewed	Conflict/Gap Identified	Section/Page Reference	Summary of Existing Text	Summary of Conflict/Gap	Steps Taken

**Topic: Hard and Impervious Surfaces**

Maximum impervious surface allowances	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Shared driveways	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Minimum driveway width	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Use of permeable pavement for driveways & driveway encroachments	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Two-track driveway design	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :

**Topic: Bulk and Dimensional Considerations**

Building setbacks	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
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Step 1

Step 2—{WHAT}

Step 3—{WHERE}

Step 4—{Fill the GAPS}

Step 5 Step 6

WHAT topics did you review?		WHERE are the gaps?				What steps have you taken to FILL THE GAPS?
Topic/Sub Topics	Topic Reviewed	Conflict/Gap Identified	Section/Page Reference	Summary of Existing Text	Summary of Conflict/Gap	Steps Taken
Height limits	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Maximum square footage	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Clustering	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :

Topic: Clearing and Grading

Protecting existing infiltration	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Conserving native vegetation/soils	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Construction sequencing	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :

Step 1

Step 2—{WHAT}

Step 3—{WHERE}

Step 4—{Fill the GAPS}

Step 5 Step 6

WHAT topics did you review?		WHERE are the gaps?				What steps have you taken to FILL THE GAPS?
Topic/Sub Topics	Topic Reviewed	Conflict/Gap Identified	Section/Page Reference	Summary of Existing Text	Summary of Conflict/Gap	Steps Taken

Topic: Street and Roads

Travel lane widths	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Right-of-way (ROW) widths	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Use of permeable pavement for streets and roads	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Placement of utilities under paved areas in the ROW	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Required turn around area (e.g., Fire, USPS)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Sidewalk widths	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Sidewalk slope	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :

Step 1  
→

Step 2—{WHAT}

Step 3—{WHERE}

Step 4—{Fill the GAPS}

Step 5 → Step 6 →

WHAT topics did you review?		WHERE are the gaps?				What steps have you taken to FILL THE GAPS?
Topic/Sub Topics	Topic Reviewed	Conflict/Gap Identified	Section/Page Reference	Summary of Existing Text	Summary of Conflict/Gap	Steps Taken
Use of permeable pavement for sidewalks	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Minimum cul-de-sac radius	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Alternatives to cul-de-sacs	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :

Topic: Parking

Minimum/maximum parking ratios	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Use of permeable paving	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Parking stall dimensions	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Driving aisle dimensions	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :



Step 1

Step 2—{WHAT}

Step 3—{WHERE}

Step 4—{Fill the GAPS}

Step 5 Step 6

WHAT topics did you review?		WHERE are the gaps?				What steps have you taken to FILL THE GAPS?
Topic/Sub Topics	Topic Reviewed	Conflict/Gap Identified	Section/Page Reference	Summary of Existing Text	Summary of Conflict/Gap	Steps Taken
Off-street parking regulations	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :

**Topic: Design Guidelines and Standards**

Trees and bioretention	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Continuous curb requirements	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Curb radii	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :

**Topic: Stormwater Management and Maintenance**

Maintenance Provisions	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Inspection Access (covenants, easements)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :

Step 1

Step 2—{WHAT}

Step 3—{WHERE}

Step 4—{Fill the GAPS}

Step 5 Step 6

WHAT topics did you review?		WHERE are the gaps?				What steps have you taken to FILL THE GAPS?
Topic/Sub Topics	Topic Reviewed	Conflict/Gap Identified	Section/Page Reference	Summary of Existing Text	Summary of Conflict/Gap	Steps Taken
Enforcement	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :

**Topic: Subdivision and Planned Unit Development (PUD)**

Individual open space requirements	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Passive vs. active open space requirements	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :
Opportunities for Performance Based Designs	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :

**Topic: Critical Areas and Shoreline Management**

Sub Topic	Topic Reviewed	Conflict/Gap Identified	Section/Page Reference	Summary of Existing Text	Summary of Conflict/Gap	What steps have you taken to FILL THE GAPS?
Allowance of LID BMPs in critical areas/shorelines when compatible	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				<input type="checkbox"/> Amended existing code <input type="checkbox"/> Developed new code <input type="checkbox"/> Decided not to incorporate any changes If you decided not to incorporate any changes, explain why :

Additional Notes:

## Subtopic Focus Sheets

### Purpose

**Purpose of Subtopic Focus Sheets:** The purpose of these subtopic focus sheets is to provide additional information on the importance of each subtopic and questions to consider during the review process. These subtopic focus sheets are organized into the major topic categories identified in *Integrating LID into Local Codes: A Guidebook for Local Governments* and should be used in conjunction with the example **Review Form**. Use of these subtopic focus sheets is not required for permit compliance.

## Integrating LID into Local Codes

### Focus on Site Planning and Assessment

Subtopic	Why is this important?	What should I consider during my review?
<b>Building locations</b>	Locating buildings away from critical areas and soils that provide effective infiltration to preserve and protect these areas and provide potential locations for infiltrating LID facilities	<ul style="list-style-type: none"> <li>- Can the code be revised to require that buildings are located away from critical areas and preserve soils with good infiltration potential for stormwater management?</li> </ul>
<b>Parking area locations</b>	Locating parking areas to minimize site grading can preserve natural water courses, native vegetation, and native soils on site	<ul style="list-style-type: none"> <li>- Can the code be revised to encourage positioning parking areas near the entrance to the site to reduce long driveways?</li> <li>- Are there any incentives to developers to provide parking within garages rather than surface parking lots?</li> </ul>
<b>Stormwater treatment/flow control BMP/facility locations</b>	Infiltrating LID facilities should be constructed in soils that have good infiltration potential. Stormwater management facilities should be located along the natural drainage path to reduce site grading and maintain natural hydrology of the site.	<ul style="list-style-type: none"> <li>- Can the code be revised to require infiltrating LID facilities in areas with good infiltration potential?</li> <li>- Can the code include a site planning approach that emphasizes prioritizing the location of stormwater management facilities on site?</li> </ul>

## Integrating LID into Local Codes

### Focus on Healthy Soils

Subtopic	Why is this important?	What should I consider during my review?
<b>Protecting and restoring healthy soil</b>	Protecting soils during construction activities will preserve their ability to absorb and infiltrate and disperse stormwater runoff	<ul style="list-style-type: none"> <li>- Is a soil management plan in place that identifies soil protection zones and describes quantities of compost amendment?</li> <li>- Are protection areas required to be fenced?</li> </ul>
<b>Compost amendments</b>	Compost can be used to amend soil and provide additional nutrients that aid in uptake of pollutants	<ul style="list-style-type: none"> <li>- Can code be revised to require amendment of disturbed soils?</li> <li>- Could compost be provided to incentivize small projects?</li> </ul>
<b>Compaction</b>	The infiltration potential is reduced when soils are compacted, resulting in lower infiltration rates and increased runoff and erosion	<ul style="list-style-type: none"> <li>- Can the code be revised to include types of equipment for clearing and grading that minimize compaction of soils?</li> <li>- Can clearing, grading, and soil disturbance outside the building footprint be limited or restricted?</li> <li>- Consider requiring contractors to reestablish permeability of soils that have been compacted by construction vehicles.</li> </ul>

#### Resources:

Building Soil: Guidelines and Resources for Implementing Soil Quality and Depth BMP T5.13:  
<http://www.buildingsoil.org/>

