THIS ATTACHMENT CONTAINS COMMENTS/EDITS BY THE CITY OF SEATTLE.
REFER TO CITY OF SEATTLE ATTACHMENT 1 FOR ADDITIONAL COMMENTS.

All of Ecology's May 16, 2011 Proposals* Appear in Blue and City Comments Appear in Red.
Edits Appear in Underline/~~Strikeout~~ Format.
***Deleted Ecology figures in this document as no changes are proposed by the City of Seattle.**

APPENDIX 1 – Minimum Technical Requirements for New Development and Redevelopment

DRAFT REVISIONS FOR INCORPORATION OF LID-RELATED THRESHOLDS, DEFINITIONS, AND REQUIREMENTS

Section 1. Exemptions

Forest practices:

Forest practices regulated under Title 222 WAC, except for Class IV General forest practices that are conversions from timber land to other uses, are exempt from the provisions of the minimum requirements.

Commercial agriculture:

Commercial agriculture practices involving working the land for production are generally exempt. However, the conversion from timberland to agriculture, and the construction of impervious surfaces are not exempt.

Oil and Gas Field Activities or Operations:

Construction of drilling sites, waste management pits, and access roads, as well as construction of transportation and treatment infrastructure such as pipelines natural gas treatment plants, natural gas pipeline compressor stations, and crude oil pumping stations are exempt. Operators are encouraged to implement and maintain Best Management Practices to minimize erosion and control sediment during and after construction activities to help ensure protection of surface water quality during storm events.

Road Maintenance:

The following road maintenance practices are exempt: pothole and square cut patching, overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage, shoulder grading, reshaping/regrading drainage systems, crack sealing, resurfacing with in-kind material without expanding the road prism, and vegetation maintenance.

The following road maintenance practices are considered redevelopment, and therefore are not categorically exempt. The extent to which this Appendix applies is explained for each circumstance.

- Removing and replacing a paved surface to base course or lower, or repairing the roadway base: If impervious surfaces are not expanded, Minimum Requirements #1 - #5 apply. However, in most cases, only Minimum Requirement #2, Construction Stormwater Pollution Prevention, will be germane. Where appropriate, project proponents are encouraged to look for opportunities to use permeable and porous pavements.

- Extending the pavement edge without increasing the size of the road prism, or paving graveled shoulders: These are considered new impervious surfaces and are subject to the minimum requirements that are triggered when the thresholds identified for redevelopment projects are met.

- Resurfacing by upgrading from dirt to gravel, asphalt, or concrete; upgrading from gravel to asphalt, or concrete; or upgrading from a bituminous surface treatment ("chip seal") to asphalt or concrete: These are considered new impervious surfaces and are subject to the minimum requirements that are triggered when the thresholds identified for redevelopment projects are met.

Underground utility projects:

Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics are only subject to Minimum Requirement #2, Construction Stormwater Pollution Prevention.

All other new development is subject to one or more of the Minimum Requirements (see Section 3 of this Appendix).

Section 2. Definitions Related to Minimum Requirements

Arterial - A road or street primarily for through traffic. A major arterial connects an Interstate Highway to cities and counties. A minor arterial connects major arterials to collectors. A collector connects an arterial to a neighborhood. A collector is not an arterial. A local access road connects individual homes to a collector.

Bioretention BMPs - Engineered facilities that store and treat stormwater by passing it through a specified soil profile. Refer to the Stormwater Management Manual for Western Washington (2012), Volume V, Chapter 7 for Bioretention BMP types and design specifications.

Certified Erosion and Sediment Control Lead (CESCL) - means an individual who has current certification through an approved erosion and sediment control training program that meets the minimum training standards established by the Department (see BMP C160 in the *Stormwater*

Management Manual for *Western Washington* (2012)). A CESCL is knowledgeable in the principles and practices of erosion and sediment control. The CESCL must have the skills to assess site conditions and construction activities that could impact the quality of stormwater and, the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges. Certification is obtained through an Ecology approved erosion and sediment control course. Course listings are provided online at Ecology's web site.

