Part V: Response to Comments on Appendix 1 & Low Impact Development for Phase I and Western Washington Phase II Permits

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V-1 Use of references to other documents in the NPDES permit

Commenters: King County, Kitsap County, City of Oak Harbor, Port of Seattle, Snohomish County

Summary of the range of comments

- Referenced documents should be guidance, not mandatory requirements. e.g., LID Technical Guidance Manual. Anything Ecology wants to be mandatory needs to be in permit or SW Manual.
- Need a standard spec for driveways, e.g., minimum thickness of gravel and pavement.
- Referencing Rain Garden Handbook is a mistake. Homeowners frequently incapable of properly locating and constructing rain gardens. Referencing a document by a third party is neither necessary nor appropriate. Develop specifications and require engineering and specify them directly in the permit or its appendices. It is not clear that the County can accept a rain garden design that is not prepared and stamped by a professional engineer.
- The 2012 SWMMWW must include the details of the minimum LID requirements and refer to the LID Manual only for supporting information or methods beyond the minimum requirements.

- When referencing the Rain Garden Handbook, add the words "or equivalent" because the handbook has errors in it, does not reflect local jurisdiction requirements for proper setbacks, and the art is of poor design quality for printing and is proprietary artwork that can't be modified.

Response to the range of comments

- Generally, Ecology agrees. Ecology believes it is appropriate to require new and redevelopment to use LID BMPs. Ecology also believes it is appropriate to include design details for some of those BMPs that serve just a stormwater drainage or treatment function. However, Ecology does not think it is helpful to put the details of some LID techniques that serve multiple purposes in the stormwater manual. The biggest example of this is permeable pavements. Ecology can identify some basic criteria and computer modeling techniques, but detailed specifications for how to build a road are not within Ecology's technical expertise. The *LID Technical Guidance Manual for the Puget Sound Basin* can be used by local governments to help develop specifications and standard drawings that they are comfortable with. Ecology does not wish to constrain the local governments' discretion about design details by incorporating a specific design into the manual. This is also the approach in regard to vegetated roofs, rain water harvesting systems, and minimal excavation foundations.
- Ecology does not agree in regard to whether the county can accept a rain garden not designed by an engineer. The county already accepts other types of downspout dispersion and infiltration systems not designed by engineers. Sites that use rain gardens are not being required to demonstrate any particular performance of those systems. If installed with a reasonable amount of care, using the procedures in the referenced handbook, Ecology expects most of them will function well enough to move some water into the ground. Ecology will consider adding a statement in the site planning section of the stormwater manual (Volume I, Chapter 3) that encourages use of a landscaping professional with rain garden design experience.
- The concept of "or equivalent" is already spelled out in the permit. It would be cumbersome to put "or equivalent" after every LID technique referenced in the minimum requirements. Local governments can adopt their own rain garden requirements or supplement the latest Rain Garden Handbook with additional requirements, as long as they are not unnecessarily restricting their use or establishing a requirement that is not roughly equivalent from a pollution control aspect. An example of the latter would be a requirement that allows infiltration of runoff from PGIS through a rain garden that only contains highly permeable soils that do not meet the minimum soil quality criteria.

V-2 Allowance for use of alternative manuals

Commenters: Green Light Gardening, City of Longview, Son-King Watershed Council

Summary of the range of comments

- Add permit language like: "In lieu of applying Appendix I requirements to sites disturbing an acre or more (or less if part of a larger common plan of development or sale), permittees may retain or implement a set of stormwater mitigation requirements tailored to local circumstances. Such local requirements shall provide comparable protection to receiving waters and be approved by Ecology on a case-by-case basis."
- Require all municipalities to adopt the Ecology Manual to ensure consistency and reduce costs.

Response to the range of comments

- Appendix 1 applies to more sites than those disturbing 1 acre. The 1 acre threshold in the previous Phase II permit has been eliminated. The suggested wording is already within the NPDES permit. However, the permit also says that local governments not using the BMPs from the manual must be prepared to demonstrate how their local requirements are equivalent. A requirement that would exempt more projects from LID requirements without a scientific basis would probably not be considered equivalent.
- The requirements of the permit have had and will continue to improve consistency across regulated municipalities. Due to the wide range of existing conditions and local government expertise, Ecology retains the allowance for local governments to adopt requirements that provide equivalent runoff controls for new and redevelopment.

V-3 Stormwater code update

Commenters: Clark County Clean Water Commission, Lider Engineering, City of Marysville, City of Tacoma

Summary of the range of comments

- Include language in the Permit that would allow a permittee to cite Volume I, Chapter 2 of the 2012 SWMMWW to meet the minimum performance measure in S.5.C.4.a.i.
- We recently updated the stormwater manual and now it is supposed to be obsolete as this new manual is required.
- Add language to clarify that this update of the Permittee's "enforceable requirements, technical standards and manual" is specifically related to Ecology's manual and is independent from the requirement to update "rules, standards, or other enforceable documents" for LID (p. 20, lines 37-38).

- Municipal design standards need revision to require LID use in the public-right-of-way unless infeasible. This includes standard details for LID.

Response to the range of comments

- Ecology purposefully refers to adoption of statements in Appendix 1 rather than Volume 1, Chapter 2 because there are statements in Appendix 1 that are not included in Chapter 2. Local governments can cite adoption of Chapter 2, Volume 1 to partially meet the requirements of this special condition of the permit. But, they will have to adopt additional statements. In particular, refer to 1) the "General Requirements" statements in Minimum Requirement #2, prior to the listing of Construction Elements; 2) the addition of "treatment-type thresholds" in Minimum Requirement #6.
- Most of the requirements for runoff controls for new development in the existing permit and Appendix 1 remain unchanged. Most of the manual remains unchanged from the 2005 version. There are some significant changes that reflect the intent of legal rulings on the previous permits. There are other changes that Ecology made to improve the manual. Stormwater management is an evolving field. As research and experience provide better tools to control pollutants and better ways to achieve the goals of protecting beneficial uses, state and federal laws require that they are used.
- Ecology believes the text clearly distinguishes this requirement from the requirement to update other local codes to incorporate LID principles.
- Agreed. That is part of the reason behind the permit requirement that calls for updating development codes to incorporate LID BMPs and LID principles.

V-4 Development code updates (other than stormwater code)

Commenters: Association of Washington Cities, City of Bainbridge Island, Norman Baker, City of Battle Ground, City of Bellevue, BIAW, Clark County, City of Clyde Hill, EarthJustice, City of Issaquah, City of Kelso, King County, League of Women Voters of Seattle/King County, League of Women Voters Bellingham/Whatcom County, Lider Engineering, City of Mt. Vernon, Muckleshoot Indian Tribe, City of Mukilteo, Northwest Indian Fisheries Commission, People for Puget Sound, People for Puget Sound Group Letter, City of Port Angeles, City of Port Orchard, Puget Soundkeeper Alliance, Puget Sound Partnership, The Precautionary Group, City of Redmond, Regional Road Maintenance Forum, City of Renton, City of Sammamish, City of SeaTac, Sierra Club Email Campaign, Skagit County, Snohomish County, Stewardship Partners & the 12,000 Rain Gardens campaign, Val Stewart, Sustainable Development Task Force of Snohomish County, City of Tacoma, Washington Public Ports Association, Whatcom County

Summary of the range of comments

- We support requirements S5(C)5(b) which call for an update of local codes, particularly given recent improvement in the Puget Sound Partnership guidance manual on this subject.
- Pleased to see the new regulations, but concerned they don't go far enough. Without clear guidelines from the State, new codes from individual counties could be less than optimal.
- Ecology should provide guidance to municipalities relative to updating ordinances. Provide technical training to staff before requiring development code reviews and subsequent removal of obstacles to LID implementation.
- Mandatory incorporation of LID principles may exceed the constitutional limits of a jurisdiction's police powers in that it mandates a public benefit. There must be a nexus between the requirement and the impact of the proposed development. The requirement must be proportional to the impact being mitigated. RCW 82.02.020 restrains imposition of any tax, fee, or charge unless it is within one of the exceptions in the statute and that a condition to set aside land is reasonably necessary as a direct result of the development or to mitigate an impact of the development. The state should not pass to jurisdictions the liability with mandating these regulations without indemnification. State agencies are to use the process in RCW 36.70A.370(1) to assure that a regulatory action doesn't cause an unconstitutional taking of property.
- Specify the design goal(s) for the LID Principles so that they can be consistently implemented by all permittees.
- The requirement to incorporate LID into development codes is not sufficiently prescriptive. Should include native vegetation retention requirements and impervious surface limits.
- Change the language from "…LID as the preferred and commonly used approach to site development" to something clearer, for example, "Code revisions will implement LID development principles and require use of LID practices in all development situations unless technically infeasible." Rather than "…identify opportunities" for minimizing new impervious areas and vegetation loss, the code revisions should "…require use of all technically practicable means to minimize impervious surface and vegetation loss."
- We also strongly urge Ecology to consider an enforceable, accountable metric to build into these codes, for example, mandating a specific net decrease in impervious area, and increase in native vegetation, throughout the jurisdiction during the life of the permit term.
- Requirement to update development codes for LID opens a new area to litigation under CWA. This requirement has no defined endpoint, putting local governments at risk of many interpretations of compliance.
- Permit should require adoption and implementation of policies that retain native vegetation and soils. Needs more specific performance standards. Vagueness amounts to self-regulation by permittees.

- The permit language lacks detail in this area of code updates and the guidance is not prescriptive, which will lead to challenges in implementation.
- The Permit needs clear, achievable endpoints that provide regulatory certainty and allow proper planning and budgeting.
- The LID requirements are unnecessary. Removing barriers is already required under the existing permit. Stormwater already addressed in stormwater code. Delete.
- Change "identify opportunities to minimize impervious..,." to "seek to minimize impervious …"
- Code update requirement is equivalent to a land use management mandate through NPDES permit. NPDES permit is not appropriate tool for mandating land use requirements. Legislature has required land use planning through the Growth Management Act, where it is the purview of local governments. Local governments must balance 13 planning goals including protecting the environment and enhancing water quality. Add clarifying language to the permit indicating that updating of GMA and SMA planning documents is not mandated under this requirement.
- Permit should require development code updates "where feasible."
- For S5.C.5.b.ii, permittees should provide a status report on the code updates, and should list participating agencies rather than individual names.
- Delete the unnecessary and inappropriate reference to PSP document. If any minimum process is desired, state it. But no process should be specified as long as the desired result is achieved. Locals have administrative processes to follow concerning code and rule updates.
- Concerned about the potential for code-related requirements that would minimize impervious surfaces in all development situations and mandate LID principles and BMPs as the preferred approach to site development.
- Change to: "… the Permittees shall identify opportunities to minimize impervious surfaces, native vegetation loss, and stormwater runoff in all types of development situations that <u>are appropriate for local conditions and are consistent with the community vision set forth in the Permittees Comprehensive Plans</u>
- It is not clear if municipalities must submit drafts of their development code updates; and whether Ecology intends to review and approve them.
- Ecology should amend the Permit to allow for local policies to supersede required LID principles where local policies, adopted through appropriate public processes, are in conflict with those LID principles.
- The requirement to update local land development codes to incorporate LID principles should not apply in areas that already have more stringent requirements, such as the County's proposed codes concerning development in Lake Whatcom.

Response to the range of comments

- Ecology notes the supportive comments.

- Site development standards covering subjects other than stormwater are the purview of local governments. Ecology does not have expertise in the field, nor would it be appropriate for Ecology to publish broad development standards that would apply across a region of the State. Ecology expects that local governments will see the need to change their development standards in order to protect the aquatic resources. And that they will act to put forth a good faith effort to modify a substantial number of codes to incorporate LID principles. Ecology is willing to let those efforts occur and to view the results before judging the merits of the strategy and the changes.
- The State has provided a guidance document (*Integrating LID into Local Codes: A Guidebook for Local Governments)* that explains an administrative process for updating ordinances, the range of ordinances and standards to be reviewed, and a number of examples of updated ordinances. Additional training on this subject will be forthcoming as part of the development of a long range training plan for local governments and designers that was authorized in the last legislative session.
- The State considers the LID requirement to be reasonable and roughly proportional to the impacts caused by land development. On a cumulative basis, there is no question that there is a nexus between past and current stormwater and land development codes and the degradation of the aquatic natural resources of the state. Ecology does not consider the permit requirements to be an unconstitutional taking of property.
- Ecology has stated general design goals in the permit. Ecology declines to specify more specific design goals.
- Ecology considers it inappropriate to place specific native vegetation requirements and impervious surface limits into the permit. The appropriate scale for a consideration of those elements is on a cumulative watershed basis. The watershed planning requirement of the permits is intended to establish a method by which cumulative impacts can be predicted, and strategies, including native vegetation retention and limits on impervious surfaces, can be considered and recommended. Site-by-site requirements on native vegetation retention and impervious surface limits are most defensible from an aquatic natural resource protection perspective if developed within the context of a science-based strategy for the watershed.
- The required use of LID BMPs should be largely covered in the update of the stormwater code. Ecology did change the permit language to more directly describe expectations associated with the required use of LID Principles as reflected in the development codes. The permit reads: "The revisions shall be designed to minimize impervious surfaces, native vegetation loss, and stormwater runoff in all types of development situations."
- Rather than establishing an enforceable, accountable metric for the updated development codes, Ecology prefers to give the permittees direction on the range of issues that should be considered and a process within which to consider the changes. The example given in the comment is not a reasonable outcome in regard to development codes. Assuming that most undeveloped sites have no impervious surfaces and have significant tree cover, you cannot reduce impervious surfaces and improve native vegetation cover with new development.

- Ecology acknowledges that any new permit requirement opens the door to possible litigation under the CWA. Ecology further acknowledges that it has not identified a specific minimum level of performance for this permit condition. Mandating outcomes would require Ecology to identify specific land development rules and/or policies. As there are multiple variations in changes in land development practices that could comply with the permit, it is unwise to mandate a particular solution. Instead, Ecology has tried to identify a level of effort that is necessary in the process and scope of the review. And Ecology has tried to incorporate statements that indicate that significant changes are expected. Ecology believes this is an appropriate and sufficiently specific early step toward getting local governments to inject hydrologic and stormwater pollution control considerations into their codes.
- Ecology does not agree that the requirements are unnecessary. The requirements in the permit, including Appendix 1, for stormwater controls at new and redevelopment sites do not fully address the impacts on waters of the state and beneficial uses that are caused by land development.
- Ecology has changed the permit statement to be more similar to that recommended in the comment.
- It is appropriate for the NPDES permit to require the use of all known, available and reasonable methods to prevent and reduce pollution to the state's waters. Those methods include development standards that reduce urban stormwater amounts, flow rates, and pollutants. Current development practices change water quality and natural hydrology to the extent that the beneficial uses are severely compromised if not lost. Restricting stormwater management strategies to end-of-pipe methods has not and will not be successful.
- A feasibility criterion doesn't work as well for the requirement to update development codes as it does in regard to application of specific LID BMPs to a project site. The assessment of changing development codes will be a complicated process that will require municipalities to make hard choices. Applying a feasibility criterion to every potential decision concerning where and how to change development codes could be a very high bar of compliance. Ecology would prefer to take a broader cumulative view of the changes being adopted by a permittee in determining compliance.
- The submission of an interim or final status report does not seem to capture the intent of this requirement. The intent is for the permittee to summarize the changes that have been made as a result of the review and update process. The subject area organization required in the report is to facilitate a review against the goals of the requirement. Ecology agrees that it isn't necessary to submit the names of individuals who participated. It would be consistent with the guidance document for the permittees to submit the job titles of the people who participated from the various departments (*Integrating LID into Local Codes: A Guidebook for Local Governments)*.
- Ecology disagrees. The PSP reference should be very helpful to municipalities and helps provide the permittees with details concerning the level of effort and scope of review expected. It would be too detailed to include all of that in the permit, and doing so would limit local

government flexibility. The administrative processes indicated in the PSP document are unlikely to conflict with administrative processes required by local codes.

- Concern is understandable. Ecology must press forward with new approaches or more waterbodies may be degraded.
- Ecology has elected not to include the provision. Incorporation of some amount of LID principles is appropriate for local conditions. Ecology does not know what is included in community vision statements by all of the permittees. It could be that the community vision statements are the most significant barrier to application of LID principles.
- Ecology is not requiring submission of draft development codes. Ecology will be reviewing the summary reports that describe the changes made. Ecology reserves the right to make a judgment concerning whether a permittee has made a good faith effort to achieve the intent expressed in S5.C.5.b.i. Ecology will not be issuing approvals.
- Ecology does not concur that local policies should supersede where they conflict with LID. Ecology assumes that all local policies were adopted through appropriate public processes. Including such a statement would effectively remove the requirement.
- Incorporating a statement that allows local governments to supersede LID principles where they have adopted policies – through a public process – that conflict with LID principles, could be interpreted to apply to all local government policies. After all, policies are usually adopted after a public process. It seems likely that many policies were adopted without regard to the cumulative consequences of altering hydrology and pollutant discharge. So, Ecology does not concur with the suggestion.
- Local governments always have the option of adopting more stringent code requirements.

V-5 Watershed Planning

Commenters: Theodore Anderson, Rein Atteman, Association of Washington Cities, City of Auburn, City of Bainbridge Island, Norman Baker, Susan Baker, Ballard Stormwater Consortium, City of Bellevue, Building Industry Association of Clark County, Building Industry Association of Washington, Clark County, City of Des Moines, EarthJustice, Jeanine Eshpeter, Mark Evans, City of Everett, Joyce Hannum, City of Issaquah, City of Kent, City of Kenmore, King County, Kitsap County, League of Women Voters Sea/King, League of Women Voters of Washington, Lider Engineering, Judith Matchett, Thom McConathy, Natasha Mosher, Nisqually Indian Tribe, Northwest Indian Fisheries Commission, Jerome Parker, People for Puget Sound, People for Puget Sound Email Campaign, People for Puget Sound Group Letter, Pierce County, Precautionary Group, Puget Sound Partnership, City of Renton, Kathryn Rodgers, Sierra Club Email Campaign, Cari Simson, Snohomish County, SnoKing Watershed Council, Stewardship Partners & the 12,000 Rain Gardens campaign, Val Stewart, Sustainable Development Task Force of Snohomish County, Thurston County, US Fish & Wildlife Service, Washington Dept of Natural Resources, WSDOT, Dan White

Summary of the range of comments

- Support goal to protect beneficial uses, but should apply to more permittees. Also, should require a goal for native vegetation retention and impervious surface limits.
- Basins for watershed planning should be chosen for most impacted critical receiving waters such as lakes and estuaries; suggest Vancouver and Lacamas lakes in Clark County. All basins should be subject to watershed planning, not just one. Also public and stakeholder participation should be required, not just public review.
- Support, but the requirement is not sufficiently defined, and has no performance standard, no implementation provisions, no defined "models" to accomplish goal.
- Change goal to identify stormwater strategies to meet requirements to the maximum extent practicable. Goal of maintaining beneficial uses and accommodating growth is vague and technically unachievable. How does one determine whether such a plan will meet the goal?
- The goal should be no waters causing or contributing to waters violating standards due to stormwater. Plans should include retrofit project need.
- Expand watershed planning to include all jurisdictions in the watershed.
- Allow Permittees to select a basin. Allow an analysis of a sub-basin of one of the listed basins, otherwise permittees will not select any part of one of the larger, more complex watersheds in the proposed lists. Permittee actions can make a difference at the sub-basin scale (5 – 15 sq. miles). Consider study areas that are urbanizing areas of larger watersheds because subwatersheds (5-10 square miles) are manageable and may be largely inside the UGA.
- Availability of already collected data on flow and water quality should be considered as a criterion for the first watershed planning study. Existing calibrated hydrologic and hydraulic modeling should be considered.
- S5.C.5.c.iv.4 should include proposals for a schedule of actions,..." The watershed plan itself cannot create regulatory mandates. It would be better to direct that "the plan shall propose …."
- Questionable legal basis for requiring Phase II's to participate in a planning process led by a Phase I permittee. Questionable legal basis for requiring Phase I to do analyses on areas outside of its jurisdiction, and to secure cooperation from other jurisdictions and private parties.
- There is no guidance as to what the goal of this planning will be and what constitutes "participate and cooperate" thus, the economic impacts cannot be adequately assessed. Does allowing a Phase I to conduct work within the Phase ll's jurisdiction satisfy "participate and cooperate"?
- Remove from permit. Should be voluntary. Already participating in salmon recovery planning efforts.
- Proposal attempts to supersede planning under GMA, and elevate one goal over all other GMA goals. Can watershed planning be legally inserted into the GMA process?

- Watershed planning as required in the Phase I permit will run into significant conflicts with the GMA. This puts jurisdictions in the position of having to decide whether to meet GMA goals or permit requirements. Can the Basin/Watershed Planning requirement be legally inserted into the Growth Management Act process?
- Requirement should be restricted to the permittee's MS4. Ecology does not have the regulatory authority for this proposed requirement. It goes beyond the directive of the PCHB decision. Requirements such as watershed planning mandate that permittees perform activities outside of the area draining the MS4 in order to be effective and meet the permit requirement.
- Snohomish County does not own most of the land in the basins proposed, and the majority of land is outside of the County's MS4. It may be impossible for the county to obtain data from private owners and on land outside its boundaries. The County should not be required to enter onto private property to obtain data. So, it is not appropriate for the State to require this.
- Add Church Creek to the list of options as it meets the criteria listed in the Fact Sheet.
- Eliminate the deadline for selecting a basin.
- The software to perform this basin planning is still in the development stage. The permittees should not be held to a requirement that is not possible to perform, and to deadlines not possible to meet because of software development delays.
- What are the changes and appropriate scales that Ecology is interested in? What modeling techniques are acceptable? If Ecology will allow some flexibility in analysis techniques, it should revise the language to indicate that.
- The County has no idea how to evaluate impacts to the beneficial uses from existing or future development. Ecology must either delete the provision or provide direction concerning how to accomplish the task.
- There is no real world knowledge to prove that full implementation of the permit's LID, treatment and flow control standard won't work. Considering this, is it factually supportable to have a vague and unstructured watershed planning requirement in the permit?
- The requirement to identify changes needed to address harmful impacts and comply with federal and state laws is duplicative with the requirements in sections S5.C.5.a. and b.
- Page 37 of the fact sheet, "The challenge for permittees is to explain what actions they will take that will break this historical pattern of urbanization concurrent with stream degradation and loss of beneficial uses." Is there any precedent that this expectation can realistically be met? If so, cite. If not, perhaps Ecology could find a way to more realistically couch the objectives and expectations for watershed planning.
- Note that this watershed planning is separate from basin planning embodied in the minimum requirements of Appendix 1 but can include them. Consider moving watershed-scale planning to S5.C.6. and separating it from the current basin planning that allows alterations to the minimum requirements of Appendix 1
- The provision to identify structural retrofit actions to address harmful impacts is vague and ambiguous. Please revise for clarity.

- S5.C.5.c.ii.7 & 8 are vague and ambiguous.
- Clarify roles and what is required for Phase II's to "participate and cooperate" in watershed-scale planning. We are concerned with the potential loss of local control, with governance and costs associated with the watershed-scale stormwater planning requirement. Phase II requirements need to be further coordinated with Phase I requirements for a watershed based management system to work effectively.
- Change requirement to an optional pilot effort for Phase II's
- Ecology should clarify the involvement of WSDOT in planning efforts if a state highway is located in a watershed planning area.
- Ecology fails to recognize the financial magnitude of the proposed requirement. The proposal would impose a significant financial burden on the permittees at a time when budgets are in crisis. If the State wants watershed planning, the state should pay for it. In S5.C.5.c.ii (3), insert "basin" scale and on (4) insert "…or alternative future scenarios using…"
- The watershed planning requirement adds great amounts of work with little uncertain outcomes or benefits.
- The new requirements for basin-wide or watershed-wide planning leave us wondering if Ecology is proposing to add another regulatory overlay to an already burdensome and planning process at the local level. At a time when state leaders are looking for ways to eliminate redundancies in permitting, planning and process, we encourage Ecology to reconsider this.
- The Phase II permit should require the permittees to submit a watershed plan so that if they are in a selected basin, they are bound by that provision.
- Support for watershed planning to promote a better understanding of watershed functions, functional requirements, wise growth management decision-making, and better anticipated and efficient achievements in stormwater system improvements.
- Restrict the analyses required to those influenced by discharges from the MS4; restrict the identification of impacts to those influenced by MS4 discharges.
- Specify that capital improvement projects specified by a watershed plan meet the requirements of S5.C6.
- There should be a % loss of forest cover to trigger basin planning analysis as well as the % impervious trigger that is proposed – both are needed. How about a trigger for analysis when any development will push %TIA above the 10% range that has been identified as the key area where degradation begins? How does one conduct a watershed analysis for a UGA change that drains to a 303d or TMDL water-body? If the water-body already does not meet state water quality standards, it would theoretically be impossible to meet the permit guidelines. The timelines of measurable targets related to watershed change brought about by zoning changes would be much greater than the permit term of 5 years. The requirement would need to be repeated in subsequent permits to be meaningful. The minimum performance measures should not rely on WQS alone – flow monitoring and the use of flow metrics would be appropriate as would BIBI scores.

- Ecology should have authority to approve or reject plans that aren't in compliance with the Stormwater Manual for Western Washington.

Response to the range of comments

- Ecology discusses its criteria for proposing which watersheds would be appropriate for basin planning in the November 4, 2011 fact sheet accompanying the draft permits and in the Phase I permit itself. Permit language also allows the County to propose an alternative watershed, assuming it meets Ecology's basic criteria (see permit language at S5.C.5.c.i). This watershed requirement is a new regulatory approach. Given the state of knowledge about how to conduct such watershed analyses, Ecology considers it more appropriate to restrict the entities required to conduct watershed planning. Depending upon what is learned during this permit term, Ecology can decide whether and how to broaden the requirement in future permit terms.
- Ecology disagrees. The performance standard for watershed planning is compliance with water quality standards and maintenance of beneficial uses. The level of detail on implementation provisions has been increased. Ecology has funded "models" concerning how to do these analyses.
- Comment supporting habitat conservation is noted.
- Ecology rejects the suggested goal. The stated goal for watershed planning is not vague, nor technically unachievable. Achieving the goal may require changes in land development practices and land use plans. The planning should indicate whether that is necessary. The performance standards are identified in the permit. The water quality standards are adopted to protect beneficial uses. The use of projected B-IBI scores that are correlated with hydrologic metrics gives us the best available tool to judge whether beneficial uses, particularly salmonid resources, will be protected.
- See revised statements in permit regarding the goal of the watershed planning.
- The Phase II permit requires municipalities within the basins selected for watershed planning to participate. Ecology cannot direct non-permitted entities to participate in this process.
- Ecology has made minor changes to the criterion for selecting basins. Permittees may propose alternative basins.
- Permittees are welcome to take the availability of data into consideration when selecting a watershed for analysis. Certainly, the task would be reduced if sufficient or even some data already exist to calibrate runoff and water quality models. Still, the primary criterion for selection remains basins that are projected to absorb significant population growth and land development.
- Ecology agrees with the recommendation. Statement changed to be more in line with what the plan can do.
- Because a watershed can span multiple jurisdictions, and because each jurisdiction can only be held responsible for their piece of the watershed, it is necessary to require that all permitted jurisdictions in the watershed participate. Somebody has to lead this process. Given

the capabilities of existing staff and responsibilities and relationships already established under the Growth Management Act, it seemed most appropriate to designate the Phase I counties as lead entities.

- The goal is now stated. Expectations of Phase II's are described more completely in the Phase II permit. Phase II's should be partners in regard to sharing data, model development, and exploration of strategies. Ecology leaves it to the participating entities to work out any necessary financial arrangements.
- Ecology appreciates efforts municipalities are taking in regard to salmon recovery efforts. However those efforts do not generally address the cumulative impacts of future land development on the health of the aquatic natural resources. Ecology would not propose this requirement if it did not think it was necessary.
- Ecology is not mandating any particular type of land use planning nor decisions. It is requiring the permittee to project the impacts of its land use plans on the viability of the beneficial uses of the State's waters. And, where degradation of beneficial uses and violations of State water quality standards are projected to occur, to investigate and propose actions to avoid those impacts. Those actions should influence and can be incorporated into the permittee's GMA plans and related implementation documents. Implementation of identified actions is not a requirement of this round of the municipal stormwater permits.
- Ecology does not concur with the presumptions behind the first statement. The first presumption is that land development in the designated basins is not compatible with maintaining the beneficial uses. That presumption may be correct only if the permittee does not change its land development practices, and does not consider a limit to the amount of land disturbed within the basins. Secondly, the presumption is made that the GMA goals conflict with permit requirements. This is not the case. A goal of GMA is to protect the environment, including water quality. Watershed planning is a tool that will allow municipalities to explore options for meeting GMA's goals in regard to environmental protection while accommodating population growth.
- Ecology can require this watershed analysis for all areas within and proposed for likely inclusion within all MS4's of a particular basin. The focus of the watershed planning is not on the portions of the basin outside of the existing or future MS4. In doing the analysis, the permittees will have to make some assumptions and have a basis for predicting flows and quality coming from areas outside of the existing and future MS4 area. But that only serves as a background for studying the impact of the MS4 area on the receiving waters. Ecology intends watershed planning to occur where water quality and flows will be significantly influenced by urbanized lands, most of which are or will likely be served by the municipality's MS4.
- The watershed planning requirement does not indicate and Ecology does not anticipate that a permittee will have to enter onto private property to obtain data.
- Ecology considered the suggestion but decided to not add Church Creek to the list of named creeks.

- Ecology considers the deadline an appropriate milestone to ensure that permittees are making timely progress.
- Software to perform the hydrologic and pollutant loading estimates necessary are readily available. The commenter seems to be referring to the development of the SUSTAIN model. SUSTAIN is a modeling tool that could facilitate the projection of pollutant loads and concentrations and allow an estimate of the effectiveness of strategies to achieve the goals. However, basin planning can proceed without SUSTAIN if it is not readily available for use. HSPF-based watershed models can be used to predict impacts to flows and pollutants.
- The baseline hydrologic and water quality conditions inform us about the current status of the basin, and helps with initial model calibration. Baseline conditions in regard to biota and habitat inform us about the beneficial uses and the quality of the existing habitat. The latter could influence the types and locations of strategies to preserve the beneficial uses. At a minimum, basin modeling provides information concerning hydrologic and water quality conditions. Ecology intends that the County would use this planning as an opportunity to explore strategies to manage other aspects of the basin that are necessary to meet the goals of protection of the beneficial uses and achievement of water quality standards but that are not regulated by the municipal stormwater permits, e.g., quality of riparian areas
- Ecology has revised the permit language to be more indicative of the scale and modeling techniques.
- Ecology has added direction. The tools exist to accomplish the task.
- Ecology considers the final permit requirement to be sufficiently detailed and structured.
- It is precisely because compliance with the requirements of S5.C.5.a and b do not ensure and probably will not achieve compliance with the goals of the Clean Water Act within waters impacted by the MS4 that this section on watershed planning is necessary. Subsections (a) and (b) do not require a broader view of the full impact of the hydrologic changes and pollutant loads and concentrations caused by development of the area served by the MS4. To the extent the County fully embraces and aggressively implements the provisions of sections (a) and (b), the fewer additional actions will be needed to comply with the Clean Water Act requirements.
- Ecology is not aware of local precedents of maintaining healthy aquatic systems in areas with significant urbanization. That does not mean Ecology should give up. Nor does the law condone allowing the degradation to occur. The objectives and expectations are to meet the requirements of federal and state law.
- The scope of basin planning depends upon what you want to accomplish. Ecology has described a limited scope of issues that must be addressed through the watershed planning requirement. The permit indicates that permittees can extend the scope of the watershed planning to include other considerations, such as those described in Appendix 1 for basin planning, at their discretion.
- The permittees can assume that "structural retrofits" refers to the types of projects listed in Phase I S5.C.6, the Structural Stormwater Controls component.