## Integrating LID into Local Codes

### Focus on Landscaping, Native Vegetation, and Street Landscaping

Subtopic	Why is this important?	What should I consider during my review?
<b>Tree preservation</b>	Trees provide flow control by intercepting stormwater. Currently, many codes focus on preservation of significant or heritage trees instead of conifers.	<ul style="list-style-type: none"> <li>- Are there regulatory controls over tree clearance and removal of mature trees/forest stands?</li> <li>- Can the code be revised to place greater emphasis on preservation of conifers?</li> <li>- Can the code include strategies to orient retained vegetation and open space to disconnect impervious surfaces?</li> </ul>
<b>Screening</b>	Codes typically focus on screening in terms of aesthetics (reducing visual impacts), but screening can also emphasize native vegetation preservation or replanting, which can improve stormwater infiltration and dispersion.	<ul style="list-style-type: none"> <li>- Can the screening requirements be revised to include provisions for retaining native vegetation or replanting?</li> <li>- Can vegetation planted within LID facilities count towards site, parking, or perimeter screening requirements?</li> </ul>
<b>Landscaping requirements for street frontages</b>	Codes often only include requirements for street trees, not LID or other vegetation between the sidewalk and the street.	<ul style="list-style-type: none"> <li>- Can the street frontage code be revised to include other landscaping between the sidewalk and the street?</li> <li>- Can vegetation planted within LID facilities count towards open space or landscaping requirements?</li> </ul>
<b>Landscaping requirements for parking lots</b>	Codes may not include landscaping requirements for parking lots. Trees can provide flow control by intercepting stormwater, reduce the heat island effect, and also results in a reduction in total impervious area.	<ul style="list-style-type: none"> <li>- Are minimum tree canopy or vegetation requirements specified for parking lots?</li> </ul>

## Integrating LID into Local Codes

### Focus on Hard and Impervious Surfaces

Subtopic	Why is this important?	What should I consider during my review?
<b>Maximum impervious surface allowances</b>	High impervious surface allowances result in larger volumes of stormwater runoff.	<ul style="list-style-type: none"> <li>- Does the code include maximum impervious surface limits for different land use types?</li> <li>- Can the maximum impervious surface limits be reduced in residential areas?</li> <li>- Can a portion of the impervious surface be designated as non-pollution generating impervious surface?</li> </ul>
<b>Shared driveways</b>	Individual driveways account for a large portion of the total impervious area (up to 20 percent) in residential areas. Shared driveways can reduce overall lot impervious surface coverage.	<ul style="list-style-type: none"> <li>- Are shared (or common) driveways for multiple single-family dwellings, multi-family structures, and/or commercial development allowed?</li> <li>- Can the use of shared driveways (for up to 4 or 6 houses) be incorporated?</li> </ul>
<b>Minimum driveway width</b>	A modest reduction in driveway width requirements can result in a significant reduction in total impervious area.	<ul style="list-style-type: none"> <li>- Is a minimum driveway width specified?</li> <li>- Can the minimum driveway width be reduced to 9 feet or less (one lane), 18 feet (two lanes), or 16 feet (shared driveway)?</li> </ul>
<b>Use of permeable pavement for driveways</b>	Permeable pavement is applicable to low-volume, low-traffic surfaces, and allows for infiltration of stormwater.	<ul style="list-style-type: none"> <li>- Are alternative surfaces (other than conventional concrete or asphalt) allowed?</li> <li>- Can the code be revised to include incentives for use permeable pavement for driveways?</li> </ul>
<b>Two-track driveway design</b>	Providing a pervious strip in a standard driveway design can reduce impervious surface.	<ul style="list-style-type: none"> <li>- Is a two-track driveway design allowed?</li> </ul>

## Integrating LID into Local Codes

### Focus on Bulk and Dimensional Considerations

Subtopic	Why is this important?	What should I consider during my review?
<b>Building setbacks</b>	Front yard setbacks (which dictate how far houses must be from the street) can extend driveway length and increase the impervious coverage of the lot. Side yard setbacks and wide frontages increase the total road length and overall impervious coverage.	<ul style="list-style-type: none"> <li>- Can setback distances be minimized in residential areas to increase flexibility in regard to house location? (See Figure 12.1 for the geometry of a typical 1-acre lot)</li> <li>- Can frontage areas requirements be reduced in open space residential developments?</li> <li>- Are irregular lot shapes (e.g., pie, flag, zipper, angled z) allowed? (See Figure 12.2 for examples of irregular lot shapes)</li> </ul>
<b>Height limits</b>	Limiting building height can result in increased building footprints. Encouraging developers to build up, instead of out, can help meet density goals and reduce impervious coverage.	<ul style="list-style-type: none"> <li>- Can the maximum building height be increased if building footprints are reduced?</li> </ul>
<b>Maximum square footage</b>	Large building footprints result in less available area for LID facilities and native vegetation/ landscape retention.	<ul style="list-style-type: none"> <li>- Can code be revised to incentivize or encourage minimizing building footprints?</li> </ul>
<b>Clustering</b>	Clustering of buildings in subdivisions can reduce the total site footprint and help maintain natural hydrologic characteristics of the site.	<ul style="list-style-type: none"> <li>- Are cluster development designs allowed?</li> <li>- Are cluster development designs allowed “by right” (no special permit or zoning variance required)?</li> <li>- Are flexible site design criteria available for developers that utilize cluster design options?</li> </ul>



Figure 12.1: Geometry of a Typical One Acre Lot (Schueler, 1995)

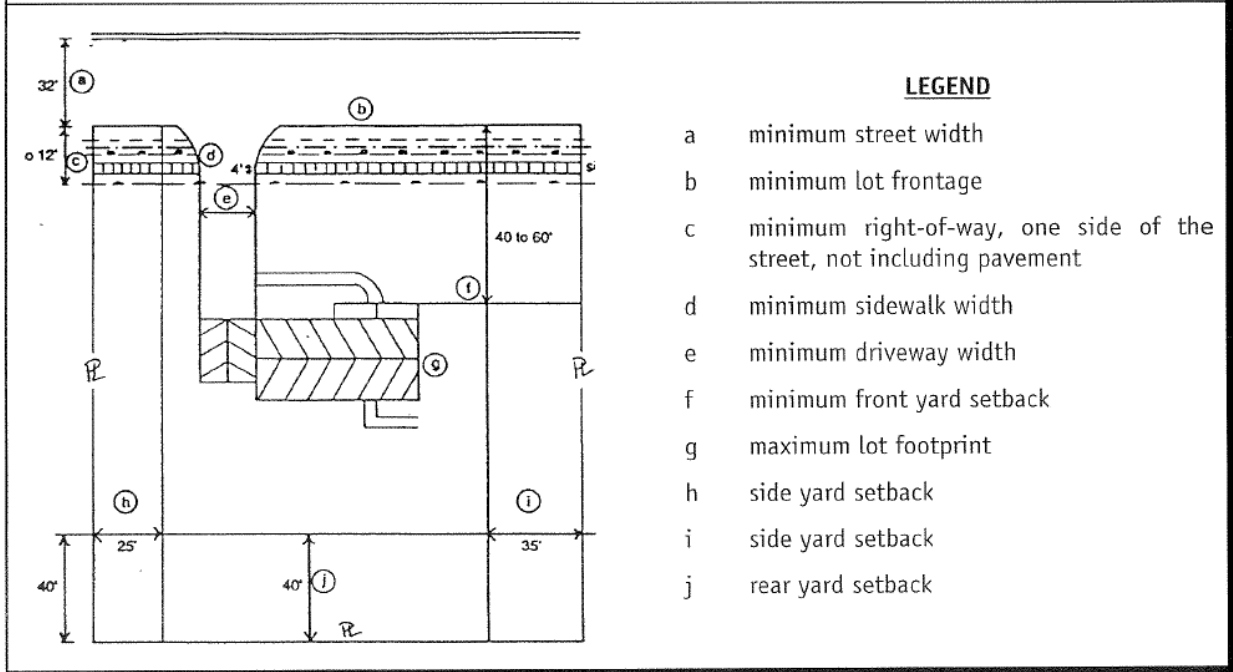
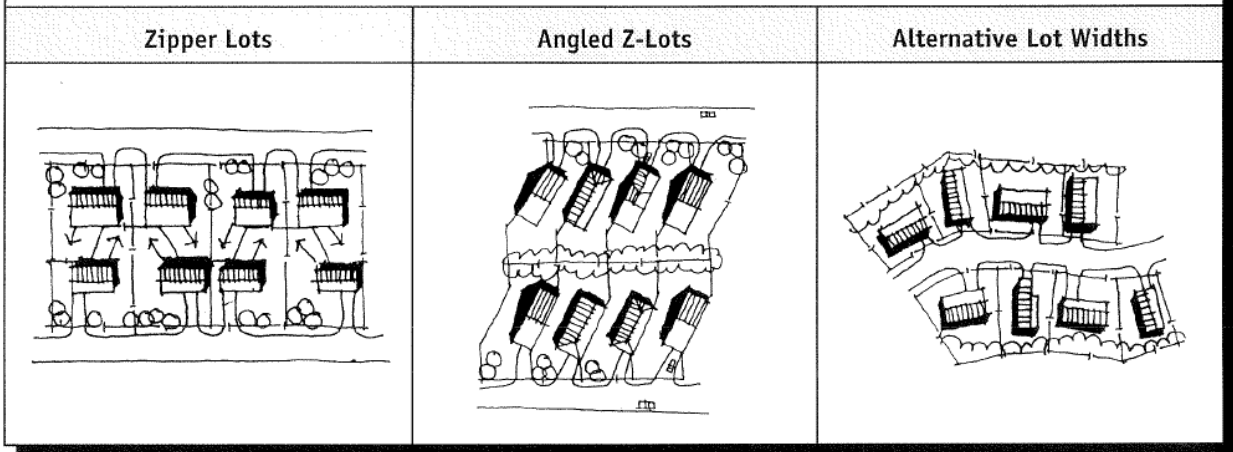