Converted Pervious Surface - Replacing native vegetation with pasture, lawn, or landscaped area.

Effective Impervious surface - Those impervious surfaces that are connected via sheet flow or discrete conveyance to a drainage system.

Impervious surfaces whose stormwater runoff is infiltrated ~~collected and redistributed below pavement (e.g., infiltration below pavement)~~ are not considered effective if continuous runoff modeling indicates that all stormwater is infiltrated. Impervious surfaces on residential development sites are not considered effective if the runoff is dispersed through at least one hundred feet of native vegetation in accordance with BMP T5.30 – "Full Dispersion," as described in Chapter 5 of Volume V of the Stormwater Management Manual for Western Washington (2012). **[COMMENT: Infiltration definition should include bioretention, infiltration trenches, etc.]**

Effective pervious surface – definition?

Erodible or leachable materials. Wastes, or chemicals that measurably alter the physical or chemical characteristics of runoff when exposed to rainfall. Examples include erodible soils that are stockpiled, uncovered process wastes, manure, fertilizers, oily substances, ashes, kiln dust, and garbage dumpster leakage.

Hard Surface. An impervious surface, a permeable pavement, or a ~~green~~ vegetated roof.

Highway. A main public road connecting towns and cities

Impervious surface – A non-vegetated surface area that either prevents or retards the entry of water into the soil mantle as under natural conditions prior to development. A non-vegetated surface area which causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater. Open, uncovered retention/detention facilities shall not be considered as impervious surfaces for purposes of determining whether the thresholds for application of minimum requirements are exceeded. Open, uncovered retention/detention facilities shall be considered impervious surfaces for purposes of runoff modeling.

Infiltration below pavement. Infiltration or percolation of water below a hard pavement

surface. Examples include water infiltration below permeable pavement, or impermeable pavement with stormwater collection and redistribution into the base course below.

Land disturbing activity - Any activity that results in movement of earth, or a change in the existing soil cover (both vegetative and non-vegetative) and/or the existing soil topography. Land disturbing activities include, but are not limited to clearing, grading, filling, and excavation. Compaction that is associated with stabilization of structures and road construction shall also be considered a land disturbing activity. Vegetation maintenance practices are not considered land-disturbing activity.

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

LID Best Management Practices - Distributed stormwater management practices, integrated into a project design, that emphasize pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation and transpiration. LID BMPs include, but are not limited to, bioretention/rain gardens, permeable pavements, roof downspout controls, dispersion, soil quality and depth, minimal excavation foundations, vegetated roofs, and water re-use.

LID Principles - Land use management strategies that emphasize conservation, use of on-site natural features, and site planning to ~~minimize~~ reduce impervious surfaces, native vegetation loss, and stormwater runoff. LID principles include, but are not limited to, regional strategies such as increased density in urban areas to prevent sprawl, and mass transit, bicycling, and walkable communities to reduce impacts to water quality.
[COMMENT: "LID principles" is not defined by the PCHB or past Ecology permit, and there is no mandate for the definition.]

Maintenance - Repair and maintenance includes activities conducted on currently serviceable structures, facilities, and equipment that involves no expansion or use beyond that previously existing and results in no significant adverse hydrologic impact. It includes those usual activities taken to prevent a decline, lapse, or cessation in the use of structures and systems. Those usual activities may include replacement of dysfunctional facilities, including cases where environmental permits require replacing an existing structure with a different type structure, as long as the functioning characteristics of the original structure are not changed. One example is the replacement of a collapsed, fish blocking, round culvert with a new box culvert under the same span, or width, of roadway. See also Road Maintenance exemptions in Section 1 of this Appendix.

