2012 Draft LID Manual
Public Comment Period - February 15, 2012

Review Comments

1. Ensure that terminology and definitions are consistent between this document and the 2012 Ecology Surface Water Management Manual for Western Washington (SWMMWW) and the draft NPDES Permits.

2. Please ensure that the terms for professionals involved with design and construction such as professional engineer, engineer of record, responsible engineer, geotechnical engineer, geotechnical professional etc are used consistently throughout this manual and the SWMMWW and NPDES Permits.

3. Please provide a consolidated glossary and verify consistency between the definitions in the LID Manual, the Stormwater Management Manual for Western Washington and the NPDES Permit.

4. Define and clarify “site-appropriate development principles” and “LID Principles”. The NPDES Phase I Permit Stormwater Management Program requirements and Appendix 1, and the Stormwater Management Manual for Western Washington reference site-appropriate development principles and LID Principles. In order to maintain consistency of application, it is important that a framework for outlining site assessment steps be provided with enough detail that municipality staff would be able to easily evaluate whether or not site-appropriate development principles or LID principles have been implemented on a project site appropriately and “to the extent feasible”. The application of the LID principles and site-appropriate development principles needs to be clarified. A checklist format may be helpful.

Chapter 1

5. Page 11 Section 1.4.6 Please provide a definition for site design objectives and clarify the relationship to site-appropriate development principles and LID principles. Provide information to aid in the evaluation of the objectives and how they should be applied to projects.

6. Page 12 Table 1.2 Because of the distinction between bioretention and rain gardens in the NPDES permit and SWMMWW, please add rain gardens to this table. Please coordinate with the SWMMWW to ensure that BMPs for sizing and design are included for each technique in the Table.

Chapter 2

1. Page 16, Section 2.1.1: We recommend that this section be removed and a reference to the SWMMWW be provided. Ensure consistency between this document and the SWMMWW.
   a. A survey prepared by a register land surveyor is not required to meet Minimum Requirements 1-5.
b. A soils report prepared by a licensed geotechnical engineer is not required to meet Minimum Requirements 1-5.

2. Page 19, Section 2.1.2: We agree with the recommendation to install monitoring wells if it cannot be confirmed that a 5 feet or greater separation from the high groundwater exists. However, this is inconsistent with Ecology’s draft SWMMWW. Revise the SWMMWW to be consistent with the LID Manual.

3. Page 19, Section 2.1.2: It is recommended to have the geotechnical engineer evaluate interflow for potential re-emergence. It would be helpful if examples of this evaluation were provided.

4. Page 19, Section 2.1.2:
   a. It should be made clear if a mounding analysis is required for a single “infiltrating” bioretention facility.
   b. Clarify that a mounding analysis may not be necessary if the facility has an underdrain.
   c. The Ecology draft SWMMWW indicates that a mounding analysis is needed for all facilities, not just bioretention. Please clarify and revise to be consistent.
   d. We recommend some consideration be allowed for the contributing area ratio to the size of the facility and infiltration rate in the determination of if a mounding analysis is required.

5. Page 22, Section 2: Please indicate how it is determined if unconsolidated soils are present on a site.

6. Page 27, Section 2.5 In an urban environment, the remaining wetlands have already been altered and exist under that altered hydrologic regime. Surface water has been historically directed away from the wetlands it once supported or, in some cases, surface water has been directed to wetlands that it never supported. Plant species and common urban animals have adapted to the new environment. Incorporating LID with re-development will likely change the existing hydroperiod of the wetlands and could also result in the unanticipated alteration of vegetation and habitat.

The wetland section includes guidance when a project is in the drainage area of the wetland but does not extend that guidance to large areas that are not within the drainage area but support the wetland indirectly through the existing storm system. The changes may occur slowly over time with no impact, or even an improvement, but they could also result in loss of wetlands or the reverse could be true when surface water from a large area has been directed away from the wetland. Saturated wetlands could become permanently ponded wetlands. These changes should be considered.


Chapter 3

7. Page 39, Road Layout and Streetscape: Clarify that the bioretention is intended to be in the landscaping islands in parking areas.

8. Page 40, Alleys: Clarify that gravel paving systems are a permeable paving system rather than just a layer of gravel. It may be possible to make this clarification with a definition of gravel paving systems.

9. Page 43, Stormwater Management: How do porous pavers allow stormwater to drain directly into a detention vault? Are there holes in the vault?

10. Page 50, Table: Tacoma’s Skinny Street for local access is 28 ft.

Chapter 5

11. Sections 5.1 and 5.2 Clarify the relationship of this section to LID principles and site-appropriate development principles.