Figure 12.2: Nontraditional Lot Designs (ULI, 1992)



## Integrating LID into Local Codes

### Focus on Clearing and Grading

Subtopic	Why is this important?	What should I consider during my review?
<b>Protecting existing infiltration</b>	Protecting existing infiltration rates will preserve natural hydrologic characteristics of the site.	<ul style="list-style-type: none"> <li>- Do clearing and grading regulations include provisions for minimizing site disturbance and protecting native vegetation and soils?</li> </ul>
<b>Conserving native vegetation/soils</b>	Native vegetation and soils provide natural stormwater management and pollutant removal.	<ul style="list-style-type: none"> <li>- Is there an existing ordinance that requires or encourages the preservation of natural vegetation?</li> <li>- Is wholesale clearing (mass grading) or sites prohibited or limited?</li> <li>- Are developments required to set aside an undeveloped portion of the site?</li> <li>- Are there specific native vegetation retention standards based on land use and density?</li> <li>- Is there any incentive to developers or landowners to conserve land (open space design, density bonuses, stormwater credits, or lower property tax rates)?</li> <li>- Does the native vegetation definition (or other code section) include minimum tree density, minimum retention requirements, protecting native vegetation areas, replanting requirements, soil amendment standards, management plan specifications, and maintenance requirements?</li> </ul>
<b>Construction sequencing</b>	Proper construction sequencing can minimize construction impacts on future LID facilities by reducing potential for soil erosion and compaction.	<ul style="list-style-type: none"> <li>- Does the code include methods for effective construction sequencing to minimize site disturbance and soil compaction?</li> <li>- Do engineering and street standards outline construction sequencing and practices for protecting pervious areas and LID BMPs during construction?</li> <li>- Can the code be revised to limit clearing to the building footprint and area needed for maneuvering machinery?</li> </ul>

## Integrating LID into Local Codes

### Focus on Streets and Roads

Subtopic	Why is this important?	What should I consider during my review?
<b>Travel lane widths</b>	Travel lanes are often wider than necessary to provide safe access for larger vehicles. Impervious surface coverage can be reduced by narrowing minimum travel lane widths.	<ul style="list-style-type: none"> <li>- What minimum travel lane widths are required based on street classification?</li> <li>- Is the travel lane wider than required by the fire department or other emergency responders?</li> <li>- Can street widths be reduced for local access streets?</li> <li>- Are narrower pavement widths allowed along sections of roadway where there are no houses, building, or intersections, and where on-street parking is not anticipated?</li> <li>- Are queuing lanes (i.e., cars wait between parked cars while the approaching traffic passes) allowed? (See Figure 1.2 for examples of queuing lanes)</li> </ul>
<b>Right-of-way (ROW) widths</b>	ROW width (and impervious surface coverage) can be reduced by narrowing travel lane widths, revising sidewalk requirements, and reducing grass border areas	<ul style="list-style-type: none"> <li>- Can the minimum ROW width be reduced or include flexibility for LID considerations? (See Figure 3.2 for examples of narrower ROW design options for residential streets)</li> <li>- Can sidewalks be placed on one side of the street only in low-density residential areas?</li> <li>- Can alternate pedestrian networks (e.g., trails through common areas) be substituted for sidewalks?</li> </ul>
<b>Use of permeable pavement for streets and roads</b>	Use of permeable pavement on streets and roads provides stormwater infiltration and reduces stormwater runoff.	<ul style="list-style-type: none"> <li>- Can permeable pavement be used for road shoulders, parking lanes, and emergency parking areas?</li> <li>- Does the code require or encourage use of permeable pavement for future street/road resurfacing projects?</li> </ul>
<b>Placement of utilities under paved areas in the ROW</b>	Utilities and storm drains located within the paved section of the ROW result in fewer conflicts for installation of roadside LID BMPs.	<ul style="list-style-type: none"> <li>- Does the code allow utilities to be placed under the paved section of the ROW?</li> </ul>
<b>Required turnaround area (e.g., Fire, USPS)</b>	Required turnaround radius or street width can conflict with minimizing impervious surfaces	<ul style="list-style-type: none"> <li>- Is the minimum street section necessary for safe access and emergency response being used?</li> </ul>

Subtopic	Why is this important?	What should I consider during my review?
<b>Sidewalk widths</b>	Reducing sidewalk widths reduces total impervious area and required ROW width.	<ul style="list-style-type: none"> <li>- What is the minimum sidewalk width allowed?</li> <li>- Can sidewalk width requirements be reduced in areas where LID BMPs are present?</li> </ul>
<b>Sidewalk slope</b>	Sidewalk slopes can be adjusted to drain towards a LID BMP or native vegetation area along the roadway instead of directly into the street.	<ul style="list-style-type: none"> <li>- Does the code contain sidewalk slope direction requirements?</li> </ul>
<b>Use of permeable pavement for sidewalks</b>	Use of permeable pavement on sidewalks provides stormwater infiltration and reduces stormwater runoff.	<ul style="list-style-type: none"> <li>- Is permeable pavement allowed for sidewalks?</li> </ul>
<b>Minimum cul-de-sac radius</b>	Reducing minimum cul-de-sac radii can decrease impervious surface.	<ul style="list-style-type: none"> <li>- What is the minimum cul-de-sac radius? (a radius of 35 feet is optimal, depending on emergency vehicle access needs)</li> <li>- Can a landscaped island be placed in the center of the cul-de-sac and used for stormwater flow control and treatment?</li> </ul>
<b>Alternatives to cul-de-sacs</b>	Alternatives turnarounds result in less impervious surface coverage compared to a circular cul-de-sac.	<ul style="list-style-type: none"> <li>- Can hammerhead (T-shaped) turnarounds or loop roads be used instead of standard cul-de-sacs? (See Figure 4.1 for examples of turnaround options for residential streets and the impervious area associated with each turnaround option)</li> </ul>

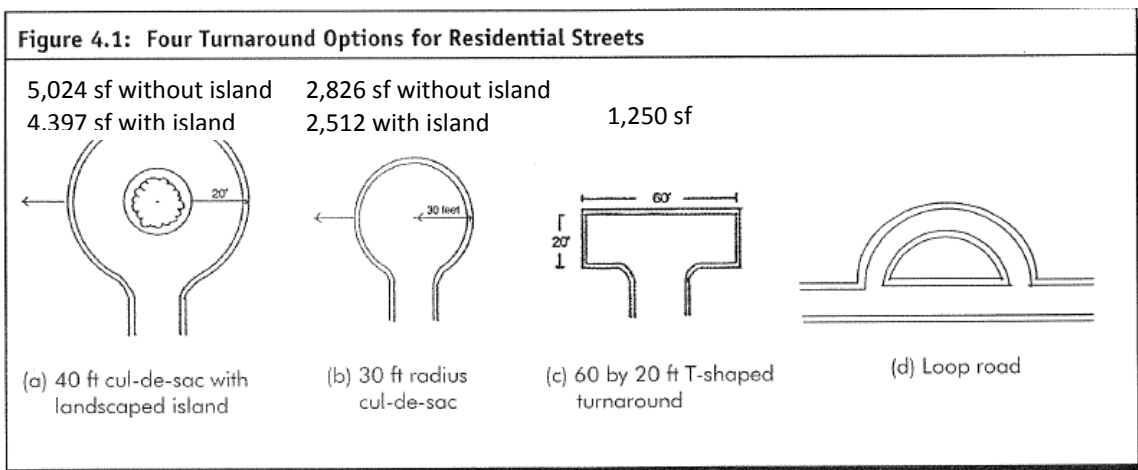


Figure 1.2: A Comparison of Queuing Streets vs. Traditional Streets [Source: Portland (OR) Office of Transportation, 1994]