Native vegetation . A cluster of vegetation comprised of plant species, other than noxious weeds, that are indigenous to the coastal region of the Pacific Northwest and which reasonably could have been expected to naturally occur on the site. Examples include trees such as Douglas Fir, western hemlock, western red cedar, alder, big-leaf maple, and vine maple;

shrubs such as willow, elderberry, salmonberry, and salal; and herbaceous plants such as sword fern, foam flower, and fireweed. **[COMMENT: Change suggested because Ecology's definition could be interpreted to include isolated individual plants.]**

New development - Land disturbing activities, including Class IV -general forest practices that are conversions from timber land to other uses; structural development, including construction or installation of a building or other structure; creation of impervious surfaces; and subdivision, short subdivision and binding site plans, as defined and applied in Chapter 58.17 RCW. Projects meeting the definition of redevelopment shall not be considered new development.

Permeable pavement Pervious concrete, porous asphalt, permeable pavers or other forms of pervious or porous paving material intended to allow passage of water through the pavement. It often includes an aggregate base that provides structural support and acts as a stormwater reservoir.

Permeable pavement surface – permeable pavement receiving only direct precipitation.

Permeable pavement facility – permeable pavement receiving and infiltrating runoff from adjacent impervious surfaces.

Pervious Surface A surface which allows stormwater to infiltrate into the ground. Examples include lawn, landscape, pasture, native vegetation areas, and permeable pavements.

Pollution-generating impervious surface (PGIS) - Those impervious surfaces considered to be a significant source of pollutants in stormwater runoff. Such surfaces include those which are subject to: vehicular use; industrial activities (as further defined in the glossary of the Stormwater Management Manual for Western Washington); or storage of erodible or leachable materials, wastes, or chemicals, and which receive direct rainfall or the run-on or blow-in of rainfall. Metal roofs are also considered to be PGIS unless they are coated with an inert, non-leachable material (e.g., baked-on enamel coating).

Pollution-generating pervious surfaces (PGPS) - Any non-impervious surface subject to vehicular use, industrial activities (as further defined in the glossary of the Stormwater Management Manual for Western Washington); or storage of erodible or leachable materials, wastes, or chemicals, and that receive direct rainfall or run-on or blow-in of rainfall, use of pesticides and fertilizers or loss of soil. Typical PGPS include permeable paved roads, driveways and parking lots, lawns, landscaped areas, golf courses, parks, cemeteries, and sports fields.

Pre-developed condition The native vegetation and soils that existed at a site prior to the influence of Euro-American settlement. The pre-developed condition shall be assumed to be a forested land cover unless reasonable, historic information is provided that indicates the site was prairie prior to settlement.

Project site - That portion of a property, properties, or right of way subject to land disturbing activities, new impervious surfaces, or replaced impervious surfaces.

Rain Garden A non-engineered shallow landscaped depression, with compost-amended native soils and adapted plants that ponds and temporarily stores stormwater runoff from adjacent areas. Designed to allow stormwater to pass through the amended soil profile. Stormwater that exceeds the storage capacity is designed to overflows to an adjacent drainage system. Refer to the Rain Garden Handbook for Western Washington Homeowners (WSU 2007 or as revised) for rain garden specifications and construction guidance.

See the explanation for this distinction between Bioretention BMPs and Rain Gardens in the Explanatory notes accompanying this draft

Receiving waters - Bodies of water or surface water systems to which surface runoff is discharged via a point source of stormwater or via sheet flow. ~~Groundwater to which surface runoff is directed by infiltration.~~ **[COMMENT: No precedent to call groundwater a receiving water for purposes of the Manual.]**

Redevelopment - On a site that is already substantially developed (i.e., has 35% or more of existing impervious surface coverage), the creation or addition of impervious surfaces; the expansion of a building footprint or addition or replacement of a structure; structural development including construction, installation or expansion of a building or other structure;; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities.

Replaced impervious surface - For structures, the removal and replacement of any exterior impervious surfaces or foundation. For other impervious surfaces, the removal down to bare soil or base course and replacement.