- The provision is intended to indicate that the County can identify non-regulatory strategies to help achieve the goals. Land acquisition is listed as an example. If the County does not choose to avail itself of such strategies and can demonstrate achievement of compliance without them, they do not have to identify any non-regulatory strategies.
- Ecology does not concur that the subsection 8 is vague and ambiguous. Ecology is requiring that the County demonstrate that it has contemplated how it might go about implementing the actions that it has identified as capable of achieving the goal.
- In most watersheds of the size indicated for this planning, the WSDOT highway system is a minor player in water quality. In addition, the primary focus is on the impacts of new and redevelopment which is less likely to involve major state highway improvements. However, potential strategies to maintain beneficial uses and protect water quality may suggest actions on the part of WSDOT. Ecology anticipates that WSDOT will want to be informed about progress in these plans. If it becomes necessary to make assumptions about options to control runoff from WSDOT highways, WSDOT should be involved, but Ecology does not consider it necessary to require their involvement.
- Ecology understands the requirement has a significant cost, and that the budgets of local governments are currently quite difficult. Ecology's understanding is that a good faith effort on the part of the municipalities to fully meet the other provisions of their permit will still result in incremental degradation of the aquatic resources that the State and the municipalities are required to protect by federal and state laws. Something must be done to address this situation. The watershed planning requirement is an attempt to use the best available technical tools and research results to investigate strategies for accomplishing accommodation for growth and protecting the resources. This type of analysis has not been widely used, and to Ecology's knowledge has not been used by local governments in making land use decisions. Information generated by these plans should influence future plans, codes, and rules adopted by local governments under the Growth Management Act.
- The Phase II permit has a provision for Phase II's in a selected watershed to participate in the planning. They are bound by that provision.
- The permit requirement has been revised to indicate that the primary focus is on the impacts to the waters caused by future build-out as allowed by existing or proposed land use management plans. Most of those changes will be areas that fall within the jurisdictions' stormwater management authority. However, in order to make reasonable predictions re the impacts of their MS4, and the effectiveness of strategies within the MS4 area, there will have to be assumptions about the influence of any direct stormwater discharges within their MS4 area, and about the rate and quality of waters entering the permit coverage area from areas not covered under the MS4 permits.
- Projects of the type specified in S5.C6 would help meet those requirements.
- For this permit term, Ecology does not agree with the suggestion to trigger basin planning when certain land cover thresholds are reached. Ecology will restrict this requirement to selected watersheds for this permit term. The science of and procedures for the type of

analyses necessary to predict impacts to water quality and flows is not so straightforward that it can be applied by all the permittees at the present time. Ecology does agree with the suggestion that performance measures should include use of flow metrics and B-IBI scores. The permit condition requires use of those parameters.

- The goal for watershed planning is to protect the beneficial uses and comply with standards. Compliance with the manual is not the goal. The manual is a set of default requirements that apply in areas that have not had basin-specific requirements developed. Basin-specific requirements must be intended to meet the goal.

V-6 Timelines related to adoption and implementation of new and redevelopment requirements

V-6.1 Deadlines

Commenters: City of Anacortes, Association of Washington Cities, City of Auburn, City of Bainbridge Island, City of Bellevue, City of Bothell, City of Bremerton, Clark County, City of Duvall, EarthJustice, City of Everett, City of Kelso, King County, Lider Engineering, City of Longview, City of Monroe, City of Newcastle, City of Olympia, Pierce County, City of Port Orchard, City of Poulsbo, Puget Soundkeeper Alliance, Puget Sound Partnership, City of Renton, River Network/American Rivers, City of Sammamish, City of SeaTac, City of Seattle, City of Sedro Woolley, Snohomish County, City of Tacoma, Whatcom County

Summary of the range of comments
Specific recommended deadlines

- Deadline for ***draft*** SW update:
  - Support Phase I draft deadline for SW code of December 2013.
  - Alternatives: June 2014, December 2015, June 2017.
- Extend ***approved*** SW code update to:
  - Longer but unspecified
  - Phase I: December 2015, June 2015, or December 2016 for adoption and June 2017 for implementation, June 2018 (end of permit term).
  - Phase II: June 2017 or next permit term, December 2016, December 2016 to complete review and December 2019 for incorporation; December 2017 or later.
- Extend Broader Code Updates
  - Consistent with Comprehensive Plan update schedule in RCW 36.70A.130. – King Co.
  - Phase I: June 2015 and extend report deadline to third year report; December 2015; February 2016 for adoption and June 2016 for implementation; June 2017.

  - Phase II: December 2016; December 2016 to complete review and December 2019 to incorporate; June 2017; December 2017 or later.
- Timelines are not feasible; equivalency review process with Ecology and rule-making processes takes longer than provided for in the draft.
- Request to extend the deadline for the development code updates due to the necessary comprehensive review; this is a labor intensive process.
- Shorten SW code update deadlines and broader code updates
- Development Code updates and Stormwater Code updates should be on the same schedule.
- Align LID changes with the GMA comp plan schedule in RCW 36.70A.130. Extend Watershed Planning deadline and interim dates by 1 year. For watershed planning, the timeline is insufficient to allow for funding and cost-share agreements with the Phase II municipalities, and community engagement.
- Too much to accomplish within 5-year permit term for Phase II's. Begin with technical requirements and sequence other requirements later.
- The LID advisory group recommended at least two years to complete code updates. The current deadline would only provide two years to comply if the Permittee started this activity during the 2012 permit. The Permittees cannot be expected to comply with both the 2012 Permit and the 2013 Permit at the same time.
- Please clearly state in each case when the update should be completed versus when it should be adopted and effective. Tacoma suggests providing at least four months between the reviewed and revised deadline and the adopted and effective deadline to allow time for the City Council adoption process.
- The permit requires that a drainage manual equivalent to the 2012 Stormwater Management for Western Washington be adopted by December 31, 2015 and that applicable LID friendly codes and standards be adopted by December 31, 2016. Is it correct to assume that there may be a one-year window where codes and standards conflict (competing needs) with LID implementation?
- Suggests separate deadlines for the review process of the existing codes and the subsequent revisions to the codes.
- PCHB acknowledged Phase II's are different, and therefore deserving of different requirements and time frames.
- Delays in adopting code updates should not be used my municipalities as excuse to delay implementation of the new SWMWW.
- The permit should require completion of the plan this permit term. Adoption of the plan, or portions of it, may then be adopted in the next permit term.
- Local governments updated their stormwater codes and manuals during the current permit term. The cost associated with the process was hundreds of thousands of dollars. Being required go through an even more extensive policy process in a short time is unrealistic and unreasonable.

- Should be automatic extension each time Ecology asks for revisions and re-submittals. Deadlines should be flexible, not mandatory.
- Grant extensions up to length of time of unresolved litigation contesting substance of a permit provision; unilaterally at Ecology discretion. Ecology shall not unreasonably deny requests for extensions - based on unresolved litigation - from permittees. No penalties and no compensatory mitigation for extensions due to unresolved litigation.

Response to the range of comments

- Legislation passed in the 2012 state legislative session amended RCW 90.48.260. The amendment directs Ecology to require Phase II municipal permittees to update their stormwater code and development codes simultaneously. It also directs those updates must be effective "no earlier than December 31, 2016, or the time of the scheduled update under RCW 36.70A.130(5), whichever is later." The revised above deadlines for Phase II implement that legislative directive.
- Ecology decided that it should apply the same simultaneous approach for the Phase I permittees. The deadlines for the stormwater and development code updates are extended another 6 months from the schedule proposed in the draft. The reasons for that include:
    - Keeping stormwater and development codes updates on the same deadline avoids implementation conflicts.
    - The deadline is consistent with the deadline for development code updates called for under the Growth Management Act.
    - It allows for 2 year from the effective date of the permit. Many LID committee members recommended a 2-year time frame.
    - The deadline gives Phase II permittees 1.5 years to update their codes using Phase I information. Many Phase II municipalities have relied on using the regulatory requirements adopted by Phase I permittees. So, they need the Phase I final codes to begin their administrative process. The permit requires completion of the plan this permit term.
- The deadline for Watershed Planning completion is determined in part by the permit reissuance schedule. In order to consider the results of watershed planning for the next permit reissuance, Ecology will need the plans by October 1, 2016. That will allow for full public review of any follow-up NPDES requirements, and a decision concerning whether to expand the watershed requirement to other areas and permittees. Ecology considers the scope of work for this planning to be achievable by that date.
- Need to distinguish between litigation from 3rd parties and litigation brought by the permittees. No automatic deadline extensions for litigation brought by permittees.

V-6.2 Clarify documents that must be submitted to Ecology for review

Permit reference: Phase I permit S5.C.5.a.i and ii

Commenter: Snohomish County

Summary of the range of comments

- Clarify the documents that permittees must submit to satisfy S5.C.5.a.i and ii.

Response to the range of comments

- This requirement is similar to conditions placed within the previous municipal stormwater permits. The county is to submit all ordinances, rules, and enforceable manual requirements that it will use to satisfy those sections of the permit. In addition, "Permittees shall document how the criteria and requirements will protect water quality, reduce the discharge of pollutants to the maximum extent practicable, and satisfy the state AKART requirements. Permittees who choose to use the requirements, limitations, and criteria above in the 2012 *Stormwater Management Manual for Western Washington*, or an equivalent manual approved by Ecology, may cite this choice as their sole documentation to meet this requirement."

V-7 Establish procedure to allow changes without permit modification

Commenters: Cascadia Green Building Council, King County, City of Seattle, Snohomish County

Summary of the range of comments

- Ecology should be able to extend deadlines as appropriate for circumstances without penalty or formal permit modification. Make deadlines flexible due to Rosemere decision.
- Establish a procedure to allow for beneficial adaptive modifications to Appendix 1.

Response to the range of comments

- Deadlines are seen as substantive permit requirements. Federal and state rules prohibit changes in substantive requirements without following a formal permit modification process.

V-8 Reporting

Commenters: City of Kelso, Puget Sound Partnership, City of Renton, City of Sammamish, City of Shoreline, Snohomish County

Summary of the range of comments

- Support reporting by goal area.
- Delete report on development code updates in 2nd Annual report, or reduce type of details. A check box would suffice.
- *S5.C.4.g.ii- #2.* Substitute "established vegetation" for "native vegetation." If the term "native vegetation" remains, the ramifications could be that an entire lot could be cleared of vegetation because it is not native or define the term "native vegetation" to include existing vegetation that is not considered a noxious plant.

Response to the range of comments

- The reporting date has changed to the annual report after the deadline for the updates. To do a substantive review of the code changes requires more than just a checkbox.
- Ecology modified statements in the permit related to vegetation.

V-9 One-acre Threshold

See additional comments in Part III for the Western Washington Phase II permit.

Commenters: League of Women Voters of Washington, City of Longview, Judith Matchett, Muckleshoot Indian Tribe, Stewardship Partners & the 12,000 Rain Gardens campaign Sustainable Development Task Force of Snohomish County, US Fish & Wildlife Service

Summary of the range of comments

- Support for eliminating the 1-acre threshold.
- Projects below 1 acre rarely have the sophistication and funds to go through the permitting and professional services processes, and meet the one-size-fits-all requirements.

Response to the range of comments

- Ecology notes the supportive comments.
- Projects below 1 acre have had to go through permitting and professional services processes in most western Washington municipalities for some time. Ecology acknowledges that the new stormwater requirements increases the level of information

being required for small projects in most cases. This is unavoidable in order to properly and reasonably implement LID practices.

V-10 Inspections for smaller projects

Commenters: Skagit County

Summary of the range of comments

- Clearly identify that rain gardens and other BMPs identified in MR5 do not require annual post construction inspection.

Response to the range of comments

Bioretention facilities and permeable pavements that are installed in projects that have to demonstrate compliance with Minimum Requirements #6 (treatment) and #7 (flow control) are included in the facilities that require ongoing inspections by the municipal permittees. Municipalities do not have ongoing inspection responsibilities for LID facilities on projects that had only to comply with Minimum Requirements #1 - #5. See definition for "Stormwater Treatment and Flow Control BMPs/Facilities."

V-11 Appendix 1 Exemptions

Commenters: Arnie Broadsword, City of Everett, City of Oak Harbor, Snohomish County, City of Tacoma, City of Woodinville

Summary of the range of comments

- The scope and applicability of this section is unclear. Please add an introduction.
- Add an exemption from LID requirements if compliance would require acquisition of additional right-of-way. The County does not think it fair to ask private property owners who own land next to the existing public right-of-way to give up land so that the County can manage stormwater from the public road system in accordance with MR #5. The County also objects to the expenditure of tax dollars for acquisition of the additional right-of-way.
- Add the following as an exemption: "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. When this exemption applies to a project, the project shall nonetheless meet Minimum Requirement #5 to the extent reasonably feasible (i) within the existing right-of-way, and (ii) without compromising public safety.

- Add new exemptions for recreational trail maintenance and construction, and campsite establishment activities. Without an exemption, the County could be required to implement practices out-of-scale with this practice, and on sites surrounded by significant forest or native vegetation acreage.
- Road projects that repair or replace the base course or lower should only be subject to Min. Requirements 1 – 4. Resurfacing streets and alleys within the public right-of-way should be exempt…. it is difficult for local governments to fund street maintenance sufficiently to prevent the need for grinding pavement and constructing spot repairs.
- Oil & Gas Field Activities or Operations, Page 1: It is unclear why access roads should be exempt in this context. Oil and Gas Field Activities or Operations should be regulated the same as other land disturbing activities and subject to the rules of Appendix 1 or equivalent.
- Road Maintenance, Page 1: This section should apply to all paved areas, such as parking lots, driveways, etc. Consider a title as "Pavement Maintenance."
- Road Maintenance, Page 1: The placement of what is not exempt within the exemption section of Appendix 1 is confusing. Consider including the items that are not exempt in the definition for new and redevelopment.
- Underground Utility Projects, Page 2: Clarify what is meant by "similar runoff characteristics" and how this will be determined.
- If an exemption is to be provided for forest practices and commercial agriculture there should be clear equivalent protective statues in place. There does not seem to be equivalent protection under Title 222 or for commercial agriculture.
- Under the Road Maintenance exemption, provide a limit or definition to the phrase "reshaping/regrading drainage systems".
- The following maintenance practices should not be considered redevelopment for the following reasons:
    - Repair of "alligator cracking" (caused by water entering the base material or subgrade) requires excavation to base material or lower; permeable pavement should not be required because water will exacerbate the pavement failure problem and turn an overlay project into a reconstruction project.
    - Road overlay budgets are inadequate, so increasing the cost of road maintenance projects via MR#5 requirements will lead to significant costs and degraded roadways.
    - Permeable pavement will introduce moisture into traditional pavement sections that have no aggregate reservoir layer. Traditional pavement is designed to carefully control soil moisture content and then capped to prevent moisture from altering those soil properties.
    - If upgrading the pavement wear course triggers resurfacing with permeable pavement, the project will turn into a full depth reconstruction project.

Response to the range of comments

- Ecology has made changes that should help clarify scope and applicability.
- Ecology does not concur with the suggestion of an exemption if additional right-of-way acquisition is required.
- Ecology has added an infeasibility criterion for permeable pavement where existing impervious surface is being replaced. However, where the permittee is installing a new road or widening a road, Ecology considers it appropriate that at least the new surfaces be installed with the latest stormwater requirements.
- Ecology is reluctant to establish a blanket exemption for recreational trail maintenance and construction. Where a new trail would concentrate runoff and send it offsite, it should meet new stormwater requirements. Most recreational trail construction should be able to "fully disperse stormwater runoff" with practices that are in-scale with that construction. Trail maintenance activities (filling of ruts, cutting back vegetation, etc) should not trigger the thresholds for new or redevelopment.
- Pavement maintenance and repair is exempt. Replacement of existing impervious pavements with permeable pavements is categorized as infeasible unless the pavement is a non-pollution-generating surface over highly porous soils (see infeasibility criteria for permeable pavement in Chapter 5 of Volume V).
- Exemptions related to Oil & Gas Field Activities or Operations are taken from federal regulations.
- Ecology concurs. See text change regarding pavement maintenance.
- Statements regarding road maintenance have appeared in this section for over 10 years. Moving them now would probably create more confusion than it would solve.
- "Similar runoff characteristics" includes stormwater quantity and quality. The local government will have to decide.
- The NPDES permit program has historically not applied to commercial agriculture. Although an equivalent regulatory program does not exist now for commercial agriculture, Ecology will not decide to extend the program into that area unless explicitly directed to do so by state and federal legislators.
- Ecology does not agree that additional definition of "reshaping/regrading drainage systems" is needed.
- In most cases, Ecology concurs that it is inappropriate to require pervious pavements on projects that are maintaining or replacing existing impervious pavements. The exception is the replacement of non-pollution-generating impervious surfaces on highly porous soils (See permeable pavement in Chapter 5 of Volume V). Existing roads were built without the intent of passing water through the pavement.

V-12 Appendix 1 Definitions

Commenters: City of Auburn, City of Bellevue, Arnie Broadsword, Clark County, Cowlitz County, Cowlitz County Soil and Conservation District, Robert Dashiell, EarthJustice, Green Light Gardening, City of Kent, King County, Kitsap County, City of Longview, City of Monroe, City of Oak Harbor, City of Olympia, Port of Tacoma, Port of Vancouver, Regional Forum Permit Committee, City of SeaTac, City of Seattle, Snohomish County, Val Stewart, Sustainable Development Task Force of Snohomish County, City of Tacoma, Thurston County, City of Vancouver, Whatcom County, WSDOT

Summary of the range of comments

- Add key definitions from Appendix 1 to the basic permit. For instance, "impervious surfaces" is a term that is used in setting stormwater utility fees. There is almost no way possible to write a municipal stormwater rate structure ordinance that meets the definitions of impervious surface and all the nuances in this permit.
- Permittees are required to adopt the definition for commercial agriculture in the *SWMMWW*, which is limited to "wholesale trade." Request that Ecology remove the term "wholesale trade" to include in the definition agricultural production for retail, such as for farmers markets or direct sale to restaurants.
- Provide a definition for MS4.
- Please reference the federal functional classification system in the definition of arterials. RCW 36.86.070 requires the County to use that system when classifying County roads
- Can the same person be a CESCL for multiple sites? Can a CESCL delegate duties to non-CESCL?
- The definitions for "Source Control BMP" and "Threshold Discharge Area" reference "this manual." It is unclear what manual is being referenced or if the term 'manual' should be 'permit' in this context.
- Pre-developed: How far back is historic information required to document that the land was not forest?
- Bituminous surface treatment: Provide a more thorough definition.
- Threshold Discharge Area: Provide a definition for natural discharge location and clarify if the downstream path includes manmade conveyances or if it is intended to include only predeveloped conditions.
- Vehicular use: Replace "unfenced fire lanes" and "fenced fire lanes" with something like "unrestricted access fire lanes" and "restricted access fire lanes." Fencing of a fire lane is excessive and other types of barriers may be used.

- Vehicular Use: Should car show fields be added to the list of regularly used sites? Identify quantitative criteria to define when a maintenance access road or other surface would be considered as used regularly or irregularly.
- Clarify how the term "vehicular use" is used in the permit.
- Add a definition for Interflow.
- Add definitions for:
    - "measurably" as used in the definition for erodible or leachable materials.
    - "non-vegetated" since gravel shoulders along roadways can become overgrown with vegetation but are still impervious.
    - "4th Strahler order stream.
    - "effective pervious surface
- In the definition of "new development" add the following before the last sentence: "For proposed new subdivisions, short subdivisions, and binding site plan projects, assume, for threshold determination purposes in Figures 3.2 and 3.3, that ____<insert value here> square feet of impervious surface will result on each newly created lot, unless the project proponent has otherwise formally declared other values for each lot in the corresponding complete land division application."
- Expand definition of project site to reference to the site plan prepared for compliance with MR #1.
- The definition of erodible or leachable materials should be expanded beyond chemicals and wastes. Suggest replacing them with "materials." Erodible or leachable materials – define "measurably" and "chemical characteristics" and what about Brine? Revise the definition to include measurable criteria to evaluate if a waste or chemical "measurably alters the physical or chemical characteristics of runoff." Verify that the list of examples is inclusive of all erodible or leachable materials.
- Hard surface – This definition does not meet federal definition of green roof. Is a gravel road a hard surface?
- Impervious surface – inclusion of "green roof" contradicts with hard surface def.
- Permeable pavement – replace "porous" with "pervious" before asphalt
- Delete the term, hard surfaces. If retained, do not include permeable pavement or vegetated roofs in the definition. Permeable pavements and impermeable pavements do not have similar hydrologic characteristics so they should not be regulated the same. Treating them the same for regulatory purposes removes the incentive to use permeable pavements
- Clarify that ballast and sub-ballast layers for railroad tracks are not hard, nor impervious surfaces. Remove gravel roads and packed earth materials from the listing of impervious surfaces. Terms are too vague and may be pervious.
- Add a definition for "project" as related to the "common plan of development" concept and provide a definition for common plan of development.

- Land disturbing activity: The added sentence states, "Stormwater facility maintenance…." It seems that all public works facility maintenance should be included here. In addition, these items should be added to Section 1 Exemptions of Appendix 1.
- Expand the activities listed as not included under "land disturbing activities" to include:
    - 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."
    - Installation of a stormwater facility
    - Add, "thereby exempt" at the end of the definition.

Comments regarding LID BMPs

- Expand definition of LID BMP's to include site planning to reduce impervious surfaces and retain native vegetation. Don't rely on code updates by municipalities to require these.
- Delete roof downspout controls from LID BMPs definition.
- LID Best Management Practices: Expand the list of to include Ecology-approved BMPs in the Highway Runoff Manual (natural and engineered dispersion, compost amended vegetated filter strip, bioinfiltration pond, bioinfiltration swale, infiltration pond, infiltration trench, and media filter drains). Provide a definition by which a BMP could be evaluated to determine if it is LID, or provide a list of approved LID BMPs.
- Clearly delineate which LID BMPs are actual infrastructure and which are non-structural.
- Delete "and land use" from definition of LID. Delete "mimic pre-disturbance" and replace with "allow hydrologic process of infiltration." Define "pre-disturbance" if used.
- Change term "LID BMPs" to "LID Features" or other term to avoid over using "BMPs." Clarify the purpose of LID BMPs (i.e., allow infiltration).
- Pervious surface: Rephrase to "Any surface material which…"
- LID Best Management Practices: Specify which roof downspout controls meet the definition of LID and clarify whether or not BMPs with underdrains will be considered LID BMPs.
- Remove definition of LID Principles. No NPDES permit authority. Already defined in the permit.
- Definition of LID should be crafted around achievement of a performance standard. Terms such as "pre-disturbance" and "pre-development" need definitions to avoid litigation. Define LID as stormwater management practices exclusively and not other land use actions that may address other societal goals.

Comments regarding PGPS, PGIS, and PGHS

- The definition of pollution-generating pervious surface (PGPS) should focus on whether a subject pollutant is transported via surface flow.

- Pollution-generating pervious surfaces (PGPS):This definition could be misconstrued that a project would need ¾ acre of permeable pavement in order to require treatment. Clarifying by stating that thresholds for hard surfaces apply to permeable pavements. Generalize the definition to "Typical PGPS include permeable pavement subject to vehicular use" rather than including a list which may not be all inclusive.
- Add to the end of the definition for "PGIS" – ", or exist in an Ecology-designated phosphorus limited or sensitive watershed."
- Clarify whether green roofs and pasture should be considered pollution generating pervious surfaces. Consider the practical application of what is said for pollution generating surfaces.
- Residential roofs should be re-categorized as pollution-generating as they generate zinc and other pollutants. Roof runoff should not be allowed to infiltrate unless it has passed through a treatment system similar to other PGIS.
- A definition of erodible or leachable materials should be the broadest category with subcategories that include PGIS, PGPS, PGHS, and loose materials that can be responsible for discharge of pollutants. A new category of pollution –conveying surfaces can be added.
- Pollution-generating pervious surfaces (PGPS): Parks include several categories of surfaces and should not be included in this list. Landscaped areas, sports fields, and lawns may or may not be pollution-generating, depending on the surface material and the maintenance plan.
- Clarify PGIS and PGHS; define PGHS.

Comments regarding rain gardens and bioretention

- Define rain gardens.
- Expand definition of Bioretention BMP's to incorporate concept of flow control.
- Remove the term, "non-engineered" from the definition of rain garden. Non-engineered systems are generally regarded as likely to fail. Add "or engineered" to rain garden definition.
- Rain Garden: Do not reference the Rain Garden Handbook in the definition of Rain Garden.
- Rain Garden: State that this is not a flow control or Retention/Detention facility and that these facilities are not subject to a yearly inspection.
- Rain Garden:
    - The definition specifically requires compost-amended native soils. The definition should allow for rain gardens to use an imported rain garden mix or compost amended soils.
    - Instead of using the terms "rain garden" and "bioretention", use the terms "engineered rain garden" and "non-engineered rain garden".
    - The definition describes a rain garden as "non-engineered" while also being "designed." Designed implies a soils evaluation to size the facility and typically some level of engineering. Require a soils evaluation by a professional for any rain garden if the project triggers any of the minimum requirements and would require a permit for construction.

  - Add language that equivalent guidance to the Rain Garden Handbook can be used for rain garden design.
- Support differentiation between Rain Gardens and Bioretention. Suggestion to define rain gardens as accepting runoff from less than 5,000 sf of impervious surface and which may be installed by home-owners or professionals. Suggestion that bioretention be defined as facilities providing flow control and treatment to PGIS greater than or equal to 5,000 sf.

Comments regarding replaced and converted surfaces

- Change definition of replaced impervious surfaces in regard to "other impervious surfaces." It is hard to identify base course. Allow municipalities more flexibility in considering projects maintenance rather than replaced impervious. Allow repair of subgrade of an existing road when it is done as part of a road expansion. In light of these, have a change of 0.25 feet in the grade distinguish between a maintenance activity and a replacement activity.
- Replaced Impervious Surface*:* Include an exception for rebuilding due to fire damage. The definition indicates a prejudice against moving the footprint of impervious surfacing which could discourage reconfiguring of existing impervious surfaces to improve storm drainage handling and treatment.
- Replaced Impervious Surface: Clearly define the impervious surfaces associated with structures.
  - "Down to the foundation"...does this include removal of the foundation, or removal of everything except the foundation?
  - Is reroofing considered replaced or maintenance? Previous email guidance from Ecology indicated that reroofing would be considered replaced. However, if reroofing projects are considered replaced impervious surfaces, it may make restoration of older buildings infeasible for owners because of the related stormwater requirements.
  - For other impervious surfaces where it says "removal down to bare soil or base course", is this the top of the base course or below the base course?
  - What is required if a building is removed, but the foundation is left as a parking area. Should this be considered new PGIS, replaced PGIS or simply a change of use?
- Add definition of "replaced hard surface" to definitions section.
- Add "sports fields" to the definition of converted pervious surface.
- Suggest that definition of converted pervious surface should be any conversion of native vegetation, pasture, scrub/shrub or unmaintained non-native vegetation (e.g. scotch broom, Himalayan blackberry) to lawn/landscape and any conversion of native vegetation to pasture.
- The definition of converted pervious surfaces should reference the MS4 rather than a "drainage system." The criteria for "ineffective" should include the option of "residential and/or commercial surfaces that infiltrate on-site pursuant to Volume III".

- We recommend that the word ' native ' be removed from the definition of Converted pervious surface and that vegetation be more clearly defined. Recommend "*Converted Pervious Surface* - The surfaces on a project site where vegetation is converted to lawn or landscaped areas or where native vegetation is converted to pasture. When referencing *Converted Pervious Surface*, vegetation refers to pervious surfaces that have a higher permeability than the pervious surface being converted to."

Comments regarding effective impervious, pervious and hard surfaces

- Limit the definition of "effective impervious surface" to the first sentence and include a definition of "ineffective impervious area" using the remaining language.
- Revise definition of effective impervious surface to include, in addition to the existing definition, those impervious surfaces dispersed in accordance with appropriate BMPs which allow the impervious surface to be modeled as lawn/landscape in the SWMMWW or dispersion through 100-ft of native vegetation whether BMP T5.30 land area limits are met or not.
- Define "Effective Hard Surfaces" and establish criteria for when a green roof can be considered "effective hard surface" or "impervious surface".
- Effective impervious surface – Downspout Infiltration systems are trench or drywell designs intended only for use in infiltrating runoff from roof downspout drains. They are not designed to directly infiltrate runoff from pollutant-generating impervious surfaces.
- Define "effective hard surface"
- Define effective pervious surface and conveyance system

Response to the range of comments

- Ecology has chosen to keep both definitions sections. The definitions section for Appendix 1 pertains directly to the terms as used in the Appendix. It will make it easier for permittees to use and understand Appendix 1 to keep those definitions in Appendix 1. Ecology has tried to avoid any differences in the definition of the same term in the permit definitions.
- Not necessary as the term MS4 is not used in Appendix 1 or the manual. The term is used in the body of the general permits, and it is defined in the definitions section of those permits.
- Ecology agrees, and has revised the definition in the manual to remove the term "wholesale" and limit it to "commercial trade." This definition is consistent with definitions of agricultural land and agricultural activity in RCW 7.48.310(2) Nuisances; RCW 36.70A.030 Growth Management Act; and RCW 84.74.020 (Open space, agricultural and timber lands). Ecology has added the definition of Commercial Agriculture to Appendix 1 where the term is used in Section 1: Exemptions.
- Ecology incorporated the federal functional classification system reference.
- The same person can be a CESCL for multiple sites. The CESCL must have the ability to fully discharge their responsibilities for all sites they are assigned to. A CESCL may

certainly delegate implementation of BMP's. A CESCL cannot delegate duties that required of a CESCL through the NPDES Construction Stormwater Permit, or that require the exercise of judgment that has been informed by CESCL training.

- The first reference has been changed to indicate the 2012 Stormwater Management Manual for Western Washington. The second reference is changed to "this appendix."
- As far back as the land was first settled. Generally, the soils have to be fairly permeable for the area to have been a natural prairie. So, if you have till or loamy soils, chances are it was forested.
- Definition of bituminous surface treatment not added.
- The manual includes a definition for "natural location." The preference is to use pre-developed conditions that are either natural or that are part of a drainage system that was previously approved by the jurisdiction. However, if the downstream flow paths are on adjacent developed lands where flow paths have already been altered, that would seem to be the only alternative.
- Comment related to fenced/unfenced vs. restricted/unrestricted is accepted.
- Ecology can't anticipate all situations related to regular vehicular use. Permittees will have to exercise their discretion as they determine appropriate.
- Vehicular use is used only within other definitions.
- Interflow is defined in the glossary.
- Ecology does not agree with the suggested additional definitions of; measurably, non-vegetated, 4th Strahler order stream, effective pervious surface and does not change the permit.
- Ecology supports the concept of assuming a certain level of hard surfaces on each newly created lot. But given the new requirements to employ permeable pavements, it would be hard to assume set levels of impervious surface. This will probably have to be determined in each project proposal.
- Ecology prefers not to use the suggested reference. A project doesn't have to trigger MR #1 to have a project site.
- It is usually not standard procedure to use a word or phrase that you are trying to define in the definition. However, Ecology agrees with the intent of the comment and will propose a revised definition to expand the substances that can be considered erodible or leachable. Ecology will not further define measurably or chemical characteristics. Brine is a waste that alters a chemical characteristic of runoff. Therefore it is captured in the definition.
- The definition does not have to correspond to a federal definition. A gravel road is defined as an impervious surface. Therefore, it is also a hard surface.
- The commenter must have been looking at a previous edition of proposed Appendix 1. Vegetated roofs are not included in the definition of impervious surface.
- Ecology is using a terminology convention that has been accepted by the concrete and asphalt industries. The products are "pervious concrete" and "porous asphalt."

- Ecology will retain the definition of hard surfaces and continue to use the same size thresholds to regulate pavements whether impermeable or permeable. Ecology is concerned about the pollutants generated by both surfaces, and about impacts to surface waters and ground waters. Therefore, the regulatory thresholds should be the same for both.
- Ecology does not consider rock ballast typically used for railroad tracks to be a hard or impervious surface. This will not be called out in the definition. Gravel roads and packed earth materials will remain defined as impervious surfaces, as they have been for twenty years. They generally produce runoff in quantities more similar to asphalt than uncompacted pervious areas.
- The term "common plan of development" was unnecessary to use and has been removed from the text.
- Ecology does not agree that "all public works facility maintenance" is automatically exempt. Any other maintenance would have to be covered under the exemptions section to be exempt.
- Rather than the suggested additions, Ecology deleted "movement of earth" from the definition, as it seems to unnecessarily capture the activities listed in the comments.

Responses regarding LID BMPs

- Ecology disagrees with suggestion to expand LID BMPs definition. Ecology will stick with considering the referenced actions to be LID principles.
- Ecology disagrees with suggestion to delete roof downspout controls from LID BMPs definition. Roof downspout controls can help reduce hydrologic changes.
- Natural and engineered dispersion are considered LID practices. The other practices listed above by WSDOT are engineered treatment practices with design criteria. They include hydrologic benefits. Ecology has dropped the terms bioinfiltration pond and bioinfiltration swale.
- All the listed LID BMPs are infrastructure and need long-term maintenance. If the issue is which carry long-term inspection responsibilities by municipalities, please refer to the definition of stormwater treatment and flow control BMPs/facilities in the permit and the use of that term in the permit requirements re inspections of new and redevelopment and long-term inspection responsibilities.
- The proposed definitions were changed only marginally. Generally, the use of underdrains results in no to very little hydrologic benefit and therefore does not meet the definition of LID. The LID definition was agreed upon by the LID Advisory Committees. It was crafted to express the goal of LID. Any performance standards for new and redevelopment need to be based upon helping to achieve the goal. The term, "pre-disturbance" is intended to mean before commencement of historical land clearing practices by European settlers. The term, "pre-developed" means a land cover condition prior to the proposed project. A pre-developed condition to be used in a particular regulatory requirement must be specified.