12. Page 86, Visit one:

   a. Bullet 1 Clarify that the geotechnical engineer or other design professional that made the design assumptions/recommendations confirms that the existing soils are consistent with the design assumptions/recommendations outlined in the stormwater site plan.

   b. Bullet 9 Clarify why the subgrade for a bio-retention facility is scarified 2-inches and amended soils are scarified 4-inches? In addition, clarify if it is necessary to scarify if there is an underdrain or liner.

13. Page 87, Visit Two:

   a. Replace all “responsible Engineer” references with Engineer of Record.

   b. Fourth Bullet This paragraph is unclear as written. Please clarify the verify BSM guidelines. A table or bullets may be helpful. This section uses the word “should”. Please revise to shall or provide guidance how to mitigate if the requirements aren’t met to ensure treatment is achieved.

14. Page 88, Visit three:

   a. Please clarify when infiltration tests are necessary.

15. Page 89, Visit one:

   a. Please provide more guidance as to methods of treating over-compacted areas. Or reference the section where this information is provided.
b. Prior to placing geotextile and aggregate base it should be verified that the subgrade is free of construction sediment, is not compacted or saturated. This inspection should be conducted by the geotechnical professional to confirm that the subgrade and associated materials meet the design assumptions.

16. Page 90, visit three: Include measures to protect the permeable pavement if the site is not entirely stabilized.

17. Page 91, Section 5.4: Include the inspector in the project team.

18. Page 92, Section 5.4.1 Bioretention: “However, deep compaction in bioretention areas is very difficult, if not possible, to mitigate” We believe this should be “impossible to mitigate.”

19. Page 92 Residential: Please clarify that a performance bond could be required for private development.

20. Page 93 Residential #2: It may be allowable possible for the contractor to utilize the bioretention areas during construction if the Contractor replaces the media at their own expense once the site is stabilized.

21. Page 95 Option 1 last bullet: Revise to read “The project engineer should inspect the site and test to confirm that the ATB is clean and infiltrating adequately.

Chapter 6

22. Page 98, Due to the distinction between bioretention and rain gardens in the NPDES permit and SWMMWW, please add guidance specific to rain gardens to this chapter. Separate bioretention information from rain garden information.

23. Page 104, Ponding Depth and surface water draw-down: Ecology has also set draw-down timing requirements, verify consistency.

24. Page 106: We agree with the flexibility outlined in the last paragraph addressing the number of PIT tests required. However, the information provided in the LID Manual is not consistent with the Ecology draft SWMMWW. Revise the SWMMWW to be consistent with the guidance in the LID Manual.


26. Page 109, Section 6.1.2.2, Flow entrance and Presettling, City of Tacoma would recommend 12” curbcuts.

27. Page 110, Include that leafy plants should not be placed near overflow structures or inlets.
28. Page 116: It appears that two pH recommendations are provided. One as the second bullet at the top of the page and one at the very bottom of the page. Please clarify. As a point of information, our last submittal from Cedargrove had a pH of 7.67.

29. Page 117, BSM Depth: Revise “should” to “shall” be a minimum of 18 –inches.

30. Page 120, Underdrain: It is possible to model the bioretention areas with the underdrain as an orifice so that the area above the drain can demonstrate some storage capacity.

31. Page 120-121 Underdrain: Please consider the WSDOT underdrain pipe Specification to aid in availability. In addition, specifying that the perforation to be installed on top allows for additional storage and improves the ability to clean and tv the pipe.

32. Page 128 Excavation: The inspection checklist indicates the need to scarify to 2-inches, and this section indicates 6-inches. Please clarify and revise for consistency.

33. Page 129 Verification: Clarify when verification is required. Provide consistent guidance to the SWMMWW.

34. Page 130 TESC: It may be possible to use bioretention areas for TESC if the media was replaced once the site is stabilized.

35. Page 136 table: Please include data for an 18-inch depth of media.

36. Page 145 Section 6.2 Verify consistency between this Section and SWMMWW BMP 513.

37. Page 165, fourth bullet: The word pavement is not very clear in this context. Clarify if the seasonal high groundwater within 6-inches from the bottom of the subbase or HMA? The SWMMWW is requiring 1 foot of separation from the bottom of the subbase.

38. Page 166 The Asphalt industry represents that pervious asphalt is constructible up to 9-10%. Additional design considerations may be required at these types of higher slopes such as subgrade check dams, terracing, and/or excellent soils. It would be helpful to indicate in the LID Manual that certain measures may increase the possible slope for the application of permeable asphalt.

39. Page 167 Section 6.3.2 Item 1: Consider including the amount of anticipated run-on and if this could be diverted if necessary as a part of this analysis.