Site . The area defined by the legal boundaries of a parcel or parcels of land that is (are) subject to new development or redevelopment. For road projects, the length of the project site and the right-of-way boundaries define the site.

Source control BMP - A structure or operation that is intended to prevent pollutants from coming into contact with stormwater through physical separation of areas or careful management of activities that are sources of pollutants. This manual separates source control BMPs into two types. *Structural Source Control BMPs* are physical, structural, or mechanical devices, or facilities that are intended to prevent pollutants from entering stormwater. *Operational BMPs* are non-structural practices that prevent or reduce pollutants from entering stormwater. See Volume IV of the *Stormwater Management Manual for Western Washington* (2012) for details.

Threshold Discharge Area - An onsite area draining to a single natural discharge location or multiple natural discharge locations that combine within one-quarter mile downstream (as

determined by the shortest flowpath). The examples in Figure 2.1 below illustrate this definition. The purpose of this definition is to clarify how the thresholds of this manual are applied to project sites with multiple discharge points.

Vehicular Use. Regular use of an impervious or pervious surface by motor vehicles. The following are subject to regular vehicular use: roads, un-vegetated road shoulders, bike lanes within the traveled lane of a roadway, driveways, parking lots, unfenced fire lanes, vehicular equipment storage yards, and airport runways.

The following are not considered subject to regular vehicular use: paved bicycle pathways separated from and not subject to drainage from roads for motor vehicles, fenced fire lanes, and infrequently used maintenance access roads.

Wetland **-** Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands.

Section 3. Applicability of the Minimum Requirements

3.1 Thresholds

Not all of the Minimum Requirements apply to every development or redevelopment project. The applicability varies depending on the type and size of the project. This section identifies thresholds that determine the applicability of the Minimum Requirements to different projects. The flow charts in Figures 3.1, 3.2 and 3.3 must be used to determine which of the Minimum Requirements apply. The Minimum Requirements themselves are presented in Section 4 of this Appendix.

~~Use the thresholds in sections 3.2 and 3.3 at the time of application for a subdivision, plat or a short plat. The thresholds apply to a common plan of development or sale as defined in the definitions and acronyms section of this permit. For projects without development plans involving only land disturbing activities, (e.g., clearing or grading), the thresholds apply at the time of application for the permit allowing or authorizing that activity. Note the exemption in Section 1 for forest practices~~

[COMMENT: Ecology should not attempt to state a unique rule to govern when local stormwater requirements are to be applied to development, but should defer to state and local laws that routinely govern applicability of development requirements.]

3.2 New Development

All new development, regardless of size, shall be required to comply with Minimum Requirement #2.

The following new development shall comply with Minimum Requirements #1 through #5 for the new and replaced hard surfaces and the land disturbed:

- Results in 2,000 square feet, or greater, of new plus replaced hard surface area, or
- Has land disturbing activity of 7,000 square feet or greater.

The following new development shall comply with Minimum Requirements #1 through #9 for the new and replaced hard surfaces and the converted pervious surfaces:

- Results in 5,000 square feet, or more, of new plus replaced hard surface area, or
- Converts 3/4 acres, or more, of native vegetation to lawn or landscaped areas, or
- Converts 2.5 acres, or more, of native vegetation to pasture.

3.3 Redevelopment

All redevelopment, regardless of size, shall be required to comply with Minimum Requirement #2.

The following redevelopment shall comply with Minimum Requirements #1 through #5 for the new and replaced hard surfaces and the land disturbed:

- Results in 2,000 square feet, or more, of new plus replaced hard surface area, or
- Has land disturbing activity of 7,000 square feet or greater.

The following redevelopment shall comply with Minimum Requirements #1 through #9 for the new hard surfaces and converted pervious areas:

- Adds 5,000 square feet or more of *new* hard surfaces or,
- Converts 3/4 acres, or more, of native vegetation to lawn or landscaped areas, or
- Converts 2.5 acres, or more, of native vegetation to pasture.