Responses regarding PGPS, PGIS, and PGHS

- Ecology does not agree. The definition of PGPS should focus on the ability of the surface to be a source of pollutants. Once it is identified as a source of pollutants, the surface is potentially regulated whether the rainfall transports the pollutants to a surface water or into the ground.
- The first suggestion is not taken. It would be out of place to put such a statement in this definition. The issue is handled adequately in the thresholds of sections 3.2 and 3.3 and the thresholds in Minimum Requirements #6 and 37. The second suggestion is accepted.
- Ecology does not concur. It seems unusual to assume that all impervious surfaces are pollution-generating because they exist in a phosphorus-limited watershed.
- Vegetated roofs that are subject to "industrial activities" (see definition) are pollution-generating. Pastures are pollution-generating if subject to animal activities, application of fertilizers, pesticides, or insecticides; or subject to erosion.
- Many of the pollutants in residential roof runoff are associated with asphalt particles. These particles can be effectively removed prior to infiltrating stormwater in dry wells and trenches by construction of the catch basins detailed in Section 3.1.1 of Volume III. Residential roof runoff may also have elevated dissolved zinc as a result of contact with galvanized gutters or downspouts. The dissolved zinc concentrations and loadings are likely not sufficient to cause groundwater pollution problems. Requiring residential roof runoff to pass through an enhanced treatment BMP prior to infiltration does not seem to be necessary. Roof runoff that is dispersed in accordance with downspout dispersion techniques in Section 3.1.2 of Volume III passes through a soil profile that is capable of removing dissolved metals. Therefore, runoff that may emerge on the downgradient edge of such dispersion systems is likely to be significantly lower in dissolved metals.
- While there is logic in the proposal to re-shuffle definitions, there is little purpose in doing so. The surfaces generating pollutants can be identified using the current nomenclature system.
- See revised definitions for PGIS and PGHS.

Responses regarding rain gardens and bioretention

- Rain gardens are a defined term.
- Agreed. See revised definition of bioretention BMP.
- Ecology does not agree with the assumption that non-engineered systems are necessarily likely to fail. No permit change.
- In the short-term, the reference is useful to help people understand the concept. No permit change
- Rain gardens are not included in the definition of "stormwater treatment and flow control facilities" which require annual inspection.
- It is acceptable to use imported mixes as allowed in the referenced Handbook. Ecology retained use of the terms "rain garden" and "bioretention." Projects that have triggered

Minimum Requirement #5 will need to have some soils analysis done by a professional. This is indicated in the site planning guidance. The suggestion for adding language regarding equivalent guidance is not necessary. It is already covered in the text of the permit.

- Thank you for the suggestion. However, the proposal is not compatible with the need to require projects that are subject to Minimum Requirements #6 and/or #7 demonstrate compliance quantitatively.

Responses regarding replaced and converted surfaces

- Ecology does not concur that the described activities should not be considered replacement.
- No permit change in response to suggestion of exception for rebuilding due to fire.
- In the order of the questions on replaced impervious surfaces related to structures: "Down to the foundation" means removal of everything except the foundation. Re-roofing generally does not trigger requirements whether it is maintenance or a full replacement. Removal down to base course means to the top of the base course. If a building is removed but the foundation is left as a parking area it is a change of use.
- Ecology added a definition of "replaced hard surface".
- Ecology changed the definition of pollution-generating pervious surfaces to indicate that natural and artificial turf surfaces are included under the broader category of lawn and landscaped areas. Therefore, "sports fields" are included in the definition for converted pervious surfaces too.
- The suggestion on the converted pervious surface definition and vegetation has been accepted as a definition for converted vegetation.
- Ecology has dropped the term converted pervious surface and has added a definition for converted vegetation. The definition does not refer to a drainage system. The definition does reference the downspout infiltration systems specified in Volume III.

Responses regarding effective impervious, pervious and hard surfaces

- Ecology chose not to take the suggestion of including a definition of "ineffective impervious area".
- The first suggestion is not necessary as those impervious surfaces are connected via sheet flow to a drainage system and are therefore already covered in the definition. Ecology does not agree with the second suggestion.
- "Effective hard surfaces" is only used in the context of Min. Requirement #7. In that text, all the hard surfaces have to be modeled (unless "fully dispersed in accordance with BMP T5.30) to demonstrate whether the 0.10 cfs threshold is exceeded. A vegetated roof is defined as a hard surface.
- Agreed. Although the standard designs indicated in Volume III have a sump that will remove heavy particles such as sloughing particles from asphalt shingles.
- A definition of "effective hard surface" is easily inferred from the definition of effective impervious surface and hard surfaces. The term is only used in regard to the 0.10 cfs

threshold within Minimum Requirement #7. Project proponents will have to model hard surfaces to determine whether that threshold is exceeded.

- A definition for conveyance system is in the Glossary of the manual. "Effective pervious" has been removed.

V-12.1 Inclusion of ground water in the definition of receiving waters

Commenters: City of Bellevue, City of Kelso, City of Longview, Regional Forum Permit Committee, City of Renton, City of Sammamish, City of Seattle, City of Sedro Woolley, Snohomish County, Thurston County, City of Vancouver, WSDOT

Summary of the range of comments

- Remove addition of ground waters to definition of receiving waters as it adds liability to municipalities and is counter to LID.

Response to the range of comments

- The municipal stormwater permits have always included coverage for a municipality's discharges to the ground. The permits are issued as combined NPDES and State Waste Discharge Permits and apply to discharges to "waters of the State," which includes ground water.

V-13 Appendix 1 Thresholds

Commenters: City of Bainbridge Island, City of Battle Ground, BIAW, Arnie Broadsword, EarthJustice, City of Edmonds, City of Issaquah, City of Kent, City of Kirkland, City of Marysville, City of Mount Vernon, City of Oak Harbor, City of Olympia, City of Port Orchard, Port of Tacoma, Regional Road Maintenance Forum, City of Renton, City of Sammamish, City of Seattle, Snohomish County, SnoKing Watershed Council, Val Stewart, City of Tacoma, Thurston County, US Fish & Wildlife Service, City of Vancouver, WSDOT

Summary of the range of comments

- Figure 3.1, with the change in definition for MS4 to include waters of Washington State this figure implies Permittees apply Minimum Requirements for projects that discharge to MS4s regulated under the UIC regulations. Is that Ecology's intent?
- Figure 3.1: If an applicant proposes to discharge directly to a major receiving body (instead of a MS4) there would be no requirements for the permittee to regulate that action. This appears contrary to the intention of the regulations, and would leave the potential for unregulated discharges to receiving bodies such as lakes, rivers, and the Puget Sound which are not part of the MS4.

- Appendix I, page 8, lines 1-2: revise application to "complete application." Add building permits and construction permits as well as subdivision and land disturbing permits and clarify to describe new development and redevelopment in the first sentence.
- Figures 3.2 and 3.3: revise "all minimum requirements apply" to "Comply with all applicable requirements", since the applicant must evaluate if minimum requirements #6-#8 apply or not.
- Section 3.3: Revise to read: "If runoff from the new or replaced hard surfaces and converted pervious surfaces is not separated from runoff from other surfaces on the project site..." When it is not possible or desirable to isolate drainage from existing surfaces from discharging to the proposed stormwater facility, clarify whether or not runoff from those existing surfaces should be modeled for the existing condition or predeveloped conditions.
- In Section 3.4, make this revision, "Other types of redevelopment projects shall comply with Minimum Requirements #1 through #9 for the new and replaced hard surfaces and converted pervious surfaces if the total of …".
- The thresholds use the terms new or replaced hard surfaces, but the definitions of new development and redevelopment refer only to impervious surfaces. Consistent with requests to eliminate the term, "hard surface," change the thresholds for new and redevelopment to impervious surfaces.
- Don't include pervious pavement in the threshold calculation and exclude from the stormwater treatment requirement. Suggest leaving changes in impervious surface as the threshold for when all minimum requirements apply for redevelopment projects.
- Include forest practices in thresholds section.
- Remove "plus replaced" from figure 3.2.
- Clarify how replacement of existing impervious surface by non-impervious hard surface is to be treated.
- Clarify how development thresholds apply to simple divisions of land without any infrastructure construction at the time of land division.
- Clarify how pervious pavement and green roofs will be treated for purposes of "replaced impervious surface"
- Clarify what type of vegetation conversions apply to the ¾ acre and 2.5 acre thresholds. Define vegetation and landscaped areas.
- Retain the word "native" or clarify intent in order to avoid unintended consequences for noxious weed control or restoration projects, and to not diminish the importance of retaining native vegetation on development sites.
- The focus on conversion from native vegetation to something else is incorrect. The focus should be on whether a land cover change causes a difference in the hydrology.
- New landscape areas should not be included in threshold calculations because they generally allow infiltration and should be encouraged.
- The 2.5 acre limit for the conversion of vegetation to pasture seems very high. Explain this threshold.

- Figure 3.3 implies that a re-roof or an interior remodel triggers MR #2.
- Using the proposed definitions of new development, redevelopment, and hard surfaces, a project which replaces 2,500 sq. ft. of permeable pavement with 2,000 sq. ft. of permeable pavement would trigger requirements 1 – 5. That is confusing. A project that replaces 5,500 sq. ft. of permeable pavement with 5,000 sq. ft. of permeable pavement would trigger requirements 1 – 9. Is that Ecology's intent? That is confusing and unreasonable.
- Under Section 3.3, Redevelopment, does the statement in regard to sizing stormwater facilities apply to projects that trigger Minimum Requirements 1 – 5, or only to projects that trigger Minimum Requirements 1 – 9?
- Not appropriate to have permeable pavement be required for road projects that are only replacing pavement, and thus trigger MR 1 – 5 in the redevelopment category. Appendix 1, page 9, Figure 3.2: "New impervious" was replaced with "new plus replaced hard surface area." This may result in a significant new obligation for WSDOT, mostly in rural areas, since in a highway setting the roadway may not cover 35% of the project area. Any project that just replaces roadway without adding any 'new impervious surfaces' will trigger all the Minimum Requirements (MR) instead of only MR2 as is currently the case. Was this the intent? By definition add "pavement rehabilitation projects" as redevelopment projects.
- Projects that trigger only Minimum Requirements 1-5 should be required to use LID BMPs to address only the project's new hard surfaces to the maximum extent feasible; not replaced surfaces.
- Allow use of *equivalent area trading* between *threshold discharge areas* (TDAs) to meet any new LID requirements as outlined in the HRM.
- Please clarify how the language in the first two paragraphs of Section 3.4 differs from the language in Section 3.3.
- Require LID for all projects in the public right-of-way.
- LID should apply to smaller projects.
- Support for LID at the site and subdivision scale applying to projects needing only to satisfy MRs 1-5.
- LID should only apply to large projects (e.g., that trigger all requirements). Mandated LID at 2000 sf of hard surfaces and 7000 sf of disturbed land is too difficult for a typical small project.
- Whenever 5,000 sq. ft of new pavement, roads should meet new SW requirements for the new and any replaced surfaces. It is necessary to start solving existing problems.
- Proposal will add site planning costs to small projects and require expanded expertise at local government.
- The revisions will require use of LID BMP's on projects triggering only MR 1 – 5. This will create an economic hardship.
- Unclear when the LID requirements apply.
- We do not have tools to require that all projects, regardless of size, must comply with erosion and sediment control requirements.

- The threshold for retrofit to implement LID techniques will make retrofitting existing sites increasingly difficult and in many cases infeasible. This may have significant impacts on redevelopment and land value.
- Suggest that the redevelopment thresholds for road projects triggering MR6 and MR7 be revised so that requirements apply to both new and replaced hard surfaces. Unclear rationale for the "50% threshold" and suggestion that road projects would not be significantly impacted by the cost of retrofitting replaced hard surfaces. Also suggest that funds for this retrofitting be spend in high priority locations.
- Clarify if the thresholds apply to more types of development/redevelopment actions than are specified by "subdivision, plat, or a short plat"; if intended to apply to parcel activities, add "parcel" to the list.
- Concern that using "hard surfaces" in the thresholds will make maintenance activities, such as shoulder work, more costly.

Response to the range of comments

- Yes, that is Ecology's intent. Permittees may meet UIC program requirements by applying their Stormwater Management Program to areas served by UIC wells (see Chapter 173-218-090(1) WAC). There are additional requirements for UIC wells such as registration, assessment, and retrofit requirements for UIC wells determined to be a high threat to ground water.
- That is the way the regulatory system is set-up. Ecology encourages local governments to place the same requirements on the stormwater discharge just as if it were discharging into its MS4. Their local permitting authorities should be established to allow them to do that.
- See revisions. Statement broadened to include other permits.
- The proposal solves one potential point of confusion while creating another. The point of the flow charts is to direct the permittee to read the minimum requirements that are applicable. If the suggestion is taken, the applicant can still be left wondering which requirements are applicable. No change to permit language.
- This statement in Section 3.3 was removed from this section and modified for insertion in Minimum Requirement #6 – Treatment.
- Comment regarding Section 3.4 accepted.
- Ecology is retaining use of the concept of "hard surfaces," and intends to use it in the thresholds. The definitions of new development, redevelopment, and project site are changed to replace "impervious" with "hard."
- Ecology does not concur with the suggestions. Pervious pavements generate as much pollution as impervious pavements. The pollutants are directed downward rather than horizontally. Ecology considers it appropriate to use the same size thresholds, whether impervious or pervious pavement, for triggering stormwater requirements and a review by the local municipalities to ensure that appropriate pollution control measures are being taken.
- Forest practices are regulated under different state authorities. Ecology does not intend to

regulate those practices under the municipal stormwater permits.

- Ecology thinks it is appropriate to consider application of updated stormwater requirements to replaced impervious surfaces at new development project sites.
- The intent is to use the thresholds as written in figures 3.2 and 3.3. An impervious surface is a hard surface. So, assume that the existing impervious surface is a hard surface.
- Please refer to Section 3.1 in Appendix 1 of the Municipal Stormwater Permit, Phase I or II. If the action is a division of land without any development activity, the municipality could delay the application of stormwater requirements until such time that building permits, or clearing and grading permits for individual lots are applied for.
- Pervious pavements and vegetated roofs are not impervious surfaces. They are hard surfaces. So, use the thresholds for hard surfaces when considering them.
- See new definition of converted vegetation.
- A new term, converted vegetation (areas) is incorporated. See flow charts and text.
- While the comment has merit, it cannot work as a threshold to trigger stormwater requirements. Also, the land's ability to generate pollutants is an issue.
- New landscape areas won't encourage much infiltration unless they comply with BMP T5.13. They won't have to comply with that BMP unless the thresholds are written to capture them. So, new landscaped areas must be in the thresholds.
- This threshold has been used since the 2001 manual. On till soils, this size of conversion causes a 0.1 cfs increase in the estimate for the 100-year return flow at sites in central Puget Sound. At that flow rate increase, a detention facility is considered a reasonable requirement.
- Re-roofing and projects that strictly do interior remodeling do not fit under the definition of replaced hard surface. They do not involve removing removal and replacement of exterior surfaces down to the building foundation. Therefore, they do not trigger MR #2.
- This is an unlikely proposition in the near future since there are so few permeable pavements. In the first situation, minimum requirements 1 – 5 are triggered. In the second case, requirements are not triggered unless the valuation or space (roads) thresholds of redevelopment are triggered.
- This statement will be moved to the section on MR #6 – Treatment. The statement applies to all stormwater treatment facilities on new and redevelopment projects that have hydraulic sizing design criteria. Treatment facilities listed in Chapter 3 of Volume V all have hydraulic sizing criteria.
- Pavement replacement projects are listed in the infeasibility criteria for permeable pavements. So, though the project initially triggers Minimum Requirements #1 - #5, the use of permeable pavements is not required. It is inappropriate to exempt such projects from the use of other on-site stormwater BMPs if they are feasible.
- Ecology does not agree, though Ecology agrees with exempting existing impervious road surfaces from the use of permeable pavements.
- Ecology will evaluate this in the future and suggests WSDOT discuss this proposal with Ecology staff.

- It may help to consider that Section 3.3 is the equivalent of the top half of Figure 3.3 (i.e., down to direction to proceed to the "Next Question). Section 3.4 is the equivalent of the bottom ½ of the flow chart. It is intended to address whether additional Minimum Requirements (other than those determined in the top ½ of the chart) apply to the replaced hard surfaces.
- Ecology is not proposing to change the proposal to indicate the suggestion to require LID for all projects in the public right-of-way.
- The 2,000/7,000 sq. ft. regulatory thresholds have a lot of history behind them. Ecology is reluctant to change them.
- Support for LID at the site and subdivision scale applying to projects needing only to satisfy MRs 1-5 noted.
- Cumulative impact of small projects can be substantial. Ecology has retained LID requirements for projects exceeding those thresholds.
- Ecology did not consider changing the thresholds this permit term. There are separate permit requirements in regard to addressing existing problems.
- Agreed. Ecology considered site planning costs and required expertise at the local level in the proposal.
- Not requiring LID on small projects will likely not meet federal and state anti-degradation laws or protect the aquatic natural resources in a developing watershed. Cumulative impact of small projects can cause substantial declines in water quality and habitat.
- LID requirements do not change the timing of when the applicant must demonstrate compliance with stormwater requirements. That is usually at the time of plat application. Where the applicant has assumed a certain distribution of LID BMP's on individual lots, the recordings for those lots must indicate the location and the size of the LID BMP.
- The requirement is already within the 2007 municipal stormwater permits. Municipalities can adopt ordinances that only require submission of Construction SWPPPs for projects that have triggered minimum requirements #1 - #5. But the ordinance must be clear that all projects that disturb land are to take measures to prevent and reduce the discharge of sediment from a construction site. And, the permittee must have the ability to enforce upon sites that violate those provisions.
- That could occur. The infeasibility criteria and limitations sections of the most demanding LID BMPs include considerations for redevelopment sites.
- The 50% threshold was established 12 years ago. Ecology did not actively reconsider changing it in this update.
- Better to read the definitions of new development and redevelopment to get an indication of what the thresholds apply to.
- It should not make maintenance more costly. Certain maintenance activities are exempt, and permeable pavements are considered infeasible for existing roads.

V-14 Minimum Requirement #1

Commenters: Arnie Broadsword, City of Kent, City of Kirkland, City of Oak Harbor, Pierce County, Puget Soundkeeper Alliance, City of Seattle, Snohomish County, City of Tacoma,

Summary of the range of comments

- The requirement to retain native vegetation and minimize impervious surfaces is ambiguous and confusing. ECY must provide detailed site assessment guidance if it wants consistency. What amount of clearing is OK? Concern it precludes development, reduces density ranges, and infringes on building size and use.
- This requirement to retain native vegetation and minimize impervious surfaces should not change the uses and development types allowed by the zoning; otherwise it could conflict with other rules adopted to comply with GMA. Add to the new sentence: "… *without limiting the specific uses or reducing floor area otherwise allowed by zoning and development standards*."
- Replace "Stormwater Site Plans shall use site-appropriate development principles to retain native…" with "Stormwater Site Plans shall encourage site-appropriate…"
- Change feasible to "maximum extent technically feasible."
- In Section 4.1, consider renaming "site-appropriate development principles" to "LID principles" for consistency with Appendix 1 definitions.

Response to the range of comments

- Ecology acknowledges it is ambiguous. Ecology does not intend it to add any additional requirement than what will be required when the local government's development codes are updated to include LID principles.
- Suggestion to change feasible to "maximum extent technically feasible" does not substantially change the requirement.
- Ecology did not use the suggestion for renaming "site-appropriate development principles", but is OK with a local government using this terminology.

V-15 Minimum Requirement #2

For new construction element #13 regarding protection of LID BMPs, please see the Response to Comments for Volume II of the Stormwater Management Manual for Western Washington.

Commenters: City of Bremerton, Cowlitz County, City of Duvall, City of Kelso, City of Longview, City of Oak Harbor, City of Olympia, City of SeaTac, City of Sedro Woolley, Snohomish County, Whatcom County

Summary of the range of comments

- Does the allowance for an abbreviated SWPPP format apply to sites that are less than 1 acre, or to sites where the land disturbance will be less than 1 acre?
- An abbreviated SWPPP format will be allowed for projects less than an acre if the permittee develops the abbreviated format. The abbreviated format should be standard among all jurisdictions. The City requests that DOE develop this form as opposed to local jurisdictions.
- Remove "regardless of size" from MR2. It is too burdensome with little benefit.
- The allowance for seasonal work limitations should be based on rainfall patterns not the calendar. It is not clear whether all of the conditions are necessary for each site.
- 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 'General Requirements' do not define what has to be disturbed to trigger a SWPPP. The definition of disturbance could pertain to inside a structure or other disturbance activities that are not land disturbing activities. We recommend adding a descriptor 'land' into the sentence. "...or which disturb 7,000 sq. ft. or more of land."
- Page 22, line 36; The permit eliminates the "Erosivity Waiver", however, the waiver remains in the 2012 SWMMWW. Is this the intent?
- Delete "regardless of size" because a SWPPP and consideration of all 13 elements should not be required for projects below the initial (2,000/7,000) thresholds (a residence installing a garden for example).
- Switch the order of Elements 12 and 13.

Response to the range of comments

NOTE: We have responded to comments on the "General Requirements" of MR #2 here. We have summarized and responded to comments on each "construction element" in the Volume II section of the response to comments on the stormwater manual.

- Ecology intends the latter and have changed the statement to "… development projects that will disturb less than 1 acre."
- Ecology agrees that an abbreviated format would be useful, but does not have a standard format available.
- The phrase is removed, but the intent of the statement is not changed. The local code should require all projects to comply with MR #2, even if they don't exceed the thresholds that trigger a stormwater plan and review by local government. Ecology has encouraged local governments to attach something to all issued building permits that informs the applicant of their responsibility to retain sediment on-site.

- The calendar dates are based on rainfall patterns in Western Washington. The local government must include all three conditions in their regulatory requirements if they choose to consider authorizing construction activities within the listed months. As applied on a case-by-case basis, the local reviewer must decide whether the proposed construction SWPPP has sufficient site conditions, limitations, and measures to qualify for construction authorization during this time period.
- Ecology agrees but has indicated elsewhere that a demonstration is necessary unless approved pre-sized approaches are used (e.g., Downspout Full Infiltration Systems)
- Ecology added the word "land" to the sentence describing land disturbance.
- The erosivity waiver is deleted.
- The phrase, "regardless of size" has been deleted. However, municipalities need to adopt a stormwater ordinance that indicates that erosion control is required on all construction sites, even very small sites. Projects below the 2,000/7,000 thresholds do not have to submit a Stormwater Site Plan or a Construction SWPPP.
- Ecology considered the suggestion to switch the order of elements 12 and 13, but rejected it because it creates other reference complications.

V-16 Minimum Requirement #6: Runoff Treatment

Commenters: City of Battleground, Arnie Broadsword, Kitsap County, City of Redmond, City of Seattle, City of Tacoma, Thurston County

Summary of the range of comments

- Clarify section 4.6 as follows: "Projects in which the total of pollution-generating pervious surfaces (PSPS) - <u>with the exception of permeable pavements which have a 5,000 square foot threshold</u> – is (3/4) of an acre or more in a threshold discharge area…"
- Add "new and replaced" to the first bullet under project thresholds in Section 4.6.
- The second bullet under project thresholds in Section 4.6 mentions a surface discharge. Is this a predicted discharge via an approved continuous simulation model, or is this an observed discharge? The bullet should be revised for clarity. This bullet is also missing the term "new and replaced".
- For clarity, the threshold should read: "Projects in which the total of <u>*new plus replaced*</u> hard surface ….."
- <u>Section 4.6 Runoff Treatment, Basic Treatment.</u> Provide a clear definition and identification of BMPs for pretreatment. Include operational BMPs such as street sweeping, if appropriate. The language of paragraph 2) is unclear.
- <u>Under Treatment Facility Sizing</u>**,** each jurisdiction should be able to choose their own design storm events based upon local data. This should not be specified in the permit or SMMWW, but handled through the manual equivalency review process. <u>Under Additional Requirements</u>**,** provide the reference for the document and include "or an equivalent manual."

- Consider requiring continuous runoff modeling for treatment facility sizing.
- The "Additional Requirements" section of MR #6 would allow discharge from permeable pavements to ground water without treatment. Modify the statement to indicate that soils beneath permeable pavements must provide basic treatment.
- Page 26, line 16 – Chapter 7 volume V -Infiltration and Bio-infiltration Treatment Facilities has many examples versus the 5% of the total area conditions stated here? Do we use Chapter 7 Vol. V? My understanding is the same facility may be designed for flow control in addition to treatment.
- Will green roofs – which may be subject to pesticides, fertilizers, etc., be considered PGPS? – If so, could these be exempted from the ¾ acre threshold?
- Clarify if and what type of treatment is required for permeable pavement and green roofs since both can be considered PGHS; bullets appear contradictory.
- Clarify why define different water quality design rates for pre and post detention BMPs; it seems that 91% of the volume flows through the BMP at or below the treatment rate applies in both cases without the need for this unduly burdensome differentiation. Use one standard for both cases.

Response to the range of comments

- Ecology did not accept the suggestion for clarifying Section 4.6. Ecology considers it unnecessary.
- The minimum requirement may or may not apply to replace impervious surfaces on a project depending upon the thresholds in Figures 3.2 and 3.3. No permit language change.
- Added, "or will be." It can be a projected discharge from the project plans, or it can be an observed discharge.
- It is not always true that the treatment requirements apply to replaced impervious surfaces. Ecology favors inserting a clarifying statement that indicates that you read the thresholds in regard to whatever surfaces exceeded the initial thresholds in Figures 3.2 and 3.3.
- Approved pre-treatment BMPs are either in Chapter 6 of Volume V, are basic treatment BMPs, or are listed as approved for pretreatment at the Ecology TAP-E website.
- Ecology does not concur. The Water Quality Volume was determined over twenty years ago. The Design Flow Rate standard was decided upon eleven years ago. These are technology-based, AKART level decisions that the state has made. Local governments can establish higher volumes and flow rates, but not lesser volumes and flow rates. The reference under "Additional Requirements" is to the *Stormwater Management Manual for Western Washington.* That reference is added.
- Ecology does require continuous runoff modeling for sizing treatment facilities that are based on a hydraulic loading rate. The only treatment facilities allowed to use single event modeling are wetpool designs (Chapter 10 of Volume V).

- Ecology agrees with the intent of the comment regarding soils beneath permeable pavements but has chosen to add a statement that is more consistent with direction given in the Stormwater Manual for Western Washington. See the changed text.
- Chapter 7 has been modified. Use Chapter 7 for design criteria for all bioretention devices. If the intent is to use a bioretention facility to completely meet the treatment requirement, then it must be properly represented in an approved runoff model to demonstrate that it will.
- Most roofs are considered non-PGPS. Vegetated roofs on single family residences and on commercial properties that do not vent significant amounts of dusts, mists, or fumes are considered non-PGPS.
- Green roofs are generally considered non-pollution generating. The level of treatment for permeable pavement depends upon the land use context. Use the same triggers as would be used for impervious surfaces.
- In 2001, Ecology made the decision to require use of the 2-year flow rate downstream of detention facilities. This was a flow rate readily identifiable through the design of the flow control facilities. This flow rate still is much smaller than the water quality design flow rate upgradient of the detention facilities. A treatment facility downgradient of detention will experience flows over a much greater length of time than facilities located upstream. The reduced down time between flows may cause inefficiencies in treatment due to low dissolved oxygen. To offset that, the 2-year release rate was identified as the target.

V-16.1 Basic Treatment

Commenters: City of Tacoma

Summary of the range of comments

- Section 4.6 Runoff Treatment, Basic Treatment. Provide a clear definition and identification of BMPs for pretreatment. Include operational BMPs such as street sweeping, if appropriate. The language of paragraph 2) is unclear.
- Under Treatment Facility Sizing**,** each jurisdiction should be able to choose their own design storm events based upon local data. This should not be specified in the permit or SMMWW, but handled through the manual equivalency review process. Under Additional Requirements**,** provide the reference for the document and include "or an equivalent manual."

Response to the range of comments

- Pretreatment is defined in Volume V.
- Ecology disagrees. The Water Quality Design Storm Event is defined by Ecology. It translates into different rainfall quantities based on local rainfall patterns. Local governments can choose larger storms, but not smaller storms.

V-16.2 Phosphorus Treatment

Commenters: People for Puget Sound

Summary of the range of comments

- Phosphorus treatment should be required for all discharges.

Response to the range of comments

- The need to control phosphorus inputs is driven by whether the receiving water has a documented problem with phosphorus, or is likely to have a problem unless phosphorus is controlled. Generally, this is an issue for areas draining to lakes.

V-16.3 Enhanced Treatment

Commenters: City of Kent, City of Tacoma, City of Woodinville, WSDOT

Summary of the range of comments

- Section 4.6 Runoff Treatment, Enhanced Treatment. The proposed revision to the first sentence is confusing. The requirement should be fully explained in this section.
- *Minimum Requirement #6:* Multifamily residential sites do not have the same pollutant characteristics as commercial or industrial and should not be subject to Enhanced Treatment requirements.
- Revise enhanced treatment criteria to only roads that have AADT of 15,000 or higher regardless of classification. Current requirement puts unfair burden on local agencies.
- Appendix 1, page 27, #3: Change "Enhanced Treatment" to "Dissolved Metals reduction" and "Basic Treatment" to "TSS reduction".

Response to the range of comments

- It would be cumbersome to explain fully within the text. The intent is that there are portions of the sites listed below that can apply only Basic Treatment. Those areas are described within the Basic Treatment thresholds on the next page.
- Comment not accepted. Most multi-family residential sites have large common parking areas whose drive aisles are subject to considerably more traffic than single family residential areas.
- The criteria for Enhanced Treatment for roads were set in a previous edition of the manual. Ecology did not review additional data on this topic. Therefore, the current criteria remain unchanged. The criteria were established based upon a review of

concentrations of metals from different road types and locations.

- Ecology considered the change in title of Enhanced Treatment, but decided to wait on the name changes until a full evaluation and update of the treatment BMP menus is completed.

V-16.4 Oil Treatment

Commenters: City of Tacoma

Summary of the range of comments

- Section 4.6 Runoff Treatment, Oil Control: revise the oil treatment thresholds to take into account the overall pollution generation of a site as well as the ratio of vehicles per building size.

Response to the range of comments

- The oil thresholds are not substantially changed. Local governments can add more instances in which it should be used.

V-17 Minimum Requirement #7: Flow Control

Commenters: City of Auburn, Arnie Broadsword, BIA of Clark County, Clark County, Kitsap County, City of Longview, City of Mount Vernon, City of Redmond, City of SeaTac, City of Sedro Woolley, City of Tacoma, Thurston County, US Fish and Wildlife Service

Summary of the range of comments

- Clean Water Act only requires restoration to 1976 conditions. Streams have adjusted to long ago land cover changes. Ecology is making new development pay for problems caused by existing development.
- Diversion of water from a stream is sometimes acceptable as noted in the supplemental guidance of the stormwater manual. So, change the minimum requirement "applicability" statement to allow that.
- Ecology should not require developers to match pre-developed condition. These provisions may violate RCW 82.02.020. Existing land cover prior to development should be required instead.
- Should "hard surfaces" replace "impervious surfaces" in MR7, page 31, lines 3-6 & 8-9?
- Since "native" was removed from flow charts, should it remain in Thresholds to trigger flow control?

- Revise the Permit and supporting documents to eliminate the flow control requirement for permeable pavement and green roofs.
- Define "effective hard surface" and "effective pervious surface" or remove.
- "Effective" is redundant when specifying flow rate changes that are seen off the subject property; clearly surfaces are effective if surface flow comes off the property. Delete "effective" from the 3rd threshold bullet.
- Evaluate use of terms "effective pervious" and "converted pervious" and standardize use and/or include applicable definitions.
- Revise to be consistent with Figures 3.2 and 3.3.
- Explain the rationale for the "40% impervious as of 1985" alternative standard flow control requirement; concern that existing degraded conditions in these areas will not be improved.

Response to the range of comments

- The Clean Water Act requires the maintenance and protection of beneficial uses that existed as of November, 1975. The stream conditions that may have been present in 1976 may not have been conducive to the long-term survival of the species in that stream at that time. So, it is incorrect to assume that the Act requires restoration to 1976 conditions.
- For many of the minimum requirements, Ecology has published supplemental guidelines in the stormwater manual that are intended to provide additional direction to municipalities concerning options for implementing and enforcing. Ecology does not intend to try to incorporate all of those guidance statements into Appendix 1. Municipalities can rely on the supplemental guidance statements as an indication of Ecology's regulatory position regarding proper implementation of the requirements, and regarding where the municipality has some discretion.
- Ecology did not actively consider changes to the flow control standard for this update. The existing flow control standard has been reviewed and upheld in previous legal decisions.
- The thresholds now read as intended in MR7.
- The text of the minimum requirement has been changed to be consistent with the thresholds in the figures.
- Permeable pavements may not meet the flow control requirement by themselves, and green roofs surely do not. They are both methods that can help a project meet its flow control requirements. But an estimation of their performance using an approved modeling method is necessary.
- Effective impervious and hard surfaces remain. Those surfaces are only ineffective if the runoff from them is handled through "Full Dispersion" (BMP T5.30), or "Downspout Full Infiltration."
- The term "effective pervious" has been removed. The definition of "converted pervious" has been changed.
- Ecology has revised MR7 accordingly.

- The decision to use the existing land cover as the flow control target in basins that have 40% or more impervious area since 1985 was made over 10 years ago. A discussion paper was written and released for public review at that time. In summary, Ecology does not see it as productive to have development projects meet the historic land cover condition flow rates when there are a host of habitat issues that if unaddressed will continue to preclude restoration of the streams in those areas to productive fish use. Phase I permittees are still required to have stormwater retrofit programs to make progress in reducing pollutants discharged to these waters.