40. Page 168 TESC Long-Term: It is recommended that all the parcels adjacent to pervious streets be flagged for notification if development permit applications were submitted in the future. The owners of these parcels should receive a notification that they are adjacent to a pervious street and their responsibilities. Simple utility repairs should be patched with regular asphalt and graded to drain to porous areas. Tile work or patio construction that requires cutting material can cause fine particles to runoff and clog porous areas. Homeowners and inspectors need to
be educated. Porous Streets should be marked to be clearly identified to street maintenance crews. The City of Chicago stamps each green alley apron.

41. Page 170 Common Components: This section should include
   a. Guidance for porous areas adjacent to standard HMA. A 30 mil pvc liner or other type of barrier shall be installed to protect the standard subbase.
   b. Install traffic (barrier) curb rather than curb and gutter to avoid water ponding in the gutter.

42. Page 174 Underdrains,
   a. Revise to a 6-inch minimum pipe diameter for ease of maintenance and inspection.
   b. Recommend installing with perforations up.

43. Page 176 Water Quality: Ecology has indicated that porous pavement meeting the soils suitability criteria will provide enhanced treatment. Revise to be consistent.

44. Page 181 Verifying subgrade: First paragraph: Clarify the depth of excavation into the soil profile. Would 3 feet below the bottom of the facility be adequate? Clarify this paragraph.

45. Page 185 Aggregate base/storage bed material: The minimum base depths for structural support seem to be overly conservative. Pavement calculations for recent projects have shown that roadway cross-sections could be less. On recent design included 6 inches of HMA, 2-inch choker course, 6-inch permeable ballast.

46. Page 186 Wearing Course:
   a. Please include that 70-22 is only available in limited supplies in the winter season. US Oil does not make it and other suppliers have it in limited quantities.

47. John Grisham (Miles Sand and Gravel) recommended that projects be designed with a minimum 3-inch lift. Smaller lifts are difficult to work with and may not provide the strength needed.

48. Page 213 Remove “suburban” from the first sentence of Section 6.4.1; section 6.4 is entitled Urban, implying that this section should not included suburban areas.

49. Page 213 Revise the second sentence within Section 6.4.1 to state the following: “Properly placed new trees and protected existing trees intercept precipitation and reduce associated surface flow on paved or impervious areas, such as, streets, alleys, parking lots, sidewalks, and promenades.” It is not necessary to specify the type of street.

50. Page 213 and 214, Section 6.4.2 Assessment and Design, consider the following revisions:
a. Replace “canopy” with “crown”. Canopy = more than one tree crown, crown = one tree.

b. Change the statement “urban environment” to “developed environment”; it would better capture the intent of the statement.

c. Replace “city trees” with “trees in developed areas”.

d. Replace “oxygen exchange” with “gas exchange”; it’s not just oxygen in the exchange process.

e. Provide definition for a “small” tree, and a “large” tree.

f. It may not be necessary to include the following statement to get the point across; “too much water can kill a tree faster than too little water.”

g. Consider replacing the first paragraph of Section 6.4.2 Assessment and Design with the following to better capture the intent:

h. “Traditionally developed design and assessment has not taken into consideration tree retention or the basic biological needs of trees. Soils are often limited in volume, compacted, and/or surrounded by impervious surface.”

51. Page 214 and 215, Section 6.4.2.1 Site Assessment and planning, consider the following revisions:

a. Remove the word “significant” from the first sentence; it is highly variable, recommend adding retention/preservation.

b. Provide definition for “type of tree”, small, large, evergreen, deciduous?

c. Add the following to second item in bulleted list, “relative to pavement, buildings, and utilities”.

d. Replace “overhead wires” with “all utilities (overhead and below ground)”.

e. Replace “neighbors” with property lines, driveways.

f. Create a separate list for “tree quality”.

g. Replace the first sentence of the second paragraph with the following, “More often than not, existing soil conditions will dictate designs for trees”.

h. Remove “Good Urban” from the beginning of the second sentence of the second paragraph.

i. Add the following to the first bulleted item in the second paragraph; “for the most appropriate tree species meeting site and/or owner needs.”
j. The example of “design planting areas longer in direction of travel” is not clear, provide better clarification.

k. The second bulleted item listed in the second paragraph states “larger planting spaces are the most effective strategy for growing healthy, mature trees”; please note that soil quality in a developed area, particularly under pavement, is just as important.

l. The third bulleted item in the second paragraph states “four feet above ground”; industry standard is 4.5 feet above ground.