If the runoff from the new hard surfaces and converted pervious surfaces is not separated from runoff from other surfaces on the project site, the stormwater facilities must be sized for the entire flow that is directed to them.

The local government may allow the Minimum Requirements to be met for an equivalent (flow and pollution characteristics) area within the same site. For public roads' projects, the equivalent area does not have to be within the project limits, but must drain to the same receiving water.

3.4 Additional Requirements for Re-development Project Sites

For road-related projects, runoff from the replaced and new hard surfaces (including pavement, shoulders, curbs, and sidewalks) shall meet all the Minimum Requirements if the new hard surfaces total 5,000 square feet or more and total 50% or more of the existing hard surfaces within the project limits. The project limits shall be defined by the length of the project and the width of the right-of-way.

Other types of redevelopment projects shall comply with Minimum Requirements #1 through #9 for the new and replaced hard surfaces if the total of new plus replaced hard surfaces is 5,000 square feet or more, and the valuation of proposed improvements, including interior improvements exceeds 50% of the assessed value of the existing site improvements.

The Permittee may exempt or institute a stop-loss provision for redevelopment projects from compliance with Minimum Requirements for treatment, flow control, and wetlands protection as applied to the replaced hard surfaces if the Permittee has adopted a plan and a schedule that fulfills those requirements in regional facilities. See also Sections 5, 6 and 7 of this Appendix.

[COMMENT: Regarding Ecology deletion pertaining to variance/exception, see Section 6 and related comments in Attachment 1, Comment #8.]

3.5 Modification of the Minimum Requirements

Basin Planning is encouraged and may be used to tailor Minimum Requirement #5 On-site Stormwater Management, Minimum Requirement #6 Runoff Treatment, Minimum Requirement #7 Flow Control, and/or Minimum Requirement #8 Wetlands Protection. Basin planning may be used to support alternative treatment, flow control, and/or wetland protection requirements to those contained in Section 4 of this Appendix. Basin planning may also be used to demonstrate an equivalent level of treatment, flow control, and/or wetland protection through the construction and use of regional stormwater facilities.

See Section 7 of this Appendix for details on Basin Planning and how Permittees may use basin planning to modify the Minimum Requirements in Section 4.

Section 4. Minimum Requirements

This Section describes the Minimum Requirements for stormwater management at new development and redevelopment sites. Section 3 of this Appendix should be consulted to determine which of the minimum requirements below apply to any given project. Figures 3.2 and 3.3 should be consulted to determine whether the minimum requirements apply to new surfaces, replaced surfaces or new and replaced surfaces.

4.1 Minimum Requirement #1: Preparation of Stormwater Site Plans

The permittee shall require a Stormwater Site Plan from all projects meeting the thresholds in Section 3.1 of this Appendix. Stormwater Site Plans shall use site-appropriate development principles to retain native vegetation and ~~minimize~~ reduce impervious surfaces ~~to the extent~~ where feasible while also encouraging increased density within Urban Growth Areas that are suitable for more intense development. Stormwater Site Plans shall be prepared in accordance with Chapter 3 of Volume 1 of the *Stormwater Management Manual for Western Washington* (2012).

[COMMENT: LID requirements should reflect regional benefit of increasing density within urban areas. Increased density within urban cores allows LID to be

truly compatible with Growth Management Act principles, balancing substantial use of LID practices where suitable and focusing density in urban areas where pollutant loading decreases can also occur by transportation choices of mass transit and bike lanes. A primary need is that the LID requirement does not significantly restrict an urban development from constructing proposed lot coverage established by local development codes and associated zoning to achieve UGA density goals.]

4.2 Minimum Requirement #2: Construction Stormwater Pollution Prevention Plan (SWPPP)

Permittees may choose to allow compliance with this Minimum Requirement to be achieved for an individual site if the site is covered under Ecology's *General NPDES Permit for Stormwater Discharges Associated with Construction Activities* and fully implementing the requirements of that permit.