V-18 Minimum Requirement #8 and Appendix 1-D of the Manual: Wetlands Protection

Commenters: City of Bellingham, Clark County, City of Kent, Pierce County, Snohomish County

Summary of the range of comments

- In the standard requirement section, replace "within the drainage area of a wetland" with "whose stormwater discharges into a wetland either directly or indirectly through a conveyance system." Otherwise it differs from the "applicability" section. Otherwise extensive field work and complicated modeling is required.
- Appendix I-D has not undergone rigorous review as a scientifically and legally defensible approach to managing stormwater discharges to wetlands. Guide sheet 2 restrictions on all stormwater BMPs/facilities from wetlands with native amphibian species is not supported by best available science.
- The original guidance for wetlands allowed the use of wetlands to some degree for water management as long at the hydro period was maintained. It would seem with a matching input strategy, the ability to make use of wetlands for attenuation will substantially be unavailable. The loss of this benefit will result in more land supply being devoted to stormwater facilities.
- Provide guidance on distance from a wetland a hydrologic analysis is required (ex. within ¼ mile of a wetland)
- This requirement will require modeling that is not an industry standard. It will establish a burden in regard to mapping, classification of offsite, downstream wetlands, and plan review.

Response to the range of comments

- Text changed similar to as suggested.
- The guidelines in Appendix I-D are as recommended by the Department of Ecology's wetlands scientists. These guidelines have the intent of meeting the hydroperiods suggested

in the previous guidelines. But the new approaches were created in acknowledgement of the limits of earlier data and modeling tools.

- Ecology does not agree with the conclusion stated regarding use of wetlands for attenuation.
- There is not a distance limit.
- Ecology respectfully disagrees. The new guidance is far more implementable than the existing guidance.

V-19 Minimum Requirement #9: Operation and Maintenance

Commenters: Snohomish County, City of Tacoma

Summary of the range of comments

- Incorporate MR #9 into MR #3. This will mean that all stormwater facilities will need an O&M manual, even those facilities built on sites that only triggered minimum requirements #1 - #5.

Response to the range of comments

- MR #9 refers to BMPs/facilities constructed to manage stormwater, e.g., detention ponds, treatment systems, bioretention. Those facilities are generally described in Volumes III and V. MR #3 refers to operational and structural source control BMP's that keep stormwater from being contaminated e.g., roofs, curbed enclosures, sweeping practices. Those practices are described in Volume IV. Ecology does not think it is appropriate to mix those two different categories of BMPs into one minimum requirement. They have been separated into different topic areas dating back over 20 years.
- In regard to O&M manuals for all stormwater facilities, Ecology does not agree with the suggestion that all facilities require an O&M manual that must be retained on-site or within reasonable access to the site, and a log kept of maintenance. Projects that trigger MR #1 - #5 do not build engineered treatment and flow control facilities. The only facilities that they may build in the future, that aren't already required (with no requirement for an O&M manual) are rain gardens and permeable pavement. These 2 BMP types do not require a formal O&M manual or a maintenance log. On sites that triggered only MR #1 - #5, these facilities are not being relied upon to achieve a particular treatment or flow control requirement. But they still should be maintained. That can be managed through identification on the deed and with public education programs. For projects that have triggered MR #1 - #9, any bioretention and permeable pavement facilities are being relied upon to contribute to meeting specific treatment and flow standards. They too need maintenance, and the permittee can use the same administrative methods to get compliance. However, in this instance, the

county bears the additional responsibility to inspect those facilities and to enforce proper O&M.

V-20 Exceptions/Variances

Commenters: City of Bremerton, Cowlitz County, City of Duvall, EarthJustice, City of Kent, Olympic Environmental Council, People for Puget Sound, Puget Soundkeeper Alliance, River Network/American Rivers, City of Seattle, City of Woodinville

Summary of the range of comments

- Should be a requirement to annually report number of variances granted; Ecology should review locals use of variances; should be consequences for overuse; should be public review and appeal provisions.
- Eliminate the "unexpected" requirement. Could conflict with property rights and complicates implementation
- Clarify intent in Section 6, page 35, lines 24-26 – Recommend "How the application of the minimum requirement(s) restricts the proposed use of the site compared to the restrictions that existed prior to the adoption of the minimum requirement; instituting the requirements of this permit; and".
- The definition of "severe and unexpected economic hardship" does not provide specific thresholds. The City recommends that thresholds be defined as a specific percent value loss (possibly 20%). for the stormwater portion of the project. Alternatively, the City recommends that language be included stating the "jurisdiction codify the percent value loss as part of the S5.C.4.g.i requirement."
- Variances should not be allowed. The effort is to stem stormwater overflows and handle stormwater on site/close to sites as possible. Excuses and ways around stopping overflows should be done away with. Variances are too easy where motivation for LID is lax.
- Define "severe and unexpected economic hardship"
- Process for determining economic hardship is subjective and arbitrary.
- *Additional Requirements for Re-development Project Sites (Section 3.4):* Provide additional exemptions because there is a standard presumption that the public sector cannot plead economic hardship.
- Provide discretion for determining if a variance is for the public good.
- Require permittees to consider the economic impacts associated downstream of the project when granting an exception or variance. Require permittees to summarize all exceptions and variances within their Annual Reports.

Response to the range of comments

- Ecology has the option of asking for that information. The variance provisions call for a legal public notice of the application and the decision. Though not an NPDES permit requirement,

it is standard procedure in local governments that such decisions can be appealed through a local process.

- The proposed variance provision is the same that has been in the municipal stormwater permits since 2007. Ecology did not propose a substantial change.

V-20.1 Require offsite mitigation as a condition of a variance

Commenters: EarthJustice, People for Puget Sound, Puget Soundkeeper Alliance, Sierra Club Email Campaign

Summary of the range of comments

- Any variances or findings of LID infeasibility should trigger requirements for mitigation for adverse impacts.

Response to the range of comments

- Ecology disagrees. If the conditions for a variance are met, there isn't a reason to ask for mitigation.

V-21 Use of basin planning to establish alternative requirements

Commenters: City of Auburn, EarthJustice, Snohomish County, Thurston County

Summary of the range of comments

- Need to provide greater clarity and direction regarding what can be acceptable. Must be at least as stringent as the default requirements. Should not be used to sidestep LID.
- Basin Planning should not be a requirement of this permit. The SUSTAIN model is not yet operational, so the permittees should not be required to use it.
- Ecology should propose an optional, pilot effort for interested Phase II permittees to develop stormwater planning on a watershed basis.
- At least MR#3 needs to be added to this section for consistency with Appendix I-A of the draft 2012 SMMWW.

Response to the range of comments

- Ecology has given more guidance in the supplemental guidelines and in an Appendix to Volume 1. With the exception of the basic and oil control treatment requirements, alternative requirements established through basin planning do not have to be as stringent as the defaults in the stormwater manual.
- Basin Planning is not required by Appendix 1 of the permits. The appendix indicates that permittees may use basin planning as a basis to support alternative requirements. The text is there to make sure permittees know of this option. Permittees do not have to use it, and the

section does not imply that they do. The requirement for basin planning in the permit (S5.C.5.b.) is a separate issue. Ecology has not specified that SUSTAIN must be used.

- Basin planning is not required of most Phase II permittees. Only those Phase II permittees who occupy a basin selected for analysis through S5.C.5.b. of the Phase I permit are required to participate in that process.
- It seems unlikely that a basin plan will identify new source control techniques or needs that go beyond what is in Volume IV now. However, if it there is a situation where it makes sense to identify and require new source control strategies in a watershed other than those already in the manual, that can be accepted by Ecology because locals always have the option of being more stringent than the permit requirements.

V-22 Site assessment/planning

Commenters: Ballard Stormwater Consortium, City of Bellingham, BIA of Clark County, EarthJustice, City of Everett, Kathy Humphrey, City of Longview, Master Builders of King and Snohomish Counties, City of Oak Harbor, People for Puget Sound, City of Poulsbo, City of Renton, Snohomish County, Sustainable Development Task Force of Snohomish County

Summary of the range of comments

- Extensive soil investigation or on-site infiltration rate testing must be required to prevent inordinate use of any minimum infiltration rate.
- Requirements for soil testing and borings, infiltration tests are too severe and costly, especially for small projects and results are unreliable.
- Prevent developers from clearing large areas of vegetation, putting in large detention basins and claiming there is no room for LID.
- Ensure flow patterns are broken up into small sizes to help mimic historic hydraulic flow patterns.
- Support for use of LID where they can be demonstrated to be feasible; require site testing/monitoring of groundwater and perched water in situ during periods of soil saturation. Site conditions are variable across the region and thus LID cannot be modeled. Require all installations to be monitored for effectiveness during and following installation. All stormwater controls that keep contaminated stormwater out of Puget Sound should be considered "green" solutions.

Response to the range of comments

- Ecology has recommended site assessment procedures in Chapter 3 of Volume 1 and more specific site procedures for bioretention and permeable pavement in Section 3.4 of Volume III. More analysis of site soils and knowledge of subsurface restrictive layers is necessary to properly implement LID, regardless of the size of the project. Ecology has recommended procedures that it thinks can provide the most valuable and accurate information. Local

governments can develop similar assessment procedures and authorize different testing techniques as long as the alternatives provide a similar level of information and reliability.
- Clearing a site and then claiming there is no room for LID should not be acceptable.
- Mimicking historic flow patterns is a standard LID technique that Ecology expects to be applied more often. However, it is not the only way to achieve the goal, so mandating it is problematic.
- LID will have to be modeled for projects that must demonstrate compliance with Min. Requirements 6, 7 and 8, and for projects choosing the LID performance standard. Ecology has recommended monitoring post construction performance.

V-23 General Comments on Low Impact Development

Commenters: City of Battle Ground, Arnie Broadsword, Clark County Clean Water Commission, City of Clyde Hill, City of Des Moines, EPA Region 10, City of Issaquah, King County, City of Kent, City of Lacey, City of Mukilteo, Northwest Indian Fisheries Commission, City of Olympia, People for Puget Sound Email Campaign, People for Puget Sound Group Letter, City of Renton, River Network/American Rivers, City of SeaTac, City of Tacoma, WSDOT

Summary of the range of comments

- Stormwater permitting should incorporate LID and greywater management, rainwater harvest and re-use, heating and cooling systems design, and irrigation needs.
- Concern that the permits make it possible for permittees to delay implementation, seek exceptions/variances, and seek presumptive compliance through mandatory lists.
- Eliminate special conditions attached to LID BMPs throughout the permit and SWMMWW. BMPs should have the same requirements as other infiltration-based water quality treatment and flow control facilities/BMPs.
- The implications of hydrologic design and low impact development have not been reconciled and are substantial changes to the historical approach to stormwater management.
- Allow permittees ample time, resources, and flexibility in adopting and implementing the new requirements, and by ensuring practicality and cost-effectiveness are part of the equation.
- Include strong, science-based standards for LID.
- Proposed requirements are risky for public projects and will cause confusion for citizens and developers.
- Tribes are not interested in stemming growth, but do want growth to be done in ways that protect salmon and its habitat.
- Changes to Appendix 1 do not represent low impact development principles.

- Ecology should pursue an approach similar to the stormwater facility design strategy (section 2-5.2) and the BMP selection process (section 5-3) in WSDOT's Highway Runoff Manual (HRM). **[**Refer to WSDOT's Comment Letter for a full description of WSDOT's alternative approach and how their alternative would meet a similar intent and meet the requirements of the PCHB's ruling.]
- Ecology's *allowing the fox to guard the hen house* approach doesn't provide the kind of clear-cut protections that scientific research suggests is needed to protect the beneficial uses from irreparable impacts. This approach is also fundamentally inconsistent with the regulatory scheme of the Clean Water Act, which requires the delegated agency to make the determination of compliance, not the permittee. Nonetheless, by failing to set clear criteria to ensure the protection of beneficial uses, this permit essentially codifies a system of voluntary self regulations, because the permittee decides both the level of protection and the tools needed to accomplish it.
- The design, installation, maintenance, and life-cycle costs of LID features in the Northwest are not well-documented. Ecology should initiate a structured, wide-spread pilot program focused on installing and monitoring LID techniques. This would go a long way in determining the feasibility of these techniques over the long term, which is particularly important given the diverse topography, hydrology, soils, and geology of the region.
- Provide evidence supporting LID implementation, and cost-effectiveness of LID compared to conventional site development and stormwater management techniques. Cite positive examples of successful LID projects across our region, so anyone concerned can see how integrating LID into a site can yield positive results.
- Information presented in the stormwater manual, LID manual, and draft permit insufficient to assess engineering and practical application, determine O&M requirements, and legal issues.
- LID BMPs should be implemented in phases so that barriers can be addressed and unintended consequences minimized.
- Clarify what practices are needed in areas where common infiltrating LID BMPs are not feasible before requiring local codes to require LID.
- The EPA supports the overall framework to include LID requirements at the site and subdivision scale, in local codes, and at the watershed scale.

Response to the range of comments

- Ecology does not agree because the suggestion is an over-extension of the subject matter of stormwater permits.
- Ecology has established deadlines, explained that limited use of variances is the expectation, and made it clear that presumptive compliance through use of the list approach in many development situations is acceptable.
- Not sure of the intent of the comment. Because the LID BMPs are mandatory (if not using the performance standard), it is necessary to try to identify circumstances when they are not

feasible. This is by necessity a different construct than treatment, where they have options based on site conditions; and it is different from flow control which can be met by detention, retention, or full dispersion.

- Ecology acknowledges it is a significant change from traditional stormwater management. It is a change that is long overdue and necessary because of the inadequacy of current development techniques and traditional stormwater management methods to protect the surface aquatic natural resources, and the lack of an adequate attention to cumulative impacts of development in virtually every watershed in western Washington.
- The permit provides implementation time frames over the course of the permit. Given the likelihood of increased, and likely unfixable impacts to freshwater systems that will be caused by future development not aggressively using LID techniques, it is incumbent on Ecology to press for use of these techniques and for local governments to commit themselves to using them and improving them over time. The State has developed guidance, provided grants, and training on LID for a number of years. Yet, full scale implementation of LID is nowhere near reality in most municipalities. To protect aquatic natural resources it is necessary for society to fully embrace the concepts of LID and require the application of them where feasible.
- Ecology acknowledges there are increased risks of costs and impacts to the public in implementing LID. However, not implementing LID undoubtedly puts the preservation of aquatic natural resources at very high risk. Without an adequately science-based strategy for managing pollutants and hydrology in a basin, it is not reasonable to expect that the surface water natural resources will be protected with our current stormwater strategies. And yet, that is what the federal Clean Water Act and the State Water Pollution Control Act require. It is understandable that the new requirements will cause confusion, angst, failures, and difficulties with implementing new approaches. That does not reduce the need to implement these new approaches. It does mean that there is a lot of training and learning ahead of us.
- Ecology acknowledges little inclusion of LID principles in Appendix 1. That is why there are permit requirements for broader code changes and watershed planning.
- Appreciate the comment, but Ecology does not concur that the WSDOT approach will work on a municipal basis.
- Ecology does not agree with the characterization in the above comment. Our local permittees often raise concerns about the detail to which the permit specifies minimum performance standards when other areas of the country do not have nearly the same level of detail. The regulatory tack of the municipal stormwater permit program has been to not use explicit effluent limitations, but rather programmatic requirements. Therefore, there will always be a tension about how detailed and prescriptive the programmatic requirements will be. Ecology makes judgments every permit term about how to make the permit more effective in reducing pollution due to municipal stormwater.
- Ecology does not agree, and neither does the Pollution Control Hearings Board. There may never be sufficient data to describe all the potential design options and site constraints.

While LID is not a panacea for completely mitigating the impacts of land development on the aquatic natural resources of the State, it is certainly a tool that has been demonstrated sufficiently that it can and should be used much more frequently than it is used now.

- It is not hard to find many examples of successful LID projects within our State and across the nation. One need only explore the references in the LID manual, at the Puget Sound Partnership website, at USEPA sponsored sites, and at information at non-profits supporting LID, and vendors advertising their products and successful sites; or to go visit the many LID sites already built across western Washington. There have been studies done by USEPA and non-profits that demonstrate substantial cost savings in using LID techniques. But, Ecology acknowledges that the cost-effectiveness of LID depends upon the development situation.
- Ecology and others are doing what they can to identify and provide guidance on engineering, practical and legal issues.
- A phased approach is not the direction Ecology was given.
- Ecology has identified feasibility criteria, and application limitations for many LID BMPs.

V-23.1 LID is counter to GMA mandates; may cause sprawl

Commenters: Ballard Stormwater Consortium, City of Bremerton, BIA of Clark County, City of Longview, City of Mount Vernon, City of Port Angeles, City of Port Orchard, City of Poulsbo, Master Builders of King and Snohomish Counties, Washington Dept. of Natural Resources

Summary of the range of comments

- Implementation of LID may lead to urban sprawl.
- The permit is mandating land use code changes that are the purview of GMA. Any changes must be established through GMA.
- Limit permittee liability by resolving the conflicts between the Permit and the Shoreline Management Act, Growth Management Act, state laws and local government authority to regulate land use. Require that only the LID accommodations be identified and planned, and direct agency staff to update the Shoreline and Growth Management Acts directly.
- The relative cost effectiveness of LID BMPs will lead to increased development of undisturbed land; LID is difficult to retrofit into already built areas.
- The LID principle to minimize vegetation loss could be contrary to Growth Management Act (GMA) requirements to accommodate infill development

Response to the range of comments

- Ecology does not concur. The speculation about leading to urban sprawl is a logical conclusion only if one takes a narrow view of LID. Practices and development standards can

be employed that can put more people into smaller spaces and preserve more areas in a natural condition. That could lead to significant changes in standard development techniques, housing types and commercial building standards.

- It is appropriate for the NPDES permit to require the use of all known, available and reasonable methods to prevent and reduce pollution to the state's waters. Those methods include development standards that reduce urban stormwater amounts, flow rates, and pollutants. Current development practices change water quality and natural hydrology to the extent that the beneficial uses are severely compromised if not lost. Restricting stormwater management strategies to end-of-pipe methods has not and will not be successful.
- The Pollution Control Hearings Board has stated in its opinions that it finds the goals of the Clean Water Act and State Water Pollution Control Act to be complementary with the goals of the Growth Management Act.
- Ecology does not think there is an inherent conflict of the named statutes and the permit. Certainly, development codes changes implemented to meet the permit requirement should be compatible with the SMA and GMA. And, code changes to meet the permit requirement will have to be adopted in accordance with GMA procedures.
- The basis for the first comment is not known. The second comment is often true. Ecology has established feasibility criteria some of which will come into play in redevelopment situations.
- If the end result is the same density of people per square mile whether you preserve vegetation or not, that should not be contrary to GMA.

V-23.2 Oppose regulatory requirements for LID; support voluntary incentives

Commenters: Association of Washington Cities, BIAW, Arnie Broadsword , City of Issaquah, City of Kent, City of Lacey, City of Longview, Master Builders of King & Snohomish Counties, City of Oak Harbor, City of Poulsbo, City of Renton, City of Sammamish, City of SeaTac, Skagit County, Taylor Shellfish

Summary of the range of comments

- Oppose mandatory LID requirements. Support voluntary, incentive-based approach.
- Oppose a prescriptive approach so that LID is not used inappropriately. Prescriptive approach will increase failures and slow implementation where they are possible and appropriate.
- Requiring LID stormwater management measures instead of encouraging their creative use in those areas *where possible* we feel further increases the chances for failure, subsequently slowing the implementation of LID storm water management techniques where they are more possible and appropriate.

- Where LID is appropriate incentivize LID rather than mandate it. Use more stringent LID or stormwater regulations adjacent to sensitive areas (such as shellfish growing areas) similar to what we have done with O&M requirements on septic systems.
- The technical requirements should encourage and incentivize retention of native vegetation to the extent feasible.

Response to the range of comments

- The PCHB ruling requires application of LID wherever feasible.
- Feasibility criteria are intended to identify instances where LID is inappropriate.
- BMP T5.30 is an option. Retention of vegetation has benefits by not generating stormwater. Ecology suggests that the local land development ordinance revisions are the best manner in which to require or incentivize native vegetation retention.

V-23.3 Support strong LID requirements but no additional direction

Commenters: Frank Backus, Arnie Broadsword, Cascadian Edible Landscapes, EarthJustice, Amanda Grantham, Green Light Gardening, Joyce Hannum, Thom Holz, Kathy Humphrey, Whitney Johnson, Lake Burien Neighborhood, Abigail Lynam, Judith Matchett, National Marine Fisheries Service, Nisqually Indian Tribe, Olympic Environmental Council, River Network/American Rivers, Rosemere Neighborhood Association, Vivian Sharples, Shorewood-on-the-Sound Community Club, SnoKing Watershed Council, Stewardship Partners & the 12,000 Rain Gardens campaign, Val Stewart, Sustainable Development Task Force of Snohomish County, Sustainable West Seattle, Katy Vanderpool, Jan Von Lehe, ZGF Architects

Summary of the range of comments

- Support strong or stronger LID. Support mandatory implementation of LID, but no additional details concerning aspects of the proposal that they support or oppose. The success of LID will depend upon actual implementation and Ecology's commitments to technical support, program review, compliance inspections and enforcement. Particular support for watershed approach.
- Ecology's Draft Permit language fails to meet legal requirements to mandate control of stormwater to the maximum extent practicable ("MEP") and to employ AKART, failing to fulfill the Pollution Control Hearings Board mandate to require low impact development ("LID") where feasible.
- All Phase II jurisdictions by this point have had to review their codes to identify barriers to LID and remove them. It is preposterous to argue that LID should not be mandated in Phase II jurisdictions in this Permit. All that is needed is a clear standard and a clear requirement with an implementation deadline.

- Direct permittees to adopt specific LID standards.

Response to the range of comments

- Ecology suggests the success of LID depends more upon developers and local governments buying into the concepts.
- Ecology disagrees with the statement.
- Ecology has proposed what it considers to be the best approach. Requiring the removal of barriers is less proactive than requiring LID principles to be incorporated into development standards.

V-23.4 Has the environmental need for LID been established?

Commenters: City of Arlington, BIA of Clark County, City of Port Angeles, City of Renton

Summary of the range of comments

- Does Ecology have data to confirm degradation even where ’05 manual requirements have been applied? Little benefit over flow control BMP’s in Appendix C of King County manual.
- Streams have adjusted to long ago land conversions. No need to control low intensity storms.
- In low growth areas, we will not see any appreciable changes with these new requirements.

Response to the range of comments

- It is unlikely that Ecology could identify a watershed in which the development standards of the ’05 manual are used throughout, so that the benefits could be observed. Computer modeling suggests that the Ecology flow control standard does not prevent significant shifts in hydrology that has impacts on maintaining beneficial uses. Monitoring of treatment BMP performance also suggests that end of pipe treatment systems often fall short of removing sufficient pollutants to prevent water quality degradation.
- Studies of urban areas by the University of Washington do not reveal a pattern in which one can predict which streams should stabilize and which will not. Without stream-specific knowledge it is not correct to assume that a stream has stabilized. In addition, unless a stream was fully built out years ago, it should still be experiencing ever increasing flow adjustments as more land is developed. Studies (Gasperi et al, JAWRA, 3/2009) done on correlating various hydrologic parameters to biologic stream health, as estimated using Benthic Index of Biotic Integrity (B-IBI) scores, reveal the importance of managing flows from even low intensity storm events.

- If the growth is extremely small, this could be true. But studies in the Puget Sound lowlands reveal changes in biological health of streams that have as little as 4% total impervious area.

V-23.5 Question application of LID (feasible and necessary) for urban redevelopment projects

Commenters: City of Bellevue, City of Bremerton, EPA Region 10, City of Longview, City of Woodinville

Summary of the range of comments

- Conduct an analysis to determine whether the increased standards (some say an increase of 330% of the runoff volume that needs to be managed) are technically and economically feasible and necessary, particularly for urban redevelopment.
- Consider reduced requirements for projects in Regional Growth Centers
- The opportunity to use LID stormwater BMPs and their effectiveness are more limited in developed areas due to competing urban density. Appropriate use of LID stormwater BMPS in an urban environment must take into account site, engineering, and cost considerations while accommodating growth and density.
- It will be very costly if not physically impossible to meet proposed requirements for projects 2-5000 sq ft. in the dense urban core. This will discourage redevelopment.

Response to the range of comments

- Ecology recognizes there are reduced opportunities to use LID BMPs and principles in areas that are already significantly developed. Sites being considered for redevelopment have already been developed without LID principles. And, the opportunity to incorporate LID BMPs in locations where they could be most effective is likely already lost. However, because of legal obligations to apply AKART, and to maintain and restore beneficial uses, it is necessary to try to make improvements in pollution control in urban areas as they redevelop. Ecology has tried to identify site and engineering based conditions that can make a site infeasible for LID BMPs. Probably the most ubiquitous criterion recommendation that will come into play on redevelopment sites is that existing impervious roads, driveways, and parking lots need not be replaced with pervious pavements. This is an acknowledgement that the methods used to build the original surfaces are probably not conducive, without significant additional work, to a proper functioning permeable pavement system. In addition, determining whether it could function would be difficult.

V-23.6 LID requirement should mandate native vegetation retention and limit impervious surfaces

(*Common comment to all levels of LID comments)*

Commenters: Rob Ahlschwede, Theodore Anderson, Rein Atteman, Norman Baker, Susan Baker, Ballard Stormwater Consortium, Burbank/Elliott Neighborhood Association, Cascadia Green Building Council, Clark County, Columbia Riverkeeper, EarthJustice, EPA Region 10, Jeanine Eshpeter, Mark Evans, Green Light Gardening, Joyce Hannum, Ann Hirschi, Kathy Humphrey, Susan Kaun, City of Lacey, Lake Forest Park Streamkeepers, League of Women Voters, League of Women Voters Bellingham-Whatcom County, Lider Engineering, Judith Matchett, Muckleshoot Indian Tribe, National Marine Fisheries Service, Nisqually Indian Tribe, North Sound Baykeeper Team, Northwest Indian Fisheries Commission, Jerome Parker, People for Puget Sound, People for Puget Sound Email Campaign, People for Puget Sound Group Letter, Pilchuck Audubon Society, Precautionary Group, City of Redmond, Kathryn Rodgers, Rosemere Neighborhood Assn, Shorewood-on-the-Sound Community Club, Sierra Club Email Campaign, Cari Simson, SnoKing Watershed Council, Stewardship Partners & the 12,000 Rain Gardens campaign, Val Stewart , Sustainable Development Task Force of Snohomish County, Sustainable Seattle, Sustainable West Seattle, Transition Port Gardner, Dan White

Summary of the range of comments

- Objection to lack of specific requirements for developments to retain a certain amount of native vegetation and to place limits on the amount of impervious areas. Suggestions to reduce or limit impervious area increases, or specify a net decrease.
- NMFS recommends that the forest cover and riparian buffer requirement be retained to the Maximum Extent Possible.
- Do not use the term “native” in establishing requirements for vegetation. It implies an assemblage that represents a time frame which is passing.
- Strengthen site planning requirement in C.5.a.ii so that LID should not become infeasible because of development practices and project design, e.g., Removing all soils and trees, reducing depth to groundwater.
- Additional non-infiltrating BMPs should be required, such as limiting site disturbance to building footprints, pier or pin-pile foundations, soil preservation, large canopy tree root protection, designation of Future Heritage Trees, soil amending, cluster development, stormwater bogs, bioberms, cisterns and water re-use/rainwater harvesting.
- Lists don’t include many LID options. This may discourage use. Add statement to not preclude additional strategies
- The GMA critical areas regulations limit native vegetation removal in and near wetlands, steep slopes and riparian areas. Additional stormwater rules mandating vegetation retention

are not likely to be supported by the public for smaller individual lot development in rural areas.

- Suggest that the State hire a professional, permaculture-trained water management specialist to consult on the use of vegetation to mitigate stormwater.
- Preserve least disturbed watersheds, no net loss of forest cover, halt runoff from new impervious surfaces, preserve and restore stream buffers, reduce amount of runoff from existing impervious area.

Response to the range of comments

- Ecology's position is that while native vegetation retention and limiting impervious surfaces are key LID approaches, the extent to which that happens on s site-by-site basis should be driven by updated site development standards. In addition, the best forum in which to set those limits is through a watershed-level analysis. It is the cumulative impact of development on a basin that determines its waters likelihood of meeting federal and state water quality goals and requirements. There are probably many combinations of strategies that could be applied to minimize hydrologic change and maintain sufficient water quality that the beneficial should be maintained. That will be demonstrated through the initial set of watershed plans done to satisfy another requirement of the permit.
- See the revised threshold statements related to native vegetation.
- Ecology has provided more detailed site planning guidance that encourages vegetation retention. But as explained in other responses above, the extent of native vegetation retention in various types of development situations should be addressed through: updates in site development codes; and updates in those codes based on watershed-level strategies.
- All the options listed above can be used to help reduce impacts and to help meet the LID performance standard. Soil amending is required to be used in all cases. It is not appropriate to require the use of the other listed BMPs as standard practice in all developments.
- The LID performance standard allows for use of various types of LID BMPs and principles and creativity.
- The proposal does not mandate vegetation retention, although local governments may establish such mandates through their development code updates.
- Thank you for the suggestion.
- Ecology's proposal does some of the above, but the scope of the comment goes beyond the authority of the NPDES permit program.

V-23.7 Economic/Implementation Issues

Commenters: City of Bellevue, City of Bellingham, City of Bremerton, BIA of Clark County, City of Des Moines, City of Edmonds, City of Issaquah, City of Kelso, City of Kent, City of Kirkland, City of Lacey, City of Longview, Master Builders Association of King and Snohomish

Counties, City of Mt Vernon, City of Newcastle, City of Olympia, People for Puget Sound Petition Campaign, City of Port Angeles, Port of Seattle, Puget Soundkeeper Alliance, City of Renton, Skagit County, Sustainable West Seattle

Summary of the range of comments

- We are concerned about costs. LID BMP's not reasonable in all circumstances. Other methods may be as effective and not increase costs of installation, O&M.
- The cost of installing LID to public and private entities needs to be analyzed. Economic impact of existing requirements not yet studied. Ecology should do an analysis of the costs of LID versus the flow reduction benefits these facilities provide. The cost of the new stormwater requirements will vary depending on site-specific feasibility for LID BMPs. More detailed analysis is required to better understand those costs, including costs for analysis and design, initial capital investment, construction and ongoing maintenance inspections, operations and maintenance, replacement and refurbishment, full life cycle costs and costs of system failures.
- Cost considerations for implementing LID must be balanced with the true costs of not implementing strong LID standards.
- The region is ready for LID, and arguments on cost or readiness should not be an issue.
- LID will have a drastic impact on growth and redevelopment
- We support LID but have concerns about long term costs and maintenance needs.
- MR#5 ignores huge costs to design, construct, inspect and maintain these systems, and is too prescriptive, too inflexible and too complicated to apply to all projects.
- Requiring LID in slow draining soils will cause unforeseen issues and increased long-term maintenance costs.
- Requiring LID on projects requires additional soil and geotechnical information that is not currently required for small projects. This required soil information will be an additional expense for developers, will require additional City staff review time, and will require cities to have staff with geotechnical knowledge.
- Economic Impacts. The cost of the new storm water requirements will vary significantly depending on the site-specific feasibility for LID stormwater BMPs and local requirements for implementing LID. Economic conditions make these increases a hardship.
- We strongly recommend a phased approach to increased LID storm water BMP requirements for the draft Phase II Permit. This is necessary to allow for more industry experience, better understanding of challenges with implementing LID stormwater BMPs, especially in the urban environment, economic conditions to improve, and for consistency with the Pollution Control Hearings Board (PCHB) Phase II LID decision.
- The public and private capacity to design, review, install, and inspect is not yet sufficient to move from the "facilitating LID" to the "mandating LID" stage.

- Broadly mandating LID techniques may lead to substandard project design and implementation failures. The number of unknowns associated with LID technologies poses significant risk for future failures and unexpected operational and maintenance costs. Complete additional work to define the development scenarios where low impact development implemented; provide an adaptable checklist approach.
- Provide more municipal involvement in the analysis of urban-scale land use interactions and their reconciliation. Municipal practitioners can provide expertise on the technical, legal, and community interactions and challenges associated with urban-scale development. The mandated use of LID techniques by the permit raises a level of regulatory and financial uncertainty that is atypical of municipal infrastructure decision-making.
- There is little long term experience with LID implementation. There are many potential problems associated with LID implementation and the potential for unintended consequences needs to be addressed. Ecology should postpone implementing mandatory LID to give time to collect and analyze monitoring data and the performance of LID pilot projects to understand the potential impacts, unintended consequences, and costs associated with this new technology
- The LID proposal requires local governments to establish requirements on the use of private property that may go beyond its constitutional powers to do so. A public benefit that should be borne by the public should not be imposed on private entities. There must be a nexus between requirements and impacts of the project. Ecology should analyze whether the requirements are unduly oppressive and whether there are other means of accomplishing the objective. State agencies are to utilize the process established by RCW 36.70A.370 (1) to assure that proposed regulatory or administrative actions do not result in an unconstitutional taking of private property.
- Local talent doesn't exist to design, construct and provide materials for these LID requirements.
- LID is cost effective where implemented on sites that support it, but when LID is forced in less supportive areas, they become much more expensive to design, install and maintain, and are overall less effective.
- Provide clear and concise method to determine the economic feasibility of many of the LID measures (relates to the "reasonable" part of AKART).
- Keep documentation about infeasibility simple where possible to avoid costs of geotechnical studies and PIT tests when not warranted.