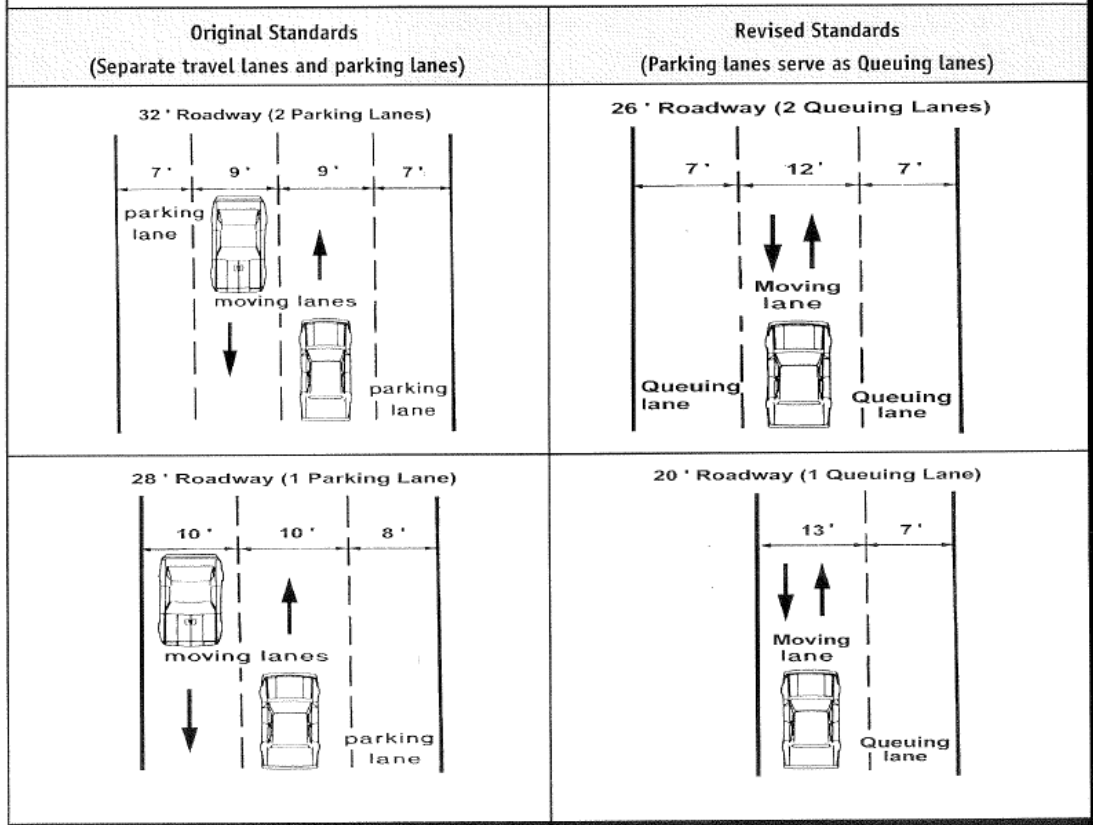
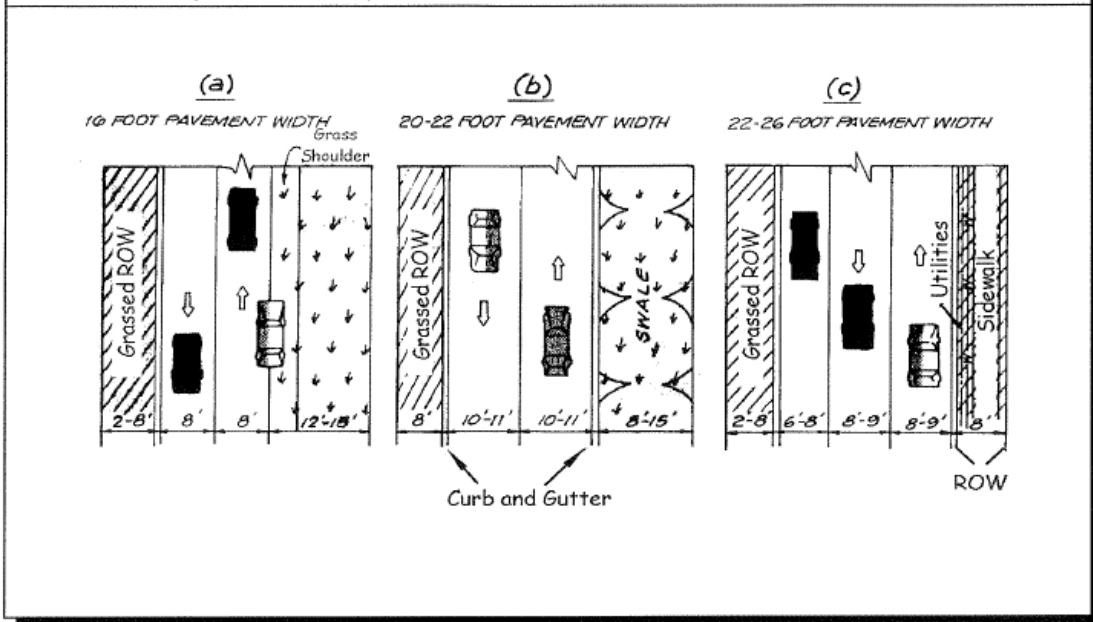


Figure 3.2: Potential Design Options for Narrower ROW on Residential Streets (Schueler, 1995)

