Snohomish County Comments
Draft Stormwater Management Manual for Western Washington
(November 2011 Draft)

Document at Issue	**Section, Page# and/or Paragraph#**	**Existing Language**	**Comment**	**Proposed Language**
Stormwater Manual Nov. 2011 Draft	All Volumes		The County objects to the incorporation by reference into the *Stormwater Manual* (and thereby into the Permit) of a 260+ page document authored by third parties; Namely, the *LID Technical Guidance Manual for Puget Sound* (the "*LID Technical Guidance Manual*") that was released in draft form by WSU Extension and Puget Sound Partnership on January 9, 2012. It is not appropriate to incorporate the entirety of a 260+ page document authored by third parties into a regulatory permit issued pursuant to the Clean Water Act. If Ecology believes there are specific portions of the *LID Technical Guidance Manual* that should be made mandatory for Permittees, those specific portions of the document should be inserted directly into the body of the Permit or the body of the *Stormwater Manual*. Further, because the draft *LID Technical Guidance Manual* was not released until January 9, 2012, and the authors are only accepting public comments on the document until February 9, 2012, Ecology's statement in fn. 1 to Section S5.C.5.a.ii, that the draft *Stormwater Manual* is currently available for public review and comment is inaccurate and misleading. The *LID Technical Guidance Manual* was not available for public review and comment when the draft *Stormwater Manual* was released. Instead, the draft *LID Technical Guidance Manual* was not released for public review until 3 weeks prior to the expiration date for public comments on the draft Permit and the draft *Stormwater Manual*. The County recommends that all references to the *LID Technical Guidance Manual* be deleted from the *Stormwater Manual*. Alternatively, if Ecology chooses to retain the *LID Technical Guidance Manual* as a part of the *Stormwater Manual* (and thus, a part of the Permit), the *LID Technical Guidance Manual* must undergo the same type of public review and comment process as did the *Stormwater Manual* and the Permit.	
Stormwater Manual Nov. 2011 Draft	All Volumes		All terms defined in both the NPDES permit and the Stormwater Manual must be defined identically.	

Stormwater Manual Nov. 2011 Draft	All Volumes		The terms "vegetation" and "native vegetation" are used inconsistently throughout the Manual vis a vis converted pervious surfaces. Ecology should resolve these inconsistencies.	
Stormwater Manual Nov. 2011 Draft	All Volumes		The terms "effective impervious surface" and "effective hard surface" are used inconsistently throughout the Manual. Ecology should resolve these inconsistencies.	
Stormwater Manual Nov. 2011 Draft	Volume I – General Comment		Snohomish County recommends removing permeable pavement from the definition of "hard surfaces" or rewording the threshold for triggering minimum requirements #1 through #9. As written, permeable pavement is considered equivalent to impervious pavement as a threshold trigger in determining minimum requirements for a project. This is not recommended because: 1) pervious and impervious pavements are very different and should not trigger the same level of mitigation for their installation; and 2) this is essentially a disincentive to use permeable pavement. For example, minimum requirements are triggered by the installation of permeable pavement even if the overall impermeable pavement areas are reduced. Also, adding new permeable pavement could trigger Minimum Requirements 1-9 for all new plus replaced surfaces (i.e., require a full retrofit of replaced surfaces), whereas currently the standards provide credits for adding pervious pavement, and retrofit of replaced surfaces is not required unless you add 50% or more to the existing impervious surfaces within the project limits.	[MODIFY AS INDICATED]
Stormwater Manual Nov. 2011 Draft	Vol. I; Section 1.5.4; pg. 1-6, third paragraph		Snohomish County commends Ecology's proposed shift from explicitly regulating wetland hydroperiods to regulating stormwater inputs to wetlands as a surrogate for hydroperiod. The County agrees that it is not feasible to regulate hydroperiod.	
Stormwater Manual Nov. 2011 Draft	Vol. I; Section 1.5.5; pgs. 1-6 – 1-7	"Those BMPs are generally not viewed as low impact development (LID) practices, but they do help achieve the goals of LID."	This statement is confusing. Snohomish County recommends removing the statement. As written, the statement implies that Ecology agrees on-site stormwater management BMPs are not LID BMPs, while acknowledging that unnamed others think they are. However, Ecology's definition of LID set forth in Volume I says that on-site stormwater management BMPs <u>are</u> LID BMPs. If anything needs to be said, it would be clearer to simply state that Ecology considers the on-site BMPs to be LID BMPs and will regulate them as such.	[DELETE OR MODIFY AS INDICATED]
Stormwater Manual	Vol. I; 1.6.1; pg. 1-7	"The Stormwater Management Manual of Western Washington is not a regulation. The Manual does not have	Snohomish County suggests that this language be reworked to be more consistent with the Permit and to clarify that a	[PLEASE CLARIFY]

Nov. 2011 Draft		any independent regulatory authority and it does not establish new environmental regulatory requirements."	Permittee may choose to use the Manual or an equivalent manual approved by Ecology. Snohomish County further recommends that Ecology make clear that a Permittee is authorized to use its current approved alternative manual until the deadline by which Permittees are required to have updated their local ordinances and other enforceable documents to meet the new requirements of the 2012 Stormwater Management Manual for Western Washington.	
Stormwater Manual Nov. 2011 Draft	Vol. I; 1.6.3; pg. 1-11	"Approved stormwater technical manuals include this Manual and other equivalent stormwater management guidance documents approved by Ecology (See Section 1.6.4)."	The reference to Section 1.6.4 is now outdated because Ecology proposes to delete the discussion regarding "Stormwater Technical Manual" and "Alternative Technical Manuals" from Section 1.6.4. As written, the language is ambiguous regarding whether or for how long continued use of the various documents listed in Appendix 10 of the Draft Permit as being equivalent to the 2005 *Stormwater Management Manual for Western Washington* will be considered compliant with this Permit. Please revise this language to expressly address this issue. See Snohomish County's comment on Permit Sections S5.C.5.a.ii at page 18; S5.C.7.B.i at page 26; S5.C.9.a at page 35; and the definition of "Stormwater Management Manual for Western Washington at page 87.	[DELETE INCORRECT CROSS-REFERENCE] [ADD THE FOLLOWING:] "Use of the documents listed in Appendix 10 of the Permit as being equivalent to the 2005 *Stormwater Management Manual for Western Washington* shall continue to meet the requirements of the Permit until the deadline by which Permittees are required to have updated their local ordinances and other enforceable documents to meet the new requirements of the 2012 *Stormwater Management Manual for Western Washington*."
Stormwater Manual Nov. 2011 Draft	Vol. I; 1.6.4; pg. 1-11	"The Puget Sound Partnership's 2008 Action Agenda identifies a coordinated, regional approach to reducing the sources of water pollution in Puget Sound that reflects six primary objectives. Urban stormwater is the focus of objective #2 . . . Implement the municipal stormwater NPDES Phase I and II permits so that the discharges from municipal stormwater systems are reduced. Achieve overall water quality standards. Provide financial and technical assistance to permitted cities and counties."	This goal will be difficult to achieve because the primary contributor of non-compliance with water quality standards in the state are existing background levels that do not meet current standards from existing developed areas. Insufficient funding is being provided at the state and federal levels to meaningfully improve water quality in the Puget Sound Region. Areas of insufficient flushing of the Sound and low dissolved oxygen in specific areas, like Hood Canal, will continue to persist with or without new development or redevelopment.	[NO CHANGE]
Stormwater Manual Nov. 2011 Draft	Vol. I; 1.6.4; pg. 1-13	"Retrofits should include low impact stormwater management techniques to the greatest extent feasible. Monitor effectiveness of the techniques."	While this is a good goal, it will be difficult to incorporate many LID techniques in some of the areas due to the potential to introduce surface pollutants to groundwaters that recharge streams that flow to the Sound.	[NO CHANGE]
Stormwater Manual Nov. 2011 Draft	Vol. I; 1.6.15; pg. 1-25	"Examples of UIC wells are drywells, infiltration trenches with perforated pipe, catch basins, stormchambers, and similar devices that discharge to the ground."	Does this mean that infiltration of rain gardens with perforated pipes or infiltration PIT test facilities that are deeper than they are wide will require a separate UIC permit or authorization from Ecology? This may limit development or stifle LID use on some projects.	[PLEASE CLARIFY]

Stormwater Manual Nov. 2011 Draft	Vol. I; 2.2 pgs. 2-3 – 2-4	[ADD AN EXEMPTION]	The County requests that a new type of exemption be added to this section. This exemption should apply to public road projects (whether maintenance, new construction or re-development) when undertaking the project in accordance with the Minimum Requirements normally applicable to the type of project at issue would require the Permittee to condemn new right-of-way to accommodate LID BMPs. This proposed exemption is grounded in public policy and equity concerns. The County believes public roads constitute necessary public infrastructure. The County believes the safety of public roads is of paramount importance to the community. Thus, from a public policy perspective, projects that upgrade public roads are critical to the public health, safety and welfare. The County does not believe it is fair to require citizens whose private property is located adjacent to existing public right-of-way to have to relocate their residences or businesses so that new LID BMPs can be installed as a component of a road improvement project. Condemning additional right-of-way is time consuming and expensive. In addition to displacing property owners whose land is condemned, obtaining additional right-of-way also increases the cost of road projects, which burdens the County's entire tax base, and ultimately reduces the number of road improvement projects the County is able to perform. For these reasons, the County asks Ecology to include an exemption in Section 1 of Appendix 1 that would exempt public road projects from having to meet Minimum Requirement #5 whenever meeting that requirement would entail the acquisition of additional right-of-way.	"Public Road Projects: Projects that maintain, replace, redevelop, construct, widen, re-align, re-shape, re-grade or otherwise improve public roads and that would normally be subject to Minimum Requirement #5 shall be exempt from Minimum Requirement #5 if complying with Minimum Requirement #5 would necessitate the acquisition of additional right-of-way."
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.2; pgs. 2-3 and 2-4	[ADD AN EXEMPTION]	A new category of exemption for recreational trail maintenance should be added here, consistent with the suggested exemption to Section 1 of Appendix 1, page 2. Trail maintenance activities are similar to road maintenance activities. Without an exemption for trail maintenance, the County could be required to implement minimum requirements that are out of scale and unrealistic for trail maintenance projects located on sites with significant acreage and surrounded by forest and/or native vegetation. Trail maintenance typically consists of grooming or replacing lost material, addressing localized drainage issues, and vegetation management.	"Recreational Trail Maintenance: The following recreational trail maintenance practices are exempt: grooming, filling depressions, re-surfacing with in-kind materials without expanding the trail footprint, reshaping/regrading drainage systems, removing rubbish and vegetation maintenance. The following recreational trail maintenance activities are considered new or redevelopment, and therefore are not categorically exempt: (i) Removing and replacing a paved surface to base course or lower. (ii) Resurfacing by upgrading from dirt to gravel, asphalt

				or concrete; or from gravel to asphalt, or concrete. These are considered new impervious surfaces and are subject to the minimum requirements that are triggered when the thresholds identified for new or redevelopment projects are met. (iii) Resurfacing from dirt, gravel or impervious surface with porous asphalt or pervious concrete."
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.2; pgs. 2-3 and 2-4	[ADD AN EXEMPTION]	A new category of exemption for recreational trail construction should be added here, consistent with the suggested exemption to Section 1 of Appendix 1, page 2. Without an exemption for trail construction, the County could be required to implement minimum requirements that are out of scale and unrealistic for earthen trail construction projects located on sites with significant acreage and surrounded by forest and/or native vegetation. Trail construction typically consists of vegetation removal within a narrow corridor, removal of forest duff to consolidated soil layer within the trail footprint and installation of drainage facilities as warranted by site conditions. Typically, any collected stormwater is fully dispersed through on-site natural vegetation. The United States Forest Service Trail Design Specification outlines best management practices specifically for this application.	"Recreational Trail Construction: The construction of earthen, unpaved recreational trails located outside of critical areas shall be subject only to Minimum Requirement 2, so long as the trails at issue are designed and constructed in accordance with the United States Forest Service Trail Design Specifications."
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.2; pgs. 2-3 and 2-4	[ADD AN EXEMPTION]	A new category of exemption for campsite establishment activities should be added here, consistent with the suggested exemption to Section 1 of Appendix 1, page 2. Without an exemption for campsite establishment, the County could be required to implement minimum requirements that are out of scale and unrealistic for development of campsites located on sites with significant acreage and surrounded by forest and/or native vegetation. Campground establishment typically consists of vegetation removal and grooming the soils to establish a 400 square foot to 600 square foot level pad. Tree canopies over the area are left in-tact, where practical.	"Campsite Establishment: Establishment of temporary or permanent campsites that comprise less than one percent of the cumulative acreage within a park boundary is only subject to Minimum Requirement 2. Installation of any impervious surface is not exempt and is subject to applicable minimum requirements according to exceeded thresholds."
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.3; 2-4	"***Arterial*** – A road or street primarily for through traffic. The term generally includes roads or streets considered collectors. It does not include local access roads which are generally limited to providing access to abutting property. See also RCW 35.78.010 and RCW 47.05.021."	This definition should directly reference the federal functional classification system, as RCW 36.86.070 requires the County to use that system when classifying County roads.	"***Arterial*** – A road or street primarily for through traffic, as classified according to the federal functional classification system. The term generally includes roads or streets considered collectors. It does not include local access roads which are generally limited to providing access to abutting property. See also RCW 35.78.010, RCW 36.86.070 and RCW 47.05.021."
Stormwater Manual	Vol. I; 2.3; pg. 2-5	"***Certified Erosion and Sediment Control Lead (CESCL)*** – means an individual who has current certification through an	The County requests clarification regarding the duties and liabilities associated with being the designated CESCL for	[PLEASE CLARIFY]

Nov. 2011 Draft		approved erosion and sediment control training program that meets the minimum training standards established by the Washington Department of Ecology (Ecology) (see BMP C160 in the *Stormwater Management Manual for Western Washington* (2012)). A CESCL is knowledgeable in the principles and practices of erosion sediment control. The CESCL must have the skills to assess site conditions and construction activities that could impact the quality of stormwater and, the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges. Certification is obtained through an Ecology approved erosion and sediment control course. Course listings are provided online at Ecology's web site."	multiple sites or projects. Does Ecology anticipate a CESCL will designate certain duties to other personnel who are not CESCL certified? Does Ecology anticipate that a single CESCL may be validly assigned to multiple sites and/or projects? Or does Ecology anticipate that each site or project will have its own CESCL assigned to it?	
Stormwater Manual Nov. 2011 Draft	Vol. I; Section 2.3; pg. 2-5	**"*Converted Pervious Surface* –** The surfaces on a project site where native vegetation is converted to lawn or landscaped areas, or where native vegetation is converted to pasture."	This definition is flawed. It should be deleted or revised. It is not the case that conversion of any type of native vegetation to pasture or lawn will negatively affect the hydrologic cycle in the same manner. For example, the conversion of forest to lawn impacts the hydrologic cycle far more than a conversion from pasture to lawn. In fact, a conversion from pasture to lawn could actually improve infiltration and reduce runoff by amending soil formerly compacted by grazing. Thus, the important metric to focus on when vegetated land is converted is whether or not that conversion has a negative impact on on-site infiltration. Please either delete this definition or revise it to more appropriately focus the inquiry on whether and to what extent the conversion of vegetated areas has a negative impact on the hydrology of the site.	[DELETE] or [REVISE TO FOCUS THE INQUIRY ON WHETHER CONVERSION OF VEGETATED AREAS HAS A NEGATIVE IMPACT ON SITE HYDROLOGY]
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.3; pg. 2-5	"***Effective Impervious Surface*** – Those impervious surfaces that are connected via sheet flow or discrete conveyance to a drainage system. Impervious surfaces are considered ineffective if: 1) the runoff is dispersed through at least one hundred feet of native vegetation in accordance with BMP T5.30 – 'Full Dispersion' as described in Chapter 5 of Volume V of the *Stormwater Management Manual for Western Washington* (2012); 2) residential roof runoff is infiltrated in accordance with Downspout Infiltration Systems in Volume III; or 3) approved continuous runoff modeling methods indicate that the entire runoff file is infiltrated."	This definition raises several concerns. First, the words "to a drainage system" should be replaced with "to an MS4 owned or operated by the Permittee and covered by this Permit." Next, as written, this definition excludes from its scope commercial project related impervious surfaces as well as residential sidewalks, patios, driveways, etc. If infiltrated fully, these types of surfaces would not be considered effective impervious. Finally, stormwater modeling under (3) is not something an average homeowner or architect would be able to do.	"***Effective Impervious Surface*** – Those impervious surfaces that are connected via sheet flow or discrete conveyance to an MS4 owned or operated by the Permittee and covered by this Permit. Impervious surfaces are considered ineffective if: (1) the runoff is dispersed through at least one hundred feet of native vegetation in accordance with BMP T5.30 – 'Full Dispersion' as described in Chapter 5 of Volume V; (2) residential roof runoff is infiltrated in accordance with Downspout Infiltration Systems in Volume III; (3) residential and/or commercial surfaces that infiltrate on-site pursuant to Volume III; or (4) approved continuous runoff modeling methods indicate that all runoff will be infiltrated."
Stormwater Manual Nov. 2011	Vol. I; Section 2.3; pg 2-5	***"Erodible or leachable materials*** – Wastes, or chemicals that measurably alter the physical or chemical characteristics of runoff when exposed to rainfall. Examples include erodible	As written, this definition limits the defined term to meaning only "wastes" and "chemicals." Other types of substances should be included in the defined term as well. Recommend	***"Erodible or leachable materials*** – Materials that measurably alter the physical or chemical characteristics of runoff when exposed to rainfall. Examples include erodible soils that are