Response to the range of comments

- Only if a site has highly permeable outwash soils could traditional stormwater management methods be as effective as LID BMPs and principles in reducing surface water hydrologic change caused by land development. On a site-by-site basis, LID approaches can often reduce costs as demonstrated by examples cited at USEPA and other websites. It can result in

increased costs too. However, development that does not meet the proposed Minimum Requirement #5 is more likely to have larger negative impacts on surface waters. And, development without aggressive use of LID measures throughout most watersheds will result in water quality degradation.

- Ecology will provide updated cost examples of developments with and without LID features to augment the existing information available on the costs and benefits of LID available on EPA's and the Puget Sound Partnership's websites (see reports available at http://water.epa.gov/polwaste/green/ and at http://www.psparchives.com/our_work/stormwater/stormwater_resources.htm#cost). However, cost is not the over-riding factor in this decision. Although it could be cheaper to stick strictly with conventional stormwater management BMPs, that approach does not protect water quality and the beneficial uses of fresh water or marine systems. So, to compare costs of employing new management strategies that will do a better job of meeting legal requirements to a system which is inadequate in meeting legal requirements isn't a level comparison. The flow reduction and pollutant control benefits that LID BMPs and principles (as required and defined in the permit) provide, may still not be adequate to protect the aquatic natural resources either. However, until land use decisions make appropriate use of predictive tools to control impacts to the aquatic resources, we are obligated to make use of the best available methods.
- LID BMPs and principles, if fully embraced, will have a significant impact on how our developments look, and where they occur. It is unlikely that they will significantly retard growth and redevelopment.
- Ecology agrees that there is more uncertainty in the long-term costs and maintenance needs of some LID BMPs as compared to traditional methods. However, the approach must be used if we are to have less of an impact on our aquatic natural resources. Ecology is making efforts to help identify long-term costs and maintenance issues. Certainly there are lessons yet to be learned and new approaches that will have to be taken to effectively manage stormwater systems that utilize more distributed techniques.
- Ecology agrees with the above comment. To correctly consider the use of LID BMPs and principles into the site planning process requires knowledge of the soils and groundwater conditions. However, even the existing stormwater requirements often trigger a professional soils analysis at small project sites. See existing BMP T5.10.
- Current economic conditions don't play a role in the determination of what constitutes all known, available, and reasonable technologies, or in the determination of what actions are necessary to meet water quality standards and maintain beneficial uses.
- In large part, LID is being phased in. The permittees have a few years before they must adopt and implement the requirements. The number of LID facilities, as compared to existing stormwater infrastructure, will be very minor for years to come. Also, there has been over 10 years of installing LID voluntarily in this region. It is time to move ahead with incorporating

LID as standard practice. As enabled by recent legislation, training will be provided to municipalities and development interests to facilitate a transition to LID methods.

- Ecology is responding to direction given by the Pollution Control Hearings Board.
- Ecology does not agree that there are so many unknowns with LID technologies that they should not be required. Without a mandate to use these known and available methods, most new and redevelopment will not use them. While there are increased risks with new types of infrastructure failures (e.g., ponded surface water, or improperly laid asphalt) in certain instances, the certainty of expanding the negative impacts to surface waters when these techniques are not used speaks to the necessity to change our standard practices.
- Ecology acknowledges that the permit requirements will cause a shift in municipal infrastructure management. Shifts in infrastructure management usually come gradually. However, Ecology points out that the impacts of standard development practices to the aquatic natural resources have been known by stormwater managers for over 15 years. Yet very little has been done to change those standard practices. The development of LID techniques and their use has been supported by federal and state grants, and a handful of local governments. These permit requirements direct permittees to take more progressive measures to meet our obligations to federal and state statutes in regard to water quality.
- Ecology does not agree that these requirements threaten private property rights, or are unduly oppressive. Land development changes hydrology and adds pollutants. Current land development practices cause water quality degradation and loss of beneficial uses in violation of federal and state water pollution control statutes. So, there is a strong nexus between the requirements and the impacts of land development that the requirements are trying to reduce. Ecology agrees that site-by-site application of LID strategies may not be the most efficient, or even an adequate way to achieve the goal of resources protection. But until local governments develop watershed-based strategies, based on sound science that demonstrate an ability to accommodate additional development and protect the aquatic natural resources, the default site-by-site application of LID is necessary to reduce the future impacts of new development.
- Design and construction of LID BMPs is not overly complicated. The basic skills exist now. There is adequate time to better train and familiarize practitioners in various design and construction fields, and local government staff.
- Ecology has identified feasibility criteria for various LID BMPs. Ecology does not intend LID BMPs to be installed in inappropriate settings. An assumption that LID is more expensive to design, install, and maintain in areas in "less supportive" areas is not accurate. It doesn't cost any more to retain trees in till soils than in native soils. It doesn't cost more to have the same size of a bioretention or rain garden system on a till soil that meets minimum infiltration criteria, than on outwash soils.
- Ecology is not proposing infeasibility criteria based upon economics.
- Ecology has indicated that the general recommendations in regard to field testing may be adjusted where warranted by a professional with expertise.

V-23.8 Municipalities do not have resources to change codes and implement LID

Commenters: City of Anacortes, Association of Washington Cities, City of Battle Ground, City of Bremerton, City of Des Moines, City of Edmonds, City of Issaquah, City of Kent, King County, City of Lacey, City of Mount Vernon, City of Mukilteo, City of Port Orchard, City of Poulsbo, City of Renton, City of Sammamish, City of SeaTac, City of Sedro Woolley, City of Sumner

Summary of the range of comments

- Municipalities don't have staff to revise codes and implement new requirements. It will take a large undertaking across multiple departments to conduct the proposed development code updates.
- MR#5 will be burdensome for city staff to evaluate and document all feasibility criteria.
- Municipalities don't have sufficient staff to inspect all LID facilities. It will be too expensive to inspect these facilities. Restrict inspections to those designed to comply with MR #7 – flow control

Response to the range of comments

- A meaningful and thorough update of the codes is a large undertaking. Ecology understands that this is an additional task for all departments involved. It is a task that Ecology considers necessary to achieve the requirement to prevent degradation of the State's waters due to new and re-development.
- The expanded requirements of MR #5 will place additional review responsibilities on local government staff. Ecology will develop and make available training opportunities so that government employees are prepared to assume those responsibilities.
- Ecology has limited the permittees' inspection requirements to certain types of LID facilities that are constructed at project sites that had to demonstrate compliance with Minimum Requirement #5 (LID performance standard option), #6 or #7. These are sites where the LID facilities are being relied upon to help meet quantitative flow rate control requirements and treatment requirements. Checking periodically that they are functioning as intended is crucial to protecting the aquatic resources.
- The need for ongoing inspections of these distributed stormwater management facilities to ensure their ongoing function is unquestioned. That will mean a larger burden on municipalities. Fortunately, this burden will ramp up only in proportion to the amount of new development and redevelopment occurring in a jurisdiction. And the ramp up won't start until after the code updates take effect. This should allow a good deal of time for a transition to a new way of doing business, and significantly delay the higher costs associated with inspecting a greater number of facilities.

V-23.9 Ecology should prepare a small business economic impact statement

Commenters: City of Anacortes, City of Bellevue, City of Bremerton, City of Lacey, City of Longview, City of Newcastle, City of Mount Vernon, Puget Soundkeeper Alliance, City of Renton

Summary of the range of comments

- Ecology should complete a comprehensive cost analysis or economic impact analysis and determine cost/benefit ratios. Section 19.85.030(1)(a) of the Regulatory Fairness Act requires agencies to prepare a small business economic impact statement if a proposed rule will impose more than minor costs on businesses in an industry.
- Economic impacts substantial for Commercial and Transportation projects (see HDR cost analysis)
- LID costs should be balanced with true costs of not implementing, e.g., costs to shellfish, human health, tourism, and fish habitat.

Response to the range of comments

- Ecology disagrees that the changes to Appendix 1 require a small business economic impact statement.
- There are undoubtedly costs to fish, human health, and tourism if current development practices continue.

V-23.10 Education and training needed to implement LID

Commenters: BIAW, Clark County, City of Des Moines, City of Everett, Green Light Gardening, City of Lacey, Lider Engineering, Master Builders of King and Snohomish Counties, Pilchuck Audubon Society, Port of Vancouver, City of Renton, Sno-King Watershed Council, Val Stewart, City of Sumner, Sustainable Development Task Force of Snohomish County, US Fish and Wildlife, Washington Public Ports Association

Summary of the range of comments

- Widespread education and training is necessary before any regulatory requirements. Local governments will have to dedicate significant resources to educate landowners and homeowners to prevent failures.
- Many cities do not possess the experience and knowledge related to LID in order to develop educated comments regarding the feasibility of applying LID within their geographic region.

- Need training, such as continuing education and certification, for those involved in implementing LID: designers, contractors, municipal staff reviewers, maintenance personnel/facility owners, municipal facility inspectors).
- Experiences over permit term should lead to refinements in design, O&M, feasibility criteria, etc.
- Need examples of application of Minimum Requirements 6, 7 and 8 to industrial, commercial, and residential projects.

Response to the range of comments

- The state has supported LID training and education for over 10 years. New training opportunities should be forthcoming as a result of legislation passed in the last session. Training for landowners and homeowners is also needed.
- The comment describing a lack of city LID experience and knowledge is an indication of the necessity of incorporating LID concepts into the municipal stormwater permit. In light of the conclusions of local research in regard to the impacts of development on surface waters, and the many examples of LID BMPs that have been built in western Washington over the last decade, this is a logical, timely, and needed step forward in stormwater management. The comment is also an explicit indication of the need to deliver training to local governments.
- Ecology has begun the process of seeking advice and professional assistance in developing a comprehensive, coordinated training plan for the State.
- Ecology agrees that implementation experience will lead to future refinements. Ecology will need ongoing feedback from municipalities, project proponents and others to inform future refinements.
- Ecology is preparing examples with cost estimates for release in 2013. WWHM training will also include examples.

V-24 Minimum Requirement #5: Onsite Stormwater Management

Commenters: City of Auburn, Arnie Broadsword, Jones Engineers Inc., City of Kirkland, City of Redmond, Snohomish County

Summary of the range of comments

- The first paragraph should incorporate the goal of not causing water quality impacts to surface waters or groundwater.
- MR #5 raises questions concerning a balance between social justice and environmental justice. The costs to comply with MR #5 are likely substantial, and therefore may be inappropriate for low-income populations.

- Concern that retaining stormwater based on pre-existing conditions will result in less water being released downstream and potentially interfering with riparian water rights.
- Clarify what percent of the runoff LID BMPs are intended to address (for example, the 2009 KCSWDM requires LID BMPs for 10-20%). 50% would be more realistically feasible than 100%.
- This whole section is difficult to understand and follow; suggest rewriting for clarity.
- The table in Section 4.5 which lists the stormwater management requirements for projects that trigger Minimum Requirements #1 through #9 has acreage limits that appear arbitrary. Eliminate the table and allow projects that do not trigger thresholds for flow control and water quality treatment to utilize the Mandatory List as an alternative to the LID Performance Standard.
- It is hard to imagine that someone could meet the requirements in MR #1 - #5 without the help of a stormwater engineering professional.
- Projects triggering MR #1 - #9 should have to meet the Performance Standard. Smaller projects should be allowed to use the prescriptive approach. Maybe slightly larger projects, based on a maximum disturbed area, could use a prescriptive standard. Use project size not parcel size to determine which requirements should apply.

Response to the range of comments

- Comment noted.
- It is more likely that updated stormwater requirements will improve flows in streams during low flow conditions, and thus support downstream water rights.
- LID BMPs are to be applied to all surfaces where feasible under the list option. Under the Performance Standard option, the designer has choices.
- The section has been significantly rewritten to improve clarity.
- The table gives most projects the choice to use the lists or the performance standard.
- Meeting Minimum Requirements #1 - #5 will require the services of at least a soils professional. That professional may not be an engineer, though a professional engineer with expertise in proper subject areas is an option.
- Ecology disagrees. There are too many instances in which meeting the Performance Standard on a development site would involve application of practices that would seem unusual.

V-24.1 Relationship of LID requirement to other requirements

Commenters: City of Arlington, City of Lacey, Port of Seattle, City of Redmond

Summary of the range of comments

- If LID is used with impervious surfaces minimized and native vegetation retained, do projects still have to meet other requirements?
- The mandatory lists do not include all LID practices and techniques that are feasible on many sites. If you want site plans to consider those, e.g., tree retention, reduced development envelope, rainwater harvesting, soil preservation you need to state so plainly.
- On-site Stormwater Management dives straight into a discussion of requirements for BMPs, without any mention of LID principles or the site design framework within which the LID BMPs should be incorporated.
- Do not require LID for industrial sites required to meet numeric discharge benchmarks or limits under other NPDES permits and allow those sites instead to consider all flow control mechanisms where needed to provide them maximum flexibility to design stormwater controls that meet their permit requirements.

Response to the range of comments

- Compliance with the expanded Minimum Requirement #5 does not relieve a project from meeting other applicable Minimum Requirements. The LID BMPs and LID principles used to comply with Minimum Requirement #5 will help attain compliance with the requirements for treatment and flow control. Demonstration of compliance using approved design and runoff modeling methods is still necessary.
- Note that Ecology offers the option of compliance with the LID performance standard by any combination of techniques. Projects using the list approach can apply even more LID BMPs and achieve even more runoff reduction if they so choose. Local governments can certainly state that use of additional BMPs is not precluded if the list option is chosen.
- That context is within the Site Planning guidance in Chapter 3 of Volume I, and is associated with Minimum Requirement #1.
- Industrial facilities are not exempt from meeting the requirements of local stormwater codes.

V-24.2 LID should not apply to flow control exempt areas

Commenters: City of Bainbridge Island, City of Bellingham, City of Bremerton, Kitsap County, League of Women Voters, City of Olympia, City of Port Angeles, Port of Bellingham, Port of Seattle, Port of Tacoma, Port of Vancouver, City of Poulsbo, City of Seattle, Washington Public Ports Association, WSDOT:

Summary of the range of comments

- The LID requirement should apply in flow control exempt areas.

- Exempt all areas draining to flow control exempt waters. At best, some LID BMPs could be a treatment option for pollution-generating surfaces.
- Exempt non-pollution generating surfaces (trails, bike lanes, walks) in the public right-of-way or a public place from LID as there is no significant environmental benefit added.

Response to the range of comments

- Ecology decided to not require most LID BMPs in flow control exempt areas. Those practices previously listed under Minimum Requirement #5 (BMPs T5.10 through T5.13) must still be used in flow control exempt areas. The primary purpose of the LID requirement is to reduce the likelihood of hydrologic changes that cumulatively have a negative impact on the attainment of water quality standards in streams. Ecology's opinion is that implementation of LID practices are not needed to attain water quality standards in flow exempt waters.

V-24.3 LID Performance Standard

Commenters: City of Auburn, City of Battle Ground, City of Bellevue, Arnie Broadsword, BIA of Clark County, BIAW, Cascadia Green Building Council, Clark County, EarthJustice, City of Issaquah, City of Kelso, City of Kent, Kitsap County, City of Longview, City of Marysville, City of Mount Vernon, City of Olympia, Puget Sound Partnership, City of Sammamish, City of SeaTac, City of Sedro-Woolley, City of Tacoma, WSDOT

Summary of the range of comments:

- Recommend strike out "~~Project sites that must meet minimum requirement #7- full flow controls- must match flow durations between 8% of the 2-year flow through the full 50-year flow~~." Sentence conflicts with MR7 on pg 32, lines 33-35 Flow Control Standards.
- Not based on sound science. Doesn't do enough for small storms. Prefer variant of federal standard.
- Inadequate basis. Is the fact sheet justification for the LID performance standard sufficient to promulgate a new standard? The standard was selected because it can be met, not because of any specific information stating it is appropriate.
- Meeting 8% of the 2-year flow through the full 50-year flow is an untested standard and may result in hindering the use of LID BMPs. Delete this language under MR#5. It is confusing; clarify if this standard applies to all LID BMPs or just project sites that require flow control.
- The LID performance standard and associated stormwater modeling has not been adequately developed, tested, and utilized in the industry.
- The standard has only been modeled, not tested on a regional scale.

- The LID performance standard does not represent "low impact" in that it results in infiltrating more runoff than would occur under pre-European contact conditions. Since rainfall normally captured by the forest canopy and/or evapotranspired would instead be directed into the ground. In some circumstances, rainwater harvesting could be employed to mimic these aspects, but has not been proposed as one of the LID options. And it works at cross-purposes with smart growth principles by creating new barriers to fostering redevelopment, thereby incentivizing development at the urban fringe and in Greenfields.
- The LID performance standard will have significant implications. Has Ecology run simulations on a representative 10,000 square foot parcel with typical development to figure out how large of a LID facility is needed to meet the proposed LID standard for feasibility? *MGS Flood* is not capable of evaluating the proposed standard. However, using the single-event model to run a worst-case scenario (i.e., the discharge is from an orifice and infiltration is not possible) resulted in detention volumes over four times that of current flow control design standards. The PCHB ruling never suggested that defining such a performance standard was necessary. Given the potential adverse implications, an adequate case hasn't been made to warrant the introduction of this new performance standard.
- Ecology acknowledges that a project proponent will probably not be able to meet the requirement by increasing the pond size alone; because of the nature of highway projects, the infeasibility for permeable pavements and bioretention, and the need to provide safe highways, we may not be able to utilize many of the more traditional LID BMPs and thus have to use ponds.
- The performance standard should be mandatory on sites down to 2 or 3 acres.
- The performance standard should have broader application to more projects, e.g., inside Urban Growth Area, or adopt another standard sufficiently proscriptive to ensure maximum application of LID principles and BMPs.
- Performance Standard will be unachievable in areas where soils don’t infiltrate well. Too aggressive. Will require large scale changes in the form and function of how development occurs. The proposed standard is not realistic or attainable. It would expand the regulatory authority into unproven and ineffective technologies, and will require too detailed analysis using sophisticated models. Urban landscapes cannot be engineered to mimic hydrology of old growth forests.
- Suggest a more effective approach is to allow for any options that achieve the desired performance standard; and allow for local approaches based on local conditions and circumstances.
- Ecology must add language to clarify when the LID performance standard does not need to be met.
- Amend the language to “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 may use a combination of LID techniques including bioretention, stormwater harvest and re-use, vegetated roofs, preservation of native

vegetation, minimum excavation foundations, as well as infiltration and dispersion BMPs as described in the *Stormwater Management Manual for Western Washington (2012)* to achieve the LID Performance Standard." Note: prescriptive rain garden sizing cannot be used in combination with the LID Performance Standard. Bioretention sizing shall be used instead."

- Ensure that WWHM can generate the information for the LID performance standard before this becomes a requirement.
- It is unlikely that Phase II counties will have sites outside of UGAs but within the MS4 coverage area that are 5 or more acres.

Response to the range of comments

- The text does not conflict. The text is pointing out that the lower limit of the flow control standard corresponds with the upper limit of the LID performance standard. This results in a combined standard that extends the full range of both requirements. The text does not independently add requirements; it merely clarifies the relationship between the LID Performance Standard and the Flow Control Standard.
- Ecology disagrees that the standard is not based on sound science or has an inadequate basis. The standard has a more sound science basis than the federal LID standard and any other LID performance standard that has been adopted by a water quality regulatory agency of which we are aware. The flow duration matching requirement will result in matching more of the flow duration curve produced by natural conditions. Based on computer modeling matching this portion of the flow duration curve will also result in matching or nearly matching the annual total of interflow and surface runoff produced by a natural land cover situation.
    - Watershed modeling work conducted by King County (Juanita Creek Basin Retrofit Study to be released soon) estimates that retrofitting 80% of the existing impervious surfaces in the Juanita Creek Basin to meet both the Flow Control and LID Performance Standards would result in improving hydrologic conditions in the basin to a level correlated with a probable B-IBI score that is associated with maintaining conditions suitable for salmonids.
    - Ecology ran a number of trial runs of different development types on different soil types to determine what would need to be done to achieve the LID performance standard. Ecology ran these tests using the existing, publicly available WWHM. The standard is sufficiently developed and tested. The standard is not utilized by the industry only because it has never been proposed before. In terms of the current computer modeling methods, it utilizes the same flow duration matching procedures as have been used for the flow control standard. The extent of the duration curve to be matched will just be larger. This standard was chosen because it would be easier to implement than the other similar (e.g., annual runoff volume) options considered.
- Post-development conditions create more stormwater than pre-developed conditions because of the loss of the hydrologic functions of vegetation – most significantly, the trees. That

additional runoff must go somewhere. Currently, the additional runoff is directed mostly to surface waters. That has damaging impacts on the biology of the fresh water systems. Under the standard, the extra water is split between going into the ground and going down the stream. So, reducing risk to the stream adds more risks associated with putting more water into the ground. It is simply unavoidable unless the rainwater harvesting and reuse is used. The State does not think that step is necessary.

- Ecology has run development scenarios to test the standard. If you attempt to match the predevelopment performance curve from 8% of the 2-year flow all the way to the 50 year flow with just a detention pond, it would have to be quite large. Probably, prohibitively large. That is partly why Ecology chose the LID performance standard. Unless you have on-site soils that infiltrate very quickly, you will have to use LID BMPs to meet the standard. Also, remember that at most project sites, you don't have to demonstrate compliance through use of the LID performance standard.
- If permeable pavements and bioretention are infeasible for your site, then choose the list option. In rural areas, that will mean full dispersion if the adjacent land can be used. If that isn't feasible either, then you don't have any obligation in regard to Minimum Requirement #5 other than to document the infeasibility of doing any of the list options.
- Ecology decided on the 5 acre threshold because most rural areas have that as the standard minimum lot size. As you reduce the lot size, the more likely there can be difficult complications with achieving the standard.
- Ecology considers the list approach to be a reasonable compromise for projects inside the urban growth areas. These are project sites where individual lots are relatively small.
- Except on large lots in rural areas, the designer may choose to comply with the list rather than demonstrating compliance with the LID performance standard. In rural areas, full dispersion option is available without having to demonstrate compliance with the LID performance standard. Ecology does not agree that compliance with the LID performance standard will demand changes in the form and function of how development occurs. Ecology does concur that unless there are more significant changes in the form and function of how development occurs, the State will continue to experience significant degradation of its aquatic natural resources in areas of new and re-development.
- Ecology has stated that as long as options can be adequately represented within the approved continuous runoff models, applicants can choose whatever combinations of methods they want to meet the LID performance standard.
- The revised Minimum Requirement #5 clarifies when the LID performance standard does not need to be met.
- For projects subject just to MR #1 - #5, Ecology thinks List #1 should be the primary route to compliance rather than the LID Performance Standard. The performance standard requires the services of a professional engineer. The applicant may have to hire a professional to evaluate soils for their small site, but they will not need a professional engineer unless they choose to use the LID Performance Standard.

- The existing, publicly available WWHM can be used to demonstrate compliance with the performance standard. This is done by simply adjusting the lower boundary for compliance to 8% of the 2-year flow. However, Ecology is updating the WWHM to make it easier to demonstrate compliance.
- Comment noted.

V-24.4 Mandatory list with prioritized BMPs

Commenters: AKS Engineering and Forestry, City of Auburn, Norman Baker, City of Battle Ground, City of Bellingham, Arnie Broadsword, Cascadia Green Building Council, Clark County, Cowlitz County, City of Duvall, EarthJustice, City of Edmonds, City of Issaquah, King County, City of Lacey, League of Women Voters of Washington, Lider Engineering, City of Longview, City of Monroe, People for Puget Sound Group Letter, City of Port Orchard, Puget Sound Partnership, Precautionary Group, City of Redmond, City of Renton, River Network/American Rivers, City of SeaTac, City of Seattle, City of Sedro Woolley, Snohomish County, Sno-King Watershed Council, Sustainable Seattle, City of Tacoma, Thurston County, Transition Port Gardner, City of Vancouver, WSDOT, Whatcom County

Summary of the range of comments

- Add tree planting to Mandatory lists #1 & #2 for every 1,000 sq. ft. of lawn/landscape
- Permittees should be given flexibility to apply a range of BMPs appropriate to local conditions rather than being required to use permeable pavement.
- I am not too sure what consider means? I disagree with the order of consideration. I would put rain gardens (bioretention) before permeable pavement. The Manual requires permeable pavement to be modeled as lawns, which means to me that you need swales/ bioretention anyway.
- Allow applicant to choose either bioretention/rain garden or permeable pavement. B/RG may prove more reliable in long run. Allow any type of infiltration system as long as a Tributary area to infiltration area ratio met.
- Allow rainwater re-use when utilizing the Mandatory Lists. Allow pervious pavement with overflow to full dispersion, without triggering the LID Performance Standard on small projects. Small projects in this case should be limited to those that do not trigger thresholds for flow control. Mandatory Lists #1 and #2 should include or encourage vegetated roofs and minimum excavation foundations.
- Allow full dispersion and permeable pavement to have "equal" weight in the decision matrix based on site conditions. Or, modify these lists to allow greater flexibility on the part of the design team in the application of LID techniques that are site appropriate rather than just "feasible".

- In Mandatory Lists 1 and 2 under "roofs" and "other hard surfaces" add: "Full infiltration in accordance with SMMWW Volume III Chapter III Section 3.3.9(a)."
- Require use of the mandatory list, not performance standard. Allow use of rain gardens in Mandatory List #2.
- Page 25, line 34 – Main concern is need property particularly in C & D soils. Typically rain gardens of Compost amended filter strips (CAFS) require less impact than dispersion.
- Remove Full Dispersion BMP T5.30 from the mandatory list but add a section that if Full Dispersion is used on a project or a threshold discharge area that MR#5 is met for that area. Many would argue that this is virtually always feasible.
- The LID requirement should include rainwater harvesting and reuse, green roofs, or cisterns.
- The underlying assumption that permeable pavement, green roofs and water harvesting are known and common technologies or practices *in our region* is wrong. If they are AKART, municipalities should not be required to pay to test their effectiveness.
- Requiring the use of specific LID techniques at all project sites is too limiting, and will likely create an emphasis on finding exemptions within the proposed feasibility criteria.
- The requirement to include Rain Gardens or Bioretention facilities in the public right-of-way will place a significant burden. Remove public roadways from the mandatory lists. This does not limit a jurisdiction from using these methods but it would not require them at this time.
- Add language that clarifies that the applicant is to use the first BMP listed to the extent feasible before considering the next BMP further down the list.
- Only small projects should use a mandatory list. Larger projects should be required to meet a performance standard.
- Use of only the first feasible practice is inadequate. LID uses multiple BMPs integrated throughout the site. Include an enforceable metric in the mandatory list approach that requires elimination of as much runoff as technically feasible.
- Because most projects will use the mandatory lists, Ecology should provide more specificity and measurability to the lists, and developers should have to document the effectiveness of each strategy and identify how runoff not addressed through LID will be managed.
- Concern that the phrase "no other on-site stormwater management BMP is necessary for that surface" could be misinterpreted to apply to MRs 6 and 7 as well. Suggest use "LID BMP" instead of on-site stormwater management BMP.
- Applicants should be allowed to choose any method on the list.
- For commercial buildings, the option of routing runoff below permeable pavement should be revised to allow runoff below any type of pavement. Modify the language in Mandatory List #2 for roofs under item #5 to reflect that impervious roofs may drain "to and/or below" permeable pavement, consistent with a Q&A from the Vancouver workshop.
- It should be clearer that there are no follow-up actions if the mandatory BMPs are infeasible. What do you do if none of the options are feasible?

- As written, the mandatory list prohibits the use of combinations of BMPs. This is illogical and unsound. A combination of multiple BMPs will be more stable and functional than reliance on one type. Revise to enable use of multiple BMP types.
- As written, the requirement can result in contradictory requirements. For example if full dispersion is feasible, but the driveway and walk must be permeable in accordance with the footnote.
- Concerned about routing impervious roof runoff below permeable pavement. This will increase the likelihood that permeable pavement will fail such as where hardpan is 20 to 40 inches deep.
- Clarify the second sentence under option 5 for roofs in list #2.
- There should be more LID options discussed. More detailed requirements and incentives for cisterns, green roofs, and water re-use are needed.
- The call out for full dispersion indicated BMP T5.30 does not also reference Volume III, Appendix C for further requirements for full dispersion of roadways dependant on collection system type and soils type. Alternatively a cross reference between the two sections dealing infiltration requirements could be provided in the new stormwater manual.
- Strongly recommend Ecology revise its list of mandatory BMPs. Additional LID BMPs should include, at a minimum, natural and engineered dispersion, compost amended vegetated filter strip, bio-infiltration pond, bio-infiltration swale, infiltration pond, infiltration trench and media filter drain.
- Clarify "for all surfaces with in each type of surface listed below." The next thing listed below is in regards to projects triggering MRs1-9.
- Since developers can use LID performance standard, do not call lists "Mandatory."
- Clarify what mandatory list #2 is for.
- Page 24, line 16 – This is confusing. Rain gardens are a bioretention option in the 2012 Manual.
- Consider revising Item 2 under List 2 for roofs to say that infiltration below pavement must be considered.
- Mandatory List #1, under "Roofs", rain garden and infiltration trench should hold an equal standing in the order of precedence, and a "cookbook" design for a rain garden should be provided to dispose of the same amount of runoff as the infiltration trench design. The required soils testing should be equivalent for both, infiltration trenches and rain gardens. If Ecology has set up the system to just have any level of "infiltration", a similar sizing scenario for infiltration trenches and rain gardens could be established.
- The mandatory list of BMPs fails to recognize that many LID approaches developed for suburban settings do not work in urban densities. As infiltration rates decrease, facility failures are expected to increase dramatically unless very complex and expensive geotechnical work is done during the design phase.

- It will be difficult for WSDOT to utilize the "Mandatory Lists" in this section. As part of WSDOT's MS4 permit reissuance, we would like to work closely with Ecology to develop an approach that is appropriate in a highway setting.
- For roofs, add a statement telling developers to check the conditions of their plat and determine whether disconnecting, or not connecting at all, the downspouts is a viable option. If a developer wishes to disconnect the downspouts to use one of these techniques in an area where conditions currently state that a closed conveyance system must be used, the owner or developer will be forced to do a plat amendment for the entire plat to modify their piece of property. For most owners or developers this would make this project infeasible due to the amount of time and cost involved. Suggest checking plat conditions to make certain a plat amendment will not be necessary.
- Small projects should only have pre-sized rain gardens unless steep slopes or underground issues restrict their placement; rain gardens with an overflow can be installed on all soils. Other items on the Mandatory List should be optional.
- Should require water reuse and strengthen requirement for green roofs.
- Add "unless written documentation is provided to demonstrate that LID BMPs are infeasible" to the MR#5 project thresholds section.

Response to the range of comments

- Ecology decided not to add tree planting to the lists. Although Ecology concurs that adding more trees to the urban landscape provides many environmental benefits, it did not think it appropriate to mandate such a detailed landscaping requirement.
- The only alternatives to permeable pavement are bioretention/rain gardens and partial dispersion. Neither accomplishes as much reduction in runoff as permeable pavement. For List #1, Ecology decided to give the same priority ranking to permeable pavement and bioretention/rain garden BMPs. This gives small projects more flexibility and less demanding requirements. For larger projects, permeable pavement is preferable over bioretention because the ratio of infiltrating area to contributing area is much higher. Thus, it has more ability to reduce surface runoff.
- Listed BMPs must be used if they are feasible. So, it doesn't make sense to "allow" BMP options in the list. Small projects don't have to comply with the performance standard.
- Full dispersion is viewed as likely more effective and more beneficial than permeable pavement. It has the potential to not only fully control runoff from the developed area, but also results in retention of significant areas with native vegetation.
- The lists are required for urban areas unless the LID performance standard option is chosen. The LID performance standard option will generally control more surface runoff. Projects using list #2 cannot use rain gardens because the flow reduction benefits cannot be sufficiently estimated.
- The term "rain gardens" does not include compost-amended filter strips (CAVFS). The latter are a treatment BMP option.