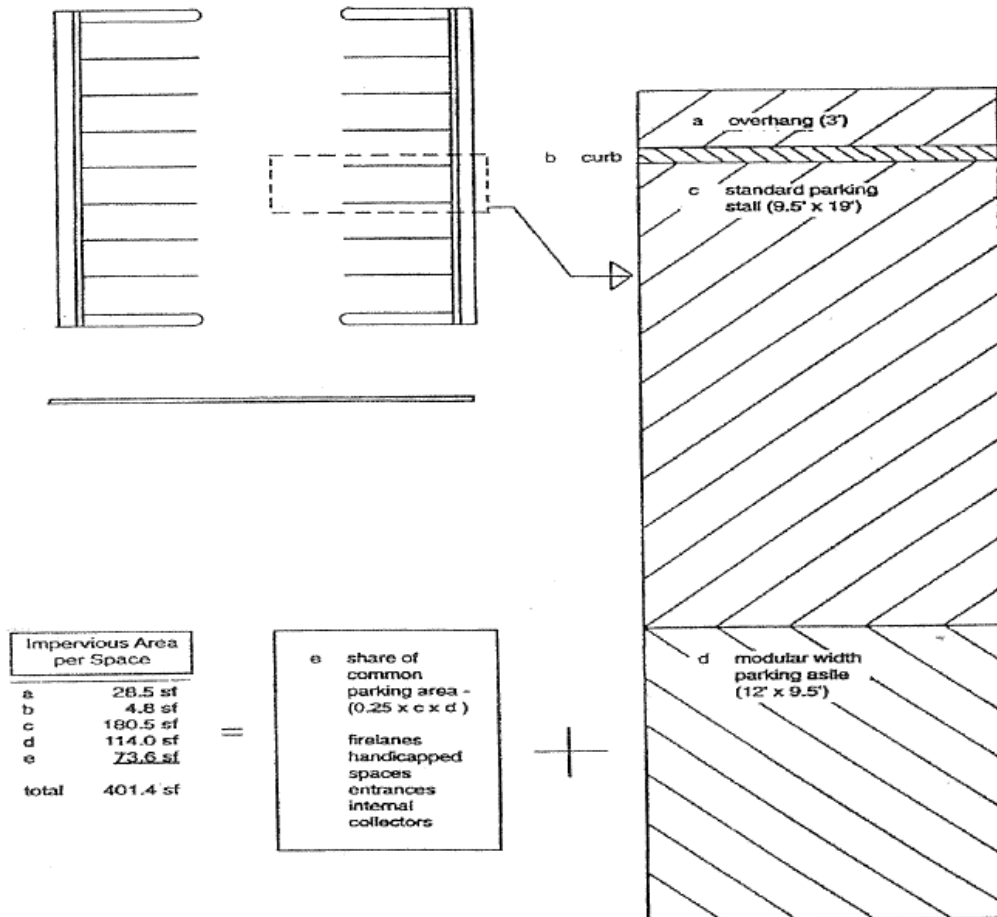


## Integrating LID into Local Codes

### Focus on Parking

Subtopic	Why is this important?	What should I consider during my review?
<b>Minimum parking ratios</b>	Adjusting minimum parking ratios can reduce the amount of impervious surface and ensure that you are not requiring more parking than is needed.	<ul style="list-style-type: none"> <li>- What is your minimum parking ratio for the following:               <ul style="list-style-type: none"> <li>o Professional office building</li> <li>o Shopping center</li> <li>o Single family home</li> </ul> </li> <li>- Can the number of required parking spaces be reduced due to shared parking, proximity to transit, car sharing, etc.?</li> </ul>
<b>Maximum parking ratios</b>	Establishment of a maximum parking ratio can be an effective strategy for reducing large and underutilized parking areas.	<ul style="list-style-type: none"> <li>- Are the parking requirements set as maximum or median (rather than minimum) requirements?</li> <li>- Can a maximum number of parking spaces be specified?</li> </ul>
<b>Permeable paving use</b>	Permeable pavement is applicable to low-volume, low-traffic surfaces, and allows for infiltration of stormwater.	<ul style="list-style-type: none"> <li>- Can permeable pavement be used for parking areas, parking lanes, and/or parking spaces?</li> <li>- Can permeable pavement be incentivized for spillover (infrequently used) parking areas?</li> </ul>
<b>Parking stall dimensions</b>	Impervious surface area can be reduced with: compact spaces/narrowing of the parking space; reduced length; reduced width.	<ul style="list-style-type: none"> <li>- What is the minimum stall length and width for a standard parking space? (See Figure 8.1 for a breakdown of the total impervious area needed to support a single parking stall)</li> <li>- Can the parking stall length and/or width be reduced?</li> <li>- Are a fixed percentage of stalls (15 to 35%) assigned to compact cars?</li> </ul>
<b>Driving aisle dimensions</b>	A reduction in driving aisle width can have a significant impact in overall impervious surface coverage.	<ul style="list-style-type: none"> <li>- Is the driving aisle wider than required by the fire department or other emergency responders?</li> <li>- Can one-way aisles be used in conjunction with angled parking stalls instead of two-way aisles?</li> </ul>
<b>Off-street parking regulations</b>	Focused on establishing a minimum number of off-street parking spaces based on specific land uses or zones.	<ul style="list-style-type: none"> <li>- Can mechanisms be integrated to reduce parking requirements (e.g., shared parking, proximity to transit, car share, etc.)?</li> <li>- Can structured or tuck-under parking be incentivized?</li> </ul>

Figure 8.1: The total impervious area needed to support a single parking stall.



A parking stall is supported by a larger parking space that includes the (a) overhang, (b) curb, (c) stall, (d) parking aisle needed to get into the stall, and (e) the stall's share of common parking area, such as entrances, internal collectors, fire lanes and handicapped parking spaces. When these extra features are added in, the approximately 180 ft<sup>2</sup> needed for each parking stall increases to over 400 square feet.

Source of above figure (Figure 8.1 - The total impervious area needed to support a single parking stall): Center for Watershed Protection (1998), Better Site Design: A Handbook for Changing Development Rules in Your Community

## Integrating LID into Local Codes

### Focus on Design Guidelines and Standards

Subtopic	Why is this important?	What should I consider during my review?
<b>Trees and bioretention</b>	Some street trees are not compatible for use in bioretention areas due to variable moisture conditions.	<ul style="list-style-type: none"> <li>- Are specific street tree species included in the design guidelines and standards?</li> <li>- Can flexibility be incorporated to allow alternative tree species that are compatible with bioretention and can also meet similar street tree aesthetic requirements?</li> </ul>
<b>Continuous curb requirements</b>	Continuous curb requirements do not allow flexibility in street design, making integration of roadside bioretention difficult.	<ul style="list-style-type: none"> <li>- Are conventional curbs and gutters required?</li> <li>- Can the curb and gutter requirement be eliminated or adjusted to allow the use of curb cuts (breaks that allow runoff to flow into bioretention cells) or “invisible” curbs (flush with the road surface)?</li> </ul>
<b>Curb radii</b>	Curb radii requirements may restrict use of LID BMPs adjacent to roadways and sidewalks.	<ul style="list-style-type: none"> <li>- Are minimum curb radii requirements specified for street intersections or pedestrian bulbs?</li> <li>- Can curb radii requirements be reduced to provide additional space for LID BMPs?</li> </ul>



## Integrating LID into Local Codes

### Focus on Stormwater Management and Maintenance

Subtopic	Why is this important?	What should I consider during my review?
<b>Maintenance Provisions</b>	In order to maintain the benefits of LID facilities over time, clearly written maintenance standards and procedures need to be in place.	<ul style="list-style-type: none"> <li>- Does the adopted stormwater manual outline maintenance standards and/or procedures?</li> </ul>
<b>Inspection Access (covenants, easements)</b>	A jurisdiction's code may require a covenant or easement agreement for the construction of a stormwater facility. The agreement may require the facility owner to perform certain maintenance activities and grants the jurisdiction limited authority to access the site (through an easement or agreement) for facility inspection, maintenance, or repair work.	<ul style="list-style-type: none"> <li>- Does the code allow access to inspect, maintain, and repair the facility if a private property owner fails to maintain the facility?</li> </ul>
<b>Enforcement</b>	Enforcement is necessary to proper construction procedures and long-term maintenance of LID BMPs.	<ul style="list-style-type: none"> <li>- Does the code include mechanisms to ensure reimbursement for any maintenance activities conducted?</li> <li>- Are public easements, maintenance covenants, or other legal agreements required?</li> <li>- Are incentives (reduction in stormwater fees) provided for private property owners that meet their maintenance requirements?</li> </ul>

## Integrating LID into Local Codes

### Focus on Subdivision and Planned Unit Development (PUD)

Subtopic	Why is this important?	What should I consider during my review?
<b>Individual open space requirements</b>	Open space requirements typically specify a percentage of area that is required to be set aside in a subdivision. This can result in a reduction in the amount of impervious area within a development.	<ul style="list-style-type: none"> <li>- Does a minimum percentage of open space have to be managed in a natural condition?</li> <li>- Can the open space requirement be increased?</li> <li>- Are open space areas required to be consolidated into larger units?</li> </ul>
<b>Passive vs. active open space requirements</b>	Active recreation areas include playgrounds, ball fields, pools, and skate parks which involve large impervious or pollution-generating pervious areas. Passive recreation areas include undeveloped or minimally developed areas such as rustic picnic areas, benches, and trails. Integrating LID into subdivision codes can allow designers to count bioretention areas, dispersion areas, and other conserved open space toward passive open space requirements.	<ul style="list-style-type: none"> <li>- Are allowable and prohibited uses for open space defined?</li> <li>- Can LID BMPs such as bioretention count towards passive open space requirements?</li> <li>- Are native vegetation areas that integrate pervious passive recreation areas, stormwater dispersion facilities, and/or stormwater restoration projects allowed?</li> </ul>
<b>Opportunities for Performance Based Designs/PUDs</b>	Performance based designs (often called PUDs) allow for flexibility to cluster uses in exchange for increased open space, and to increase opportunities for implementing LID techniques.	<ul style="list-style-type: none"> <li>- Are PUDs required for high density areas, such as city centers?</li> <li>- Are native vegetation and maximum impervious surface standards for PUDs and high density dwellings specified?</li> </ul>