The Permittee may develop an abbreviated SWPPP format to meet the SWPPP requirement under this permit for sites that are less than 1 acre.

General Requirements

All new development and redevelopment projects are responsible for preventing erosion and discharge of sediment and other pollutants into receiving waters. Permittees must require a Construction Stormwater Pollution Prevention Plan (SWPPP) for all projects which meet the thresholds in Section 3 of this Appendix. The SWPPP shall be implemented beginning with initial land disturbance and until final stabilization.

Sediment and Erosion control BMPs shall be consistent with the BMPs contained in chapters 3 and 4 of Volume II of the *Stormwater Management Manual for Western Washington* (2012), and/or other equivalent BMPs contained in technical stormwater manuals approved by the Department.

The SWPPP shall include a narrative and drawings. All BMPs shall be clearly referenced in the narrative and marked on the drawings. The SWPPP narrative shall include documentation to explain and justify the pollution prevention decisions made for the project. Clearing and grading activities for developments shall be permitted

only if conducted pursuant to an approved site development plan (e.g., subdivision approval) that establishes permitted areas of clearing, grading, cutting, and filling. When establishing these permitted clearing and grading areas, consideration should be given to minimizing removal of existing trees and minimizing disturbance/compaction of native soils except as needed for building purposes. These permitted clearing and grading areas and any other areas required to preserve critical

or sensitive areas, buffers, native growth protection easements, or tree retention areas as may be required by local jurisdictions, shall be delineated on the site plans and the development site.

Seasonal Work Limitations - From October 1 through April 30, clearing, grading, and other soil disturbing activities may only be authorized by the Permittee if silt-laden runoff will be prevented from leaving the site through a combination of the following:

1. Site conditions including existing vegetative coverage, slope, soil type and proximity to receiving waters; and

2. Limitations on activities and the extent of disturbed areas; and

3. Proposed erosion and sediment control measures.

Based on the information provided and/or local weather conditions, the Permittee may expand or restrict the seasonal limitation on site disturbance. The following activities are exempt from the seasonal clearing and grading limitations:

1. Routine maintenance and necessary repair of erosion and sediment control BMPs,

2. Routine maintenance of public facilities or existing utility structures that do not expose the soil or result in the removal of the vegetative cover to soil, and

3. Activities where there is one hundred percent infiltration of surface water runoff within the site in approved and installed erosion and sediment control facilities.

Construction Stormwater Pollution Prevention Plan (SWPPP) Elements
The construction site operator shall include each of the thirteen elements below in the SWPPP and ensure that they are implemented unless site conditions render the element unnecessary and the exemption from that element is clearly justified in the SWPPP. The SWPPP shall include both narrative and drawings. All BMPs shall be clearly referenced in the narrative and marked on the drawings. The SWPPP narrative shall include documentation to explain and justify the pollution prevention decisions made for the project.

1. Preserve Vegetation/Mark Clearing Limits:

   a. Prior to beginning land disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area.

   b. The duff layer, native top soil, and natural vegetation shall be retained in an undisturbed state to the maximum degree practicable.

2. Establish Construction Access:

a. Construction vehicle access and exit shall be limited to one route, if possible.

b. Access points shall be stabilized with quarry spalls, crushed rock or other equivalent BMP to minimize the tracking of sediment onto public roads.

c. Wheel wash or tire baths shall be located on site, if the stabilized constructions entrance is not effective in preventing sediment from being tracked onto public roads.

d. If sediment is tracked off site, roads shall be cleaned thoroughly at the end of each day, or more frequently during wet weather. Sediment shall be removed from roads by shoveling or pickup sweeping and shall be transported to a controlled sediment disposal area.

e. Street washing is allowed only after sediment is removed in accordance with 2.d, above. Street wash wastewater shall be controlled by pumping back on site or otherwise be prevented from discharging into systems tributary to waters of the state.