- As a result of discussions within the LID Advisory Committees, Ecology agreed to include full dispersion in the lists. Because full dispersion is seen as the most effective method for reducing flows, it is listed as the first BMP to consider.
- Rainwater harvesting and vegetated roofs are not considered AKART at this time for residences.
- Ecology has not mandated use of green roofs or water harvesting. Permeable pavement is seen as a known and available technology for many situations. The feasibility criteria are intended to identify those situations where it is not appropriate. Ecology has not mandated permittees to pay to test their effectiveness.
- If project proponents find the lists too limiting, they may choose the LID performance standard.
- The local government can choose to comply with the LID performance standard if they don't want to use bioretention.
- The requirement clearly states that applicants are to consider the BMPs in the order listed, and to use the first BMP that is feasible.
- Small projects and most larger projects can use the list or the standard. Ecology established a performance standard that is compatible with the goal of meeting water quality standards and maintaining beneficial uses. In our computer modeling, it became evident that projects in urban-zoned areas could frequently have trouble meeting the performance standard because of site limitations. Ecology considered universal application of the performance standard to be unreasonable, or at least extremely difficult to meet in a number of typical urban situations. Therefore, Ecology elected to require a technology-based approach for those areas. The lists include those LID BMPs that Ecology considers available and reasonable in most urban situations unless there are site limitations that make their use infeasible. Ecology requires project proponents to do the best they reasonably can to reduce hydrologic disruptions and control pollutants in those areas already designated for urban use.
- The list approach represents a significant increase in the amount of on-site BMPs that are expected to be used on a site. In practical application, there should be multiple BMPs used on a site, and stormwater will often pass through more than one BMP.
- Specificity and measurability are the reason for the design criteria for each BMP. For projects not triggering Minimum Requirements #6 - #9, Ecology prefers to not establish computational requirements. That is similar to the existing regulatory structure. For projects that trigger Minimum Requirements #6 - #9, projects are required to document the effectiveness of their LID techniques in order to determine if they have met the treatment (minimum requirement #6) and/or flow control (minimum requirement #7) requirements or whether they must add on facilities to do so.
- "LID BMP" is a synonym with "On-site Stormwater Management BMP."
- Ecology does not concur that applicants should be allowed to choose any method on the list. The lists reflect a priority order based on their effectiveness in reducing runoff.

- The proposal regarding use of vegetated roofs or infiltration below pavement has been removed. Local governments may require investigation of the feasibility of these options if they so choose.
- If all of the listed BMP options are infeasible, then the applicant is obliged to document that in their application. As indicated in the Site Planning guidance in Chapter 3 of Volume 1 of the SWMMWW, no other actions would be necessary to comply with Minimum Requirement #5. The applicant is still obliged to comply with the other applicable minimum requirements.
- Ecology does not agree that the list approach or the LID Performance Standard approach prohibits the use of combinations of BMPs. The list approach simply says no additional BMP is required for that surface. That does not prohibit the stormwater from passing through other downgradient LID BMPs.
- Revisions in the final permits correct perceived conflict.
- The revised requirement does not require routing impervious roof runoff below pavement. Ecology believes that is still a reasonable option for projects to consider, especially if they are taking the LID performance standard approach.
- For clarity, see revised statements in MR #5.
- More LID options are available in Chapter 5 of Volume V and may be used.
- The design details for LID BMPs have been removed from Appendix III-C of the SWMMWW and placed within the BMP descriptions in Volume V, Chapter 5. Appendix III-C now only includes computer modeling guidance.
- Natural and engineered dispersion are included under Full Dispersion (BMP T5.30). Compost amended filter strips are seen as a treatment BMP and are in Chapter 7 of Volume V of the SWMMWW. They certainly can be used in the LID Performance Standard option. The terms, Bio-infiltration pond and Bioinfiltration swale have been eliminated. The concepts that those options offered are included within Bioretention Cells, Swales, and Boxes. Infiltration ponds & trenches, and media filter drains are full scale treatment options. They too can be used to help meet the LID Performance Standard option as well as the treatment and flow control requirements.
- See revised statements in Minimum Requirement #5. The statement means for instance that all roofs have to go through the list options to determine the highest priority BMP that is feasible.
- Ecology agrees and has eliminated the word "mandatory" from the titles of the lists.
- List #2 applies to projects that have to demonstrate compliance with Minimum Requirements #1 through #9. List #1 applies to projects that have to demonstrate compliance with only Minimum Requirements #1 through #5.
- Ecology has defined the terms rain garden and bioretention differently. See the definitions sections in the Permit and in Chapter 2 of Volume 1 of the 2012 SWMMWW.
- Ecology decided to remove infiltration below pavement from the list.

- Ecology guidance for infiltration trenches and dry wells is to have them be used in highly infiltrative soils where they can be sized to take all of the rainwater that is tributary to them. They are not used on tighter soils. Ecology and local governments have tables for sizing infiltration trenches for different types of class A and B soils. In contrast, rain gardens and bioretention are deemed feasible down to much lower infiltration rates. And, Ecology has taken the position that they do not have to be sized to infiltrate all of the stormwater draining to them. Ecology is willing to accept whatever flow reduction benefit can be gotten. Much as has been done for infiltration trenches, local governments could create tables of rain garden bottom area necessary to have the rain garden considered a full infiltration option. Each table could have a set of free-standing ponding depths (3 inches to 24 inches in 3-inch increments) versus roof drainage areas with rain garden bottom surface areas (for a standard depth of soil, e.g., 12 inches) filling the table.
- The feasibility criteria are intended to identify situations where certain LID types should not be used. More upfront soils and subsurface investigation must be done in order to determine feasibility of LID techniques and how they can fit within the development envelope.
- WSDOT can approach Ecology on the issue.
- Projects that have already been platted and have their stormwater management plans approved do not have to comply with the new requirements. If a local government has requirements in development codes that would limit the use of LID BMPs, Ecology expects that those barriers will be removed through the development code review and revision process required in the permits.
- Pre-sized rain gardens are an option for small projects if such pre-sizing is available in their area and follows the minimum standards for sizing. Ecology does not agree that the other LID BMPs should be optional. That would involve not even implementing the existing On-site Stormwater Management options, which is not a legal option.
- The text of Minimum Requirement #5 already includes a reference to feasibility. In addition, the Site Planning guidance has a statement that feasibility decisions should be documented in the Stormwater Site Plan documents submitted for the project.

V-24.5 Permeable Pavement

Commenters: Robert B. Mallahan, City of Oak Harbor, City of Olympia, Snohomish County, City of Tacoma

Summary of the range of comments

- Revise the lists to make permeable pavements optional rather than mandatory.
- Mandatory List #1, under "Other hard surfaces", why is permeable pavement the preferred option over other types of infiltration? Require infiltration of any type, and this could be conditioned by a minimum requirement for bottom area in proportion to the tributary area.

- Provide industry standards for permeable pavements, both concrete and asphalt. Develop the necessary standard drawings for structural road sections, overflow structures, and utility trench check dams and specifications for porous asphalt and pervious concrete. Delete the requirement to install permeable pavements or set design parameters (i.e., aggregate storage layer) that ensure success rather than pavement failure.
- Supports permeable pavement for parking and residential traffic areas.
- Runoff and overflow from permeable pavement should not pass through bioretention because this will require extra infrastructure (pipes, inlets, pumps, retaining walls, etc.) and storms that require treatment should not produce overflow runoff from a properly designed permeable pavement section.

Response to the range of comments

- Ecology does not agree to make permeable pavements optional. Permeable pavements are a known, available, and reasonable technology unless site conditions trigger a feasibility issue.
- Ecology has done something similar to the suggestion. See the revised List #1.
- Ecology has chosen not to develop extensive design details for permeable pavements. Ecology does not have road building expertise. It is more appropriate to allow the local governments to create their own standard specifications for permeable pavements in their area. The *Low Impact Development Guidance Manual for the Puget Sound Basin* and other industry sources can be referenced and used.
- Comment noted.
- Text changed so that overflow and runoff from permeable pavement does not have to pass through a bioretention facility. However, projects subject to treatment and flow control requirements must still demonstrate compliance with those requirements.

V-24.6 Concern about construction cost and life cycle cost of permeable pavement

Commenters: Association of Washington Cities, City of Bremerton, BIA of Clark County, Cowlitz County, City of Everett, City of Kelso, King County, City of Poulsbo, City of Renton, City of Seattle, Snohomish County, Thurston County

Summary of the range of comments

- Requiring permeable pavements for roads would have a significant public cost. Examples include: 30% increase in construction costs (because pavement and gravel layers must be thicker for equivalent strength); increased lifetime costs for inspections and maintenance (including the purchase of equipment); and increased costs for pavement repair or replacement.

- Permeable pavement is a BMP that has not been thoroughly investigated and needs further evaluation in the field utilizing the Technology Assessment Protocol - Ecology (TAPE) before becoming a required BMP.
- Designs on slopes will require catch basins under road to meet flow control standards.
- Lack of material supply, higher material costs, and increased labor and equipment costs will make development projects infeasible.
- Draft documents appear to require the use of pervious pavements for non-arterial municipal streets in most cases. Experience with permeable pavement points to durability issues/reduced life spans. Permeable pavement should not be required before pavement mix designs are included in WSDOT standards. There are no standard specs for testing and acceptance and there is not a local standard mix of materials.

Response to the range of comments

- Ecology is aware of various cost estimates for use of permeable pavements. There are studies through the literature that document overall project capital cost decreases due to stormwater benefits. And there are projects where the costs will be higher than using impervious products. There likely will be higher long-term costs due to equipment purchase for maintenance. Increased costs due to replacement are not necessarily true.
  The commenters do not acknowledge the destructive impact that impervious roads have on the natural hydrology and water quality of stream systems.
- The TAP-E protocol applies to treatment systems. Permeable pavements are not recognized as treatment systems. Research is ongoing to determine if Ecology should grant any treatment recognition for them. Meanwhile, permeable pavements have hydrologic benefits. Those hydrologic benefits are well-tested and verified.
- Permeable pavement designs do not have to meet flow control standards by themselves. A downstream pond can be used to shave flows further. Any such ponds should be significantly smaller due to loss of water below the pavement. Standard designs on slopes do not call for catch basins.
- Costs for pervious concrete and permeable asphalt should go down appreciably as the demand rises. Currently their costs reflect the need to do special batches. If the majority of new and redevelopment projects need those materials to meet mandated stormwater requirements, the industry will have the materials more readily available. This has been the experience in Chicago.
- Ecology disagrees that permeable pavements will necessarily have reduced life spans. The literature includes reports of significant progress in improving asphalt and concrete mixes such that their lifetimes can match impervious pavements. Waiting for WSDOT to produce standard specifications is not a viable strategy. WSDOT has little need to produce the specifications because they are not mandated to use them on the highway system. Seattle and others across the country, as well as the *Low Impact Development Manual for the Puget*

Sound Basin, have developed specifications. Specifications are available from the American Concrete Institute in Section 522. It may be the best option for local governments to form a committee to agree upon local standard designs.

V-24.7 Comprehensive analysis of long-term costs and O&M for permeable pavement

Commenters: Association of Washington Cities, City of Bainbridge Island, City of Bellevue, City of Bellingham, BIA of Clark County, Clark County, City of Issaquah, King County, City of Mount Vernon, City of Olympia, City of Renton, City of SeaTac, Snohomish County, City of Sumner, Thurston County:

Summary of the range of comments

- It is believed that there is inadequate information at this time on additional construction cost, maintenance cost and the life cycle of such pavements.
- Too many situations in which permeable pavement will be problematic. Return to incentives rather than mandates.
- Completion of a cost/benefit analysis needs to be completed to understand the cost implications of using permeable pavements.

Response to the range of comments

- Ecology disagrees. There is sufficient information available to know that permeable pavements are a feasible option in many situations. Ecology has taken a somewhat conservative approach in not requiring them for highways, arterials, and collectors/distributors. See also response to comments under topic 24.6 above.
- An incentive-based program does not meet the direction provided by the Pollution Control Hearings Board. An incentives-based program will also take hold gradually, resulting in most projects not using permeable pavements and continuing to put the aquatic resources at high risk of degradation.
- A cost-benefit analysis is not mandated by federal or state laws. Federal and state water pollution control laws have technology-based and water quality-based requirements.

V-24.8 Design or construction issues with permeable pavement

Commenters: City of Bellingham, City of Issaquah, King County, City of Renton, Snohomish County:

Summary of the range of comments

- The design costs and time constraints for seasonal monitoring and PIT prior to construction is overly burdensome. The requirement for a PIT test to be completed for pervious pavement projects between 2,000 and 5,000 square feet is excessive. The cost of testing may exceed the value of the pavement. An alternate method is needed to provide determination of applicability of the BMP and default sizing of the water storage layer for the permeable pavement. This alternative sizing methodology should also be considered for projects over 5,000 sf where the pavement portion of said project is below an established size threshold.
- There are substantial public safety and private property damage issues with failure. The risks outweigh the potential benefits.
- Design guidance is inadequate or has too many conflicts. Examples include: permeable pavements tend to have high infiltration rates, but infiltration rates must be slower to provide treatment; need to avoid saturated conditions in the pavement base course.
- Support for treatment provisions for access roads and parking lots to prevent groundwater contamination.
- Permeable pavements could cause groundwater pollution.

Response to the range of comments

- Ecology has made its recommendations for appropriate field tests in the 2012 update of *Stormwater Management Manual for Western Washington*. Local governments can choose to select other field testing procedures that they feel are appropriate and useful for various situations.
- Ecology has provided its recommendations for minimizing risks to public safety and private property. It is also germane to note that the risks to the surface waters of the state of not using permeable pavements are quite well known and ubiquitous.
- Ecology has provided guidance concerning when permeable pavements are feasible and when they are not. It has provided specific guidance in regard to the quality of soils that must underlie permeable pavements that are pollution-generating so as to reduce risks of groundwater pollution.
- Comment noted.
- If the native soil beneath the pavement meets the soil suitability criteria, there is a low risk of groundwater pollution.

V-24.9 Operation and maintenance issues

Commenters: City of Bainbridge Island, BIA of Clark County, King County, City of Olympia, City of Poulsbo, City of Renton, Skagit County, City of Sumner, Thurston County

Summary of the range of comments

- Permeable pavements are not ready for widespread use. Difficulties include: not for medium to heavy traffic, cost of increased maintenance frequency and new equipment, homeowners ability to maintain is questionable, more damage from studded tires, clogging from winter sanding, salting passing through and creating ice domes, spot repairs, compromised support soils if saturated, more frequent overlays and less money available for maintenance, more complete failures and complete replacement needed, and overall higher risk to local governments.
- The type of vacuum street sweepers needed to appropriately maintain permeable pavements are not readily available and are expensive to purchase and maintain. Private property owners rarely adequately maintain permeable pavements.
- Do not require permeable pavement on city roads because of increased costs for cleanup, repair and potential loss of maintenance tools (i.e., chip seals and resurfacing).
- Additional information on the subject of maintenance, repair, and equipment is necessary prior to requiring permeable pavement.
- Do not require permeable pavements for public and private roads.
- How will one determine if permeable pavement is still infiltrating adequately? How will one determine if pollutant build-up and ultimately breakthrough occurs? And what happens then? Will underlying media need removal? How would you handle spills? The definition of permeable pavement should indicate that they must be maintained.

Response to the range of comments

- There are design criteria and feasibility restrictions to address a number of the difficulties listed. Increased maintenance costs are likely. Guidance to and cooperation from homeowners will be necessary. Studies that Ecology is aware of (e.g., Univ. of New Hampshire) point to the advantages of permeable pavements in preventing ice build-up.
- Local governments will likely have to purchase new types of equipment. The need to do so is a few years off. And, the number of pieces of equipment needed will start out small. Ecology points out that the limited benefits of mechanical street sweepers have been known for years. And the benefits of other designs using vacuum and sprays in reducing pollutant loading has been well-demonstrated. The use of permeable pavements is another reason to switch to more efficient street cleaning systems.
- Ecology is not mandating that existing impervious roads be replaced with permeable pavement. So, existing tools need not be lost.
- Permeable pavements are necessitated by the need to prevent degradation of the State's surface waters. Ecology is preparing maintenance guidance and cost information to assist local governments in preparing to manage permeable pavements.

- Ecology has limited feasibility of permeable pavement for roads to public access roads. If a project wishes to meet the LID Performance Standard they can demonstrate compliance using techniques other than permeable pavements.
- Ecology will suggest simple inspection procedures to test for adequate infiltration capability. Pollutant buildup in the pavement or in the underlying gravel media is not likely to occur. Pollutant buildup will occur in the soil profile beneath the pavement and base material. The issue is whether the soil has sufficient long-term pollutant adsorbing/absorbing/breakdown capability to manage the pollutants over the long-term. Ecology cannot guarantee that a breakthrough of pollutants to groundwater could not occur under some situations. However, we are gauging that our minimum soil characteristics criteria, combined with the large volume of soil receiving the pollutants in relation to the area generating pollutants, will provide an adequate method of long-term pollutant control. Spills on permeable pavement cannot be effectively controlled. Therefore, Ecology recommends against permeable pavements in areas that are more likely to experience spills. Where a spill occurs in a normally low risk situation (e.g., on a residential street), there will have to be a case-by-case assessment of the relative risks to surface and groundwater pollution in deciding whether to try to disturb the pavement in an attempt to retrieve a spill. The definition of permeable pavement does not and should not include the concept of maintenance.

V-24.10 Bioretention and rain gardens

Commenters: City of Bellingham, Lider Engineering, Olympia Environmental Council, Snohomish County, Val Stewart, City of Tacoma,

Summary of the range of comments

- Concerned about the siting, design, and construction of rain gardens without the services of a professional engineer. Homeowners do not have the expertise to do this.
- The tests and processes described in the Rain Garden Handbook are overly simplistic and unlikely to provide accurate data.
- Allow modified or equivalent versions of the Rain Garden Handbook, for example to address phosphorus, by stating "or equivalent design procedures" in the language.
- Please provide a differentiation between Rain Gardens and Bioretention facilities. Define Rain Gardens as accepting runoff from impervious areas less than 10,000 square feet, typically non-engineered facilities that may be installed by home owners or other professionals working in this field. Bioretention facilities would be those facilities providing flow control and water quality treatment to pollution generating impervious areas greater than or equal to 10,000 square feet. Design of bioretention facilities would be performed under the supervision of a professional civil engineer specializing in stormwater design.

- Biosolids should not be allowed for LID projects. Regardless of their legal status, "biosolids" are highly polluted and will run off with stormwater into surface waters and onto other yards, or percolate towards ground water.
- Rain gardens eliminate and reduce stormwater runoff from properties and enhance community aesthetics. They reduce stormwater by infiltrating and dispersing stormwater; improving stream water quality by eliminating high flow runoff during storms that scour, erode, and damage our local streams. Rain gardens reduce water pollution footprints and reduce flooding.

Response to the range of comments

- Ecology's site planning guidance references the services of a soils professional. Such a professional does not have to be a professional engineer. In addition, Ecology recommends but does not require the use of experienced landscaping services in constructing the rain garden. The County may prefer to require installation by experienced landscaping services.
- The updated handbook will have more complete guidance for the construction of rain gardens for new or redevelopment projects that are subject only to Minimum Requirements #1 through #5.
- Permittees are allowed to specify modified versions of the Rain Garden Handbook if they consider the modifications to be equal or better in providing pollution control benefits. Ecology does not want to state "or equivalent design procedures" after reference to the handbook, because it would set a precedent that would have to be used in many other places too. That simply gets too cumbersome and makes text difficult to read.
- Ecology makes a different distinction between situations in which Bioretention facilities are necessary, and situations in which Rain Gardens or Bioretention may be used.
  Rain Gardens are not an allowable option in threshold discharge areas which exceed the thresholds for application of the treatment requirement (Minimum Requirement #6), or the flow control requirement (Minimum Requirement #7). In those situations, bioretention facilities: 1)may be used if the project applicant is choosing (or must) meet the LID performance standard, or 2) must be used where List #2 applies, and bioretention is the first feasible option on List #2 for a roof or other hard surface. This restriction to bioretention is necessary regardless of the size of the area draining to an individual facility.
  On project sites to which only Minimum Requirements #1 through #5 apply, the applicant may choose to comply with List #1 or with the LID performance standard. If the applicant chooses the list option, a Rain Garden or Bioretention facility (applicant's choice) must be used for any roof or other hard surface where it is the first feasible option. If the applicant chooses to demonstrate compliance with the LID performance standard, the applicant may use a bioretention facility, but not a rain garden, to help achieve compliance.
- Biosolids must not be used in construction of rain gardens or bioretention facilities.
- Comment noted.

V-24.11 Construction and life cycle cost of bioretention and rain gardens

Commenters: Association of Washington Cities, City of Bellevue, BIA of Clark County, City of Issaquah, King County, City of Mount Vernon, City of Olympia, City of Renton, City of SeaTac

Summary of the range of comments

- Concern about the construction costs and life cycle costs of bioretention/rain gardens.

Response to the range of comments

- LID techniques have been shown to be cost-efficient ways to reduce surface runoff volumes and flow rates that degrade surface water systems. They do demand space and ongoing maintenance. A project proponent can use whatever approved BMPs they want to meet the LID Performance Standard option. If a local government does not want bioretention systems used in their jurisdiction, they can choose to require all projects to meet the LID performance standard using other LID techniques.

V-24.12 Call for comprehensive analysis of long term cost of bioretention

Commenters: Association of Washington Cities, City of Bainbridge Island, City of Bellevue, BIA of Clark County, Clark County, City of Issaquah, King County, City of Mount Vernon, City of Olympia, City of Renton, City of SeaTac, Thurston County

Summary of the range of comments

- Provide a comprehensive analysis of long-term costs of bioretention.

Response to the range of comments

- Ecology is preparing cost estimates and maintenance guidance to augment previous analysis on this topic by EPA and PSP (see additional comments for issue V-23.7). This information will not change the need to use aggressive LID practices in order to meet water quality standards and maintain beneficial uses.

V-24.13 Design and construction issues for rain gardens

Commenters: City of Seattle, Val Stewart, City of Tacoma

Summary of the range of comments

- Design, sizing, and construction requirements for rain gardens should be incorporated into the SMMWW or the municipal stormwater permit.
- Require a professional soils analysis to classify the soils for rain gardens.
- Soils that normally don't infiltrate well can be amended; consider WSU's calculations regarding soils with low infiltration rates.

Response to the range of comments

- Ecology will keep the guidance for rain gardens in a separate document that provides more user friendly step-by-step explanations than what is usually provided in the SWMMWW.
- Ecology agrees and has incorporated requirements for a soils analysis.
- Compost assists in increasing infiltration rates only through the depth that the compost has been tilled in. The underlying soil may still present a restricted infiltration rate or none at all.

V-24.14 Bioretention/rain gardens may add phosphorus

Commenters: City of Bellingham

Summary of the range of comments

- Need flexibility for other soil mixtures for phosphorus-limited waters

Response to the range of comments

- Ecology does not yet have a standard soil specification for bioretention facilities in phosphorus-limited basins. Ecology is funding additional research on bioretention designs that may demonstrate soil mixes that do not leach nutrients at higher rates and still remove solids, metals, and various organic pollutants at significant rates. If that research is successful, Ecology will issue updated guidance. Meanwhile, Ecology does not recommend bioretention with underdrains in those basins.
- If a local government wants to proceed with specifying or allowing a specification for an alternative soil mix, they may do so. However, for bioretention facilities, the soil mix must be tested and meet the specifications within "Design Criteria for Custom Bioretention Soil Mixes" under BMP T7.30 in Volume V of the *Stormwater Management Manual for Western Washington, 2012.*

V-24.15 Vegetated roofs

Commenters: City of Battle Ground, City of Bellingham, City of Gig Harbor, Green Light Gardening, Kathy Humphrey, City of Issaquah, North Sound Baykeepers, City of Oak Harbor, City of Poulsbo, Stewardship Partners & the 12,000 Rain Gardens campaign, Sustainable Development Task Force of Snohomish County, City of Tacoma

Summary of the range of comments

- Use of vegetated roofs is far from being a common and accepted practice in this region and should not be mandated. The requirement for green roofs being proposed is completely unreasonable and should be entirely removed.
- The standards for green roofs are weak.
- The requirement for a vegetated roof on commercial structure should come with thresholds of size.
- The "slope greater than 20%" feasibility criterion for vegetated roofs seems like a design choice that would be very easy to use to avoid the green roof requirement. Add language requiring the feasibility evaluation to specify the design limitations that would require a slope greater than 20% to allow the roof to function properly. Otherwise the slope would be required to be less than 20%, and a green roof would be considered feasible.
- Regarding the feasibility criterion "Building cannot technically be designed to accommodate structural load of a vegetated roof," specify how this would be determined and provide examples of when this condition might occur.
- Additional feasibility criteria are needed for green roofs.
- Revise feasibility criteria to state "vegetated roofs are infeasible if slope is over 40%."
- Clarify if significant costs associated with a green roof could make it infeasible even if the roof has less than 20% slope; the cost analysis does not appear in the feasibility criteria and instead appears only in the mandatory list.
- O&M and inspections of green roofs need serious consideration as it will be very difficult to ensure that commercial developments are properly maintaining their green roofs.

Response to the range of comments

- Vegetated roofs have been removed as an option that must be considered in Minimum Requirement #5. Vegetated roofs can still be used to help meet the LID performance standard, or where they are preferred.
- Ecology does not consider vegetated roofs to be sufficiently demonstrated and accepted in the area to consider it a default BMP for new or redevelopment. This is particularly true in regard to single family home construction.

- Concerns about feasibility criteria for vegetated roofs should be greatly reduced as vegetated roofs are no longer included in the list approach as an option that must be considered if all higher priorities are infeasible.
- Maintenance inspections for green roofs would seem to be more difficult than checking BMPs on the ground. However, at least one city in North America has started to require vegetated roofs. Ecology may be able to apply lessons learned from that experience in the future.

V-24.16 Comments on requirement for vegetated roofs cost analysis submittal

Commenters: City of Battle Ground, City of Bellevue, City of Bremerton, City of Kirkland, Kitsap County, City of Marysville, Pierce County, City of Poulsbo, Puget Sound Partnership, River Network/American Rivers, Snohomish County, City of Tacoma

Summary of the range of comments

- Don't use cost basis for green roofs. Just use engineering and science criteria.
- Provide more specific direction re what to include in the cost analysis.
- Providing the analysis will become the default choice. Concern that cost documentation is too simple and will result in too frequent use.
- This requirement adds significant cost to development as the weight of vegetative roofs requires a separate structural analysis, and is inappropriate to include as a stormwater permit provision.
- Requiring vegetated roofs or proving that all commercial development cannot include vegetated roofs is financially burdensome and is in conflict w/ many design standards.
- Vegetated roofs should be considered infeasible where their costs exceed conventional roof costs by 20% on a life cycle cost basis.

Response to the range of comments

- The intent of the proposal was to encourage developments to consider vegetated roofs, but not to require them. The cost analysis submittal was intended to create a source of information concerning costs for vegetated roofs. Ecology has removed the proposal to have commercial roofs provide a cost analysis because the quality of data would be questionable and the inefficiencies in the cumulative amount of time spent providing the information did not justify the requirement.

V-24.17 Comments on benefits of vegetated roofs

Commenters: City of Issaquah

Summary of the range of comments

- There is minimal, if any, hydrologic function of a vegetated roof (other than a dirt sponge) because the rainy season does not coincide with the growing season. A vault or a pond would be much more effective.

Response to the range of comments

- There is hydrologic benefit to a vegetated roof as demonstrated in field observations in Seattle and Portland.

V-25 Comments applicable to all feasibility criteria

Commenters: City of Bellingham, City of Bremerton, Arnie Broadsword, Clark County, EPA Region 10, City of Issaquah, City of Kent, City of Mount Vernon, Northwest Indian Fisheries Commission, City of Oak Harbor, Port of Tacoma, Regional Road Maintenance Forum, City of Seattle, Snohomish County, City of Tacoma,

Summary of the range of comments

- Feasibility criteria do not belong in the permit. They are design criteria for BMPs and should be only in the manual. Easier to change as we learn.
- Ecology should specify who makes the feasibility decision and how much deference reviewing administrative and judicial bodies should give that decision (e.g., a SEPA Threshold Determination is not overturned unless arbitrary or capricious). Where based on engineering judgment rather than unambiguous calculations, informed, legitimate professional opinions can differ. This can create a proliferation of litigation that does not serve the public well.
- Allow more local flexibility and engineering judgment in applying LID. The list is not comprehensive and should not be limited to these cases.
- Will encourage development on marginal sites where LID is not feasible, e.g., shallow soils and steep slopes.
- Ecology may want to consider some default on-site mitigation involving on-site storage for projects where feasibility criteria negate mandatory list 1. Otherwise challenging sites get a free pass on mitigation.
- The use of one feasibility criteria applying to mandatory list 1 and 2 will be confusing. It is suggested that a feasibility list be provided that is pertinent to each of the mandatory lists.
- Consider less stringent LID requirements and feasibility criteria for Puget Sound Regional Growth Centers.

- We understand that the concept of feasibility was a mandate from the PCHB; however, we are dissatisfied with how it was integrated into the permit. Essentially, the current approach allows for new development to opt out of LID practices based on numerous exemptions, such as soil types and cost of practices, and in many cases without prior approval of Ecology. LID approaches such as the retention of native vegetation and soils (and humus) should not be prohibited by these concerns, because they are neither impacted by soil type or cost. Unfortunately, the permit is structured such that feasibility exemptions can serve to prohibit these common sense practices. The end result being that Ecology's approach of granting discretion to the permittee, with numerous potential off-ramps, effectively eliminates the implementation of some of the most important LID practices.
- Support feasibility criteria and hope that DOE will continue to include additional guidance for when LID may not be appropriate.
- If an infeasibility decision is triggered, does this mean that an applicant would not be required to do the "infeasible" item or will not be allowed to do the infeasible item? We suggest that the applicant not be required, but be allowed to do the item. For example, according to the criteria, bioretention cannot be used in Landslide Areas, on slopes greater than 15% or within 50 feet of slopes that are greater than 20%. Add a condition clarifying whether or not it would be allowed if a geotechnical engineer provides an analysis that infiltration is safe in these areas.
- Provide a list of feasibility criteria for each of the mandatory BMPs in the list including roof downspout controls, dispersion and soil quality BMPs. If there is no case in which the BMP will be considered infeasible, state that. It should be noted that BMP T5.13 should always be feasible for lawn and landscaped area. If there is a scenario where it is not feasible, provide this scenario.
- We suggest including a brief discussion in the beginning of Section 8 restating that the mandatory list of BMPs are considered feasible and shall be designed and constructed per the requirements listed in the technical manuals except if the feasibility criteria are not met.
- Local governments will have to determine where and under what conditions LID will be feasible in their jurisdiction. This effort may be significant and costly.
- Add the qualifier that LID is required "where feasible" to the permit language in Phase II S5.C.4 and Phase I S5.C.5.

Response to the range of comments

- Ecology concurs with the suggestion to remove feasibility criteria from the municipal stormwater permits, and place them within the BMP descriptions in the manual.
- The permittee will decide if they want to challenge feasibility decisions made by the site professional. But the local government should require site-specific information unless they have made a regulatory decision about feasibility for a BMP type in a particular area based on the preponderance of evidence.

- In accordance with the applicable permit requirement (Phase II WWA S5.C.4.a.ii and Phase I S5.C.5.a.ii), local governments must be prepared to justify any changes and additions to the feasibility criteria included in the SWMMWW.
- Comment noted.
- Ecology will not establish any other default on-site mitigation other than compliance with all other pertinent minimum requirements.
- The engineering and site feasibility criteria are associated with the BMPs. Competing needs criteria generally apply to all.
- Ecology considered and rejected Puget Sound Regional Growth Centers as a basis for less stringent requirements. Ecology's use of the list approach and feasibility criteria was developed with urban areas in mind.
- *See other responses in regard to native vegetation retention and impervious surface limits.* In summary, Ecology thinks these are key concepts under LID. However, their proper use is in the context of site development codes. Ecology has a separate permit requirement for local governments to update their site development codes. In cooperation with the Puget Sound Partnership, Ecology has developed guidance for local governments to use in revamping their site development codes. In that guidance are examples of native vegetation retention and impervious surface limits suggested for different types of development. Yet it is still true that Ecology is not setting lower limits on the extent that local governments establish such requirements. Ultimately, Ecology thinks these concepts are most useful when considering their impact on a watershed-wide basis. Ecology has another permit requirement in regard to watershed planning which will help demonstrate the need for locals to set such requirements and limits.

  In regard to the criticism that the feasibility criteria establish a basis for projects to opt out of LID, Ecology is unapologetic. If Ecology requires LID BMPs, it should also provide guidance for the responsible implementation of LID BMPs. To require their use in situations where they are likely to fail or cause public health, safety, or property damage would be counterproductive.
- Comment noted.
- Ecology agrees that the BMPs could be allowed if approved by a permittee and has clarified this in statements preceding infeasibility criteria for bioretention and permeable pavements in Chapter 5 of Volume V of the 2012 SWMMWW.
- Ecology has provided statements in regard to applications and limitations and feasibility criteria for the listed LID BMPs. A limitation on the use of BMP T5.13 on steep slopes was added to the 2012 SWMMWW.
- Ecology does not believe it is necessary to make the suggested statement at the beginning of Section 8. Such statements might confuse people concerning their ability to use the LID Performance Standard option.
- Ecology has provided guidance concerning how to make feasibility decisions.

- The term "feasibility" in regard to Minimum Requirement #5 is adequately used in Appendix 1 of the permit.