Draft		soils that are stockpiled, uncovered process wastes, manure, fertilizers, oily substances, ashes, kiln dust, and garbage dumpster leakage."	using the broader term "materials" instead.	stockpiled, uncovered process wastes, manure, fertilizers, oily substances, ashes, kiln dust, and garbage dumpster leakage."
Stormwater Manual Nov. 2011 Draft	Vol. I; Section 2.3; pg. 2-5	"***Hard Surface*** – An impervious surface, a permeable pavement, or a green roof."	The County recommends abandoning use of this defined term. If Ecology chooses to retain the term, the County recommends removing "permeable pavement" from the definition of the term. It does not make sense to include impervious surfaces and permeable pavement in the same category. Impervious surfaces and permeable pavement do not have similar hydrological characteristics. It is precisely because permeable pavement has different hydrological characteristics than impervious surfaces that Ecology is including permeable pavement in the Mandatory Lists of LID BMPs. Because the two types of surfaces do not handle stormwater runoff in the same manner, they should not be treated the same for purposes of triggering Minimum Requirements. Additionally, treating permeable pavement the same as impervious surfaces removes an incentive for a project proponent to use permeable pavement. The County recommends Ecology continue providing incentives to project proponents that encourage the use of permeable pavement by providing clear, measurable benefits for the use of permeable pavement.	[DELETE] or "***Hard Surface*** – An impervious surface or a green roof."
Stormwater Manual Nov. 2011 Draft	Vol. I; Section 2.3; pg. 2-7 Vol. I; Section 2.4.1; pg. 2-13 Vol. I; Section 2.4.1; pg. 2-13	"***New development*** – Land disturbing activities, including Class IV – general forest practices that are conversions from timber land to other uses; structural development, including construction or installation of a building or other structure; creation of impervious surfaces; and subdivision, short subdivision and binding site plans, as defined and applied in Chapter 58.17 RCW. Projects meeting the definition of redevelopment shall not be considered new development." "The following new development shall comply with Minimum Requirements #1 through #5 for the new and replaced hard surfaces and the land disturbed:" "The following new development shall comply with Minimum Requirements #1 through #9 for the new and replaced hard surfaces and the converted pervious surfaces:"	The definition of "new development" limits the term to the "construction," "installation" or "creation" of "impervious surfaces." However, Section 2.4.1 discusses "new development" as though the term includes "replaced hard surfaces" and "converted pervious surfaces." Please revise Section 2.4.1 for consistency with the definition of "new development."	[NO CHANGE] "The following new development shall comply with Minimum Requirements #1 through #5 for the new impervious surfaces and the land disturbed:" "The following new development shall comply with Minimum Requirements #1 through #9 for the new impervious surfaces:"
Stormwater	Vol. I; 2.3; pg. 2-	"***Pollution-generating pervious surfaces (PGPS)*** - Any	The use of the term "blow-in rainfall" is not easily modeled or	"***Pollution-generating pervious surfaces (PGPS)*** - Any non-

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Stormwater Manual Nov. 2011 Draft	Vol. I; Section 2.3; pg. 2-6	***Land disturbing activity*** **-** Any activity that results in movement of earth, or a change in the existing soil cover (both vegetative and non-vegetative) and/or the existing soil topography. Land disturbing activities include, but are not limited to clearing, grading, filling, and excavation. Compaction that is associated with stabilization of structures and road construction shall also be considered a land disturbing activity. Vegetation maintenance practices are not considered land -disturbing activity. Stormwater facility maintenance is not considered land disturbing activity if conducted according to established standards and procedures.	Recommend adding additional exemptions to the definition of "land disturbing activity" and breaking those out in an easier to read format.	"***Land disturbing activity*** **-** Any activity that results in movement of earth, or a change in the existing soil cover (both vegetative and non-vegetative) and/or the existing soil topography. Land disturbing activities include, but are not limited to clearing, grading, filling, and excavation. Compaction that is associated with stabilization of structures and road construction shall also be considered a land disturbing activity. Notwithstanding the foregoing, none of the following types of activities shall be considered land disturbing activities: • Vegetation maintenance practices • Stormwater facility maintenance conducted according to established standards and procedures • Storage or movement of rock, soil, compost, sediment, or similar materials at a property owned or operated by a municipal stormwater permittee if the materials are used for municipal operations and the activity is regulated by Section S5.C.9 of this Permit; or • Storage or movement of rock, soil, compost, sediment, or similar materials at a commercial property if the materials are offered for sale."
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.3; pg. 2-8	"***Rain Garden*** – A non-engineered shallow landscaped depression, with compost-amended native soils and adapted plants. The depression ponds and temporarily stores stormwater runoff from adjacent areas. Designed to allow stormwater to pass through the amended soil profile. Stormwater that exceeds the storage capacity is designed to overflow to an adjacent drainage system. Refer to the *Rain Garden Handbook for Western Washington Homeowners* (WSU 2007 or as revised) for rain garden specifications and construction guidance."	The language used in this definition is problematic and should be revised. Within the engineering community, the term "non-engineered" is generally understood to mean there is no guaranty/likelihood that the system at issue will function appropriately. Thus, from a technical standpoint, anything that is "non-engineered" should not be used in land development or for managing stormwater runoff because anything that is "non-engineered" is likely to fail. The County recommends Ecology revise this definition to remove the term "non-engineered." Also, as it is entirely possible to design and build a functional rain garden without reference to the Rain Garden Handbook for Western Washington Homeowners, the County recommends removing reference to that document from this	"***Rain Garden*** – A shallow, landscaped depression, with compost-amended native soils and adapted plants, which can be used to meet Minimum Requirement 5 – On-site Stormwater Management." and [CONSIDER REVISING TO ADDRESS THE NEED FOR DESIGN BY A LICENSED ENGINEER]

			definition. Additionally, with respect to rain gardens, generally, the Washington State Board of Registration for Engineers has in the past considered this type of design to be an engineering function that needs to be prepared, stamped and sealed by a licensed engineer. Has Ecology contacted the Board of Registration regarding this issue? It is unclear to the County whether the County has authority to accept a rain garden plan designed by a homeowner instead of a licensed professional.	
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.3, pg. 2-9	"***Receiving waters*** - Bodies of water or surface water systems to which surface runoff is discharged via a point source of stormwater or via sheet flow. Ground water to which surface runoff is directed by infiltration."	This language is vague. It should be revised for clarity. Additionally, as the NPDES permit program does not regulate ground water, ground water should be omitted from the definition.	"***Receiving waters*** - Bodies of water into which surface runoff is discharged via a point source of stormwater or via sheet flow (e.g., streams, rivers, lakes, wetlands, salt water, or tributaries to any of the foregoing)."
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.3; pg. 2-9 Vol. I; 2.4.2; pg. 2-14 Vol. I; 2.4.2; pg. 2-14	"***Redevelopment*** – On a site that is already substantially developed (i.e., has 35% or more of existing impervious surface coverage), the creation or addition of impervious surfaces; the expansion of a building footprint or addition or replacement of a structure; structural development including construction, installation or expansion of a building or other structure; replacement of any impervious surface that is not part of a routine maintenance activity; and land disturbing activities." "The following redevelopment shall comply with Minimum Requirements #1 through #5 for the new and replaced hard surfaces and the land disturbed:" "The following redevelopment shall comply with Minimum Requirements #1 through #9 for the new hard surfaces and converted pervious areas:"	The definition of "redevelopment" uses the words "the creation or addition of impervious surfaces" and the "replacement of any impervious surface that is not part of a routine maintenance activity." However, Section 2.4.2 discusses "redevelopment" as though the term includes "new and replaced hard surfaces" and "converted pervious areas." Please revise Section 2.4.2 for consistency with the definition of "redevelopment."	[NO CHANGE] "The following redevelopment shall comply with Minimum Requirements #1 through #5 for the new and replaced impervious surfaces and the land disturbed:" "The following redevelopment shall comply with Minimum Requirements #1 through #9 for the new impervious surfaces and the land permanently disturbed in a manner that negatively affects on-site infiltration:"
Stormwater Manual Nov. 2011 Draft	Vol. I; Section 2.3, page 2-9	***"Replaced impervious surface*** - For structures, the removal and replacement of impervious surfaces down to the foundation. For other impervious surfaces, the removal down to bare soil or base course, and replacement."	There are a couple of problems with this definition as applied to "other impervious surfaces." First, base course is not easily identified in the field. Next, it is advisable to allow municipalities more flexibility in replacement of in-kind pavement for maintenance purposes. Finally, there are some projects where the repair of subgrade is done alongside installation of new roadway expansion, but the subgrade work is really a maintenance function. Recommend revising the second sentence for increased flexibility and ease of administration.	"***Replaced impervious surface*** – For structures, the removal and replacement of impervious surfaces down to the foundation. For other impervious surfaces, such surfaces are considered replaced impervious surfaces if the removal down to bare soil or base course results in grade changes of more than 0.25 feet; otherwise the work is considered maintenance rather than replacement. "
Stormwater	Vol. I; Section 2.3; pg. 2-8	***"Project site*** - That portion of a property, properties, or right of way subject to land disturbing activities, new impervious	Recommend adding a reference to the site plan developed	***"Project site*** - That portion of a property, properties, or right of way subject to land disturbing activities, new impervious

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Stormwater Manual Nov. 2011 Draft	Vol. I; Figure 2.4.1; pg. 2-11	Figure 2.4.1: Flow Chart for Determining Requirements for New Development	Consistent with the County's request, above, to either (i) abandon use of the term "hard surfaces" entirely, or (ii) revise the definition of "hard surfaces" to exclude permeable pavement, the County requests that Ecology revise Figure 2.4.1 to replace all instances of the term "hard surfaces" with the term "impervious surfaces."	[REVISE THE FLOW CHART TO REPLACE ALL INSTANCE OF THE TERM "HARD SURFACES" WITH THE TERM "IMPERVIOUS SURFACES"]
Stormwater Manual Nov. 2011 Draft	Vol. I; Figure 2.4.2; pg. 2-12	Figure 2.4.2: Flow Chart for Determining Requirements for Redevelopment	Consistent with the County's request, above, to either (i) abandon use of the term "hard surfaces" entirely, or (ii) revise the definition of "hard surfaces" to exclude permeable pavement, the County requests that Ecology revise Figure 2.4.2 to replace all instances of the term "hard surfaces" with the term "impervious surfaces."	[REVISE TO CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. I; Figure 2.4.2, page 2-12	Figure 2.4.2	In the third row, change text as noted.	"Convert ¾ acres, or more, of vegetation to lawn or landscaped areas, when such conversion negatively affects on-site infiltration."
Stormwater Manual Nov. 2011 Draft	Vol. I; Figure 2.4.2, page 2-12	Figure 2.4.2	Ecology should clarify the term "vegetation." It does not make sense that MRs are triggered by the conversion of "vegetation" to "lawn", "landscape" or "pasture" – these proposed conditions are themselves "vegetation." In addition, it is not the case that conversion of any type of vegetation to pasture or lawn will negatively affect the hydrologic cycle in the same manner. For instance, the conversion of forest to lawn impacts the hydrologic cycle far more than a conversion from pasture to lawn. In fact, a conversion from pasture to lawn could actually improve infiltration by compost amending and top soiling formally compacted grazing areas.	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. I; Figure 2.4.2, page 2-12	Figure 2.4.2	The strikeout of "native" has not been included in Section 2.5.7 – MR 7 – or in the definition of "converted surfaces". Was this strikeout truly intentional?	
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.4.1; pg. 2-13 Vol. I; Figure 2.4.1; pg. 2-11	"All new development, regardless of size, shall be required to comply with Minimum Requirement #2."	This implies that an interior remodel of an existing building or a re-roofing of an existing structure would be required to meet Minimum Requirement 2. The County questions whether such was Ecology's intent. The County thought such projects would be exempt from MR 2 unless the ground is being disturbed. Please clarify.	[PLEASE CLARIFY]

Stormwater Manual Nov. 2011 Draft	Vol. I; 2.4.2; pg. 2-13 Vol. I; Figure 2.4.2; pg. 2-12	"All redevelopment, regardless of size, shall be required to comply with Minimum Requirement #2."	This implies that an interior remodel of an existing building or a re-roofing of an existing structure would be required to meet Minimum Requirement 2. The County questions whether such was Ecology's intent. The County thought such projects would be exempt from MR 2 unless the ground is being disturbed. Please clarify.	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.4.1; pg. 2-13	"The following new development shall comply with Minimum Requirements #1 through #5 for the new and replaced hard surfaces and the land disturbed: • Results in 2,000 square feet, or greater, of new plus replaced hard surface area, or • Has land disturbing activity of 7,000 square feet or greater."	This provision is confusing. Based on this proposed language, together with the definition of "new development," and the definition of "hard surfaces," it appears that replacing 2,500 square feet of permeable pavement with 2,000 square feet of new permeable pavement (e.g. 500 sq. ft. less) meets the definition of "new development" and will trigger MR #1-#5. That does not sound appropriate. Is that in fact Ecology's intent? Please revise for clarity. Additionally, the definition of the term "new development" limits the term to the "construction," "installation" or "creation" of "impervious surfaces." However, Section 2.4.1 discusses "new development" as though the term includes "replaced hard surfaces" and "converted pervious surfaces." Please revise Section 2.4.1 for consistency with the definition of "new development."	"The following new development shall comply with Minimum Requirements #1 through #5 for the new impervious surfaces and the land disturbed:" • Results in 2,000 square feet, or greater, of new impervious surface area, or • Has land disturbing activity of 7,000 square feet or greater."
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.4.1; pg. 2-13	"The following new development shall comply with Minimum Requirements #1 through #9 for the new and replaced hard surfaces and the converted pervious surfaces: • Results in 5,000 square feet, or greater, of new plus replaced hard surface area, or • Converts ¾ acres, or more, of vegetation to lawn or landscaped areas, or • Converts 2.5 acres, or more, of vegetation to pasture."	This provision is confusing and unreasonable. Based on this proposed language, the definition of "new development," and the definition of "hard surfaces," it appears that replacing 5,500 square feet of permeable pavement with 5,000 square feet of new permeable pavement (e.g. 500 sq. ft. less) meets the definition of "new development" and will trigger MR #1-#9. That does not sound appropriate. Is that in fact Ecology's intent? Please revise for clarity. Additionally, the definition of the term "new development" limits the term to the "construction," "installation" or "creation" of "impervious surfaces." However, Section 2.4.1 discusses "new development" as though the term includes "replaced hard surfaces" and "converted pervious surfaces." Please revise Section 2.4.1 for consistency with the definition of "new development." It is not the case that conversion of any type of vegetation to pasture or lawn will negatively affect the hydrologic cycle in the same manner. For instance, the conversion of forest to lawn impacts the hydrologic cycle far more than a conversion from pasture to lawn. In fact, a conversion from pasture to lawn could actually improve infiltration by compost amending	"The following redevelopment shall comply with Minimum Requirements #1 through #9 for the new impervious surfaces and land disturbed in a manner that negatively affects on-site infiltration: • Results in 5,000 square feet, or greater, of new impervious surface area, or • Converts ¾ acres, or more, of vegetation to lawn or landscaped areas, when such conversion negatively affects on-site infiltration, or • Converts 2.5 acres, or more, of vegetation to pasture, when such conversion negatively affects on-site infiltration."