## Integrating LID into Local Codes

### Focus on Critical Areas and Shoreline Management

Subtopic	Why is this important?	What should I consider during my review?
<b>Allowance of LID BMPs in critical areas/shorelines when compatible</b>	Some regulations may not allow for LID techniques within critical areas, shorelines, sensitive areas, or their associated buffers; however, if designed and maintained properly, LID facilities located within or adjacent to these areas can have a positive impact on these areas.	<ul style="list-style-type: none"> <li>- Are allowable or prohibited uses of buffers defined?</li> <li>- Are LID BMPs allowed within or adjacent to critical areas/shoreline/sensitive area/wetland buffers?</li> <li>- Can native vegetation associated with LID BMPs be used to meet buffer enhancement requirements?</li> </ul>

## Code and Ordinance References

This document provides a selection of model ordinances along with examples of existing code language to help jurisdictions in Washington State integrate LID into local codes, rules, standards, and other enforceable documents. The example codes and ordinances are divided by relevance for Western and Eastern Washington jurisdictions.

### For Western WA Jurisdiction Staff

- Model Ordinance - Off Street Parking  
[www.psp.wa.gov/downloads/LID\\_Guidebook/Parking\\_Draft.pdf](http://www.psp.wa.gov/downloads/LID_Guidebook/Parking_Draft.pdf)
- Model Subdivision Ordinance  
[www.pca.state.mn.us/index.php/view-document.html?gid=7429](http://www.pca.state.mn.us/index.php/view-document.html?gid=7429)
- Landscaping Requirements examples (not considered to be “model code language,” but provided as examples of existing code language on this topic):
  - City of Bothell Municipal Code, Chapter 12.18 – Tree Retention and Landscaping:  
[www.codepublishing.com/WA/Bothell](http://www.codepublishing.com/WA/Bothell)
  - City of Edmonds Community Development Code, Chapter 20.13 – Landscaping Requirements: [www.codepublishing.com/wa/edmonds](http://www.codepublishing.com/wa/edmonds)
  - City of Poulsbo Municipal Code, Section 18.90.050 – Site Planning and Design:  
[www.codepublishing.com/wa/poulsbo](http://www.codepublishing.com/wa/poulsbo)
- Parking code examples (not considered to be “model code language,” but provided as examples of existing code language on this topic):
  - City of Auburn Municipal Code, Chapter 18.52 – Off-street Parking and Loading:  
[www.codepublishing.com/wa/auburn](http://www.codepublishing.com/wa/auburn)
  - City of Bothell Municipal Code, Chapter 12.16 – Parking, Loading, Transit Access, and Pedestrian Circulation: [www.codepublishing.com/WA/Bothell](http://www.codepublishing.com/WA/Bothell)
  - City of Olympia Municipal Code, Chapter 18.38 – Parking and Loading:  
[www.codepublishing.com/wa/olympia](http://www.codepublishing.com/wa/olympia)
  - LID-Specific Code Chapter (Snohomish County, Chapter 30.63C – Low Impact Development)  
[www.codepublishing.com/wa/snohomishcounty](http://www.codepublishing.com/wa/snohomishcounty)
- Local Regulation Assistance Project (Puget Sound Partnership 2005-2008):
  - Town of Coupeville (2008 recipient; adopted many of the recommendations to Chapter 16 – Development Regulations):  
<https://library.municode.com/index.aspx?clientId=16301>
  - City of Lake Stevens (2008 recipient; adopted many of the recommendations to Chapter 14 – Land Use Code): [www.codepublishing.com/WA/LakeStevens](http://www.codepublishing.com/WA/LakeStevens)
  - City of Marysville (2005 recipient; adopted many of the recommendations to Title 12 – Streets and Sidewalks, Title 14 – Water and Sewers, Title 19 – Zoning, and Title 20 – Subdivisions): [www.codepublishing.com/wa/marysville](http://www.codepublishing.com/wa/marysville)

- City of Mill Creek (2008 recipient; adopted many of the recommendations to Chapter 15 – Buildings and Construction, Chapter 16 – Subdivisions and Plats, and Chapter 17 – Zoning): [www.codepublishing.com/wa/millcreek](http://www.codepublishing.com/wa/millcreek)
- City of Port Orchard (2006 recipient; adopted many of the recommendations to Title 16 – Land Use Regulatory Code): [www.codepublishing.com/WA/PortOrchard](http://www.codepublishing.com/WA/PortOrchard)

## For Eastern WA Jurisdiction Staff

- Model Water Use Conservation Ordinance, 2010  
[www.cmap.illinois.gov/documents/10180/11537/model\\_water\\_use\\_conservation\\_ordinance.pdf/e28c8492-b127-4466-a9fb-439501c939de](http://www.cmap.illinois.gov/documents/10180/11537/model_water_use_conservation_ordinance.pdf/e28c8492-b127-4466-a9fb-439501c939de)
- Parking code examples (not considered to be “model code language,” but provided as examples of existing code language on this topic):
  - City of Spokane Municipal Code, Chapter 17C.230 – Parking and Loading:  
<https://beta.spokanecity.org/smc>
  - City of Yakima Municipal Code, Chapter 15.06 – Off-street Parking and Loading:  
[www.codepublishing.com/WA/yakima](http://www.codepublishing.com/WA/yakima)
  - Spokane County Zoning Code, Section 14.802 – Off-street Parking and Loading Standards:  
[www.spokanecounty.org/data/buildingandplanning/lud/documents/Zone%20Code%202008%20for%20internet.pdf](http://www.spokanecounty.org/data/buildingandplanning/lud/documents/Zone%20Code%202008%20for%20internet.pdf)

# Communicating with Your Elected Officials and City Managers

## Western Washington

Elected officials and city managers play an important role in the code update and adoption process, therefore it is critical to engage them early and keep them updated as the process progresses. This handout provides: 1) key information that your elected officials and city managers need to know about LID and the code update process, and 2) a step-by-step approach to **what** your elected officials and city managers need to know, and **how** they can support the process. The information presented below is organized based on the 6 steps in *Integrating LID into Local Codes: A Guidebook for Local Governments*.

### General tips to get their attention and keep it:

1. Make contact early in the project, and at key milestones as the project progresses.
2. Be concise and to the point.
3. Focus on key implications for internal and external stakeholders. Both positive outcomes and potential areas of conflict.
4. Remind elected officials what LID is, why it is important, and why codes are being updated each time you speak with them.
5. Be prepared to propose ways that elected officials and city managers can support the process.

### General information about what they need to know:

Each elected official or city manager will have a different level of knowledge about the LID code update process. Below are suggested talking points on the NPDES permit requirements, followed by web links for additional information on why we are doing LID.

### Code updates – where we are today:

- Codes are being reviewed and updated to integrate changes required by the new Washington State Department of Ecology NPDES Western Washington Municipal Stormwater Permit. These changes are required and each jurisdiction is obligated to comply by the deadlines.
  - Your jurisdiction is part of the Phase II permit which went into effect on August 1, 2013.
  - LID will be required to be evaluated by project applicants for use on new development, redevelopment, and infrastructure projects like roads and parking lots.

- Most Phase II jurisdictions will need to implement changes adopted and effective by December 31, 2016. (Variations to this deadline apply to: Lewis & Clark Counties' deadline is 6/30/17; New permittees' deadline is 12/31/17; and city of Aberdeen's deadline is 6/30/18)
- There are potential budget and work plan implications.
- As part of these updates, LID will be required to be evaluated first for managing stormwater runoff.
  - LID will be required to be evaluated by project applicants for use on new development, redevelopment, and infrastructure projects like roads and parking lots.
  - If LID is not feasible, justification will need to be provided

### LID – why we are doing it

- For talking points regarding why we are doing LID, please visit:  
[www.awcnet.org/portals/0/documents/lid/TalkPointsWhyDoingLID0513.pdf](http://www.awcnet.org/portals/0/documents/lid/TalkPointsWhyDoingLID0513.pdf)
- For a complete list of LID resources for elected officials and city managers, please visit:  
<http://www.awcnet.org/TrainingEducation/LowImpactDevelopment.aspx>

## The Six Steps: What elected officials and city managers need to know and how they can get involved.

### Step 1 {Who} Assemble the Project Team

Step 1 involves assembling a comprehensive team of key internal staff and potential key external stakeholders to assist with the process of integrating LID into local codes.