V-26 Engineering feasibility criteria

Commenters: Rob Ahlschwede, Norman Baker , Susan Baker, City of Battle Ground, City of Bellevue, City of Bremerton, Arnie Broadsword, BIAW, Burbank/Elliott Neighborhood Association, Cascadia Green Building Council, EarthJustice, EPA Region 10, Joyce Hannum, Thom Holz, City of Issaquah, City of Kent, Lake Forest Park Streamkeepers, League of Women Voters, Judy LeBlanc, Lider Engineering, City of Marysville, Judith Matchett, People for Puget Sound, Pierce County, Port of Bellingham, Port of Seattle, Port of Vancouver, City of Poulsbo, Precautionary Group, Puget Sound Partnership, City of Redmond, Skagit County, Sno-King Watershed Council, Stewardship Partners & the 12,000 Rain Gardens campaign, Sustainable Development Task Force of Snohomish County, Sustainable West Seattle, City of Tacoma, Thurston County, Transition Port Gardner, Washington Public Ports Association, Dan White

Summary of the range of comments

- The feasibility criteria are too general, too vague, too many loopholes.
- Ecology does not define what is feasible but defers to local governments to make that decision.
- Remove language "where considered feasible by the developer."
- The criterion regarding geotechnical recommendations is quite broad. Could there be more specific guidance to ensure that bioretention, rain gardens, and permeable pavements are not as easily dismissed?
- The feasibility criteria are difficult for plan review staff to implement because of the lack of definition for what can or cannot be "reasonably" designed under each list of feasibility criteria. The feasibility criteria include so many loosely defined conditions for allowing exceptions to LID that most projects would be able to arguably exclude many of the LID BMPs.
- The Mandatory List states that a cost analysis may be used to claim the infeasibility of a green roof, but Section 8.1.C does not cite that in the infeasibility list. Recommend including cost in the infeasibility list.
- Geotechnical engineer opinion should be eliminated or changed to require justification for infeasibility decision based only on the other listed criteria. Define reasonable concerns for use of this criterion.
- The geotechnical opinion that bioretention and/ or permeable pavements should not be used should not be restricted to erosion, slope failure or flooding – recommend deleting the remainder of the sentence after the word "area".

- "Within an area designated as a landslide hazard area" and "Where geotechnical engineering evaluation…" are redundant with similar criteria in 8.1.B. Delete and replace with "In areas that infiltration should be discouraged or minimized due to reasonable concerns about destabilization of neighboring soils or down-gradient slopes including, but not limited to: erosion hazard areas, landslide hazard areas, and areas immediately adjacent thereto. Reasonable concern shall be based on an evaluation by the appropriate state-licensed professional (engineer or geologist)."
- Local governments should determine feasibility criteria. Site professionals should decide if LID is feasible for their project.
- Use feasibility criteria as a means to allow greater flexibility in implementing LID requirements in highly urbanized areas.
- BMP T5.13 should have feasibility criteria. Examples include: the amended soil mixing is not practical on steep slopes such as 3:1 or steeper (a compost blanket with seed fertilizer and mulch is a more practical approach); slopes greater than 35% in a non-infiltrating soil.
- Change "within 100 ft of a contaminated site," to "upgradient of a known or suspected contaminated site that could be hydraulically impacted." Add "or within the proximity of such a site with known groundwater contamination if the proposed infiltration may cause the migration of a contaminated plume."
- Recommend a distance gradation depending on the source of the stormwater and the expected quantity, instead of the 100' buffer for BMPs near known hazardous waste sites and abandoned or active landfills.
- Clarify that an infeasibility determination for one portion of the site does not make the use of these techniques infeasible on other locations on the site.
- Soil stability, impact on adjacent properties and the appropriateness of soils have to be considered.
- Support for LID where feasible and directly beneficial to the receiving water; support for including the feasibility criteria and request additional guidance for when LID may not be appropriate. Add infeasibility criteria for tidal influence, overwater docks and piers and potential historic soil or groundwater contamination (not all contamination is known).
- Allow jurisdictions to identify areas that have documented poorly infiltrating soils and grant LID infeasibility in these areas without the costly site-specific analyses.
- Use quantifiable performance standards to define required techniques relative to soil types and site characteristics.
- Infiltrating LID techniques may not be appropriate in the following circumstances: within 200' of a steep slope designated as a critical area, or any potentially unstable slope great than 1H:1V; areas with seasonally high groundwater less than 3 feet below the bottom of the treatment facility; stormwater facilities over contaminated soils exceeding MTCA cleanup levels; facilities where there is a high probability of spills such as fuel transfer stations or industrial sites that regularly handle large quantities of potentially toxic or mobile chemicals.

- Additional evaluation is needed for feasibility criteria on sites with poor infiltration or high groundwater.
- Permittees will be open to third party lawsuits when local codes supersede or reduce the LID requirements as allowed in this section.

Response to the range of comments

- Ecology has been specific where it can be specific. However, Ecology has to admit that it is not omniscient in regard to producing a comprehensive list of specifics for all possible situations. Therefore, there is a necessity to leave room for the site professional to make judgment calls based on site-specific knowledge of the site. The site professional must document and submit the basis for their feasibility decisions to the local government who also must make a judgment call.
- Ecology cannot prevent a "gaming" of this system. There will be situations in which professional judgment is invoked without a sound basis to forego LID BMPs. There must be a buy-in from all parties: designers, site professionals, local governments, and the public that LID is a desirable feature and is a tool that should be used to help protect the aquatic natural resources.
- Vegetated roofs have been eliminated from the lists.
- Ecology disagrees with the recommendation to eliminate geotechnical professional opinion, or to restrict its application only to the other listed criteria. Ecology considers it necessary to allow site-specific information and professional judgment to address situations not described in the feasibility lists.
- The use of geotechnical opinion is not restricted to erosion, slope failure or flooding. Geotechnical opinions are required for a number of other criteria.
- Ecology has reorganized the text to reduce duplication within the feasibility criteria.
- Site professionals will have to give their opinion and make project proposals. Local governments will have to decide whether the proposal has provided enough information to make adequate feasibility judgments, and whether to approve or not approve of project proposals. Ecology has provided an initial listing of feasibility criteria in order to establish a basis for decisions.
- The list approach and the use of feasibility criteria allow greater flexibility in implementing LID in urbanized areas.
- Ecology has added a BMP T5.13 feasibility criterion for steep slopes.
- Ecology does not agree to a feasibility criterion that would exempt areas based on speculation that they could hydrologically impact a suspected or known contaminated site. Ecology did alter the text of the feasibility criterion in regard to contaminated sites.
- Ecology understands the logic of the recommendation for a distance gradation and encourages the permittee to investigate and propose a gradient approach.

- Ecology agrees that an infeasibility determination for a portion of a site does not extend to other locations of the site. Ecology thinks the guidance supports that position.
- There are feasibility criteria for soil stability, impact on adjacent properties and the appropriateness of soils.
- Ecology has expanded the infeasibility criteria as a result of public input. The location of a site in relation to tidal influence is not an infeasibility issue. It is more an issue concerning whether LID is necessary for such sites. Ecology chooses not to establish a criterion based on the potential for historic contamination.
- Local governments can make those area-based feasibility decisions. However, Ecology will not accept such decisions that are not based on background and field-verified information. For example, there are NRCS soil maps that will define an area as till soils. The presence of till soils (or other soils classified as having low infiltration rates) is not adequate information to make a blanket infeasibility decision. If however, there are a number of existing infiltration test results for an area, none of which exceed the recommended minimum initial rate, that can be an adequate basis. The presence of a local seasonal high groundwater table whose boundaries have been roughly defined is another example.
- Ecology has published criteria, some of which are quantified.
- Ecology has established criteria in regard to proximity to steep slopes, seasonal high groundwater, contaminated soils, and probability of spills.
- Ecology has established criteria in regard to poor infiltration and high groundwater.
- Ecology can't prevent the filing of third party lawsuits when permittees deviate from or use judgment in implementing Ecology requirements and guidance. Local governments should be prepared to explain and defend the basis for their decisions.

V-26.1 Feasibility criteria for bioretention

Commenters: City of Battle Ground, City of Bellevue, City of Bellingham, Arnie Broadsword, EPA Region 10, Green Light Gardening, Kathy Humphrey, City of Issaquah, City of Kent, City of Longview, North Sound Baykeeper Team, City of Oak Harbor, Pierce County, Port of Vancouver, Puget Soundkeeper Alliance, Puget Sound Partnership, City of Redmond, City of Renton, City of SeaTac, City of Seattle, City of Sedro Woolley, Snohomish County, SnoKing Watershed Council, Stewardship Partners & the 12,000 Rain Gardens campaign, Sustainable Development Task Force of Snohomish County, City of Tacoma

Summary of the range of comments

- Soil standards are overly conservative. Revise standards to reflect that effective levels of performance can be achieved in less than optimal soils.

- Bioretention Feasibility Criteria: Clarify if the feasibility criteria are meant to apply to all rain gardens or if lined or facilities with underdrains are not required to comply or have a different set of feasibility criteria.
- Do not comprehend where a bioretention facility might be incompatible with the surrounding drainage system.
- For the criterion "Where they are not compatible with surrounding drainage system…" A formal process for proving the connection is not feasible is suggested. Otherwise this criterion could be used very liberally as a substitute for creative adaptive design that responds to site specific challenges.
- In redevelopment, how do you decide whether there isn't enough space? Is a bioretention device always a priority over other uses of the area? E.g., sports court, garden, etc. Could this tie into whether they have followed MR #1 in using appropriate development principles? Consider the acute space constraints often encountered by public road projects.
- Bioretention facilities can be any size or shape. So, what would make them infeasible due to space concerns?
- Restrict the bioretention "lack of useable space" infeasibility criterion and specify that it only applies to allow for not fully achieving the 5% sizing requirement for Mandatory List #2. Limit to PSRC regional growth centers and for redevelopment projects outside regional growth centers where the *current* building limits the ability to achieve the 5% sizing requirement. It should also state that bioretention should be used on these sites to the extent space is available where it is otherwise technically feasible.
- Maximum slope for bioretention should be 8% in all situations.
- It is inferred that sites that exceed the 5,000 square foot threshold can use multiple bio-retention facilities to avoid the need to have 3 feet of soil separation. It would seem that this would be using a technicality to not provide the same level of protection on larger development sites. This would appear to allow large commercial parking lots to circumvent the water quality protection for groundwater.
- Add a criterion that prohibits bioretention within an aquifer protection area. A criterion is necessary to protect municipal drinking water sources. The criterion should disallow bioretention wherever the soil suitability criteria in Section 3.3.7 of Volume III are not met, or as determined necessary by a local government.
- Minimum clearance to seasonal high water table should be 3 feet for bioretention serving drainage areas below the stated amounts; and 5 feet (3 feet if mounding analysis) for bioretention serving drainage areas above the stated amounts.
- For rain gardens, the Stormwater Management Manual will allow a vertical separation of 3 feet to seasonal high water table but the infiltration BMP requires 5 feet of separation. Make the two requirements consistent or provide clarification as to why one is more conservative than the other.
- Regarding the criterion for separation from seasonal high groundwater, bedrock,

impervious layers, specify if it is acceptable to add fill to increase the amount of separation from these layers. If yes, identify the design parameters.

- Add a criterion for bioretention in areas with phosphorus-impacted lakes. E.G.: "At sites that drain to phosphorous impacted lakes, within 1/4 mile of the lake or in soils that require underdrains."
- Ecology should clarify what is meant by "reasonably designed" in the criterion for bioretention on slopes. Permittees and project proponents need a clear methodology. This determination should be based on whether or not the design adequately incorporates LID principles per minimum requirement #1. Provide criteria for judging whether or not adequate site planning was performed.
- Revise the text of the criterion for minimum clearance to groundwater, bedrock, or other impervious surface so that it reads more clearly. For instance:

  > "Where both of the following are true: (1) the drainage area is less than one of the following (a) 5,000 sq. ft. of pollution- generating impervious surface, (b) 10,000 sq. ft. of impervious surface, or (c) ¾ of an acre of pervious surface;
  > and (2) the minimum vertical separation of 1 foot to the seasonal high water table, bedrock, or other impervious layer is not achieved.

- Add road surfaces to the criterion identifying threats to safety or reliability of pre-existing underground utilities or tanks. Ecology should be clearer regarding how to make this determination.
- Add "pre-existing operations" to "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."
- Edit "within 50 feet from top of slopes that are > 20%," to 100 feet and > 10 feet vertical relief.
- Change maximum slopes for bioretention from less than 15% to less than 10%
- Include reserve areas in criteria for on-site sewage system separation requirements
- Change "Landslide Hazard Area" to "Geologic Hazard Area".
- Add "Where "project" drainage area is less than 5000 sq ft…." to clarify limits of drainage area on page 37, line 35.
- Include a feasibility criterion for the circumstance of a site where storage of hazardous chemicals or other business activities cause a higher risk of spill to pollute groundwater.
- Add a feasibility criterion in the case that there is no safe emergency overflow pathway to the MS4.
- "Where the only area available for siting would threaten the safety or reliability of pre-existing underground utilities or pre-existing underground storage tanks." Specify how this would be determined.
- Individual jurisdictions should be able to decide if they will allow bioretention facilities within building setback lines.
- Setbacks from slopes should be based on geotechnical analysis.

- Allow lined bioretention systems (membrane or concrete liner) with underdrain provided it is approved by site geotechnical engineer within 50 feet from the top of slopes that are > 20%. Allow lined bioretention facilities with under drains within 100 feet of a known hazardous waste site; or abandoned or active landfill. Delete the "within local setbacks from structures" criterion because lined bioretention systems could be allowed near structures.
- Remove greywater reuse systems from "Within 10 feet of small on-site sewage systems and greywater reuse systems."
- A distance of 10 feet of a small on-site sewer system and greywater reuse system is too close; a more reasonable distance is 30 feet but soils should be taken into consideration.
- Clarify what is meant by "drainage area" (the disturbed area or the entire parcel, for example); use "project drainage area"
- Replace "impervious" with "hard" surface in the criterion "where the drainage area is less than 5,000 sq. Ft. of pollution-generating impervious surface, or…" and revise for greater flexibility if infiltration to the native soil below is not a primary design goal and no negative downstream impact will result. Clarify the criterion "Where the drainage area is more than any of the above amounts…," and revise for greater flexibility if infiltration to the native soil below is not a primary design goal and no negative downstream impact will result.
- Clarify why the criterion for prohibiting bioretention/rain gardens in local setbacks.

Response to the range of comments

- It is true that virtually any amount of infiltration on a site is a plus. However, the slower the infiltration rate, the more likely that the design will not function as desired, or that there will be other consequences, such as prolonged ponding and resurfacing. Ecology has recommended a 0.3 in/hr initial infiltration rate based on local experiences, the need to prevent ponding for 72 consecutive hours (mosquito breeding), and the general classification of soil capabilities.
- If an infeasibility situation can be overcome with by lining a facility, that may be done. But Ecology is not requiring that it be done. In those situations the desired hydrologic benefit of LID is greatly reduced. So, Ecology does not have an over-riding reason to require the LID facility. However, if the project proponent wants to take advantage of other benefits, e.g., use a bioretention facility to achieve part of their treatment requirement, then they can proceed by under-draining and lining the facility.
- An example would be a location where an underdrain design is not possible because it would be lower in elevation than the adjacent storm sewer.
- In redevelopment situations, the site has already been developed without regard to LID principles. So, there can be reduced opportunities for on-site stormwater features, and reduced benefits from whatever LID can be used. In redevelopment situations, Ecology is not prepared to indicate that designs must accommodate priority LID BMPs, or that

stormwater management takes priority over other design goals for the project site. Ecology wants project designers to take advantage of situations that are available to use for LID BMPs.

- Rain gardens can be any size or shape. Under the proposal, bioretention facilities are to be a minimum of 5% of their drainage area. That might not be doable in a redevelopment situation. In that case, Ecology would prefer a reduced size facility rather than no facility, but at some point (a judgment call) trying to force a lot of water through a small space can create other problems that offset any potential hydrologic benefit.
- Ecology changed the maximum slope to 8%.
- A large development could have multiple small sub-drainages less than 5,000 ft2 with each going to a bioretention facility that can meet the one foot clearance to groundwater, but not the three foot clearance. If instead, they had drainages greater than 5,000 ft2 to bioretention, they would need three feet to groundwater. This is not a groundwater pollution issue. The soil profile of the bioretention facility itself is expected to remove pollutants potentially harmful to the groundwater. The lesser groundwater clearance is more of a hydraulic issue. Ecology is suggesting that bioretention sites with small drainages need less clearance to groundwater.
- Ecology does not consider establishment of an aquifer protection area as a default criterion for making bioretention infeasible. Bioretention soils that meet the soil specification should be adequate to remove high percentages of most pollutants that could threaten a drinking water supply. Because rain gardens do not guarantee certain minimum soil qualities, municipalities could prohibit them in aquifer protection areas.
- Ecology is maintaining the same separation requirements it has had in the SWMMWW for the last seven years. Ecology is not aware of field experiences that indicate the minimum clearance guidance should be changed.
- Ecology anticipates that in most cases, bioretention facilities will have smaller drainage areas than centralized infiltration facilities. The five feet to groundwater is the minimum recommendation for the latter.
- Ecology does not encourage the addition of fill layers in order to meet minimum clearances.
- Ecology concurs that caution should be exercised in placing bioretention treatment facilities in phosphorus sensitive or impacted waters. However, this is not a feasibility constraint. It should be handled as an "application and limitations" restriction within the design chapter for bioretention (chapter 7, volume V), and within the text of BMP T5.14 - rain gardens. Meanwhile, Ecology is funding research on bioretention designs that we hope will demonstrate soil mixes that do not leach nutrients at higher rates and still remove solids, metals, and various organic pollutants at significant rates. If that research is successful, Ecology will issue revised guidance.
- Ecology has site planning guidance in Chapter 3 of Volume 1 of the SWMMWW. Local governments are to require use of this guidance or to adopt and require guidance which

provides an equivalent level of water quality benefits. The methods that a developer is allowed to use for site development are more the purview of a local government's site development ordinances. Ecology has a separate requirement of the Phase I and II western Washington stormwater permits for local governments to update those codes to incorporate LID principles and practices. The extent to which local governments change those codes will drive the extent to which Minimum Requirement #1 is implemented.

- Ecology has revised the text of the criterion that specifies clearance to groundwater, bedrock, or other impervious surface. It should have more clarity than the draft.
- Ecology added road surfaces to the criterion identifying threats to safety or reliability of pre-existing underground utilities or tanks.
- Ecology does not agree to adding "pre-existing operations." Operations are only compromised if a structure, road surface or underground utility is threatened.
- Ecology changed the permit language to include vertical relief. The suggestion to change the default to a 100 foot setback from slopes is not accepted because of a lack of basis. Note on-site septic drainfield setback is 10 feet.
- Ecology changed the maximum slope to 8% based on comments from other permittees with prior experience.
- Ecology has added on-site reserve areas to the criterion.
- Ecology has not changed landslide hazard area to geologic hazard area because it would broaden the term to include critical areas such as volcano, tsunami, and earthquake hazard areas. The term "landslide hazard area" is specific to the suitability of bioretention and permeable pavement.
- To clarify, the drainage area sizes listed refer to the size of the area draining into an individual bioretention facility. Note change in wording for this criterion.
- Because many sites commonly have some amount of hazardous chemicals, it would be difficult to distinguish those that pose a real risk to groundwater pollution. Those that store hazardous chemicals outside where they could be exposed to stormwater are supposed to apply the source control methods of cover and containment that prevent their release to the environment if they have a new or redevelopment project at that site.
- Ecology added the concept of an overflow pathway. However, typical rain gardens will probably overflow frequently. Therefore, the reference will not be to an "emergency" overflow, but to a regularly used overflow.
- Ecology will not provide additional detail. If an underground utilities' performance would be threatened by submergence in water for extended periods, that would constitute a reason for an infeasibility decision.
- Ecology will not stop local governments from deciding if they will allow bioretention within building setback lines.
- The new formatting allows for alteration of the setback based on the recommendations of a geotechnical professional.

- Bioretention facilities that are lined do not provide a hydrologic benefit and therefore are not an LID feature for which Ecology will provide feasibility criteria. If a project proponent wants to put in a lined bioretention facility to take advantage of the treatment capabilities of bioretention, they are welcome to do that. But Ecology will not mandate that lined bioretention systems should be placed in areas that are otherwise infeasible due to site constraints for bioretention systems that infiltrate.
- No reason was provided for the recommendation to delete a setback from greywater resuse systems. Ecology did not change.
- The current setback guidance from small on-site systems was agreed upon with the State Department of Health.
- "Drainage area" refers to the area that drains into the bioretention device.
- Infiltration into the ground is the primary goal for use of most LID BMPs, including bioretention.
- Local governments establish setback requirements from structures. They are usually done to keep water from around the foundation or from ponding below the structure.

V-26.2 Minimum infiltration rate for bioretention

Commenters: Norman Baker, City of Battle Ground, City of Bremerton, Arnie Broadsword, EarthJustice, Lider Engineering, League of Women Voters, Master Builders of King & Snohomish Counties, North Sound Baykeeper Team, People for Puget Sound, Pierce County, Precautionary Group, Puget Sound Partnership, City of Seattle, Snohomish County, SnoKing Watershed Council, Sustainable Development Task Force of Snohomish County, Sustainable Seattle, City of Tacoma, WSDOT

Summary of the range of comments

- Minimum infiltration rate should be 0.125 inches per hour; takes into account designing hardscape runoff to rain gardens.
- Where the *design* infiltration rate is less than 0.30 inches per hour, bioretention should be infeasible.
- Infiltration rate should be set at 0.50 inches per hour to limit liability for flood damage.
- The 0.3 in/hr minimum infiltration rate is too high.
- The 0.3 in/hr minimum is too low.
- Local experience suggests bioretention can be successful on very low infiltrating sites – lower than 0.3 in/hr. Allow down to 0.2 to 0.25 in/hr; with elevated underdrains required for lower rates.
- Please describe how 0.30 inches per hour was derived and confidence that side flow will not occur.

- No science basis for the proposed minimum rate. This will eliminate infiltration in many areas of Puget Sound
- Based on our experience, we support use of 0.3 in/hr as the minimum rate for bioretention. Lower rates require groundwater mounding, and full evaluation of groundwater regime during wet season. These tests require time and money, so, restrict to sites of 0.3 in/hr initial rate or greater.
- To the minimum 0.3 in/hr rate criteria, add *or where the geotechnical evaluation specified in the 2012 SMMWW recommends infiltration not be used due to reasonable concerns that the surface pool drawdown time of 24 hours cannot be achieved at all times*
- The guidelines for rain garden feasibility should be less stringent. In the manual recommended in the draft permit itself, "Rain Garden Handbook for Western Washington Homeowners", soils of 0.1-0.25 "per hour are described as feasible.
- 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.
- Mandatory List #2 Roofs, Item 3. "If the short-term native soil infiltration rate is less than 0.3 in/hr, do not use this option unless the roof is classified as pollution-generating impervious surface." This statement is confusing. It reads as though if the rain garden would be used for treatment, then it would be required to have an underdrain. Provide clarifying language or additional explanation. Suggested revision: "If the short-term native soil infiltration rate is less than 0.3 in/hour, this option cannot be used to meet the requirements of MR#5, but a bioretention facility with an underdrain may be used to treat pollution-generating surfaces."
- Using WWHM, WSDOT ran examples of 10,000 sq. ft. drainage area (60% impervious, 40% grass) at 48 inches of rain/year, 3 feet of storage, and 18 inches of soil. *Using a 0.15 inch/hour underlying soils infiltration rate, the stormwater facility would take up about 27% of the parcel area. We estimate using the 0. 5 inch/hour or 1. 0 inch/hour rates would use 13% and 16% of the parcel area, respectively.* Based on our analysis, we recommend setting the minimum initial saturated hydraulic conductivity at >0.5 inches/hour.

Response to the range of comments

- It is true that virtually any amount of infiltration on a site is a plus. However, the slower the infiltration rate, the more likely that the design will not function as desired, or that there will be other consequences, such as prolonged ponding and resurfacing. Ecology has recommended a 0.3 in/hr initial infiltration rate for the soils beneath the facility based on local experiences, the need to prevent ponding for 72 consecutive hours (mosquito breeding), and the general classification of soil capabilities.
- Seattle's experience in the much-publicized Ballard rain gardens design was that they had compromised designs where the initial infiltration rate was below about 0.3 inches per hour.

That rate is also published by the NRCS as a rate which classifies soils as Type A. Type A soils are supposed to have little runoff potential.

- There also is a need to prevent prolonged ponding. Prolonged ponding reduces the ability of oxygen to penetrate the soils. This reduces the rate at which soil organisms can breakdown organic pollutants. Prolonged ponding also provides conditions more suitable for successful mosquito larvae hatching. A number of species types require 72 hours of ponded water. The *LID Technical Guidance Manual for the Puget Sound Basin* recommends designs that will eliminate surface ponding in 24 hours. At a minimum initial rate of 0.3 inches per hour, 7 inches of water can infiltrate in a 24-hour period. However, the designer must also consider a correction factor based on variability of soils at the site and the number of locations tested. See Section 3.4 of Volume III. So, at these low rates, the designer may want to restrict the total maximum depth of ponded water.
- Soils testing and determining the depth to groundwater or other impermeable layer is necessary to determine the feasibility and location of infiltrating facilities. It is an unavoidable cost for LID design. Many small sites should already have been using a soils professional to determine their soil type in accordance with the existing guidance for downspout infiltration systems.
- The statement regarding using an underdrain has been removed from the list. The intent was to give the option of using an underdrained bioretention device if the site did not meet the 0.3 in/hr criterion. However, because stormwater isn't being directed into the ground, the hydrologic benefit is greatly reduced. So, it was decided to remove reference to that option.
- The WDOT analysis of areas needed for bioretention assumes that the bioretention facility has to achieve the LID Performance Standard. Ecology has not required that. Even in instances where the performance standard is chosen or must be achieved, the applicant can use other BMPs in addition to bioretention, and a downstream flow control facility to meet the standard.

V-26.3 Feasibility criteria for permeable pavement

Commenters: City of Bellevue, Arnie Broadsword, City of Duvall, EarthJustice, EPA Region 10, City of Gig Harbor, City of Issaquah, City of Longview, City of Oak Harbor, People for Puget Sound, Pierce County, City of Redmond, City of Renton, City of Sammamish, City of SeaTac, City of Seattle, Snohomish County, City of Tacoma, Thurston County, Whatcom County

Summary of the range of comments

- There are too many variables involved in determining whether permeable pavement is feasible for a site. Any feasibility list could not be comprehensive.
- In general, are these criteria meant to apply to pavements both with and without underdrain systems?

- Several feasibility criteria should be replaced with "Where it can be shown that the area to be paved cannot reasonably be designed to meet the pervious pavement design criteria" including: "Within 10 feet of a small on-site sewage…" "Where the site cannot reasonably be designed to have porous asphalt surface at less than 5 percent…" "Excessively steep slopes…" "Where the native soils below a road…" "Where seasonable high groundwater creates…" "Where fill soils are used…" "Where infiltrating and ponding water …"
- "Where the site cannot reasonably be designed to have a porous asphalt surface at less than 5 percent slope…" The term reasonably could be used to excuse a project from pervious pavement. What are the criteria to determine if it would be reasonable to conduct earthwork to flatten the grade and install pervious pavement.
- "Excessively steep slopes where water within…" Define excessively steep slope. There are techniques available for terracing the subgrade when it is sloped to slow the migration of water below the pavement surface.
- "Where the native soils below a road or parking lot do not meet the soil suitability criteria…" Consider where it is cost effective and feasible to utilize pervious pavement with distributed detention storage below the paved surface where water can be detained under the pavement surface (lined if needed) and then released to a downstream water quality facility via a control structure. This criterion does not provide adequate room for creativity and problem solving on the part of the design team, and may inadvertently restrict a site from installing a system that may have advantages over traditional pavement.
- This section should include consideration of potential weight restrictions, subgrade integrity, ability to maintain, and potential for exfiltration.
- Add road surfaces to the criterion identifying threats to safety or reliability of pre-existing underground utilities or tanks. Ecology should be clearer regarding how to make this determination.
- Regarding pre-existing underground utilities, clarify whether all types of underground utilities are relevant and whether new permeable pavement projects should be designed so there are no utilities beneath them.
- Remove option of inserting a treatment layer below permeable pavement in areas that don't meet the soil suitability criteria. No data to support this. Locating and relying on a treatment layer that cannot be maintained does not seem protective of waters of the state. Feasibility criteria not the place to introduce this concept. 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.
- Categorizing collectors and arterials, high use sites, and areas with industrial activity as infeasible for permeable pavements is unsupported.
- Clarify why the infeasibility designation for collectors and arterials does not extend to associated non-pollution-generating surfaces.
- Patios, plazas, sports and play courts should be exempted for architectural or sports regulation reasons.

- Should be a requirement to amend inadequate soils below permeable pavements.
- Pervious paver surfaces should be infeasible where the slope exceeds 5%. The limit for all pervious pavements should be 5%. Pervious pavement construction allowed on steeper slopes, but not required.
- Add a criterion that prohibits permeable pavements within an aquifer protection area. A criterion is necessary to protect municipal drinking water sources. The criterion should disallow permeable pavement where the soil suitability criteria in Section 3.3.7 of Volume III are not met, or as determined necessary by a local government.
- Minimum clearance to seasonal high water table should be 3 feet for permeable pavement serving drainage areas below the stated amounts; 5 feet (3 feet if mounding analysis) for permeable pavement serving drainage areas above the stated amounts.
- Due to lack of experience & testing, we have reservations about infiltration below pollution-generating impervious pavement because 1) concern about long-term viability of infiltration bed, 2) risks to adjoining properties and pavements, 3) effect on utilities in right-of-way. Do not require this.
- Delete "Note: these criteria also apply to impervious pavements that would employ storm water collection and redistribution below pavement" and add to design criteria in manual.
- Why is permeable pavement considered "infeasible" for the drive aisles of parking lots as long as runoff is directed to permeable parking spaces? That sounds like a design option for the engineer and not a feasibility criterion.
- Exemption for arterial/collector is not supported by science.
- The County sands all roads. Ecology must set forth express criteria for regular, heavy applications of sand. Limit this to a specific geographic region and / or by use.
- "High use" is not defined in the manual. Provide definition
- Add the following text to Appendix 1 page 38 after line 10: "Where the land use is industrial and there is a high probability of spills of hazardous materials."
- Provide recommended utility clearance criteria in the feasibility criteria and perhaps in the manual under design guidance.
- Unclear sentence, "Portions of pavements that must be laid at greater than 5 percent slope must prevent drainage from up gradient base courses into its base course". Clarify what is meant. If check dams are required say so.
- Permeable paving could be installed on steeper slopes if its base was benched and engineered accordingly. Replace this criterion with "The grade of any porous asphalt section increment exceeds 5%, or the grade of any pervious concrete section increment exceeds 6%. Portions of pervious concrete sections that exceed 5% grade must incorporate design features that prevent drainage from upgradient base courses into its base course."
- Recommend language be revised to include: "landslide Hazard Area <u>and associated Buffer</u>."
- The geotechnical infeasibility requirement as stated is valid only if the infiltration cannot be used anywhere within the project area. This statement is vague for areas where only

portions of the site have appropriate infiltration and does not include enough flexibility should other geotechnical issues arise. The City requests that the lines 35-37 be revised to state *"In portions of the project where geotechnical engineering evaluation recommends infiltration not be used due to reasonable concerns about erosion, slope failure, flooding, or other valid geotechnical issues."*

- Permeable Pavements within an area designated as a Landslide Hazard Area. Revise language to read "Within or draining to an area designated as a Landslide Hazard Area." Projects that would increase drainage (surface and/or groundwater flows) to landslide hazard areas are also hazardous and should be classified as infeasible.
- "The option for excavating and installing under drains beneath permeable pavement results in excessive construction costs, operations/maintenance costs, and lower design life. This approach uses more resources and has the potential for failure that may not be in accordance with LID goals. The City recommends that this language be deleted or that the word "can" be replaced with "may" on line 6.
- Ecology should study the water quality benefit of stormwater passing through pervious asphalt. The surface area within the pervious asphalt section appears to act as a physical filter and eventually as a biofilter, providing water quality treatment benefits not yet accounted for in the DOE Stormwater Manual.
- "Down slope of steep, erosion prone areas that are likely to deliver sediment." A project could provide an engineered barrier that would keep sediment depositions away from pavement surface.
- Eliminate or amend the following criterion: "Fill soils are used that can become unstable…" This would not necessarily cause infeasibility if a soils professional is required to provide suggestions for how fill soils must be placed when using permeable pavement.
- A distance of 10 feet of a small on-site sewer system and greywater reuse system is too close; a more reasonable distance is 30 feet but soils should be taken into consideration.
- Clarify why the concern for soils becoming unstable under saturated conditions is limited to fill soils ("where fill slopes are…").
- Do not limit the criterion regarding basements to existing basements; new below-grade construction should be included.
- "Where infiltrating and ponded water below new permeable pavement area would compromise adjacent impervious pavements." Amend this criterion to allow pervious pavement when the edges are lined appropriately and with geotechnical engineer approval.
- Is the soil suitability criteria required for permeable pavement sections that do not meet the thresholds for treatment? As written, it appears that any permeable pavement section, regardless of size, would have to provide treatment. Is this the intent?
- Further define what levels of treatment permeable pavement shall meet. It is our understanding that permeable pavement with native soils that meet the site suitability

criteria may provide basic and enhanced treatment. However, sites that require oil treatment are not viable sites for permeable pavement. If a site is required to provide enhanced and phosphorus treatment, identify if permeable pavement with appropriate underlying soils will be allowed to meet both needs.