			and top soiling formally compacted grazing areas.	
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.4.2; pg. 2-14	"The following redevelopment shall comply with Minimum Requirements #1 through #5 for the new and replaced hard surfaces and the land disturbed: • Results in 2,000 square feet, or more, of new plus replaced hard surface area, or • Has land disturbing activity of 7,000 square feet or greater."	This provision is confusing. Based on this proposed language, together with the definition of "redevelopment," and the definition of "hard surfaces," it appears that replacing 2,500 square feet of permeable pavement with 2,000 square feet of new permeable pavement (e.g. 500 sq. ft. less) meets the definition of "new development" and will trigger MR #1-#5. That does not sound appropriate. Is that in fact Ecology's intent? Please revise for clarity. Additionally, the definition of "redevelopment" uses the words "the creation or addition of impervious surfaces" and the "replacement of any impervious surface that is not part of a routine maintenance activity." However, this language in Section 2.4.2 discusses "redevelopment" as though the term includes "new and replaced hard surfaces." Please revise for consistency with the definition of "redevelopment."	"The following redevelopment shall comply with Minimum Requirements #1 through #5 for the new and replaced impervious surfaces and the land disturbed: • Results in 2,000 square feet, or more, of new plus replaced impervious surface area, or • Has land disturbing activity of 7,000 square feet or greater."
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.4.2; pg. 2-14	"The following redevelopment shall comply with Minimum Requirements #1 through #9 for the new surfaces and converted pervious areas: • Adds 5,000 square feet or more of *new* hard surfaces or, • Converts ¾ acres, or more, of vegetation to lawn or landscaped areas, or • Converts 2.5 acres, or more, of vegetation to pasture."	This provision is confusing and unreasonable. The definition of the term "redevelopment" uses the words "the creation or addition of impervious surfaces" and the "replacement of any impervious surface that is not part of a routine maintenance activity." However, this language in Section 2.4.2 discusses "redevelopment" as though the term includes "new and replaced hard surfaces" and "converted pervious areas." Please revise for consistency with the definition of "redevelopment." Additionally, it is not the case that conversion of any type of vegetation to pasture or lawn will negatively affect the hydrologic cycle in the same manner. For example, the conversion of forest to lawn impacts the hydrologic cycle far more than a conversion from pasture to lawn. In fact, a conversion from pasture to lawn could actually improve infiltration and reduce runoff by amending soil formerly compacted by grazing. Please revise to clarify that conversion of vegetation is only a trigger if the conversion negatively affects on-site infiltration.	"The following redevelopment shall comply with Minimum Requirements #1 through #9 for the new impervious surfaces and the land permanently disturbed in a manner that negatively affects on-site infiltration: • Adds 5,000 square feet, or more, of *new* impervious surfaces, or • Converts ¾ acres, or more, of vegetation to lawn or landscaped areas, when such conversion negatively affects on-site infiltration, or • Converts 2.5 acres, or more, of vegetation to pasture, when such conversion negatively affects on-site infiltration."
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.4.2; pg. 2-14	"If the runoff from the new hard surfaces and converted pervious surfaces is not separated from runoff from other surfaces on the project site, the stormwater treatment facilities must be sized for the entire flow that is directed to them."	It is not clear whether this provision is intended to apply only to redevelopment projects that are required to meet all Minimum Requirements #1 through #9, or if the provision is also intended to apply to redevelopment projects that are only required to meet Minimum Requirements #1 through #5. Please clarify. Additionally, revise the language used for consistency with the	"For redevelopment projects required to meet Minimum Requirements #1 through #9, if the runoff from the new impervious surfaces and the land permanently disturbed in a manner that negatively affects on-site infiltration is not separated from runoff from other surfaces on the project site, the stormwater treatment facilities must be sized for the entire flow that is directed to them."

			definition of "redevelopment," discussed above.	
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.4.2; pg. 2-14	"For road-related projects, runoff from the replaced and new hard surfaces (including pavement, shoulders, curbs, and sidewalks) shall meet Minimum Requirements if the new hard surfaces total 5,000 square feet or more and total 50% or more of the existing hard surfaces within the project limits. The project limits shall be defined by the length of the project and the width of the right-of-way."	As written, this provision is confusingly duplicative of the provision regarding redevelopment contained in Section 2.4.2. Please revise to clarify how the requirements of this paragraph differ from the language on the preceding page. Additionally, all instances of "hard surfaces" in this provision should be changed to "impervious surfaces" for the reasons discussed previously (i.e. the hydrologic properties of permeable pavement are not similar to the hydrologic properties of impervious surfaces).	"Projects meeting all of the criteria specified below must apply Minimum Requirements #1 through #9 to both replaced and new impervious surfaces: • The project is road-related; • The new impervious surface totals 5,000 square feet or more; and • The new impervious surface totals 50% or more of the total impervious surface area in the completed project. For purposes of this paragraph, the project limits shall be defined by the length of the project and the width of the opened (i.e. developed) right-of-way.
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.4.2; pg. 2-15	"Other types of redevelopment projects shall comply with Minimum Requirements #1 through #9 for the new and replaced hard surfaces if the total of new plus replaced hard surfaces is 5,000 square feet or more, and the valuation of proposed improvements – including interior improvements – exceeds 50% of the assessed value of the existing improvements."	As written, this provision is confusingly duplicative of the provision regarding redevelopment contained in Section 2.4.2. Please revise to clarify how the requirements of this paragraph differ from the language on the preceding page. Additionally, all instances of "hard surfaces" in this provision should be changed to "impervious surfaces" for the reasons discussed previously (i.e. the hydrologic properties of permeable pavement are not similar to the hydrologic properties of impervious surfaces).	"Projects meeting all of the criteria specified below must apply Minimum Requirements #1 through #9 to both replaced and new impervious surfaces: • The project is not road-related; • The new impervious surface plus the replaced impervious surface totals 5,000 square feet or more of impervious surface; and • The total valuation of the proposed improvements to be made to the property as a part of the project – including interior improvements – totals 50% or more of the assessed value of the pre-existing improvements."
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.5.1; pg. 2-17	"Stormwater Site Plans shall use site-appropriate development principles to retain native vegetation and minimize impervious surfaces to the extent feasible."	This requirement is ambiguous and confusing. A plain reading of the language suggests that no development whatsoever should occur. Please provide guidance regarding what levels of clearing and impervious surfaces constitute acceptable levels for various categories of developments (e.g. for a single family residence on 5 acre lot, for a 10 lot subdivision on a 5 acre lot, for a commercial development on a 5 acre lot, etc). Additionally, the County would like to note potential difficulties with code enforcement here. For instance, if a property owner chooses to clear 100% of his or her property without a permit, what type of remediation should the County require to bring the site back into compliance?	[PROVIDE ADDITIONAL GUIDANCE]
Stormwater Manual Nov. 2011	Vol. I; 2.5.2; pg. 2-18	"Seasonal Work Limitations – From October 1 through April 30, clearing, grading, and other soil disturbing activities may only be authorized by the Permittee if silt-	This provision is confusing and the date criteria are inappropriate. Please revise.	

Draft		laden runoff will be prevented from leaving the site through a combination of the following: 1. Site conditions including existing vegetative coverage, slope, soil type and proximity to receiving waters; and 2. Limitations on activities and the extent of disturbed areas; and 3. Proposed erosion control measures."	The proposed limitations should be determined by rainfall amounts, not by the calendar. Additionally, as written, it is ambiguous whether the prevention of silt-laden runoff leaving the site must include all three types of the listed measures, or whether there is discretion to determine that, say, two out of the three listed measures will suffice. Please revise to clarify.	
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.5.2; pg. 2-18	"The following activities are exempt from the seasonal clearing and grading limitations: 1. Routine maintenance and necessary repair of erosion and sediment control BMPs, 2. Routine maintenance of public facilities or existing utility structures that do not expose the soil or result in the removal of the vegetative cover to soil, and 3. Activities where there is one hundred percent infiltration of surface water runoff within the site in approved and installed erosion and sediment control facilities."	Exemptions for when a project has 100% infiltration of surface water runoff should include a requirement that this infiltration is demonstrated by approved hydrologic models. Also, add an additional exemption for emergency work needed to protect public health, safety or welfare.	"The following activities are exempt from the seasonal clearing and grading limitations: 1. Routine maintenance and necessary repair of erosion and sediment control BMPs, 2. Routine maintenance of public facilities or existing utility structures that do not expose the soil or result in the removal of the vegetative cover to soil, 3. Activities where there is one hundred percent infiltration of surface water runoff within the site in approved and installed erosion and sediment control facilities, as demonstrated by approved hydrologic models, and 4. Emergency or other urgent non-routine work required to protect public health, safety or welfare, or to protect water resources."
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.5.2, Element 12; pg. 2-27	"Projects that disturb one or more acres must have site inspections conducted by a Certified Erosion and Sediment Control Lead (CESCL). Sites less than one acre may have a person without a CESCL certification conduct inspections."	What level of inspection documentation and monitoring is expected by Ecology on sites less than 1 acre in size? For example, must they document what they saw?	[SPECIFICY DOCUMENTATION REQUIREMENTS, IF ANY]
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.5.4, Supplemental Guidelines; pg. 2-33	"The following discharge requirement is recommended: Where no conveyance system exists at the abutting downstream property line and the natural (existing) discharge is unconcentrated, any runoff concentrated by the proposed project must be discharged as follows: a)… b)… c)…"	Which of the three listed recommended discharge requirements is preferred? What is the scientific basis for the 0.2 cfs or 0.5 cfs 100-year peak discharge onto adjoining properties? Please provide the scientific and legal justification for Ecology's conclusion that 0.2 cfs or 0.5 cfs (approximately 225 gallons), uncontrolled, is an insignificant impact.	[PROVIDE ADDITIONAL INFORMATION]
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.5.5, MR#5; pgs. 2-34 – 2-38	"Projects triggering only Minimum Requirements #1 through #5 shall use On-site Stormwater Management BMP's from Mandatory List #1 for all surfaces within each type of surface listed below.	This language is confusing. Please revise for clarity. In addition, why is Ecology excluding rain gardens? An engineer may go through the calculations and find that a rain garden is all that is necessary. More importantly, it also looks	"For projects triggering only Minimum Requirements #1 through #5, the project proponent may choose to construct the project by using either of the following approaches to stormwater management: (1) using the On-site Stormwater

		Projects triggering only Minimum Requirements #1 through #5 may choose to demonstrate compliance with the LID Performance Standard in lieu of using Mandatory List #1. Projects selecting that option cannot use Rain Gardens. They can choose to use Bioretention options as described in the Stormwater Management Manual for Western Washington (2012) to achieve the LID Performance Standard. Projects triggering Minimum Requirements #1 through #9, must apply On-site Stormwater Management in accordance with the table below."	like a homeowner is unable to pass MR#5 by suggesting use of a rain garden as a means of handling runoff if they choose not to follow the Mandatory List for some reason due to their site constraints. Why is the homeowner not given this option?	Management BMP's from Mandatory List #1 for all surfaces within each type of surface listed below; or (2) demonstrating compliance with the LID Performance Standard. If the project applicant/proponent elects to demonstrate compliance with the LID Performance standard, the project may not use Rain Gardens; however, the project may use Bioretention options as described in Chapter 7 of Volume V of this manual. Projects triggering Minimum Requirements #1 through #9, must apply On-site Stormwater Management in accordance with the table below."
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.5.5; pgs. 2-35 – 2-37	Entirety of Mandatory List #1 and Mandatory List #2	As written, both Mandatory List #1 and Mandatory List #2 appear to prevent any project from using a combination of LID BMPs to address stormwater draining from "Roofs" or stormwater draining from "Other Hard Surfaces." Instead, as written, both Mandatory List #1 and Mandatory List #2 appear to require every project to use a single type of LID BMP to handle stormwater runoff from Roofs, and a single type of LID BMP to handle stormwater runoff from "Other Hard Surfaces." Namely, the first "feasible" type of LID BMP contained on the applicable Mandatory List. This restriction is illogical and unsound. The County can conceive of no legitimate reason to prohibit the use of additional types of LID BMPs on a site if such LID BMPs are appropriate and the project proponent desires to use them. Additionally, in many (if not most) circumstances, using a combination of multiple LID BMPs will provide a more stable and functional stormwater drainage/infiltration system than reliance on only one type of LID BMP. To illustrate the problem with the current language, look at Mandatory List #2. Suppose a project proponent wanted to address stormwater runoff from the roof of a proposed structure by using a "Downspout Infiltration System," two "Bioretention BMPs" and a "vegetated roof." Those three types of LID BMPs constitute Numbers 2, 3 and 5 on Mandatory List #2. Now suppose that, in this instance, the regulatory jurisdiction believed "Full Dispersion," which is LID BMP Number 1 on Mandatory List #2, would be a feasible method of handling the stormwater runoff from the hypothetical roof. Based on the existing language of Section 4.5 of Appendix 1, the project proponent would not be allowed to use any LID BMP other than "Full Dispersion" to handle stormwater runoff from the roof if the regulatory jurisdiction determined "Full Dispersion" was feasible. That	[REVISE AND/OR RESTRUCTURE BOTH MANDATORY LISTS TO ENABLE PROJECTS TO USE MULTIPLE TYPES OF LID BMPS]

			is not a result the County supports, and the County suspects it is not the result Ecology intended. Additionally, under the current language, some scenarios would result in contradictory requirements with which it would be impossible to comply. For example, looking at Mandatory List #1, suppose a project proponent wanted to construct a driveway and a patio on the project site. The project proponent proposes to use "Sheet Flow Dispersion" to handle stormwater runoff from the driveway and "Permeable pavement" to handle stormwater runoff from the patio. Those types of LID BMPs constitute Numbers 4 and 2 on Mandatory List #1. Now suppose that, in this instance, the regulatory jurisdiction believed "Full Dispersion," which is LID BMP Number 1 on Mandatory List #1, would be a feasible method of handling the stormwater runoff from all three of these "Other Hard Surfaces." Based on the existing language of Section 4.5 of Appendix 1, the project proponent would not be allowed to use any LID BMP other than "Full Dispersion" to handle stormwater runoff from the "Other Hard Surfaces" if the regulatory jurisdiction determined "Full Dispersion" was feasible. Thus, the project proponent would not be allowed to use "Permeable pavement," which is Number 2 on Mandatory List #1, for any of the "Other Hard Surfaces" on the site. However, according to footnote 2 to Mandatory List #1, if any pavement at all is used on a site, that pavement must be permeable to the extent feasible. The current language provides that if "Full Dispersion" is the feasible LID BMP for the site, then none of the other listed LID BMPs - of which "Permeable pavement" is one - can be used. So, what type of driveway and patio can the project proponent install? Must the driveway and patio be limited to dirt or gravel? May the driveway and patio be impervious because the ordering of the LID BMPs on Mandatory List #1 has prohibited "Permeable pavement" from being used on the site (thus making it "infeasible")? Please re-evaluate the way this section is structured and revise the language to avoid unfortunate and unintended results.	
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.5.5; pgs. 2-35 – 2-37	Mandatory List #1 –Other Hard Surfaces, BMP 2 = "Permeable pavement in accordance with design criteria in Appendix III-C of the SMMWW" Mandatory List #2 –Other Hard Surfaces, BMP 2 = "Permeable pavement in accordance with design criteria in	The County asks Ecology to revisit its proposed approach to increasing the use of permeable pavement. Specifically, the County recommends that Ecology develop mechanisms to encourage the use of permeable pavement, rather than mandating the use of permeable pavement. There are too many variables involved in determining the viability of successfully using permeable pavement in any	[REVISE MANDATORY LIST #1 AND MANDATORY LIST #2 TO MAKE PERMEABLE PAVEMENT OPTIONAL AND ENCOURAGED RATHER THAN MANDATORY.]