#### What elected officials and city managers need to know:

1. The code update process is a big undertaking that requires significant staff time and multiple staff.
  - To support the code review and updates, internal team members may include staff from the planning, public works, parks, fire and public safety, and building departments. Optional team members from city council, planning commission, and legal department departments.
  - To provide comment and facilitate the approval process, external stakeholders may include State/local health department, utility providers, agencies owning and maintaining streets, site designers and engineers, major property owners and developers, citizen's or neighborhood groups, environmental groups, and special districts.

- Getting this variety of professionals and stakeholders at the table together and up front in the process is critical to identifying issues and solutions that will in turn save time and frustration at the end of the process.

#### How elected officials and city managers can support the process:

1. Encourage and support (and allow time for) staff participation.
2. Bring resistant parties on board by showing top down support for the process.
3. Identify and reach out to key stakeholders.
4. Ask for support in recruiting internal team members and external stakeholders to participate in the code update process.

### Step 2 {What} Understand General Topics to Address & Step 3 {Where} Review Existing Codes and Standards

Step 2 establishes a work program that identifies what topics of a jurisdiction's codes, policies, standards, and enforceable documents, and operating procedures need to be updated to integrate LID. Step 3 identifies where the topics for review occur.

#### What elected officials and city managers need to know:

1. Examples of the types of codes, policies, standards, enforceable documents, and operating procedures that you have identified as needing to be updated.
2. Who and what kinds of projects the code updates are likely to affect (positively or negatively).
3. Any possible areas of concern, complexity, conflict, etc. at this stage of the project.

#### How elected officials and city managers can support the process:

1. Take specific questions or concerns to external stakeholders or external team members and provide feedback.
2. Provide consultation and comment on certain sections of code.
3. Help resolve any issues or internal debates/conflict, where appropriate.

### Step 4 {FILL THE GAPS} Amend Existing Codes and Develop New Codes

Step 4 fills in the gaps and addresses the barriers in existing codes and standards by amending existing codes and developing new code language.

#### What elected officials and city managers need to know:

1. Briefings on the extent of and kinds of amendments that are being proposed, including examples of revised language.



2. Details on how the code updates are likely to affect people or projects (positively or negatively).
3. Any problems and proposed corrective actions at this stage of the project.

#### How elected officials and city managers can support the process:

1. Provide consultation and comment on certain code sections or policies.
2. Take specific questions or concerns to external stakeholders or external team members and provide feedback.
3. Help resolve any possible issues, where appropriate.

### Step 5 {REVIEW & ADOPT} Public Review and Adoption Process

Step 5 reviews and adopts the new codes and standards. Each jurisdiction has its own process for reviewing and adopting codes and standards.

#### What elected officials and city managers need to know:

1. The plan and timeline for public review.
2. The types of internal staff and external stakeholders required for review of updated code language.
3. Potential adoption challenges and solutions.

#### How elected officials and city managers can support the process:

1. Help to engage external team members, stakeholders, and the public in the review process.
2. Help by being an advocate for code update process and LID.

### Step 6 {IMPLEMENT} Ensure Successful Implementation

Step 6 implements the new regulations and standards.

#### What elected officials and city managers need to know:

1. The timing and extent of the resources needed for the successful implementation of the code updates, including issues such as staffing, equipment, training, and outreach.

#### How elected officials and city managers can support the process:

1. Get involved in public outreach and/or public project that include LID components.
2. Reach out to neighboring jurisdictions to identify possible collaborations such as sharing of staff trainings, lessons learned, and maintenance equipment.

## Communicating with Your Elected Officials and City Managers

### Eastern Washington

Elected officials and city managers play an important role in any code update and adoption process, therefore it is critical to engage them early and keep them updated as the process progresses. This handout provides: 1) key information that your elected officials and city managers need to know about LID and the code update process, and 2) a step-by-step approach to **what** your elected officials and city managers need to know, and **how** they can support the process. The information presented below is organized based on the six steps described in *Integrating LID into Local Codes: A Guidebook for Local Governments*. It also provides general information about the Eastern Washington Phase II permit that became effective on August 1, 2014 and the requirement to allow LID as a viable stormwater management technique. Although code updates are not specifically required in Eastern Washington at this time, allowing for LID will likely involve code updates.

#### General tips to get their attention and keep it:

- Make contact early in the project, and at key milestones as the project progresses.
- Be concise and to the point.
- Focus on key implications for internal and external stakeholders. Both positive outcomes and potential areas of conflict.
- Remind elected officials what LID is, why it is important, and why codes are being updated each time you speak with them.
- Be prepared to propose ways that elected officials and city managers can support the process.

#### General information about what they need to know:

Each elected official or city manager will have a different level of knowledge about the LID code update process. Below are suggested talking points on the NPDES permit requirements, followed by web links for additional information on why we are doing LID.

#### Code updates – where we are today:

The Eastern Washington Phase II permit became effective on August 1, 2014. The Washington Department of Ecology is encouraging jurisdictions to expand their stormwater management techniques to enable developers to use and allow innovative approaches to managing stormwater. Jurisdictions in Eastern Washington will have to comply with the following new permit requirements by December 31, 2017:

- Implement a policy of encouraging project proponents to maintain natural drainages to the maximum extent possible, including reducing the total amount of impervious surfaces.
- Allow non-structural preventative actions and source reduction approaches such as LID techniques, measures to minimize the creation of impervious surfaces, and measures to minimize the disturbance of native soils and vegetation.
- Require projects approved to retain runoff generated on-site for, at a minimum, the 10-year, 24-hour rainfall event or a local equivalent.

Although code updates are not specifically required in Eastern Washington at this time, allowing LID as a viable stormwater management technique will likely involve code updates.

The implementation of LID requirements in Eastern Washington is an incremental approach with a strong focus on harmonizing the stormwater management techniques across jurisdictions in Eastern Washington. The Washington State Department of Ecology will continue to work with jurisdictions and industry members to evaluate the results of new permit requirements before expanding to more prescriptive requirements.

#### LID – why we are doing it:

- For talking points regarding why we are doing LID, please visit:  
[www.awcnet.org/portals/0/documents/lid/TalkPointsWhyDoingLID0513.pdf](http://www.awcnet.org/portals/0/documents/lid/TalkPointsWhyDoingLID0513.pdf)
- For a complete list of LID resources for elected officials and city managers, please visit:  
<http://www.awcnet.org/TrainingEducation/LowImpactDevelopment.aspx>

## The Six Steps: What elected officials and city managers need to know and how they can get involved.

### Step 1 {Who} Assemble the Project Team

Step 1 involves assembling a comprehensive team of key internal staff and potential key external stakeholders to assist with the review of local codes and procedures to assess the need to revise regulations or processes to better allow LID. This team will also assist with the process of integrating LID into local codes if deemed necessary.

#### What elected officials and city managers need to know:

1. The code update process is a big undertaking that requires significant staff time and multiple staff.
  - To support the code review and updates, internal team members should include staff from the planning, public works, parks, fire and public safety, and building departments. Optional team members from city council, planning commission, and legal department departments.
  - To provide comment and facilitate the approval process, external stakeholders may include State/local health department, utility providers, agencies owning and maintaining streets, site designers and engineers, major property owners and developers, citizen's or neighborhood groups, environmental groups, and special districts.
  - Getting this variety of professionals and stakeholders at the table together and early in the process is critical to identifying issues and solutions that will save time and frustration at the throughout the update.

#### How elected officials and city managers can support the process:

1. Encourage and support (and allow time for) staff participation.
2. Bring resistant parties on board by showing top down support for the process.
3. Identify and reach out to key stakeholders.
4. Ask for support in recruiting internal team members and external stakeholders to participate in the code update process.