52. Page 216, Within the fourth bulleted item of the second paragraph, replace “oxygen” with “gas and nutrient”.

53. Page 216, Within the fifth bulleted item of the second paragraph, remove the word “installation”; the tree could be preserved. What is meant by “surrounding activities”; damage? Before, during, or after construction?

54. Page 216, Section 6.4.2.2 Drainage; consider the following revisions:
   a. Revise the second to last sentence of the first paragraph to state, “If the assessment determines that there is potential for extended ponding or dense, compacted soils are present, consult the designer for appropriate drainage strategies, or an arborist for appropriate species.”
   b. Revise the second bulleted item of the first paragraph; replace “upper” with “top 18-24 inches of the”.
   c. Revise the first sentence of the third paragraph to state, “Increasing the volume of soil/and or reducing compaction in the tree planting areas for roots also increases the volume for stormwater storage and treatment.”
   d. Please note, structural soils and rigid cell systems are not are not the only solutions for increasing storage volume under paved areas; reinforced suspended pavement is another option.
   e. Is specificity of “SilvaCell” intended? Is this necessary?

55. Page 218, Section 6.4.2.3 Soil Strategies; consider the following revisions:
   a. The first paragraph appears to be the same as the first paragraph of section 6.4.2; it is suggested that it be reworded to meet the intent of this section.
   b. Revise the first sentence of the second paragraph to state, “Soil management, to reduce or minimize compaction, which maintains infiltration and adequate growing characteristics in the built environment, and particularly developed areas, requires
careful planning and attention of the designer from planning through construction phases and protection once the project is completed.”

c. Add the following to the end of the first bulleted item within the second paragraph, “and on site”.

d. Add the following to the end of the second bulleted item within the second paragraph, “prior to construction”.

e. Replace the word “reduce” with “minimize” and add “according to plans” to the end of the third bulleted item within the second paragraph.

56. Page 219, Revise the sixth bulleted item of the second paragraph; add “if necessary” after maintain moisture, and define how to protect the surface roots.

57. Page 219, Please note that tree grates are no longer an acceptable or preferred practice in the tree industry; rephrase the third paragraph of this section accordingly.

58. Page 219, Revise the first bulleted item of the fourth paragraph; replace “feeds” with “replenishes” or “builds”.

59. Page 220, Reducing compaction around existing trees section; see the following documents (for reference); ANSI A300 Part 5 – Construction Management, ISA BMP Part 5 – Construction Management, and Tree Protection on Construction & Development Sites (attached).

60. Page 220, The first sentence of the fifth paragraph of this section is not necessarily true unless it means reducing existing compaction. Strategies in the previous section are suitable for minimizing new compaction around existing trees.

61. Page 221, Soil depth and volume section, it is unclear what “canopy projection” means; is this crown size at maturity?

62. Page 222, Soil depth and volume section; it states “For native soils 100% is available for tree growth.” This is not true for soil that is compacted or paved over.

63. Page 222, Soil depth and volume section; provide clarification for the statement “soil system”; native soils?

64. Page 222, Increasing soil and rooting volume section; structural soils (listed as item #2) are not preferred. Consider including suspended reinforced pavement; it functions the same as cells, only it’s less expensive.

65. Page 223, Structural Soils Section (pg 223), second bulleted item states “soil depth: 24 inches to 36 inches”. This statement conflicts with information provided on pg 221; revise or provide explanation for difference.
66. Page 223, Add the following to the end of the sixth bulleted item on pg 223, “and poor quality soils”.

67. Page 223, Please note, studies show that structural soils are barely better than compacted soils after the first few years.

68. Page 225, Section 6.4.2.4 Protecting existing trees; see the following documents (for reference); ANSI A300 Part 5 – Construction Management, ISA BMP Part 5 – Construction Management, and Tree Protection on Construction & Development Sites (attached).

69. Page 225, Section 6.4.3 Tree selection, consider the following revisions:

70. Page 225, Revise last sentence of first paragraph as follows, “Consult local regulations or design manuals for sight distances, setbacks, and other design guidelines.”

71. Page 225, Second paragraph; replace “urban” with “developed”.

72. Second paragraph, replace “the list of urban trees” with “the potential trees to use in the right of way or near pavement”.

73. Page 225, Third paragraph; revise first sentence to state, “Several resources (books and online) including local experts (arborists, horticulturalists, etc.) are available to provide cultural and tree physical characteristics for tree selection.

74. Page 225, Fifth bulleted item; add “safety” to end of statement. Please note that pruning in developed areas is always necessary.

75. Page 225, Sixth bulleted item; replace “canopy” with “crown”. Please note that density is not often a factor that is considered.