		Appendix III-C of the SMMWW"	particular situation to include the use of permeable pavement on any "mandatory list." The technical difficulty involved in making such a determination is illustrated by the lengthy list of situations described in Section 8.A.1, under which Ecology deems it "infeasible" to use permeable pavement. However, while the County appreciates Ecology's attempt to include a broad variety of situations on that "infeasibility" list, the County does not believe the list is comprehensive. In fact, the County does not believe it is possible to create a truly comprehensive list that captures all of the myriad potential situations under which it will be "infeasible" to use permeable pavement. The potential consequences of a structural failure of any given installation of pervious pavement are substantial. Not only is the cost required to repair or replace the permeable pavement an issue, but there is also a significant likelihood that persons or property will be harmed due to such failure. Additionally, permeable pavement carries a potential for seepage/exfiltration failure (onto walking or driving surfaces) which poses risks to public health and safety, especially in freezing temperatures. The County believes the potential risks inherent in mandating the installation of permeable pavement outweigh the potential gains of such a mandate. The County therefore recommends that Ecology re-evaluate its approach to permeable pavement and return to an incentive system rather than a mandatory system.	
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.5.5, Mandatory List #1; pg. 2-36	"3. Rain Gardens in accordance with design procedures in the 'Rain Garden Handbook for Western Washington.'"	The County is concerned about potential failure of rain gardens sited and constructed by non-engineers attempting to follow the instructions in the "Rain Garden Handbook for Western Washington." In particular, the County is concerned about flooding due to such failure, both on the subject property and on adjacent or nearby properties. The County recommends deleting all references to the Rain Garden Handbook for Western Washington. As a whole, the Rain Garden Handbook for Western Washington is problematic because it attempts to simplify tasks that will usually require the knowledge, expertise and discretion of a professional engineer into mandatory abridged steps that homeowners are encouraged to blindly follow. The Rain Garden Handbook assumes the average homeowner with no special knowledge or training and no special equipment will be capable of correctly following complicated instructions, and accurately performing complex engineering	[DELETE ALL REFERENCES TO RAIN GARDEN HANDBOOK FOR WESTERN WASHINGTON]

			measurements and calculations. The County believes this is an unrealistic and incorrect assumption. Additionally, several of the tests and processes described in the Rain Garden Handbook are overly simplistic and unlikely to provide accurate data even if conducted correctly, pursuant to the instructions.	
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.5.5, Mandatory List #2; pg. 2-37	"5. For a commercial building, a vegetated roof or an impervious roof with runoff routed below permeable pavement. If the latter option is not used, a cost analysis is necessary to claim infeasibility of a vegetated roof."	This language is confusing. Please revise for clarity. With respect to the first sentence, the County is concerned about the mandate to route roof runoff below permeable pavement. This increases the amount of soil necessary to meet vertical separation requirements and makes monitoring individual performance impossible. (Snohomish County is 60 to 70 percent Alderwood and Tokul Series soils with hardpan at 20 to 40 inches.) As written, this requirement will increase the likelihood that the permeable pavement will fail. With respect to the second sentence, the County suspects Ecology's intent is not properly implemented by the current wording. Revise for clarity. Finally, please clarify the criteria that must be included in the cost analysis necessary to demonstrate the infeasibility of a vegetated roof.	"For a commercial building, a vegetated roof or an impervious roof with runoff infiltrated in accordance with Volume III. If a vegetated roof is not used, a cost analysis [INSERT LANGUAGE CLARIFYING TYPE OF COST ANALYSIS OR CRITERIA TO BE INCLUDED IN SAME] is necessary to justify infeasibility of a vegetated roof."
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.5.6 – MR #6; pgs. 2-40 – 2-41	Supplemental Guidelines	If thresholds are no longer determined by whether or not the "hard surface" is considered "effective" the discussion of such under "Supplemental Guidelines" should be removed.	[DELETE]
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.5.8 – MR #8; pgs. 2-46 – 2-48	Minimum Requirement #8	Ecology should define a quantifiable minimum threshold for the applicability of this requirement. There should be a minimum threshold.	[DEFINE QUANTIFIABLE MINIMUM THRESHOLDS]
Stormwater Manual Nov. 2011 Draft	Vol. I; 2.5.8 – MR#8; pg. 2-46 Vol. I; 2.5.8, Standard Requirement; pg. 2-47	"The requirements below apply only to projects whose stormwater discharges into a wetland, either directly or indirectly through a conveyance system." "Projects within the drainage area of a wetland shall comply with Guide Sheets #1 through #3 in Appendix 1-D."	These two provisions are inconsistent and mutually exclusive. The criterion "discharges into a wetland" is different from the criterion "within the drainage area of a wetland." Please revise the language on page 2-47 for consistency with the language on page 2-46. Almost all projects would be "within the drainage area of a wetland." That proposed language would not only require intensive field work offsite to include location and categorization on private property, but would also significantly increase the cost to the applicant of modeling and documentation requirements for compliance with MR#8. Also, the proposed requirement is not synchronized with the length of the downstream analysis required.	[NO CHANGE] "Projects for which stormwater discharges to a wetland shall comply with Guide Sheets #1 through #3 in Appendix I-D."

Stormwater Manual Nov. 2011 Draft	Vol. I; 3.1 – Stormwater Site Plan; pg. 3-1 – 3-12		Costs to small homeowners should be considered in the implementation of Mandatory List #1. Each applicant is required to hire a registered land surveyor, a licensed geotech or geologist, a licensed landscape architect or arborist or biologist, and a drainage engineer to run the hydrologic computer models. It could be argued that these mandates unfairly target low-income populations – especially in today's economic climate. These are standard procedure for municipalities, and it seems reasonable for large developers. These requirements have the potential to effectively end construction efforts for small private homeowners trying to build legally.	
Stormwater Manual Nov. 2011 Draft	Vol. I; 3.1.1, Step 1 – Collect and Analyze Information on Existing Conditions; pg. 3-2	"This section will be updated to be complementary with Site Assessment procedures described in the updated **Low Impact Development Technical Guidance Manual for Puget Sound.**"	The following seven (7) comments are based on language that, according to this statement, is subject to change depending on the terms of the LID Technical Guidance Manual for Puget Sound. When will Ecology make available possible changes to language based on this updated *Low Impact Development Technical Guidance Manual for Puget Sound*? Will Ecology provide for an additional public comment period?	
Stormwater Manual Nov. 2011 Draft	Vol. I; 3.1.1, Step 1 – Collect and Analyze Information on Existing Conditions; pgs. 3-2 – 3-4		This analysis will be difficult for the small project homeowner as they do not understand the complexities imposed by this Draft Manual and the step by step procedures required to properly prepare a Stormwater Site Plan, much less understand the new site assessment procedures in a separate document titled *Low Impact Development Technical Guidance Manual for Puget Sound*.	
Stormwater Manual Nov. 2011 Draft	Vol. I; 3.1.1, Step 1 – Collect and Analyze Information on Existing Conditions; pg. 3-2	"Site analysis requirements shall be submitted in addition to all other requirements for development approval for a project and may be submitted prior to filing other applications. The Administrator may chose to waive certain components required in this section as appropriate."	Who is the Administrator? What gives him or her the authority to waive certain, undefined components required by this section? What form would the waivers have to take? Would notice be required for this type of waiver? Does this give local governments the authority not to require a survey? For example, on small projects our GIS system may be sufficient to generate topography or existing building locations. There needs to be a cost benefit analysis performed on the impact to small parcel development with regard to the financial cost of hiring professionals versus alternative measures.	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. I; 3.1.1, Step 1 – Collect and Analyze Information on	"1. A survey prepared by a registered land surveyor showing existing public and private development, including utility infrastructure on and adjacent to the site, major and minor hydrologic features including seeps, springs, closed	Elsewhere in the Draft Manual it requires that the topography survey extend 500 feet surrounding the entire site, presumably on adjoining public and other private lands. This will raise the cost of land development through the cost and time associated	

	Existing Conditions; pg. 3-3	depression, drainage swales and contours as follows: a. Up to 10 percent slopes, two-foot contours. b. Over 10 percent to less than 20 percent slopes, five-foot contours. c. Twenty percent or greater slopes, 10-foot contours. Elevations shall be at 25 foot intervals."	with the survey. It may also save costs on some projects by minimizing conflicts related to construction encroachment and unintended consequences of development like diversion or drainage flows into adjoining properties that may impact structures. This requirement may be appropriate for large commercial development, but it appears excessive for a small garage in the middle of a five acre lot in a rural area. This specification is also too specific with regard to elevation criteria. Currently 1.c. is less rigorous than County Code for subdivisions or projects that go to Hearing. Within Snohomish County, a 33% slope is one of the slopes that is key to assessing landslide hazard areas, thus a five foot contour is always required, rather than the 10 foot contour suggested in this Draft Manual. A 2 foot contour interval is appropriate for flatter terrain or for detailed design work in urban areas.	
Stormwater Manual Nov. 2011 Draft	Vol. I; 3.1.1, Step 1 – Collect and Analyze Information on Existing Conditions; pg. 3-3	"2. A soils report prepared by a licensed geotechnical engineer or licensed engineering geologist."	This requirement is excessive and does not seem necessary for every development, depending on what is proposed. This requirement will increase the cost of land development including the cost of the report, the cost of scientific (shc) testing of the soils, depth to water table on site testing, which may end up requiring the use of a well drilling rig to find the water, and the cost of excavation equipment to dig the 10 foot by 10 foot pits to depth to classify infiltration. Is this really a value added function on a lot in a subdivision where the home is intended to be built just like the one next door and a geotechnical report may already have been done for the subdivision? How will the boundary of the soils type be mapped if the applicant can no longer use the textural classification triangle and they can no longer rely on the SCS soils maps for their jurisdiction or newer GIS soils and geologic mapping of areas? This is inconsistent with past practice. In the past, use of SCS soils mapping in concert with reports by licensed, on-site septic designers that described the soils and that log small test pits showing the mottling layers was sufficient to establish a seasonal high water table. This requirement should include licensed drain field designers for projects in which total new impervious is less than 10,000 square feet. In many small projects the designer is already working on the project and can provide soils information in a more efficient manner. The on-site designers in many cases is more familiar with shallow soils on top of till and are trained	[MODIFY REQUIREMENT]

			at spotting signs of maximum seasonal high water table.	
Stormwater Manual Nov. 2011 Draft	Vol. I; 3.1.1, Step 1 – Collect and Analyze Information on Existing Conditions; pg. 3-3	"4. A survey of existing native vegetation cover by a licensed landscape architect, arborist, or qualified biologist identifying any forest areas on site, species and condition of ground cover and shrub layer, and tree species and canopy cover."	This requirement is excessive for small projects and adds cost where there may be no benefit to the collection of this information. Would a photograph by the applicant showing no trees or vegetation on site suffice to meet this requirement? Snohomish County recommends modifying the language as noted.	"A survey of existing native vegetation cover by a licensed landscape architect, arborist, or qualified biologist identifying any forest areas on site, species and condition of ground cover and shrub layer, and tree species and canopy cover is required if trees of 8 inch diameter or larger are on-site."
Stormwater Manual Nov. 2011 Draft	Vol. I; 3.1.1, Step 1 – Collect and Analyze Information on Existing Conditions; pg. 3-4	"7. Geologic hazard areas and associated buffer requirements as defined by the jurisdiction."	This should be part of the geotechnical report required in subsection 2 as a new subsection 'd'.	[MOVE LANGUAGE TO SUBSECTION 2 AS NOTED:] "2. A soils report prepared by a licensed geotechnical engineer or licensed engineering geologist. The report shall identify: a. Underlying soils on the site utilizing soil pits, soil grain analyses b. Saturated hydraulic conductivity (shc) testing to assess infiltration capability on site. c. A few strategically placed soil test pits and shc test sites are generally adequate for initial site assessment and for smaller sites. A more detailed soil assessment and additional shc testing is necessary to direct placement of impervious surfaces such as structures away from soils that can most effectively infiltrate stormwater, and placement of permeable pavement roads, parking lots, driveways, walks, and bioretention/rain gardens over those soils. The shc tests are also necessary as input to the runoff model to predict the benefits of LID BMP's which infiltrate. d. Geologic hazard areas and associated buffer requirements as defined by the jurisdiction."
Stormwater Manual Nov. 2011 Draft	Vol. I; 3.1.1, Step 1 – Collect and Analyze Information on Existing Conditions; pg. 3-4	"Delineate these areas on the vicinity map and/or a site map that are required as part of Step 7 – Completing a Stormwater Site Plan. Prepare an Existing Conditions Summary that will be submitted as part of the Site Plan. Part of the information collected in this step should be used to help prepare the Construction Stormwater Pollution Prevention Plan."	A vicinity map is an inappropriate map on which to put this level of detailed information and would make this information almost useless to use, plan check, or decipher what is really happening on a site. This directive also fails to take into consideration the fact that most non-professional applicants for single family development still hand draw their site plans on paper, not on a computer.	
Stormwater Manual Nov. 2011 Draft	Vol. I; 3.1.5; Step 5 – Prepare a Permanent Stormwater Control Plan; pg.	"Projects that apply only Minimum Requirements #1 - #5: Provide narrative and graphic representations of the location of On-site Stormwater Management BMP's from Mandatory List #1."	What mathematical presentation of a model input parameter is expected of the applicant when they are required to hire an engineer to perform a stormwater analysis of every site that includes a complete computer model report, including input and output files?	[PLEASE CLARIFY]

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Stormwater Manual Nov. 2011 Draft	Vol. I; 3.1.5; Step 5 – Prepare a Permanent Stormwater Control Plan; pg. 3-7	"Permanent Stormwater Control Plan – Low Impact Development Features A. Description of the proposed complete LID project including: … 6. Proposed ownership of land areas within the complete LID project both during and after construction."	Why is disclosure of ownership requested? Snohomish County does not see the utility of tracking this ownership information. When a rain garden, for example, goes across property lines the various owners may not agree on how to fix it. Currently, over half of the development in the County is owned by banks, so in light of that, what purpose does the disclosure of the banks' holdings serve?	[DELETE REQUEST FOR OWNERSHIP INFORMATION]
Stormwater Manual Nov. 2011 Draft	Vol. I; 3.1.7; Step 7 – Complete the Stormwater Site Plan; pg. 3-11	"Include any special reports and studies conducted to prepare the Stormwater Site Plan (e.g., soil sampling and testing, pilot infiltration tests and/or soil gradation analyses, wetlands delineation)."	Pilot infiltration tests are a relatively new requirement for small projects. This adds to the expense of land development (the cost of the test and the added risk to puncture the aquifers).	
Stormwater Manual Nov. 2011 Draft	Vol. I; 4.2 – Step III, Step 5; pg. 4-2 – 4-3	"Permeable pavements are entered as lawn/landscaping areas over the project soil type if they do not have any capability for storage in the gravel base (more typical of private walks, patios, and private residential driveways). Permeable pavements with storage capability should use the permeable pavement "element" in the model."	Permeable pavements with storage capability can be modeled as impervious surfaces according to Appendix C.	
Stormwater Manual Nov. 2011 Draft	Vol. I; 4.2 – Step V; pg. 4-4	"Ecology proposes to eliminate the existing text from Step V, and replace it with a reference to Volume V, Chapter 2. We are interested in comments concerning any perceived drawbacks with this approach. Note that the test that appeared here will continue to be in Chapter 2 of Volume V. That text is being updated."	Include a reference to Volume V.	
Stormwater Manual Nov. 2011 Draft	Vol. I; Appendix I-D; pgs. D-1 – D-21; General Comments		What is the scientific basis for the wholesale change of the prior Appendix I-D methodology and statistical analysis of every storm event over a 50 year period on a particular day? If wetland discharge is anticipated a professional must be hired by the applicant.	[PROVIDE ADDITIONAL INFORMATION REGARDING THE SCIENTIFIC BASIS FOR THE CHANGE]
Stormwater Manual Nov. 2011 Draft	Vol. I; Appendix I-F; pg. F-1	"Where the site cannot be reasonably designed to locate bioretention facilities on slopes less than 15%, . or if bioretention is within the road right-of-way and the right-of-way cannot be feasibly designed to locate bioretention facilities on less than 8%"	This sentence is ambiguous. Ecology should revise to clarify what is meant by the term "reasonably designed." Permittees and project proponents all need have a clear methodology for determining whether or not this condition is met.	[REVISE TO CLARIFY CRITERIA FOR "REASONABLY DESIGNED"]
Stormwater Manual Nov. 2011 Draft	Vol. I; Appendix I-F; pgs. F-1 – F-2	"Where the drainage area is more than any of the above amounts and cannot reasonably be broken down into amounts smaller than those designated above, and the minimum vertical separation of 3 feet to seasonal high water table, bedrock, or other impervious layer is not achieved."	Does Ecology intend that the vertical separation measurement occur from the bottom of an infiltration trench or from the top of the foot of amended soils added to the site? In addition, the phrase "any of the above" is ambiguous. Please clarify.	[PLEASE CLARIFY]