### Step 2 {What} Understand General Topics to Address & Step 3 {Where} Review Existing Codes and Standards

Step 2 establishes a work program that identifies what topics of a jurisdiction's codes, policies, standards, enforceable documents, and operating procedures need to be reviewed and possibly updated to integrate LID. Step 3 identifies where the topics for review occur.

### What elected officials and city managers need to know:

1. Examples of the types of codes, policies, standards, enforceable documents, and operating procedures that you have identified as needing to be updated.
2. Who and what kinds of projects the code updates are likely to affect (positively or negatively).
3. Any possible areas of concern, complexity, conflict, etc. at this stage of the project.

### How elected officials and city managers can support the process:

1. Take specific questions or concerns to external stakeholders or external team members and provide feedback.
2. Provide consultation and comment on certain sections of code.
3. Help resolve any possible issues or internal debates/conflict, where appropriate.

## Step 4 {FILL THE GAPS} Amend Existing Codes and Develop New Codes

Step 4 fills in the gaps and addresses the barriers in existing codes and standards by amending existing codes and developing new code language.

### What elected officials and city managers need to know:

1. Briefings on the extent of and kinds of amendments that are being proposed, including examples of revised language.
2. Details on how the code updates are likely to affect people or projects (positively or negatively).
3. Any problems and proposed corrective actions at this stage of the project.

### How elected officials and city managers can support the process:

1. Provide consultation and comment on certain code sections or policies.
2. Take specific questions or concerns to external stakeholders or external team members and provide feedback.
3. Help resolve any issues, where appropriate.

## Step 5 {REVIEW & ADOPT} Public Review and Adoption Process

Step 5 reviews and adopts the new codes and standards. Each jurisdiction has its own process for reviewing and adopting codes and standards.

### What elected officials and city managers need to know:

1. The plan and timeline for public review.
2. The types of internal staff and external stakeholders required for review of updated code language.
3. Potential adoption challenges and solutions.

### How elected officials and city managers can support the process:

1. Help to engage external team members, stakeholders, and the public in the review process.
2. Help by being an advocate for code update process and LID.

## Step 6 {IMPLEMENT} Ensure Successful Implementation

Step 6 implements the new regulations and standards.

### What elected officials and city managers need to know:

1. The timing and extent of the resources needed for the successful implementation of the code updates, including issues such as staffing, equipment, training, and outreach.

### How elected officials and city managers can support the process:

1. Get involved in public outreach and/or public project that include LID components.
2. Reach out to neighboring jurisdictions to identify possible collaborations such as sharing of staff trainings, lessons learned, and maintenance equipment.

## Resource List for Jurisdiction Staff

This resource list was developed to help jurisdictions in Washington State integrate LID into local codes, rules, standards, and other enforceable documents. Resources are divided into the following categories: General LID Resources, LID Integration into Codes, LID Case Studies, and Barriers to Implementing LID.

### General LID Resources

- Better Site Design Manual– divided into Part 1 and Part 2 (Center for Watershed Protection 1998)  
[www.cwp.org/online-watershed-library?view=docman](http://www.cwp.org/online-watershed-library?view=docman)
- Central Coast Low Impact Development Initiative (LIDI) website  
[www.centralcoastlidi.org/Central\\_Coast\\_LIDI/Home.html](http://www.centralcoastlidi.org/Central_Coast_LIDI/Home.html)
- Green Stormwater Infrastructure (GSI) Program Overview and Annual Report (Seattle Public Utilities 2013)  
[www.seattle.gov/util/groups/public/@spu/@drainsew/documents/webcontent/01\\_028743.pdf](http://www.seattle.gov/util/groups/public/@spu/@drainsew/documents/webcontent/01_028743.pdf)
- LID Administrative Tools and Guidance video (Herrera Environmental Consultants 2014)  
[www.youtube.com/watch?v=Oz4OT-SX3nQ&feature=youtube\\_gdata](http://www.youtube.com/watch?v=Oz4OT-SX3nQ&feature=youtube_gdata)
- LID Manual for Michigan, Chapter 4, Integrating LID at the Community Level (Southeast Michigan Council of Governments 2008)  
[www.semco.org/uploadedfiles/programs\\_and\\_projects/water/stormwater/lid/lid\\_manual\\_chapter4.pdf](http://www.semco.org/uploadedfiles/programs_and_projects/water/stormwater/lid/lid_manual_chapter4.pdf)

### LID Integration into Codes

- Integrating LID into Local Codes: A Guidebook for Local Governments (Puget Sound Partnership 2012)  
[www.psp.wa.gov/downloads/LID\\_Guidebook/20120731\\_LIDguidebook.pdf](http://www.psp.wa.gov/downloads/LID_Guidebook/20120731_LIDguidebook.pdf)
- Integrating LID into Local Development Codes: Lessons Learned (University of California, Davis 2012)  
[www.drycreekconservancy.org/documents\\_downloads/LID\\_PDFs/1B\\_InglisLessonsLearnedCodeUpdates\\_Final\\_PP03.pdf](http://www.drycreekconservancy.org/documents_downloads/LID_PDFs/1B_InglisLessonsLearnedCodeUpdates_Final_PP03.pdf)
- LID Guidance Manuals and LID Code Review (University of Texas 2011)  
[www.tceq.texas.gov/waterquality/nonpoint-source/projects/statewide-low-impact-development-workshops](http://www.tceq.texas.gov/waterquality/nonpoint-source/projects/statewide-low-impact-development-workshops)
- Massachusetts Low Impact Development Toolkit (Metropolitan Area Planning Council 2010)  
[www.mapc.org/sites/default/files/LID\\_Local\\_Codes\\_Checklist.pdf](http://www.mapc.org/sites/default/files/LID_Local_Codes_Checklist.pdf)

## LID Case Studies

- Seattle 2010 NPDES Phase 1 Municipal Stormwater Permit, Program Evaluation, pp. 31-34 (Seattle Public Utilities 2010)  
[www.seattle.gov/util/groups/public/@spu/@drainsew/documents/webcontent/01\\_012401.pdf](http://www.seattle.gov/util/groups/public/@spu/@drainsew/documents/webcontent/01_012401.pdf)
- EPA Green Infrastructure Case Studies: Municipal Policies for Managing Stormwater for Green Infrastructure, pp. 25-30 (Environmental Protection Agency [EPA] 2010)  
[http://water.epa.gov/polwaste/green/upload/gi\\_case\\_studies\\_2010.pdf](http://water.epa.gov/polwaste/green/upload/gi_case_studies_2010.pdf)
- Water Quality Scorecard, pp. 43-49 (EPA 2009)  
[http://epa.gov/smartgrowth/pdf/2009\\_1208\\_wq\\_scorecard.pdf](http://epa.gov/smartgrowth/pdf/2009_1208_wq_scorecard.pdf)

## Barriers to Implementing LID

- Benefits of LID: How LID Can Protect Your Community's Resources (EPA 2012)  
<http://water.epa.gov/polwaste/green/upload/bbfs1benefits.pdf>
- Terminology of LID: Distinguishing LID from Other Techniques that Address Community Growth Issues (EPA 2012)  
<http://water.epa.gov/polwaste/green/upload/bbfs2terms.pdf>
- Costs of LID: LID Saves Money and Protects Your Community's Resources (EPA 2012)  
<http://water.epa.gov/polwaste/green/upload/bbfs3cost.pdf>
- Aesthetics of LID: LID Technologies Can Benefit Your Community's Visual Environment (EPA 2012)  
<http://water.epa.gov/polwaste/green/upload/bbfs4aesthetics.pdf>
- Effectiveness of LID: Proven LID Technologies Can Work for Your Community (EPA 2012)  
<http://water.epa.gov/polwaste/green/upload/bbfs5effectiveness.pdf>
- Maintenance of LID: Communities are Easily Managing LID Practices (EPA 2012)  
<http://water.epa.gov/polwaste/green/upload/bbfs6maintenance.pdf>
- Encouraging LID: Incentives Can Encourage Adoption of LID Practices in Your Community (EPA 2012)  
<http://water.epa.gov/polwaste/green/upload/bbfs7encouraging.pdf>