- "Where infiltrating water below new permeable pavement area would threaten existing below grade basements." And "Where infiltrating water would threaten shoreline structures such as bulkheads." And "Where installation of permeable pavement would threaten the safety or reliability of pre-existing underground utilities or pre-existing underground storage tanks." Geotechnical professionals should assess these risks and make the determinations so that these criteria are not used too liberally.
- Specify how these will be determined:
    - "Where infiltrating and ponded water below new permeable pavement area would compromise adjacent impervious pavements."
    - "Where installation… would threaten existing below grade basements" or "shoreline structures such as bulkheads."
    - "Where permeable pavements do not provide sufficient strength to support heavy loads at industrial facilities, such as ports."
    - "Installation of permeable pavement would threaten the safety or reliability of pre-existing underground utilities or…storage tanks."
- Include a criterion for infeasibility if located on a site where storage of hazardous chemicals or other business activities cause a higher risk of spill to pollute groundwater.
- Provide a definition for residential roads that provides the relationship between arterials, collectors, local and residential road classifications.
- Add: Where the amount of hard surface to be paved is too small to obtain at a reasonable cost from local suppliers. Add: Where seasonal high groundwater creates saturated soil conditions within three feet of the base of the gravel base course. Add: Other conditions determined by an engineer that would preclude safe and effective infiltration of stormwater.
- "Within 100 feet of a known contaminated site or abandoned landfill." Describe contaminated site. The Asarco Smelter Plume covers a large portion of Puget Sound. Is this statement intended to preclude all areas within the plume from using permeable pavement? Will complying with this statement require soils testing to identify "known contaminants", and if so, identify the list of contaminants to be evaluated. Finally, there should be an exception included to allow infiltration if EPA reviews and approves the "brownfield" site for stormwater infiltration.
- Provide a reference to where "soil suitability criteria" can be found.

Response to the range of comments

- Ecology agrees that it cannot specifically identify all situations that would make permeable pavement infeasible. That is why Ecology does not see an alternative to allowing for site-by-site judgments by an appropriate licensed professional.
- The criteria are intended to apply to sites without underdrains. If a site is underdrained, it will compromise the hydrologic benefits that define a practice as LID. So, Ecology will not require LID facilities to be used where they have to be underdrained because of feasibility issues.
- Ecology has identified infeasibility criteria. The County may preference those with the phrase "cannot reasonably be designed to meet…"
- Determining the best approach to take on a site is not as straightforward as it might seem. In this example, you might be able to flatten the grade. But what if doing that results in a soil profile below the road base that either will not infiltrate or that infiltrates very slowly. If the grading eliminated an appreciable depth of soil that could have been used to absorb water and spread it over a larger surface area of the subsoil base, that would have been a better option. Bioretention swales alongside the road can be installed at steeper slopes and would have provided that function. So, it is necessary to leave the site professional with some flexibility to determine what might work best for the site.
- Maximum slopes for permeable pavements are identified in the design criteria and some guidance for terracing techniques is provided in the SWMMWW and the *LID Technical Guidance Manual for the Puget Sound Basin.*
- That is an option. However, Ecology does not think it is appropriate to require such designs. The site designer can decide whether it is preferable to provide storage below the road or to provide it in a centralized infiltration facility. Because the principal LID goal of not moving water into the ground has been eliminated, Ecology does not want to require these types of designs.
- Ecology had already included criterion in the draft for weight, subgrade integrity, and exfiltration potential. Ecology does not believe there should be a feasibility criterion for ability to maintain.
- There is already a criterion for where infiltrating water would compromise adjacent impervious pavements. Ecology added "pre-existing road subgrades" to the referenced criterion. Ecology understands that without more detailed statements there will likely be differences in how local governments make this determination.
- Ecology will allow local governments to decide which type of utilities and construction methods could be compromised by infiltrating water. For new development, where utilities do not already exist, any utility that could be threatened should not be placed below the permeable pavement. Claiming infeasibility due to placement of utilities below new permeable pavement in new development projects is not acceptable.
- Ecology has retained a statement that local governments can implement an option of inserting a treatment layer. They are not obliged to allow or require it in their

jurisdiction.

- There is considerable concern about using permeable pavements on roads that are subject to heavier long-term loading. Although there is conflicting information in the literature, the perception is that the risks for using permeable pavements go up appreciably for these situations. Ecology thinks it is prudent to limit the initial use to lower volume roads. High use sites are defined as areas where there is more oil loading. Generally, these are areas where the risk of spills goes up too. Spills over permeable pavement can create significantly greater clean-up costs and complications. Areas with industrial activity are generally identified as sites needing coverage under the Industrial Stormwater General Permit. They are sites where heavy, ongoing pollutant loading are more likely to present long-term issues in regard to infiltrating such highly polluted water directly into the ground.
- The infeasibility designation applies only the surfaces bearing the traffic loading. It does not extend to associated surfaces such as sidewalks.
- Patios and plazas do not need to be exempted for architectural reasons. There are a number of permeable pavement options, including color, which can meet various desired aesthetic effects. If there are regulations in regard to the construction of a particular type of surface for sports courts, and a permeable pavement would not meet those requirements, that would be a legitimate reason for not using permeable pavements. Ecology anticipates that permeable pavements actually provide a better playing surface on most courts because of their ability to pass water.
- Not all local governments are comfortable with this option. The concerns are in regard to the potential for long-term groundwater pollution, and increased potential for plugging that could have maintenance and safety issues.
- Maximum slopes are provided based on manufacturer's recommendations. If a local government has a reasonable basis for using other maximum slopes, they can designate other maximum slopes.
- Ecology does not consider establishment of an aquifer protection area as a default criterion for making permeable pavement infeasible. Ecology does propose that where native soils below permeable pavement do not meet the soil suitability criteria, local governments can declare them infeasible, or allow for insertion of treatment layers.
- Ecology recommends less clearance below permeable pavement than below bioretention and other infiltration facilities based on the one-to-one ratio of drainage area to infiltrating surface.
- Ecology is not requiring the use of permeable pavements in road redevelopment projects. In new development projects, permeable pavements are reasonable for residential access roads. Design of the subdivision can take utilities into account and reduce risks to nearby structures.

- The statement concerning the application of criteria to designs situations that would redistribute water below pavement has been moved to the infeasibility criteria listed within the BMP text.
- The statement concerning infeasibility in the drive aisles is eliminated. It is a design option, not a feasibility criterion.
- Ecology has indicated that most roads in the Puget Sound lowlands should not meet the criterion of regular, heavy applications of sand.
- "High use sites" is defined in the manual.
- Ecology cannot be sure which proposed criterion the commenter was suggesting to append this statement to. It is not appropriate to append it to the criterion for "industrial activity" because there are "industrial activities" that generate higher concentrations of pollutants that probably should not be served by permeable pavement. Secondly, there is a separate criterion for areas likely to have spills.
- Ecology has not provided utility clearance guidance. This only seems necessary where a permeable pavement road is intersecting an impervious road with its associated utilities. Local governments may establish clearance criteria for those instances.
- The intent of preventing upgradient drainage into the base course of permeable pavement areas on 5% slopes or greater is to not create situations where the amount of stormwater is greater than can be managed in the base course.
- Local governments can allow permeable pavements on steeper slopes if the subgrade is benched and other design features added. However, Ecology will not require that it be done.
- The criterion has been changed to: "Within an area whose groundwater drains into an erosion hazard or landslide hazard area."
- Installing underdrains is not a requirement. The City does not have to allow for underdrains. Ecology replaced "can" with "may" to indicate a deferral to the permittee's preference.
- Ecology has paid for the construction of a permeable pavement installation at the WSU Puyallup. It includes a monitoring system that can collect stormwater samples directly below the pavement so that it can be determined if and how much pollutant removal is occurring as water passes through the pavement.
- An engineer might be able to provide an engineered barrier to keep sediment from steep, erosion prone areas away. However, it should not be the financial responsibility of a nearby project proponent to pay for those fixes.
- Ecology prefers to not mandate the use of fill soils that will resist instability.
- Ecology discussed setbacks with the On-site Sewage personnel at the Washington Dept. of Health. They concurred with the proposed setbacks.
- There is a separate statement in regard to the stability of other soils.
- As a blanket exemption, Ecology does not concur with the recommendation to add new below grade basements to the infeasibility criteria. Below-grade basements are more

hydrologically disruptive than homes without below-grade basements. Ecology would prefer to discourage their construction where there are design options available. There are probably situations where a below-grade or partially below-grade basement is the only option or is the best option for construction or other reasons. Local governments can make case-by-case decisions in those situations.

- Local governments can allow permeable pavements where actions are taken that will prevent instability of adjacent impervious pavements. Ecology is simply indicating that permeable pavements can be not considered where instability of existing impervious pavements may occur.
- Ecology does intend that project sites that don't trigger treatment requirements, but are still subject to Minimum Requirements #1 - #5, should not use permeable pavements where the soil suitability criteria are not likely to be met. For small projects which are not required to do the level of soil chemical testing that would be required to make this judgment, local governments can use their knowledge of local soils to decide whether to allow permeable pavement or not.
- Pervious pavement itself is not listed as an option under any treatment menu. Treatment is afforded by underlying soil that meets soil suitability criteria. In accordance with the phosphorus and enhanced treatment menus, a site that does not have soils that meet the soil suitability criteria should not be allowed to use permeable pavement if the site is within ¼ mile of the surface waterbody that triggers the use of the phosphorus or enhanced menus.
- Ecology agrees that geotechnical professionals need to assess and provide professional opinions concerning whether an infeasibility criterion applies to a site. See the re-structuring of feasibility criteria in Chapter 5 of Volume V.
- Ecology does not have pre-determined answers for how to apply some of the criteria to specific situations. Some of the criteria are simply acknowledging that there can be situations where infeasibility can be claimed. Professional judgment will have to come into play.
- There are criteria for areas with "industrial activity," and areas where the risk of concentrated pollutant spills is more likely such as gas stations, truck stop sites, and industrial chemical storage sites. The fact of storage hazardous chemicals is too broad of a category. In many cases, outdoor storage of chemicals should be done following the BMPs for cover and containment. This should reduce the need for restrictions on permeable pavements.
- Ecology has tried to provide such a definition for residential roads with the proposed statements and the citation of pertinent statutes.
- Cost due to supply should not be an issue if local governments implement the requirements. The criterion for depth to seasonal high groundwater is set at 1 foot. This is to prevent road instability and to provide for a minimum depth of unsaturated soil to remove pollutants. The one to one ratio of road surface to infiltration surface makes the reduced depth reasonable.

- Ecology has added a clarification for "contaminated sites." Ecology has added a criterion for contaminated surface soils that indicates they have to be removed.
- A reference to where "soil suitability criteria" can be found has been added.

V-26.4 Minimum infiltration rate for permeable pavement

Commenters: City of Battle Ground, Arnie Broadsword, City of Duvall, EPA Region 10, Puget Sound Partnership, Snohomish County, Sustainable Development Task Force of Snohomish County

Summary of the range of comments

- The ratio of infiltrating area to drainage area is 1:1. So, using the same limiting infiltration rate as that used for bioretention is not justified. Suggest not higher than 0.2 in/hr.
- 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.
- The hydraulic conductivity/infiltration rate infeasibility requirement does not sufficiently characterize geotechnical parameters such as soil thickness, depth to groundwater, and low permeability soil horizons needed to judge site suitability. The City recommends that language be added to line 5 that states ".... conductivity less than 0.3 inches per hour *or other geotechnical constraints such as soil thickness, depth to groundwater, or low-permeability soil horizons."*
- "Where appropriate field testing indicates soils have a short-term (a.k.a., initial) native soil saturated hydraulic conductivity less than 0.3…" reword for clarity, the first sentence seems to indicate that pervious pavement is not feasible, and the next sentence describes how this system could be allowed.
- Where the *design* infiltration rate is less than 0.30 inches per hour, permeable pavement should be infeasible.
- Minimum infiltration rate should be 0.125 inches per hour; takes into account the gravel storage baserock.

Response to the range of comments

- Ecology prefers not to set different minimum infiltration criteria for bioretention and permeable pavements. In addition to the reasons mentioned above for the 0.3 rate for bioretention, there are practical limitations to the accuracy of a field infiltration test in soils at such low rates.
- Soils testing should be done by soils professionals, not homeowners. Ecology has specified its recommendations concerning procedures to minimize inaccuracies and unreliability. There simply is no alternative to having this information to make design decisions. Ecology

acknowledges added costs to site planning in most instances and added difficulties in review by local governments.
- Ecology has added a reference to low permeability layer.
- Ecology has set the criterion at a measured (initial) 0.30 inches per hour. This is a balance between the need to reduce runoff volumes and the risk of creating surface drainage and road safety problems.

V-26.5 Allow local governments to identify geographic areas where bioretention or permeable pavement is not feasible due to ground water or infiltration rates

Commenters: City of Battle Ground, City of Bremerton, City of Woodinville

Summary of the range of comments

- Local governments should have the ability to designate geographic areas as not feasible based on knowledge about the physical features of those areas, such as ground water conditions or infiltration rates.
- Modify language to encourage LID as underlying geology and existing topography allow.

Response to the range of comments

- Ecology has placed a statement within the text of Section 3.4 of Volume III in regard to local governments' designation of areas as infeasible for permeable pavement.

V-27 Competing Needs Feasibility Criteria

Commenters: Association of Washington Cities, City of Bellevue, City of Bellingham, EarthJustice, EPA Region 10, Green Light Gardening, League of Women Voters of Whatcom County, City of Oak Harbor, City of Olympia, People for Puget Sound, People for Puget Sound Email Campaign, People for Puget Sound Group Letter, Port of Vancouver, Puget Soundkeeper Alliance, City of Seattle, Sierra Club Email Campaign, Stewardship Partners & the 12,000 Rain Gardens campaign, Sustainable Development Task Force of Snohomish County, City of Tacoma, Thurston County, Washington Public Ports Association

Summary of the range of comments

- Concern about whether listed criteria are sufficient to cover other regulatory responsibilities.
- These exemptions are too broad and could be exploited as loopholes.
- Eliminate special purpose district criterion, or list specific instances.

- The "local codes, standards, and rules" competing needs infeasibility criterion for the onsite stormwater management requirements should only apply to PSRC regional growth centers. The EPA also believes this situation could also be addressed through a process where specific codes are submitted by a local jurisdiction and are approved by Ecology for this purpose.
- Change special purpose district criterion to: Where an LID requirement has been found to be in conflict with ~~special zoning district design criteria~~ development regulations for design standards [*adopted pursuant to a public process*] ~~adopted and being implemented pursuant to a community planning process~~, the existing local codes may supersede or reduce the LID requirement. This does not relieve the Permittees of the requirement in S5.C.5 to review local development-related ~~design~~ codes, standards, and rules to remove barriers and require use of LID principles and BMP's." "Development regulations" is defined in GMA to include development regulations and design standards. All development regulations are adopted according to a public process.
- Add criterion for setback from locally protected tree species at dripline.
- Disagree with need for a general criterion regarding public safety concerns.
- Permittees must comply with all federal and state laws, standards, etc. So, it is not reasonable to require those to be mentioned in this list, or CWA violation. Change to "Requirements of any federal or state laws, rules or mandatory standards. "
- Expand transportation criterion to: "Transportation regulations or adopted transportation plans, to maintain, expand, or implement the options for ~~future expansion or~~ multi-modal use or expansion of public rights-of-way."
- High land value should be a competing need.
- There are instances where an LID BMP is either technically infeasible or not advisable for public health and safety reasons.
- Add GMA to end of line 26, pg 40 (S8.IIA)
- Edit competing needs criteria as follows: "The On-site Stormwater Management LID requirements can may be superseded or reduced where they are in conflict with:
    - A. Requirements of the following federal or state laws, rules, and standards: Historic Preservation Law and Archeology Laws as listed at http://www.dahp.wa.gov/learn-and-research/preservation-laws, federal Superfund or state Model Toxics Control Act, Federal Aviation Administration requirements for airports, American with Disabilities Act.
    - B. Local design codes, standards and rules that have been reviewed under the code revision process required in S5.C5.c to remove barriers and to require the use of LID principles and BMPs. Where an LID requirement has been found to be in conflict with the design criteria for a special zoning or land use district design criteria adopted and being implemented pursuant to a community planning process, the LID requirement existing local codes may be superseded or reduced the LID requirement.

  - C. Public Health and Safety Standards, including but not limited to, the State Building Code, Chapter 19.27 RCW.
  - D. Transportation regulations to maintain the option for future expansion or multi-modal use of public rights-of-way.
  - E. Requirements of the GMA as they relate to planning for and addressing growth, balancing planning goals, and other planning or code development requirements under the GMA."

- Areas exempt from Minimum Requirement #7 should also be exempt from Minimum Requirement #5. Would it appropriate to assume this is a justifiable "competing need"?
- Ecology should provide guidance on the use of criteria to avoid abuse.
- Consider adding the following competing needs:
  - Groundwater/aquifer protection district and wellhead protection requirements;
  - Critical areas regulations;
  - Local codes that remain barriers to LID after the required code revision process has been completed.

Response to the range of comments

- Ecology repeatedly asked for input on these competing needs criteria. We published all recommendations that we thought had merit.
- Ecology has tried to be as specific as possible. Ecology cannot prevent abuse of the criteria. Recall that the context of these criteria is to identify situations where sites that are using the list approach can claim that an LID BMP is not feasible. The ultimate goal is to protect the beneficial uses of the waters of the state. As the impacts to those waters from urban areas is a cumulative function, it would be best to be able to project cumulative impacts to waters from planned urbanization and then to develop strategies, including LID strategies, to reduce those impacts to acceptable levels. Ecology prefers to try to refine how such advance planning and strategy development should occur rather than to spend a lot of time arguing over site-by-site feasibility decisions.
- Examples of special purpose zoning districts include the City of Bellevue's Central Business District Design Guidelines requiring certain streets to have awnings, canopies or arcades for pedestrians, buildings located at the zero lot line on the street, specific types of paving for sidewalks, and specific species of trees and plants in landscaping. The City of Anacortes' Old Town Overlay District has design standards that include roof pitch requirements that could conflict with vegetated roofs. Kitsap County's Multi-family residential design criteria require a specific orientation of buildings to public streets or common open spaces that could reduce options for site design. Depending on the extent of implementation, where design standards are adopted as a result of a lengthy community visioning and design process, local governments may not be able to revise some elements to accommodate all LID BMPs and LID principles. Ecology expects

permittees developing new design guidelines for special purpose zones to incorporate LID.

- Ecology does not want to set up another layer of state review and approval of specific special purpose district codes related to land use. Ecology prefers to establish a system whereby locals must investigate the impacts of the use of those codes and other land development codes on the waters of the State, and to require the local governments to demonstrate how implementation of those codes is compatible with maintaining the beneficial uses of the state's waters.
- The suggestion to change the special purpose district criterion to "development regulations for design standards (adopted pursuant to a public process)" seems too broad. It essentially would say if LID conflicts with any other development code, it is infeasible. So, that puts stormwater management as the lowest priority code.
- Ecology has added: "A local Critical Area Ordinance that provides protection of tree species." Local governments can be more specific re the setback required.
- Public safety must be protected. Ecology does not anticipate many instances where LID use will cause public safety concerns. But the criterion should be stated.
- Ecology does not want to use the suggested general catch all of "any federal or state laws, rules or mandatory standards" because it has seen suggestions for referencing those laws in inappropriate ways. For instance, the claim that LID is infeasible because it conflicts with the State Growth Management Act is not a valid competing need.
- High land value itself is not a competing need.
- Ecology has a statement in regard to a conflict with public health and safety standards. It is the conflict with an established standard that is the key.
- Ecology does not agree to add GMA as a competing need. Meeting the requirements of GMA and use of LID BMPs and principles do not have to conflict. They can complement one another as the Pollution Control Hearings Board has indicated. The goals of the Growth Management Act do not overrule the requirements of the Federal Clean Water Act nor the State Water Pollution Control Act. Local governments have to develop plans and codes that meet the requirements of all of these acts. Current development plans and codes generally seem to not meet the requirements of the Federal Clean Water Act and the State Water Pollution Control Act because their implementation has and will continue to result in the degradation and loss of the beneficial uses of the waters of the State and violate Water Quality Standards. Therefore it will likely be necessary to revise plans and codes. Ecology contends the best context within which to consider a range of possible changes is to use watershed-based hydrologic and pollutant modeling tools to project impacts of land development options. Those options include total amount of land developed in a watershed; the types of land development allowed; changes to land development codes; and changes to stormwater infrastructure and requirements.
- Exemptions are not competing needs.

- Ecology does not consider groundwater/aquifer protection districts as competing needs that automatically make all LID strategies infeasible. Spokane Valley is an example of an area where urban stormwater is infiltrated into the ground over a sole source aquifer. What is required is the establishment of rules for infiltration that minimize the chance of unacceptable groundwater impacts.
- Ecology has added a reference to critical areas ordinances in regard to tree preservation.
- The last suggested criterion regarding local codes assumes that the local government has completed a thorough review and revision process and made changes consistent with the intent of the permit requirement. Ecology is not ready to concede that all permttees will do that.

V-28 Add economic feasibility criteria

Commenters: Frank Backus, City of Bremerton, Cascadian Edible Landscapes, Amanda Grantham, Whitney Johnson, Port of Seattle, Master Builders of King & Snohomish Counties, City of Mount Vernon, City of Oak Harbor, Michael Pagel, Pierce County, Regional Road Maintenance Forum, Thurston County, Washington Dept. of Natural Resources, WSDOT, Katy Vanderpool, Jan Von Lehe, ZGF Architects

Summary of the range of comments

- Add economic feasibility criteria
- New subsection is needed "If community economic development will be significantly impacted, requirements to be superseded or reduced."
- Is cost a feasibility factor?
- Ecology should develop a standard economic analysis format to be used in assessing LID feasibility.
- Costs of construction and maintenance should be factored into the decision-making process.
- Support strong, clear LID requirements. Let developers determine what is feasible.

Response to the range of comments

- Ecology does not consider economic feasibility criteria to be required. The LID performance standard is a water-quality based standard that is not modified by considerations of cost. Within the urban growth area, Ecology is offering a regulatory approach that requires use of the most effective LID options on a priority basis wherever feasible. This accommodates existing plans for urbanization within the urban growth areas. Where sites are able to use the higher priority BMPs of full dispersion, full infiltration, minimum soil quality and depth,

permeable pavements, or bioretention for most surfaces, the result should be near attainment of the LID performance standard (though projects do not have to demonstrate compliance). Where only lower priority LID BMPs can be used to due to site constraints, Ecology is allowing those options to proceed so that development is not restricted by the inability to fully control water quality impacts.

- In the meantime, Ecology expects that the first round of watershed planning accomplished by the Phase I permittees establishes a process by which all local governments will be able to project the impact of their land development plans and codes on the waters of the State within their jurisdiction. Where such plans are predicted to degrade the beneficial uses and violate water quality standards, the process can also help municipalities project the benefits and impacts of alternative development plans and codes. Ecology believes that an honest investigation of the extent of changes needed in development codes and plans to meet the goals and requirements of all applicable statutes – the Federal Clean Water Act, the State Water Pollution Control Act, and the State Growth Management Act – will either start the process of facilitating those changes, or will lead to a reassessment of our commitment to the stated goals and requirements of our environmental protection statutes.
- Supportive comment is noted

V-29 Operation and Maintenance

(*Comments on O&M of bioretention and permeable pavement are also addressed in BMP sections above.)*

Commenters: Association of Washington Cities, City of Bainbridge Island, Ballard Stormwater Consortium, City of Battle Ground, City of Bellevue, City of Bellingham, BIAW, City of Everett, City of Issaquah, City of Kent, King County, City of Lacey, City of Marysville, City of Mount Vernon, City of Olympia, City of Renton, Snohomish County, City of Tacoma

Summary of the range of comments

- Maintenance and Inspection should be required on all installed LID BMP's. MR #9 should apply to BMP's installed on small projects too (i.e., only MR 1-5 apply).
- Clarify how MR#5 BMPs are subject to maintenance requirements when projects are not subject to MR#9 (e.g., is Ecology relying on MR#2 item 11?).
- Modify the maintenance standards for LID facilities to contain explicit language on LID inspection and maintenance requirements.
- Insufficient information is available regarding long-term operation and maintenance of LIDs. Requiring LID facilities without documented standards would place too great a burden on permittees. If it is Ecology's position that LID facilities are proven stormwater facilities, then

clear standards for design, inspection and maintenance of said facilities should be included in the technical documents adopted by reference within the permit.

- The LID Technical Guidance Manual, on which the draft permit so heavily relies, is not detailed enough to provide the standards on which LID techniques should be designed, built, and maintained. In fact, halfway through the review period for the LID Technical Guidance Manual, Ecology issued an RFP for developing a maintenance manual for LID BMPs. If LID maintenance standards are not yet fully developed, how are municipalities supposed to fully assess the impact of the proposed LID requirements?
- Costs for long-term inspection and O&M too great.
- Legal and administrative mechanisms by which locals can ensure proper O&M are not worked out.
- Ongoing maintenance inspection of thousands of privately owned and maintained BMP' is unrealistic. If defects are present, requiring private owners to fix them will result in a code compliance and legal quagmire and will create a significant cost to tax payers via use of city forces.
- Maintenance on private property should be accomplished through technical assistance and education to owners, not through enforcement. Based on experience in King County, need to work on incentives and education for owners to maintain LID BMPs.
- We need to develop mechanisms to ensure that property owners or groups of property owners have the resources to operate and maintain these facilities.
- We encourage additional refinement of alternative development techniques that can be utilized within the public right-of-way, while providing manageable levels of maintenance and life cycle certainty.
- Bioretention facilities and permeable pavements have significantly higher maintenance costs than conventional stormwater management facilities.
- Inspections of LID facilities should only be required of the Permittee if the facilities are in right-of-way or tracts dedicated to or owned by the Permittee.

Response to the range of comments

- Ecology expects local governments to require maintenance in accordance with the published O&M guidance. Ecology did not make it a municipal stormwater permit requirement that local governments have a long-term responsibility to inspect the LID BMPs at project sites where Minimum Requirements for treatment or flow control were not triggered. In addition, Ecology did not mandate that those same sites must have operation and maintenance manuals for each LID facility, and they do not have to maintain a log of maintenance activity. It is important that homeowners are informed of their responsibility for performing maintenance, and be provided with easy access to maintenance guidance. LID BMPs should be recorded and noted on legal documents for the property.

- Ecology is updating the Operation and Maintenance guidance for a number of LID BMPs. Expect that update next year. Language related to the responsibilities of municipalities to inspect LID facilities is contained within a different permit requirement.
- Ecology has incorporated the design criteria for most LID BMPs within the 2012 *Stormwater Management Manual for Western Washington*. Design criteria for rain gardens are within the existing Rain Garden Handbook for Western Washington. That Handbook is being updated to be more useful for projects that have to meet minimum requirements #1 - #5 and to make needed corrections in the existing document. Ecology has chosen not to provide detailed design criteria or standard specifications for permeable pavements. Ecology does not have expertise in road construction. In addition, there are multiple options for detailed specifications for permeable pavements. Ecology prefers the local governments to adopt standard specifications that they are comfortable with. Local governments can use guidance in the *LID Technical Guidance Manual for the Puget Sound Basin*, as well as other sources (E.g. ACI 522) to create their specifications and standard drawings. The local governments should consider establishing an ad hoc committee to develop common specifications and drawings.
- The *LID Technical Guidance Manual for the Puget Sound Basin* also includes criteria options for LID BMPs that are not within the Minimum Requirement #5 lists, but can be used if desired or to help meet the LID Performance Standard option. This includes Vegetated Roofs, Minimal Excavation Foundations, and Rainwater Harvesting.
- The draft 2012 *Stormwater Management Manual for Western Washington* did not include an expanded Maintenance Standards Table within Section 4.6 of Volume V to include LID BMPs that will require ongoing maintenance. There are recommendations concerning maintenance from multiple sources for all types of LID BMPs. Ecology has procured consultant services to develop recommended maintenance standards and methods. The consultant will survey various sources, take recommendations to technical advisory committees and develop its final recommendations. Ecology intends to incorporate these directly into the maintenance table. In addition, the consultant will develop guidance concerning the types of equipment and expected levels of effort and actions needed to maintain BMPs. This will give local governments more direction concerning establishing both their own maintenance programs and providing direction to private parties.
- Ecology clarifies that inspection requirements apply to new and redevelopment projects that have triggered minimum requirements #6 and/or #7. Ecology assumes there will not be thousands of LID BMPs for local governments to inspect for many years. But the programs should grow over time. Ecology expects early experiences will lead to development of efficient strategies.
- On sites that did not have to comply with the minimum requirements for treatment or flow control, the local government may choose to primarily rely on education and technical assistance. On sites that did have to comply with the minimum requirements for treatment or flow control, the municipality must ensure proper maintenance. Where owners fail to respond

to technical assistance and education, enforcement action is necessary. Permittees will have to establish administrative structures and technical abilities to ensure maintenance of distributed LID facilities.

- Mechanisms to inform homeowners of their responsibilities and to educate them about maintenance of LID facilities exist now in municipalities that require or have permitted LID facilities. Sharing knowledge of these mechanisms and creating new ones will likely be one of the areas that will be addressed through long-term training plans that will be developed under legislation passed last session.
- The basis for the comment that bioretention and permeable pavement have significantly higher maintenance costs is not provided. Ecology does not necessarily agree. Conventional stormwater facilities do not provide adequate services to achieve the goals of maintenance of beneficial uses of the State's waters and compliance with Water Quality Standards. So, the State cannot rely on them as the sole mechanisms for stormwater management. The State is obliged to try additional methods. Complexity and costs will probably increase. But comparisons to strategies that are failing to achieve the goal are not legitimate comparisons.
- Permittees are responsible to ensure the maintenance of all stormwater facilities that are built to achieve permit and local code requirements, whether on public or private property.

V-30 Miscellaneous

Commenters: Ballard Stormwater Consortium, City of Bremerton, City of Longview, Northwest Indian Fisheries Commission, City of Tacoma, US Fish & Wildlife Service

Summary of the range of comments

- By failing to require full implementation of AKART for stormwater at the outset of permit issuance, the permit fails to adequately implement the standards of state law, and serves to authorize discharges to state waters without the application of the appropriate treatment and controls. Take measures to protect and retain native vegetation and soils in all jurisdictions shortly after permits are issued, and properly review and approve all program elements before granting coverage, to ensure that implementation of AKART is in fact achieved at the outset.
- Under Seasonal Work Limitations, Item 3. It states, "Activities where there is one hundred percent infiltration of surface water runoff…" Provide sizing guidance for erosion and sediment control devices that will achieve 100% infiltration.
- For sites that are regulated under both Ecology's General Construction Permit and the new and redevelopment requirements under the Municipal Stormwater Permit, clarify who has the responsibility of ensuring that the SWPPP is accurate and that the BMPs are installed correctly. Does Ecology have overarching responsibility since they administer the Construction NPDES permit, or does the jurisdiction have responsibility since they own the

MS4?

- Require source controls only on projects involving a chance in the property's use to one requiring source controls; otherwise let the IDDE program handle existing business source control problems.
- Agree that technology-based stormwater controls (AKART) will only be effective where BMPs/facilities are properly sited, designed and maintained.
- Support for reducing toxics in stormwater and maintaining clean streets. Concern that existing modeling does not include adequate margins for changing storm events (volume and velocity) caused by global climate change; constant upgrades to modeling should be required.
- Appendix 1 is not reasonable, too stringent and will cause economic harm.

Response to the range of comments

- Ecology disagrees that the permit fails to implement state and federal laws. The structure of the municipal permit program is to set programmatic requirements and allow municipalities time to adjust their programs to meet the new or increased requirements. Requirements for which compliance deadlines are past (e.g., actions required by past permits) do not have implementation time frames. It serves little purpose to not grant coverage to a municipality when establishing requirements that they cannot instantly comply with.
- Ecology clarifies that 100 percent infiltration is assumed if using pre-approved sizing methods (e.g., Roof runoff full infiltration options) or by use of an approved runoff model.
- Municipalities always have the responsibility to enforce their codes. They do not have responsibility to enforce Construction Stormwater Permit requirements that are over and above local codes requirements. For instance, Ecology does not expect local governments to enforce monitoring requirements of Ecology's Construction Stormwater Permit.
- Appendix 1 source control requirements apply to new and redevelopment projects. It is appropriate that those projects install and utilize proper source control BMPs. Other components of the Stormwater Management Program are designed to address illicit discharges from existing properties, including the application of source control BMPs as appropriate.
- Ecology concurs that BMPs/facilities must be properly sited, designed, and maintained.
- The model is being updated to account for storm events that have occurred in recent years. Rainfall patterns have changed only modestly so far, and are not expected to change so drastically in the near future that we need to change our methods for designing stormwater facilities.
- Ecology disagrees. Ecology considers the permit requirements to be known, available, and reasonable, and necessary to achieve the goals of the State Water Pollution Control Act and the federal Clean Water Act.