Stormwater Manual Nov. 2011 Draft	Vol. I; Appendix I-F; pg. F-2	"Where the field testing indicates potential bioretention/rain garden sites have a short term (a.k.a., initial) native soil saturated hydraulic conductivity less than 0.30 inches per hour. In these instances bioretention/rain gardens serving pollutant-generating surfaces can be built with an underdrain, preferably elevated within the underlaying gravel layer, unless other feasibility restrictions apply."	Soils testing is potentially an undue hardship to the small home owner and often not accurate or reliable. While the intent of this feasibility measure seems to be to provide some size limitations in poorly-draining soils, the reality of this is going to be difficult to manage.	
Stormwater Manual Nov. 2011 Draft	Vol. I; Appendix I-F; pg. F-2	"Where the only area available for siting would threaten the safety or reliability of pre-existing underground utilities, pre-existing underground storage tanks, or pre-existing structures."	This provision should be revised to expressly include pre-existing road and similar surfaces. Additionally, within an existing road right-of-way, one could argue that any bioretention system or rain garden might "threaten the safety or reliability" of "pre-existing structures." Ecology should be more clear regarding how a Permittee should make this determination.	"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 other similar surfaces." and [REVISE TO CLARIFY CRITERIA]
Stormwater Manual Nov. 2011 Draft	Vol. I; Appendix I-F; pg. F-2	"Where there is a lack of usable space for rain garden/bioretention facilities at re-development sites."	Ecology should clarify how a Permittee will determine whether there is a lack of usable space.	[REVISE TO CLARIFY CRITERIA]
Stormwater Manual Nov. 2011 Draft	Vol. I; Appendix I-F; pgs. F-2 – F-4	General comment re: subsection B – "Permeable Pavements are considered infeasible:"	This section should include consideration of potential weight restrictions, ability to maintain, and potential for exfiltration.	[ADD ANOTHER SUBSECTION ADDRESSING THESE ISSUES]
Stormwater Manual Nov. 2011 Draft	Vol. I; Appendix I-F; pg. F-2	"In the drive aisles of parking lots as long as runoff is directed to pervious pavement parking spaces."	Why is permeable pavement considered "infeasible" for the drive aisles of parking lots as long is runoff is directed to permeable parking spaces? That sounds like a design option for the engineer and not a feasibility criterion. Further explanation should be provided.	[REVISE TO CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. I; Appendix I-F; pg. F-3	"Where the native soils below a road or parking lot do not meet the soil suitability criteria for providing treatment. 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."	As written, the actual feasibility criterion pertains to feasibility of placing a six-inch layer of a suitable filter medium under the pavement. If this is what Ecology intended, please rewrite to specify the criterion.	[REVISE TO CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. I; Appendix I-F; pg. F-3	"Where regular, heavy applications of sand occur to maintain traction during winter."	All Snohomish County roads are subject to winter sanding for safety, regardless of pavement type, and the degree of application is dictated by weather. Ecology must set forth express criteria for "regular, heavy applications of sand."	[REVISE TO CLARITY]
Stormwater Manual	Vol. I; Appendix	"Where installation of permeable pavement would threaten the safety or reliability of pre-existing underground utilities	This provision should be revised to expressly include pre-	"Where the installation of permeable pavement would threaten the safety or reliability of pre-existing underground

Nov. 2011 Draft	I-F; pg. F-4	or pre-existing underground storage tanks."	existing road and similar surfaces. Additionally, one could argue that the installation of permeable pavement might "threaten the safety or reliability" of any "pre-existing underground structures" and/or "pre-existing underground storage tanks." Ecology should be more clear regarding how a Permittee should make this determination.	utilities, pre-existing underground storage tanks or pre-existing road or other similar surfaces." [REVISE FOR CLARITY]
Stormwater Manual Nov. 2011 Draft	Vol. I; Appendix I-F; pg. F-4	"Where appropriate field testing indicates soils have a short-term (a.k.a., initial) native soil saturated hydraulic conductivity less than 0.3 inches per hour. In these instances, roads and parking lots can be built with an underdrain, preferably elevated within the base course, unless other feasibility restrictions apply."	Soils testing is potentially an undue hardship to the small home owner and often not accurate or reliable. While the intent of this feasibility measure seems to be to provide some size limitations in poorly-draining soils, the reality of this is going to be difficult to manage.	
Stormwater Manual Nov. 2011 Draft	Vol. I; Glossary; pg. Glossary-6	"**Biological magnification** – The increasing concentration of a substance along succeeding steps in a food chain. Also called biomagnification."	How is the term "biological magnification" to be used in the Draft Manual to size LID or design stormwater systems?	
Stormwater Manual Nov. 2011 Draft	Vol. I; Glossary; pg. Glossary-8	"**Certified Erosion and Sediment Control Lead**. An individual who has current certification through an approved erosion and sediment control training program that meets the minimum training standards established by Ecology (see BMP C160 of Volume II). A CESCL is knowledgeable in the principles and practices of erosion and sediment control. The CESCL must have the skills to assess site conditions and construction activities that could impact the quality of stormwater and, the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges. Certification is obtained through an Ecology approved erosion and sediment control course. Course listings are provided online at Ecology's web site."	A licensed, professional engineer or geotechnical engineer should not be required to take CESCL training in order to be a CESCL for the project. Both may have training or experience that they are required under state law to practice only in those areas in which they have technical expertise. The CESCL training is fairly basic and targets the novice.	
Stormwater Manual Nov. 2011 Draft	Vol. I; Glossary; pg. Glossary-16	"***Effective Impervious Surface*** – Those impervious surfaces that are connected via sheet flow or discrete conveyance to a drainage system. Impervious surfaces are considered ineffective if: 1) the runoff is dispersed through at least one hundred feet of native vegetation in accordance with BMP T5.30 – 'Full Dispersion' as described in Chapter 5 of Volume V; 2) residential roof runoff is infiltrated in accordance with Downspout Infiltration Systems in Volume III; or 3) approved continuous runoff modeling methods indicate that the entire runoff file is infiltrated."	This definition raises several concerns. First, the words "to a drainage system" should be replaced with "to an MS4 owned or operated by the Permittee and covered by this Permit." Next, as written, this definition excludes from its scope commercial project related impervious surfaces as well as residential sidewalks, patios, driveways, etc. If infiltrated fully, these types of surfaces would not be considered effective impervious. Finally, stormwater modeling under (3) is not something an	"***Effective Impervious Surface*** – Those impervious surfaces that are connected via sheet flow or discrete conveyance to an MS4 owned or operated by the Permittee and covered by this Permit. Impervious surfaces are considered ineffective if: (1) the runoff is dispersed through at least one hundred feet of native vegetation in accordance with BMP T5.30 – 'Full Dispersion' as described in Chapter 5 of Volume V; (2) residential roof runoff is infiltrated in accordance with Downspout Infiltration Systems in Volume III; (3) residential and/or commercial surfaces that infiltrate on-site pursuant to Volume III; or (4) approved continuous runoff modeling methods indicate that all runoff will be infiltrated."

			average homeowner or architect would be able to do.	
Stormwater Manual Nov. 2011 Draft	Vol. I; Glossary; pg. Glossary-41	"***Receiving waters*** - Bodies of water or surface water systems to which surface runoff is discharged via a point source of stormwater or via sheet flow. Ground water to which surface runoff is directed by infiltration."	This language is vague. It should be revised for clarity. Additionally, as the NPDES permit program does not regulate ground water, ground water should be omitted from the definition.	"***Receiving waters*** - Bodies of water into which surface runoff is discharged via a point source of stormwater or via sheet flow (e.g., streams, rivers, lakes, wetlands, salt water, or tributaries to any of the foregoing)."
Stormwater Manual Nov. 2011 Draft	Vol. 1; Glossary; pg. Glossary-50	"**Total Maximum Daily Load (TMDL) Water Cleanup Plan**. A calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL (also known as a Water Cleanup Plan) is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation must include a margin of safety to ensure that the waterbody can be used for the purposes the State has designated. The calculation must also account for seasonable variation in water quality. Water quality standards are set by states, territories, and tribes. They identify the uses for each waterbody, for example, drinking water supply, contact recreation (swimming), and aquatic like support (fishing), and the scientific criteria to support that use. The Clean Water Act, section 303, establishes the water quality standards and TMDL programs."	As written, this definition inaccurately combines the idea of a TMDL and the Water Cleanup Plan produced pursuant to a TMDL. Snohomish County recommends defining each term separately, which could be done using the information presented.	[MODIFY AS INDICATED]
Stormwater Manual Nov. 2011 Draft	Vol. II; Chapter 2.1 – The Construction Stormwater General Permit; pgs. 2-4 – 2-7		Construction activities should not typically be exempted from erosion control by discharging 100% to groundwater. These receiving areas often require the most protection from sedimentation, lest they become clogged and no longer infiltrate – (see SWPPP Element #3, 13).	
Stormwater Manual Nov. 2011 Draft	Vol. II; Chapter 2.1; pg. 2-6	"Construction activities that meet the requirements of an Erosivity Waiver (See the CSWGP, Section S2.C.)	Reference to the "Erosivity Waiver" seems out of place. The user should not need to refer to the CSWGP itself in order to determine compliance with this section. If this information is required, include it herein.	
Stormwater Manual Nov. 2011 Draft	Vol. II; 3.2.2 – Drawings; pg. 3-6	"Site map: Provide a site map(s) showing the following features. The site map requirements may be met using multiple plan sheets for ease of legibility. … 4. The boundaries of and label the different soil types."	This Draft Manual seems to suggest in other sections that the SCS Soil Maps are now inadequate to confirm soil boundaries. In light of that, how is the applicant expected to determine where these boundaries are? What degree of accuracy is expected to show the boundaries of the different soil types? There could be subsurface eskers or underground streams that play a role in the hydrology on a particular site, but Ecology is not requesting the mapping of these features. Will County GIS mapping of soils from this source continue to be adequate for a small parcel development?	[PLEASE CLARIFY]

Stormwater Manual Nov. 2011 Draft	Vol. II; 3.3.1; pg. 3-8	"Characterize soils for permeability, percent organic matter, and effective depth."	Does this mean that an ignition test is necessary to quantify organic content or that a permeability test must be performed on the soil or an estimate of the effective depth of the soil by horizon is to be performed? Or is this intended to be an estimate of these to be done by the homeowner or something that an individual can readily acquire from available published literature on the internet or at a library? In this part it appears that use of the 1983 SCS Soils Survey for Snohomish County is acceptable. See P3-9 Example. Snohomish County supports maintaining the use of SCS maps. Snohomish County also encourages the retention of the U.S.D.A. Textural Triangle to assist homeowners in soil classification.	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. II; 3.3.2; pg. 3-10	"A qualified engineer, soil professional, or certified erosion control specialist should determine erosion potential."	Is this specialist a CPESC or would a CESCL suffice for this determination? Is this determination considered the practice of engineering or not?	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. II; 3.3.3 Element 1 – Preserve Vegetation/Mark Clearing Limits; pg. 3-12		If Silt Fence can be substituted for High Visibility Fence this should be included as a "Suggested BMP" for this element.	[MODIFY AS INDICATED]
Stormwater Manual Nov. 2011 Draft	Vol. II; 3.3.3 Element – Control Flow Rates; pg. 3-13	"Where necessary to comply with the bullet above, construct stormwater retention or detention facilities as one of the first steps in grading. Assure that detention facilities function properly before constructing site improvements (e.g. impervious surfaces)."	Revise language as recommended. Stormwater flow control facilities are not required for projects that do not trigger Minimum Requirement 7.	"Where necessary to comply Minimum Requirement 7, construct stormwater retention or detention facilities as one of the first steps in grading. Assure that detention facilities function properly before constructing site improvements (e.g. impervious surfaces)."
Stormwater Manual Nov. 2011 Draft	Vol. II; 3.3.3 Element 3 – Control Flow Rates; pg. 3-14	"Conduct downstream analysis if changes in offsite flows could impair or alter conveyance systems, streambanks, bed sediment, or aquatic habitat."	What is expected to analyze the fluvial process of monitoring or measuring bed sediment changes? "Aquatic habitat" is a broad term. Is Ecology's concern with spawning gravel locations, actual location of Redds after spawning, or vegetation along the riparian corridor?	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. II; 3.3.3 Element 3 – Control Flow Rates; pg. 3-14	"Even gently sloped areas need flow controls such as straw wattles or other energy disbursement/filtration set every 10 feet."	What is the source of the 10 foot spacing requirement? What is the definition of "gently sloped"? Many relatively flat areas do not convey sediment due to very low velocities of flow. These BMPs (straw wattles and other energy disbursement/filtration) should be listed as "Suggested BMPs" for this Element	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011	Vol. II; 3.3.3 Element 4 – Install Sediment	"BMP C231 Brush Barrier"	While we see this BMP on some plans, in practice the BMP is difficult to install as shown and infrequently installed because the brush or understory is not preserved, resulting in lawn or	[NO CHANGE]

Draft	Controls; pg. 3-16		more likely left natural as brush.	
Stormwater Manual Nov. 2011 Draft	Vol. II; 3.3.3 Element 5 – Stabilize Soils; pgs. 3-17 – 3-18		Why are there references to controlling stormwater rates under the soil stabilization requirements? Isn't that handled by the "control flow rates" element?	
Stormwater Manual Nov. 2011 Draft	Vol. II; 3.3.3 Element 6 – Protect Slopes; pg. 3-19	"Temporary pipe slope drains must handle the peak 10-minute velocity of flow from a Type 1A, 10- year, 24 -hour frequency storm event for the developed condition. Alternatively, the 10-year, 1-hour flow rate predicted by an approved continuous runoff model, increased by a factor of 1.6, may be used. The hydrologic analysis must use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis must use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the Western Washington Hydrology Model (WWHM) to predict flows, bare soil areas should be modeled as "landscaped" area."	This is a new standard. Please provide some worked examples in the Manual.	[PROVIDE WORKED EXAMPLES]
Stormwater Manual Nov. 2011 Draft	Vol. II; 3.3.3 Element 6 – Protect Slopes; pg. 3-20	"BMP combinations are the most effective method of protect [sic] slopes with disturbed soils. For example use both mulching and straw erosion control blankets in combination."	These BMPs should be listed as "Suggested BMPs" for this Element.	[MODIFY AS INDICATED]
Stormwater Manual Nov. 2011 Draft	Vol. II; 3.3.3 Element 7 – Protect Drain Inlets; pg. 3-21	"Inlets should be inspected weekly at a minimum and daily during storm events."	What size storm event triggers this requirement? During 100-year flood events, local resources are often mobilized to be part of flood monitoring and flood fighting efforts with diking and drainage districts. Most jurisdictions do not have the inspection resources to inspect catch inlets on a daily or weekly basis. It is a normal part of the on-site CESCL duties to inspect the catch basins and catch inlets occasionally during construction. Cleaning of the stormwater system occurs prior to Snohomish County acceptance of new storm infrastructure with the Snohomish County right-of-way. This includes cleaning and flushing of the catch basins.	[PROVIDE ADDITIONAL DETAIL]
Stormwater Manual Nov. 2011 Draft	Vol. II; 3.3.3 Element 8 – Stabilize Channels and Outlets; pg. 3-22	"The best method for stabilizing channels is to completely line the channel with a blanket product first, then add check dams as necessary to function as an anchor and to slow the flow of water."	These BMPs should be listed as "Suggested BMPs" for this Element.	[MODIFY AS INDICATED]
Stormwater Manual Nov. 2011 Draft	Vol. II; 3.3.3 Element 10 – Control De-Watering; pg. 3-		Why is reference to Element #8 needed under Element #10?	

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Stormwater Manual Nov. 2011 Draft	Vol. II; BMP C235 – Wattles; pgs. 4-108 – 4-109	Diagram	In the diagram the recommended spacing is 10 – 25 feet but the slope or gradient is not shown as an appropriate range for the wattle installation. This is wider spacing than previously described and also graphically steeper than earlier gently sloping text. It looks like the slope is almost 1 to 1 or 100% slope.	[PROVIDE ACCURATE DIAGRAM]
Stormwater Manual Nov. 2011 Draft	Vol. II; BMP C236 – Vegetated Spray Fields; pg. 4-111	"Do not use this BMP on soils that prevent the infiltration of the water, such as hard till."	This BMP has a lot of merit for park construction due to large, uncleared areas proposed on many park sites. The County questions the source of the 1 acre to 5 acre ratio. The County also questions the blanket prohibition on the use of this BMP on till soils because the unconsolidated upper horizon in till soils allow for some infiltration and it seems that flow rates associated with this type of dispersion can be slow enough to allow this to be a good practice.	[DELETE]
Stormwater Manual Nov. 2011 Draft	Vol. II; BMP C236 – Vegetated Spray Fields; pgs. 4-111 – 4-112		Change language to state either that spray fields must infiltrate all water, or that they may be used for surface dispersion of water (i.e., not all water is infiltrated).	[MODIFY AS NOTED]
Stormwater Manual Nov. 2011 Draft	Vol. III; 2.2.2; pg. 2-10	"Credits are given for infiltration and dispersion of roof runoff and for use of porous pavement for driveway areas. TheWWHM3 currently includes an option for obtaining credits for the use of porous pavements on Streets/Sidewalk/Parking. The credit given under this option is believed to be too small."	The software program needs to be tested and vetted with the scientific community so that the correct credits can be assigned to reflect proper flow control before it is put into a regulation or used.	
Stormwater Manual Nov. 2011 Draft	Vol. III; 2.2.2; pg. 2-10	"Ecology anticipates that future versions of WWHM will include LID modeling features complete with a use manual that provides modeling instruction for LIDs where, any credit due will be calculated by the model directly."	If this is the case, the correct credits must be built into the software. When will future LID features be available as described? Will free training on the use of this feature be available to the public if MR #5 is to be modeled as well as rain gardens?	
Stormwater Manual Nov. 2011 Draft	Vol. III; 2.2.3; pg. 2-11	"Flow –related standards are used to determine whether or not a proposed stormwater facility will provided a sufficient level of mitigation for the additional runoff from land development. There are three flow-related standards stated in the Ecology Manual: Minimum Requirement #7 – Flow Control; Minimum Requirement #8 – Wetlands Protection (See Volume I); and Minimum Requirement #5 – On-site Stormwater Management."	By adding Minimum Requirement #5 to the list of flow control or flow control related standards, it appears that Ecology is now requiring modeling for Minimum Requirement 5. Is this the intent?	[PLEASE CLARIFY]
Stormwater Manual	Vol. III; 2.2.3; pg.	"Minimum Requirement #5 allows the user to demonstrate compliance with the LID Performance Standard of matching	Where is the science behind the 8% of the 2-year peak flow? What aspect of the lower limb of the hydrograph is this low	[PLEASE PROVIDE ADDITIONAL INFORMATION]

Nov. 2011 Draft	2-12	developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 8% of the 2-year peak flow to 50% of the 2-year peak flow."	flow or small storm event trying to protect? Previously, it was bank erosion at half the 2-year event. What is it at this lower level? What are the background science/reports to support this change in modeling that will result in increased detention requirements? There is no mention of any scientific support for this change. A cost/benefit analysis would also be useful as supporting background information for this change. Again, it appears that the applicant that is doing MR#5 is being asked to model their development and assess the impacts tied to the prior predevelopment rates.	
Stormwater Manual Nov. 2011 Draft	Vol. III; 2.4; pg. 2-20	"The applicable requirements (see Minimum Requirement #7) and the local government's Sensitive Areas Ordinance and Rules (if applicable) should be thoroughly reviewed prior to proceeding with the analysis."	Snohomish County does not use the term "Sensitive Areas Ordinance." It uses the term "Critical Areas Ordinance," consistent with state law.	
Stormwater Manual Nov. 2011 Draft	Vol. III; Chapter 3; General Comment		Ecology should apply the feasibility and design criteria for "conventional" infiltration systems to all infiltration systems, including "on-site" infiltration/dispersion systems and "low impact development" infiltration systems that receive stormwater from pollution-generating surfaces. In discussions with Ecology pursuant to the development of the 2010 Snohomish County Drainage Manual, Ecology agreed that these criteria were as follows: • The cation exchange capacity of the native soil is a minimum of 5 milliequivalents / 100 grams dry soil, as measured by USEPA Method 9081, Cation Exchange Capacity of Soils (Sodium Acetate). • The organic content of the native soil is 1 per cent or greater, as measured by ASTM D2974 – 07 - Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils These criteria are supplemental to other criteria that may apply to any specific type of infiltration system. Ecology established these criteria for "conventional" infiltration systems to ensure that stormwater discharges would not pollute groundwater. Snohomish County, with concurrence from Ecology, extended these criteria in its 2010 Drainage Manual to the "on-site" infiltration/dispersion systems required by Minimum Requirement 5, and to bioretention systems designed for infiltration. By making it clear that such criteria apply to all infiltration systems regardless of their categorization, Ecology will provide	

			protection to groundwater, and will provide assurance to NPDES permittees and the development community that they can presume infiltration facilities built or regulated by them provide such protection.	
Stormwater Manual Nov. 2011 Draft	Vol. III; Chapter 3; pg. 3-1	"Note: Figures in Chapter 3 courtesy of King County, except as noted."	Snohomish County uses its own details in the majority of cases in its Engineering Design & Development Standards (EDDS) and some are different than those of King County.	
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.1.1 at pg.3-10 and 3.2.1 at pg. 3-20	"Setbacks … 2. All infiltration systems must be at least 50 feet from the top of any sensitive area steep sloped. This setback may be reduced to 15 feet based on a geotechnical evaluation, but in no instances may it be less than the buffer width." "A geotechnical analysis and report must be prepared for steep slopes (i.e., slopes over 15%), or if located within 200 feet of the top of a steep slope or landslide hazard area."	Snohomish County does not define sensitive area steep slopes in the same fashion as King County or the City of Seattle, which use 40% slopes as sensitive area steep slopes. This requirement is different than what has historically been required in Snohomish County.	[MODIFY TO BE CONSISTENT WITH SNOHOMISH COUNTY'S EXISTING SLOPE AND SETBACK REQUIREMENTS]
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.1.2; pg. 3-12	"For purposes of maintaining adequate separation of flows discharged from adjacent dispersion devices, the outer edge of the vegetated flowpath segment for the dispersion trench must not overlap with other flowpath segments, except those associated with sheet flow from a non-native impervious surface.	What is meant by this requirement is unclear. Please consider the use of a diagram. Also, the term "non-native impervious surface" is not defined and has no intuitive meaning. What does Ecology intend?	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.1.2; pg. 3-15	"For purposes of maintaining adequate separation of flows discharged from adjacent dispersion devices, the vegetated flowpath segment for the splashblock must not overlap with other flowpath segments, except those associated with sheet flow from a non-native impervious surface."	The term "non-native impervious surface" is not defined and has no intuitive meaning. What does Ecology intend?	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. III; Figure 3.10; pg. 3-32		Section B-B should reference "Figure 3.9", not "Figure 2.9"	[MODIFY AS NOTED]
Stormwater Manual Nov. 2011 Draft	Vol. III; Figure 3.12 – Stormwater Pond Sign; pg. 3-34		Snohomish County does not require use of a stormwater pond sign. The public has indicated that they consider them to be an eyesore. In addition, the pond is not in the care of the County in most instances, unlike in King County. The placement of a phone number on the sign is likely to be quickly outdated as in many cases recently ownership of the pond has reverted to banks.	[DELETE REQUIREMENT]

Stormwater Manual Nov. 2011 Draft	Vol. III; Figure 3.16 – Typical Detention Vault; pg. 3-49		The detail shown does not comply with EDDS since Snohomish County does not allow a control structure inside of the vault (it must be located outside the vault in a separate Control Manhole with appropriate catch). Typically, we have not seen the 5' by 10' opening in the vault lid as this weakens the structural adequacy of the lid itself.	
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.2.4; pg. 3-51	"Information Plate. It is recommended that a brass or stainless steel plate be permanently attached inside each control structure with the following information engraved on the plate: . . . ."	This requirement is excessive. Snohomish County does not require this type of memorial to be placed in a space which has locking bolts and may be considered a confined space in some instances. It also looks like useless documentation of data that an inspector would have little interest in seeing for inspection purposes. The only thing the inspector needs to know is that the orifice diameter is correct, that it matches the design plans, that the distances from the invert elevation to the overflow elevations matches the design drawing and as-built record, and that the lift gate or shear gate is properly secured. It also must be placed in areas that may be subject to vandalism and removal like on a concrete weir of a pond that is less than 3 feet in depth and not fenced. Placement, therefore, would be different for different types of outlet control systems. Where would this information plate be placed in control structures such as a catch basin that releases to infiltration beds and chambers? Affixed to the plastic chamber? This data is better kept in the project file and in an electronic format elsewhere by SWMM.	[DELETE REQUIREMENT]
Stormwater Manual Nov. 2011 Draft	Vol. III; Figure 3.19 – Flow Restrictor (Weir); pg. 3-54		It appears unnecessary to require that every weir to be placed in a control manhole. Some weirs are in small dams, others are just placed outside with a footing like a small wall. See the Advanced Testing Laboratories (ATL) site in Canyon Park as an example.	
Stormwater Manual Nov. 2011 Draft	Vol. III; Figure 3.23 – Sutro Weir; pg. 3-61		Snohomish County has seen very few Sutro Weirs and has not seen how those are modeled in MGS Flood, KCRTS or WWHM.	
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.2; pg. 3-65	"Pre-treatment facilities that have the capability for removal of soluable pollutants, particularly, petroleum-related pollutants and bacteria, are advisable if Site Suitability Criterion SSC-6 is not met at the infiltration facility."	What is the measure of bacteria removal for the homeowner in infiltration facilities? Is this a condition that precludes infiltration areas in kennel runs and yard areas where pet waste may be a problem? Is it fecal coliform bacteria, giardia, or other bacteria of interest to Ecology that may pollute lower aquifer regimes?	[PLEASE CLARIFY]

Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.4; pg. 3-68	"Designs of infiltration facilities for larger projects must incorporate the results of a groundwater mounding analysis as described in Section 3.3.8."	It appears that clearing a parcel greater than 1 acre in size in a rural area may require a groundwater mounding analysis if the site is intended to continue to infiltrate as it did in the pre-developed condition. This seems excessive and will increase costs to the homeowner.	
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.4 – Steps for the Design of Infiltration Facilities – Simplified Approach; pg 3-69	"5. Determine the design infiltration rate as follows: Estimate the long-term rate by first using the Large Scale or Small Scale Pilot Infiltration Test (PIT) method as described in Section 3.3.6 to estimate an initial saturated hydraulic conductivity."	The blanket requirement to perform PIT tests in consolidated soils does not take the local conditions into account, nor has access been taken into consideration. Consolidated gravelly sandy soils can often have relatively high infiltration rates, making PIT tests difficult to administer. The language needs to provide the project soils professional with the ability to provide some level of guidance as to when these tests are required.	"5. Determine the design infiltration rate as follows: Estimate the long-term infiltration rate by first using the Large Scale or Small Scale Pilot Infiltration Test (PIT) method as described in Section 3.3.6 to estimate an initial saturated hydraulic conductivity, unless the project soils professional provides a documented reason for providing alternate testing or determination of design infiltration rates."
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.4; pg. 3-70	"Construct the facility & Conduct Performance Testing: The constructed facility must be tested and monitored to demonstrate that the facility performs as designed. If the facility performance is not satisfactory, the facility will need to be modified or expanded as needed in order to make it function as designed."	The phrase "Conduct Performance Testing" is unclear. Ecology needs to more clearly define this phrase. How long is the performance testing supposed to take and in what form will the test take now? Who is the party to determine whether the LID infiltration facility is not satisfactory – the neighbor, the owner of the facility, the design engineer, the contractor who built the facility, the CESCL, the Ecology regulatory staff, the County inspector or Department of Public Works staff or all of the above? Who is the responsible party to verify performance? Facilities are typically designed for long term infiltration rates, which means facilities should be monitored for initial infiltration rates over a shortened period, which is not implied by this requirement. Expansion of the facility implies a reserve area should be required during the site planning process. Is this Ecology's intention?	[DETAIL AND CLARIFICATION NEEDED]
Stormwater Manual Nov. 2011 Draft	Vol. III; Figure 3.26 – Steps for Design of Infiltration Facilities – Simplified Approach; pg. 3-71		TYPO: "Soul gradation" should be "Soil gradation"	[CORRECT TYPO]
Stormwater Manual Nov. 2011	Vol. III; 3.3.5 – Site Characterization		Most soils professionals can use soil strata information to determine approximate groundwater levels. Monitoring through a wet season seems to be more effort than the results	

Draft	Criteria; pgs. 3-72 – 3-77		warrant.	
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.5; pg. 3-72	"Surface Features Characterization: … 4. Location of ground water protection areas and/or 1, 5 and 10 year time of travel zones for municipal well protection areas."	Certain municipal wells in Snohomish County do not have 1, 5 or 10 year travel zones mapped. Some are mapped and some are not. Applicants should have to show, only if available, applicable travel zones.	"Surface Features Characterization: … 4. Location of ground water protection areas and/or 1, 5 and 10 year time of travel zones for municipal well protection areas, if available."
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.5; 3-72	"Subsurface Characterization: … 2. Continuous sampling (representative samples from each soil type and/or unit within the infiltration receptor) to a depth below the base of the infiltration facility of 2.5 times the maximum design ponded water depth, or at least 2 feet into the saturated zone, but not less than 6 feet. If proposing to estimate the infiltration rate using the soil grain size analysis method, sample obtained must be adequate for the purposes of that gradation/classification testing."	What is the intent of this section? Is it to require a continuous data logger during wet season infiltration site sampling or to establish the saturation levels for the various soil horizons within a soil log? It reads as if the last part of the requirement is new and is advisory in nature to assess the adequacy of the sample itself throughout the soil profile up to at least 6 feet in depth. Is this depth also required for rain garden design?	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.5; pg. 3-73	"Subsurface Characterization: … 4. Ground water monitoring wells installed to locate the ground water table and establish its gradient, direction of flow, and seasonal variations, considering both confined and unconfined aquifers. (Monitoring through at least one wet season is required, unless site historical data regarding ground water levels is available.) In general, a minimum of three wells per infiltration facility, or three hydraulically connected surface or ground water features, are needed to determine the direction of flow and gradient. If gradient and flow direction are not required, and there is low risk of down-gradient impacts, one monitoring well is sufficient. Alternative means of establishing the ground water levels may be considered. If the ground water in the area is known to be greater than 50 feet below the proposed facility, detailed investigation of the ground water regime is not necessary."	This requirement may be appropriate for pits and quarries and certain types of land uses, but it is not necessarily appropriate for typical rural development based on studies of the Getchill Hill and Newberg Aquifer. Most soils professionals can use soil strata information to determine approximate ground water levels. Monitoring through a wet season seems to be more effort than the results warrant. Please provide the scientific basis for this requirement.	[PROVIDE SCIENTIFIC BASIS FOR THIS REQUIREMENT] [MODIFY LANGUAGE AS FOLLOWS] "4. Ground water monitoring wells installed to locate the ground water table and establish its gradient, direction of flow, and seasonal variations, considering both confined and unconfined aquifers. (Monitoring through at least one wet season is required, unless the project soils professional provides a documented professional opinion of this information.) . . . ."
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.5; pg. 3-73	"Subsurface Characterization: … 5. If using the soil Grain Size Analysis Method for estimating infiltration rates: laboratory testing as necessary	How will they know if they have tested to a sufficient depth? If one firm quotes tests to 6 feet depth as the minimum necessary and another suggests deeper soil tests, how can a homeowner know what is really needed to meet this requirement? Is this testing requirement limited to projects	[PLEASE CLARIFY]

		to establish the soil gradation characteristics and other properties as necessary, to complete the infiltration facility design. At a minimum, one-grain size analysis per soil stratum in each test hole must be conducted within 2.5 times the maximum design water depth, but not less than 6 feet. When assessing the hydraulic conductivity characteristics of the site, soil layers at greater depths must be considered if the licensed professional conducting the investigation determines that deeper layers will influence the rate of infiltration for the facility, requiring soil gradation/classification testing for layers deeper than indicated above."	that are professionally designed?	
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.5; pgs. 3-73 – 3-74	"Infiltration Rate Determination: Determine the design infiltration rate by first estimating the initial saturated hydraulic conductivity using field tests and/or grain-size distribution/texture (see next section). Determine initial saturated hydraulic conductivity using the Pilot Infiltration Test (PIT) described in Section 3.3.6. Such site testing is necessary to refine preliminary infiltration rate estimates based on soil size distribution or textural analysis. For sites on soils not consolidated by glacial advance, initial saturated hydraulic conductivity may also be estimated based on soil grain-size distributions from test pits or test hole samples as described in Section 3.3.6."	Requiring the PIT test will add cost to new development and redevelopment activity both because of the length of time necessary to conduct the test (approximately 17 hours) and the manpower to deliver water if it is not available to the 100 square foot hole over that period of time. Will the results from a satisfactory PIT test yield a basis to assess lateral breakout of the infiltrated water onto downstream or down gradient properties? In addition, the blanket requirement to perform PIT tests in consolidated soils does not take the local conditions into account, nor has access been taken into consideration. Consolidated gravelly sandy soils can often have relatively high infiltration rates, making PIT tests difficult to administer. The language needs to provide the project soils professional with the ability to provide some level of guidance as to when these tests are required. Provisions need to be made for instances where it is simply not possible to bring in the required equipment (i.e., water truck, etc.). Linear road projects would not typically have appropriate locations to perform such tests, and it could be very difficult for public agencies to gain access to private property for such a test. This is especially true in the early stages of the projects, when the infiltration rate determination will be used to site the facilities. Roadways are the largest contributors of pollution-generating impervious surfaces, and while treatment through LID should be required where feasible, rigid implementation standards do not provide better information.	"Infiltration Rate Determination: Determine the design infiltration by first estimating the initial saturated hydraulic conductivity using field tests and/or grain-size distribution/texture (see next section), as determined by the project soils professional. Determine initial saturated hydraulic conductivity using the Pilot Infiltration Test (PIT) described in Section 3.3.6, if needed. Such site testing is may be necessary to refine preliminary infiltration rate estimates based on soil size distribution or and textural analysis. For sites on soils not consolidated by glacial advance, initial saturated hydraulic conductivity may also be estimated based on soil grain-size distributions from test pits or test hole samples as described in Section 3.3.6."
Stormwater	Vol. III; 3.3.5 –	[Textural Triangle U.S.D.A to be DELETED]	Why is Ecology deleting the U.S.D.A. soils Textural Triangle	[RETAIN TEXTURAL TRIANGLE U.S.D.A.]

Manual Nov. 2011 Draft	Textural Triangle U.S.D.A; pg. 3-77		for the homeowners? Homeowners could easily see that if their drainfield designer called their site an Alderwood Sandy Loam that they would be able to infiltrate a portion of their roof runoff into the soil without doing a lot of further testing or monitoring on their 5 acre site. They would use the 10 foot infiltration trench for a 700 square foot roof or 40 lineal foot for a 2800 square foot home. The Rain Garden Manual cited by Ecology uses photographs to describe how a textural analysis is to be done by the homeowner to see if clays are present on-site. This is not likely to be helpful to the homeowner.	
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.6; pg. 3-82	"Large-scale in-situ infiltration measurements, using the Pilot Infiltration Test (PIT) described below is the preferred method for estimating the short-term saturated hydraulic conductivity of the soil profile beneath the proposed infiltration facility."	What other acceptable methods are available? The PIT test is preferred over what other methods? By whom is the PIT test preferred?	[PROVIDE ADDITIONAL INFORMATION]
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.6; pg. 3-83 – 3-84; General Comment	Infiltration Test	General Comment: This is entirely new language in this Draft Manual and may be more appropriately labeled "Large-scale Infiltration Test" since the magnitude of the test and the cost would both be considerable. Over 20 cubic yards of material (two dump truck loads) must be excavated just to perform the test. 400 cubic feet of water is necessary to start the test (almost 3000 gallons of water or the equivalent to 3 septic tanks filled with water) and must be hauled to the site in some fashion to initiate the test. It appears that a water truck or connection to water may be necessary just to properly perform the test. What is the value added by this test if a correction factor is to be applied after the test is run anyway? Is there a simpler way to arrive at the same results from a simpler test?	[PROVIDE ADDITIONAL OPTIONS]
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.6; pg. 3-84	"Small-Scale Pilot Infiltration Test A smaller-scale PIT can be substituted for the large-scale PIT in any of the following instances. • The drainage area to the infiltration site is less than 1 acre. • The testing is for the small-scale LID BMP's of bioretention or permeable pavement. • The site has a high infiltration rate, making a full-scale PIT difficult, and the site geotechnical investigation suggests uniform subsurface characteristics. "	Do you mean that the newly developed drainage area to the infiltration site is less than 1 acre?	[PLEASE CLARIFY]

Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.6; pg. 3-86	"Massmann (2003) indicates that where the water table is deep, soil or rock strata up to 100 feet below an infiltration facility can influence the rate of infiltration. Note that only the layers near and above the water table or low permeability zone (e.g., a clay, dense glacial till, or rock layer) need to be considered, as the layers below the ground water table or low permeability zone do not significantly influence the rate of infiltration."	If that is the case, then why cite Massman as the authority for such influence at depth? Just because he came up with this log equation for soil grain size analysis? Because a full-scale infiltration facility is not a small-scale infiltration facility? Or is this tied to the type of PIT test that is to be done?	[PLEASE CLARIFY AUTHORITY CITATION]
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.6; pg. 3-87	Equation (2)	The graphical overprint in this draft Manual makes the equation difficult to read. In the prior King County and Ecology manuals a complex formula would be followed by a worked example.	[CORRECT FORMATTING] [PROVIDE WORKED EXAMPLES OF EQUATIONS (1) – (7) IN THIS VOLUME OF THE MANUAL]
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.6; pg. 3-87	"1. Correction Factors for PIT results The SHC rate obtained from the PIT test is a short-term rate. This short-term rate must be reduced through correction factors that are appropriate for the design situation."	How are plan examiners at the various jurisdictions supposed to be knowledgeable about which correction factors are appropriate for the various design situations? These individuals typically are not trained as ground water modelers or hydrogeologists. How will they assess the uncertainty of a test method during plan review?	
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.6; pg. 3-89	"Degree of influent control to prevent siltation and bio-buildup . . . The maintenance schedule calls for removing sediment when the facility is infiltrating at only 90% of its design capacity."	This requirement will be very difficult to administer and enforce since the time frame for maintenance is ill-defined and a maintenance crew is not standing by waiting for this 90% sediment loading figure to be attained. It is not defined like the system shall function for a two year maintenance period prior to release of a financial obligation like a bond. In some cases this could be weeks or months and in other cases it may not need maintenance at all since the system may not plug. This will be particularly problematic for privately owned systems that do not have a regular maintenance crew available.	
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.8 Detailed Design 10 – Groundwater Mounding Analysis; pg. 3-102 – 3-103	"Groundwater Mounding Analysis: On residential subdivision projects larger than short plats, or commercial projects larger than 1 acre, served by a single infiltration facility, the final design infiltration rate shall be determined using an analytical groundwater model to investigate the effects of the local hydrologic conditions on facility performance. These larger projects can use the design infiltration rate determined above as input to an approved continuous runoff model (WWHM, MGS Flood, KCRTS) to do an initial sizing. Then the groundwater modeling (mounding analysis) of the proposed infiltration facility shall be done."	Groundwater mounding analysis should only be required when the project soils professional deems it necessary. This should not be based on size of project, or on a set rate or depth to restrictive layer.	"Groundwater Mounding Analysis: On residential subdivision projects larger than short plats, or commercial projects larger than 1 acre, served by a single infiltration facility, the final design infiltration rate shall be determined using an analytical groundwater model to investigate the effects of the local hydrologic conditions on facility performance. These larger projects can use the design infiltration rate determined above as input to an approved continuous runoff model (WWHM, MGS Flood, KCRTS) to do an initial sizing. Then the groundwater modeling (mounding analysis) of the proposed infiltration facility shall be done, as directed by the project soils professional."

Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.9; pgs. 3-103 – 3-107		Appendix I, Section 4.2(13), pg. 22 and Volume III, Element #13, pg. 2-30 provide a list of steps to take to protect Low Impact Development BMPs. The protections that are listed in that requirement are just as important for "conventional" infiltration facilities as for those LID BMPs.	[ADD SIMILAR PROTECTION TO REQUIREMENTS FOR INFILTRATION BMPS AT VOLUME III, SECTION 3.3.9]
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.3.11, Figure 3.31 – Oversized Pipe Trench Design; pg. 3-110		The trench design shown is not a standard used in Snohomish County. Drilled asphalt-coated CMP is a concern from a water quality perspective because it would introduce petroleum products directly into an infiltration system or large infiltration gallery. It also may lack the vertical separation that is necessary over much of Snohomish County's high water tables.	
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.4.2; pg. 3-115	"Projects subject only to Minimum Requirements #1 - #5 should use rain gardens wherever feasible. Simple procedures to test for high ground water and infiltration rate are provided in the 'Rain Garden Handbook for Western Washington Homeowners.'"	The referenced Rain Garden Handbook for Western Washington Homeowners, under the soil drainage test, guides the individual homeowner to dig a hole and see if water seeps in the hole. It further indicates that soil drainage testing is best performed during the winter months. This simply ignores soil science and the procedure to determine maximum seasonal high water table by observing soil mottling, saturation, root depth, surrounding vegetation, soil structure, etc. For example, the fall of 2011 had a long period of low rainfall and use of the test described in the Handbook would result in a good chance of a failed system and discharge of collected stormwater in a concentrated manner. Perched water tables fluctuate based on soil type, slope of impermeable layer, rainfall intensity and duration, and area of drainage basin. Digging a hole randomly during the winter yields extremely limited information on groundwater elevations.	[DELETE REFERENCE TO THE RAIN GARDEN HANDBOOK FOR WESTERN WASHINGTON HOMEWOWNERS]
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.4.2 – Bioretention and Permeable Pavement; pgs. 3-115 – 3-117		Site-specific soil testing is not worth the effort if the design infiltration rates of several locations are pooled together and averaged during the design of the facility. The different tests are done to identify site-specific variations.	[DELETE THE FOLLOWING:] "When multiple bioretention facilities with similar designs (i.e., soil depth, ponding depth, freeboard height) will be located on a project site, the drainage areas and the facility sizes may be summed and represented in the runoff model as one drainage area and one bioretention device. In this case, a weighted average of the design infiltration rates at each location may be used. The averages are weighted by the size of their drainage areas. Each design infiltration rate is the measured infiltration rate multiplied by the appropriate correction factors. For these native soils below bioretention soils, the variability correction factor, CF_v, and the test correction factor, CF_t, come into play."

Stormwater Manual Nov. 2011 Draft	Vol. III; 3.4.2; pg. 3-116	"Permeable Pavement: … Unless seasonal high groundwater elevations across the site have already been determined, upon conclusion of the testing, infiltration sites can be overexcavated 3 feet to see any restrictive layers or groundwater. Observations through a wet season can identify a seasonal groundwater restriction."	Simply overexcavating a hole 3 feet deep to observe whether there is any groundwater is not a method that is going to produce results to assure a successful design. Scientific examination of the soil profile any time of year in most cases will result in a predictable estimation of the maximum seasonal high water table. Monitoring during the winter is always an option when there is a question of whether the design can maintain minimum vertical separations.	
Stormwater Manual Nov. 2011 Draft	Vol. III; 3.4.2; pg. 3-117	**"NOTE to Reviewers:** There has been a suggestion that the designer needs to take a broad view of the site in regard to where volumes of water, infiltrated by bioretention/rain garden facilities and porous pavements, will travel. Some type of guidance in regard to assessing the potential for excessive shallow interflow emerging at slopes, development cuts, or in basements seems advisable. Also, the potential for water piling up above a shallow water table should be evaluated. Should this guidance appear as part of Site Planning and Layout? What would it include other than the generalized cautions noted above?"	The designer does need to assess where the infiltrated runoff that is modeled will actually go. Will it pop out in the adjoining ditch if it hits a compacted layer or will it be fully dispersed or will it pop up as a water table problem in the basements that are constructed adjoining the roadway? On LID projects having to comply with MR #1 - #9, a hydrogeologist report should be required to assess the groundwater impacts on down slope properties and structures. The results of pre vs. post groundwater hydrology should be evaluated. LID will result in groundwater impacts and the adjoining property owners should be considered. Also, it is a good idea to require the engineering professional that prepared the plans certify on the as built drawings that all LID features have been constructed in accordance with the approved plans. Excessive shallow interflow issues will not be a problem if LID measures are simply recognized and treated as infiltration facilities.	
Stormwater Manual Nov. 2011 Draft	Vol. III; Appendix III-B; pg. B-2	Precipitation Data Chart	The precipitation data on which the model is based was from an earlier permit cycle. In most cases, is appears the information is from 1996-1993. Why hasn't the precipitation gage data been updated for the next permit cycle to expand on the existing data set? For example, the 5 worst or highest floods on the Pilchuck River in gage height have occurred in the last 15 years. We also see increased flood event trends in the Stillaguamish Watershed over the last 15 years. This tells us either that precipitation and climate change is affecting river and flood conditions or that it reflects on the activities of the forest industry, which much of the NPDES permit does not address, as the primary influence in increased runoff in these large watershed. It would be beneficial if this data set is updated and incorporated in the permit prior to the next permit cycle.	[PROVIDE UPDATED DATA]
Stormwater	Vol. III; Appendix III-C;		The intent of modeling base material above surrounding grade differently from base material laid partially or completely	

Manual Nov. 2011 Draft	7.1.1 Permeable Pavements Modeling Approach; pg. C-2 – C-3		below surrounding grade is to account for site-specific soil types. When base material is above surrounding grade, it could have a significant impact on the adjacent surfaces if the underlying soils don't support infiltration. Where actual "grass" is installed on soils that don't infiltrate, any problem surface runoff will be obvious. By allowing the runoff into the gravel gallery, it could be harder to identify the sources if problems were to occur.	
Stormwater Manual Nov. 2011 Draft	Vol. III; Appendix III-C; 7.1.2 Design Criteria for Permeable Pavements; pg. C-5		Please provide a list of soils that will settle if the applicant tries to build a porous road over the top of it. The bridging necessary for the base course if saturated needs to be understood by the designer and the review staff.	[PROVIDE LIST]
Stormwater Manual Nov. 2011 Draft	Vol. III; Appendix III-C; 7.2.1 and 7.2.2; pg. C-7	"7.2.1 Full Dispersion for the Entire Development Site (fulfills treatment and flow control requirements)" "7.2.2 Full Dispersion for All or Part of the Development Site"	Is there a difference between "entire" and "all"?	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. III; Appendix III-C; 7.2.4 – Road Projects; pgs. C-9 – C-11		There should be some reference to BMP T5.30, Full Dispersion, within this section. Also, it seems that the two sections each have their own focus, without a lot of overlap. Ecology should consider consolidating this information.	
Stormwater Manual Nov. 2011 Draft	Vol. IV; Chapter 1; 1.6.1; pg. 1-4	"Regulatory programs such as the State Environmental Policy Act (SEPA), water quality certification under Section 401 of the Clean Water Act, and Hydraulic Project Approvals (HPAs) may require use of the BMPs described in this volume.'	This seems to add further discretionary authority to regulators on when BMPs may be required, although it is placed in the Mandatory BMP section. Typically, SEPA and HPAs have relied on drainage plan review and drainage plans in the past to incorporate required BMPs.	[RECOMMEND MOVING THIS LANGUAGE TO THE "RECOMMENDED BMPS" SECTION]
Stormwater Manual Nov. 2011 Draft	Vol. IV; Chapter 2; pg. 2-2	"The following operational source control BMPs must be implemented at the commercial and industrial establishments listed in Appendix IV-A, where required by Ecology's Industrial Stormwater General Permit, or by local government ordinances. … Sweep all surfaces with vacuum sweepers quarterly, or more frequently as needed for the collection and disposal of dust and debris that could contaminate stormwater."	The requirement for quarterly or more frequent sweeping appears to be a new requirement. How is this to be documented if it is a requirement? How are graveled, commercial surfaces expected to be maintained? In that instance, sweeping would likely just stir up the dust on those types of surfaces.	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011	Vol. IV; Chapter 2; pg. 2-5	"The following is a recommended additional BMP: … Spill kits shall be located with [sic] 25 feet of all fueling/fuel	This horizontal distance may be a problem at some sites.	

Draft		transfer areas, including on-board mobile fuel trucks."		
Stormwater Manual Nov. 2011 Draft	Vol. IV; Chapter 2; pg. 2-12	"NPDES Permit Requirement: Solid Waste Regulations prohibit discharge of leachate from a compost facility. Zero discharge is possible by containing all leachate from the facility (in tanks or ponds) or preventing production of leachate (by composting under a roof or in an enclosed building."	Is this a new requirement to enclose or require compost stockpiles to be under a covered structure? It would increase the cost to commercial composting operations to retrofit their commercial operations to comply with this new requirement.	
Stormwater Manual Nov. 2011 Draft	Vol. V; 1.4.3; pg. 1-4	"**Bioinfiltration**. Bioinfiltration refers to the use of imported soils as a treatment medium. As in infiltration, the pollutant removal mechanisms include filtration, adsorption, and biological decomposition. Bioinfiltration facilities can be built within earthen swales or placed within vaults. Water that has passed through the treatment media may be discharged to the ground or collected and discharged to surface water."	This is a relatively new method as described. We have concerns tied to the placement of imported soil within a vault.	
Stormwater Manual Nov. 2011 Draft	Vol. V; 2.1 – Step 1; pg. 2-2	"Water Clean-up Plans: These plans are written to establish a receiving water or basin, and to identify actions necessary to remain below that maximum loading."	This sentence does not make sense with the removal of the phrase "Total Maximum Daily Load (TMDL) or a pollutant". In addition, the clean-up plans are not written for the purpose of establishing a receiving water or basin, as stated. Finally, the use of "receiving water" in this context does not make sense since "basin" and "receiving water" are being used interchangeably.	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. V; 3.4; pgs. 3-6 – 3-7	"The Enhanced Menu facility choices are intended to provide a higher rate of removal of dissolved metals than Basic Treatment facilities. Based on a review of dissolved metals removal of basic treatment options, a "higher rate of removal" is currently defined as greater than 30% dissolved copper removal, and greater than 60% dissolved zinc removal. In addition, the menu choices are intended to achieve the Basic Treatment performance goal."	How are applicants expected to prove compliance with the higher rate of removal figures for copper and zinc after construction is completed? Is on-going monitoring of dissolved metals expected of the development? If so, this is a new cost to the applicant.	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. V; 4.3; pg. 4-5	"Setback requirements are generally required by local regulations, uniform building code requirements, or other state regulations."	Use of "international building code" not "uniform building code" is appropriate.	"Setback requirements are generally required by local regulations, International Building Code requirements, or other state regulations."
Stormwater Manual Nov. 2011 Draft	Vol. V; Chapter 4.6; pg. 4-30		Insert the recommended language after the existing text in Chapter 4.6. The standards for the required maximum time interval between inspection and maintenance should be set forth in this Chapter, and deleted from Special Condition S5.C.9.a.ii of the draft Permit. See Snohomish County comment on that Permit section. Snohomish County also recommends replacing the standards with those approved by	"Maintenance actions shall be performed within the time intervals set forth below. A) If an inspection shows that the hydraulic function of a drainage facility is significantly impaired, the owner or operator shall perform maintenance actions to restore proper hydraulic function within thirty days of receiving the

			Ecology in the 2010 Snohomish County Drainage Manual.	inspection results. B) In addition to the requirements of paragraph A, if an inspection of a catch basin identifies one or more conditions listed in this chapter for which maintenance is needed, and for which the necessary maintenance actions are estimated to cost less than $25,000, the owner or operator will perform the maintenance actions within six months of receiving the inspection results. This time period may be extended by the local government or permitting agency to prevent flooding, habitat degradation, or pollutant contamination of downstream property or stream corridors that could occur from maintenance performed within this time interval. C) In addition to the requirements of paragraph A, if an inspection of a drainage facility other than a catch basin identifies one or more conditions for any component listed in this chapter for which maintenance is needed, and for which the necessary maintenance actions are estimated to cost less than $25,000, the owner or operator will perform the maintenance actions within one year of receiving the inspection results. With the exception of work described in paragraph A, maintenance actions may not be allowed the period from October 1 to April 30 in order to ensure that downstream property and stream corridors will not be subject to flooding, habitat degradation, or pollutant contamination. D) In addition to the requirements of paragraph A, if an inspection of a drainage facility other than a catch basin identifies one or more conditions for any component listed in this chapter for which maintenance is needed, and for which the necessary maintenance actions are estimated to cost $25,000 or more, the owner or operator will perform the maintenance actions within two years of receiving the inspection results. With the exception of work described in paragraph A, maintenance actions may not be allowed the period from October 1 to April 30 in order to ensure that downstream property and stream corridors will not be subject to flooding, habitat degradation, or pollutant contamination.”
Stormwater Manual Nov. 2011 Draft	Vol. V; Chapter 5; General Comment		Ecology should apply the feasibility and design criteria for “conventional” infiltration systems to all infiltration systems, including “on-site” infiltration/dispersion systems and “low impact development” infiltration systems, that receive stormwater from pollution-generating surfaces. In discussions	

			with Ecology pursuant to the development of the 2010 Snohomish County Drainage Manual, Ecology agreed that these criteria were as follows: • The cation exchange capacity of the native soil is a minimum of 5 milliequivalents / 100 grams dry soil, as measured by USEPA Method 9081, Cation Exchange Capacity of Soils (Sodium Acetate). • The organic content of the native soil is 1 per cent or greater, as measured by ASTM D2974 – 07 - Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils These criteria are supplemental to other criteria that may apply to any specific type of infiltration system. Ecology established these criteria for "conventional" infiltration systems to ensure that stormwater discharges would not pollute groundwater. Snohomish County, with concurrence from Ecology, extended these criteria in its 2010 Drainage Manual to the "on-site" infiltration/dispersion systems required by Minimum Requirement 5, and to bioretention systems designed for infiltration. By making it clear that such criteria apply to all infiltration systems regardless of their categorization, Ecology will provide protection to groundwater, and will provide assurance to NPDES permittees and the development community that they can presume infiltration facilities built or regulated by them provide such protection.	
Stormwater Manual Nov. 2011 Draft	Vol. V; 5.3.2; pg. 5-2	"Full dispersion credit is limited to sites (or sub-areas of sites) with a maximum of 10% effective impervious area that is dispersed through 65% of the site maintained in natural vegetation."	We assume that one could not clear their site, fall under code enforcement for the clearing, and still be able to come back and try to use full dispersion if the natural vegetation has already been removed and the ground compacted by clearing operations. Applicants have been trying to use full dispersion in concert with re-planting or re-vegetating the sites with trees to make up the 65%	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T5.14 – Rain Gardens; pg. 5-17	"Reader could be directed to the latest edition of the "Rain Garden Handbook for Western Washington Homeowners," published by the Pierce County Extension Office of Washington State University."	Sending an applicant or engineer to another manual is difficult at best. Those referenced LID BMPs should be described in this Manual with the expectations for the same properly disclosed.	[DELETE REFERENCES TO THE RAIN GARDEN HANDBOOK FOR WESTERN WASHINGTON HOMEOWNERS]
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T5.30 – Full Dispersion; pg. 5-18	"The preserved area may be a previously cleared area that has been replanted in accordance with native vegetation landscape specifications described within this BMP."	The compaction and removal of vegetation and trees in these cleared areas makes it difficult to achieve full dispersion, especially if the clearing is recent and the native vegetation or landscaping has not yet been replanted on the site. In these	

			instances, marking the clearing limits was typically not done.	
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T5.30; pg. 5-21 – 5-22	[Section on Roadway Dispersion BMPs]	There should be some reference to Vol. III, Appendix III-C, Section 7.2.4 – Roadway Dispersion, within this section. Also, it seems that the two sections each have their own focus, without a lot of overlap. Ecology should consider consolidating this information.	[MODIFY AS INDICATED]
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T5.30; pg. 5-22	[Section on Cleared Area Dispersion BMPs]	There should be an upper limit to the percent slope that can accept dispersed runoff.	[MODIFY AS INDICATED]
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T5.30; pg. 5-22	"This section to be completed in the final to identify critical soil, vegetation, topographic, and runoff characteristics that are typical in a native landscape. The purpose is to allow a re-claimed site to serve as the 'preserved area' in a full dispersion proposal."	The proposed characteristics of a reclaimed site that serves as the "preserved area" need to include clear, measurable, reasonable requirements. Interim measures should be included until plant establishment has been confirmed.	
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T7.30; pg. 7-9	[Site Suitability Section]	Terminology about depth to hydraulic restriction layer should be consistent with the rest of the manual, and 'BSM' should be defined. Also, information about utility conflicts, setbacks, and transportation safety seem irregular and out of place. While not necessarily incorrect, there are no such requirements for other BMPs – why would Ecology choose to make recommendations such as these for this BMP alone?	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T7.30; pg. 7-11	"Flows should be less than 1.0 ft/second to minimize erosion potential."	Change as noted.	"Flow velocity should be less than 1.0 ft/second to minimize erosion potential."
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T7.30 – Bioretention Cells, Swales, and Planter Boxes; pg. 7-12	"The following are methods recommended for areas where heavy trash and coarse particulates are anticipated: □ Curb cut width <need recommendation on this>"	In many instances, it is not appropriate to cut the curb due to the sidewalk placement in the design that is adjacent to the curb. At parking stalls encourage the use of precast raised parking stops made of concrete or recycled tires that have openings in the base to pass water in lieu of a full curb application. That way, drainage can then flow to bioretention swales in the planter strips. If curbs must be cut for drainage purposes, they should have at least a 6 inch minimum opening to pass trash from the gutter section.	[MODIFY AS INDICATED]
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T7.30; 7-13 – 7-15	[Default Bioretention Soil Mix Section]	Compost requirements and specifications must match a material that is commercially available.	
Stormwater	Vol. V; BMP T7.30; pg. 7-15	[Design Criteria for Custom Bioretention Soil Mixes Section]	The terms "high enough" and "not too high" are vague and	[PLEASE CLARIFY]

Manual Nov. 2011 Draft			must be clarified.	
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T7.30; pg. 7-16	"Under-drain systems should only be installed when the bioretention facility is: … Used for filtering storm flows from gas stations or other pollutant hotspots (requires impermeable liner)."	Gas stations have specific pollutant removal requirements and it seems odd to include reference in this section.	
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T7.30; pg. 7-16	"Under-drain systems should only be installed when the bioretention facility is: … In soils with infiltration rates that are not adequate to meet maximum pool and system dewater rates, or are below a minimum rate allowed by the local government."	Text regarding "maximum pool and system dewater rates" is not consistent with the rest of the manual.	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T7.30; pg. 7-16	"Under-drain systems should only be installed when the bioretention facility is: … In an area that does not provide the minimum depth to high seasonal groundwater."	This phrase is not consistent with the intent of other design criteria.	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T7.30; pg. 7-16 and 7-17	"This configuration allows for pressurized water cleaning and root cutting if necessary (personal communication, Tracy Tackett, 2004)." "Perforated PVC or flexible slotted HDPE pipe cannot be cleaned with pressurized water or root cutting equipment, are less durable, and are not recommended."	These sentences should be rewritten for clarity.	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T7.30; pg. 7-19 – 7-20	"In bioretention areas where higher flow velocities are anticipated an aggregate mulch may be used to dissipate flow energy and protect underlying BSM. Aggregate mulch varies in size and type, but 1 to 1 ½ inch gravel (rounded) decorative rock is typical."	Aggregate mulch is not appropriate. Energy flow dissipation is addressed previously with flow entrance features.	
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T7.30; pgs. 7-20 – 7-21	[Temporary Erosion and Sediment Control (TESC) Section]	TESC measures should be housed exclusively in Vol. II of the Manual.	[MODIFY AS INDICATED]
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T7.30; pgs. 7-21 – 7-22	[Verification Section]	Verification was included in the discussion of soil mixes	
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T7.30 – Bioretention Cells, Swales, and	"If testing infiltration rates is necessary for post-construction verification use Pilot Infiltration Test method."	Is this verification a requirement or not? If not, why would someone do this test again?	[PLEASE CLARIFY]

	Planter Boxes; pg. 7-22			
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T7.30; pg. 7-23 – 7-24	[Determining Subgrade Infiltration Rates Section]	Determination of subgrade infiltration rates should be housed exclusively in Vol. III	[MODIFY AS INDICATED]
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T7.40; pg. 7-26 – 7-29	Compost –amended Vegetated Filter Strips (CAVFS)	This does not appear to be written for practical application. Snohomish County suggests referencing HRM for format and substance.	[MODIFY AS INDICATED]
Stormwater Manual Nov. 2011 Draft	Vol. V; Chapter 8 – Filtration Treatment Facilities		General Comment: Few sand treatment facilities have been installed within Snohomish County for stormwater treatment. Most of the concerns have centered around maintenance frequency and clogging of the sand bed, as well as not having clear specifications on sand filter depth, underdrain collector sizing, and depth of choker course or gravel trenches within the sand bed itself.	
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T8.40 – Media Filter Drain; pg. 8-36	***"Signing*** Nonreflective guideposts will delineate the media filter drain. This practice allows WSDOT personnel to identify where the system is installed and to make appropriate repairs should damage occur to the system."	Separate signing for the elements of a treatment system should not be required. If damage occurs to any part of the system applicants or the County should obtain the record copy of the as-builts to reconstruct said facility, if necessary. Additional sign posts in the right of way are always considered a potential traffic hazard unless they are required by MUTCD.	[DELETE REQUIREMENT]
Stormwater Manual Nov. 2011 Draft	Vol. V; Table 9.1 and Figure 9.3; pgs. 9-4 – 9-5		Table 9.1 says that the maximum longitudinal slope of contributing area is 5%. Figure 9.3 says longitudinal slopes can range from 1% to 6%. This appears to be a conflict in the Draft Manual.	[PLEASE CLARIFY]
Stormwater Manual Nov. 2011 Draft	Vol. V; BMP T9.50 – Narrow Area Filter Strip; pgs. 9-27 – 9-28		Ecology's removal of this BMP from the manual is unfortunate. Although this BMP did not seem to get a whole lot of use, it served as a valuable option sometimes.	[RETAIN BMP]
Stormwater Manual Nov. 2011 Draft	Vol. V; Figures 10.1a, 10.1b, 10.6, 10.7; pgs. 10-2, 10-3, 10-19, and 10-28		The symbol for feet or inches is not easily discerned in these details (use of a non-standard symbol in the details).	[PLEASE CLARIFY FIGURES]
Stormwater Manual Nov. 2011	Vol. V; Chapter 12	General Comment	Reference should be provided for an online list of newly approved "Emerging Technologies".	[PROVIDE REFERENCD

Draft				