3. Control Flow Rates:

a. Properties and waterways downstream from development sites shall be protected from erosion due to increases in the velocity and peak volumetric flow rate of stormwater runoff from the project site.

b. Where necessary to comply with 3.a, above, stormwater retention or detention facilities shall be constructed as one of the first steps in grading. Detention facilities shall be functional prior to construction of site improvements (e.g., impervious surfaces).

c. If permanent infiltration ponds are used for flow control during construction, these facilities should be protected from siltation during the construction phase.

4. Install Sediment Controls:

a. Stormwater runoff from disturbed areas shall pass through a sediment pond, or other appropriate sediment removal BMP, prior to leaving a construction site or prior to discharge to an infiltration facility. Runoff from fully stabilized areas may be discharged without a sediment removal BMP, but shall meet the flow control performance standard of 3.a, above.

b. Sediment control BMPs (sediment ponds, traps, filters, etc.) shall be constructed as one of the first steps in grading. These BMPs shall be functional before other land disturbing activities take place.

c. BMPs intended to trap sediment on site shall be located in a manner to avoid interference with the movement of juvenile salmonids attempting to enter off-channel areas or drainages.

5. Stabilize Soils:

   a. Exposed and unworked soils shall be stabilized by application of effective BMPs that prevent erosion.

   b. No soils should remain exposed and unworked for more than the time periods set forth below to prevent erosion:

      - During the dry season (May 1 - September 30): 7 days
      - During the wet season (October 1 - April 30): 2 days

   c. The time period may be adjusted by the Permittee, if the Permittee can show that local precipitation data justify a different standard.

   d. Soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast.

   e. Soil stockpiles must be stabilized from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways and drainage channels.

6. Protect Slopes:

   a. Design and construct cut and fill slopes in a manner that will minimize erosion.

   b. Off-site stormwater (run-on) or groundwater shall be diverted away from slopes and undisturbed areas with interceptor dikes, pipes and/or swales. Off-site stormwater should be managed separately from stormwater generated on the site.

   c. At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion. Temporary pipe slope drains shall handle the expected peak 10- minute flow velocity from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate predicted by an approved continuous runoff model, increased by a factor of 1.6, may be used. The hydrologic analysis shall use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis shall use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the
      Western Washington Hydrology Model to predict flows, bare soil areas should be modeled as "landscaped area."

   d. Excavated material shall be placed on the uphill side of trenches, consistent with safety and space considerations.

   e. Check dams shall be placed at regular intervals within constructed channels that are cut down a slope.

7. Protect Drain Inlets:

   a. Storm drain inlets made operable during construction shall be protected so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.

   b. Inlet protection devices shall be cleaned or removed and replaced when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).

8. Stabilize Channels and Outlets:

   a. All temporary on-site conveyance channels shall be designed, constructed, and stabilized to prevent erosion from the following expected peak flows. Channels shall handle the expected peak 10-minute flow velocity from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate predicted by an approved continuous runoff model, increased by a factor of 1.6, may be used. The hydrologic analysis shall use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis shall use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the Western Washington Hydrology Model to predict flows, bare soil areas should be modeled as "landscaped area."

   b. Stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches shall be provided at the outlets of all conveyance systems.

9. Control Pollutants:

   a. All pollutants, including waste materials and demolition debris, that occur onsite shall be handled and disposed of in a manner that does not cause contamination of stormwater.

   b. Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. On-site fueling tanks shall include secondary containment.

   c. Maintenance, fueling and repair of heavy equipment and vehicles shall be conducted using spill prevention and control measures. Contaminated surfaces shall be cleaned immediately following any spill incident.

   d. Wheel wash or tire bath wastewater shall be discharged to a separate on-site treatment system or to the sanitary sewer with local sewer district approval.

   e. Application of fertilizers and pesticides shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers' label requirements for application rates and procedures shall be followed.

   f. BMPs shall be used to prevent or treat contamination of stormwater runoff by pH

modifying sources. These sources include, but are not limited to: bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, dewatering concrete vaults, concrete pumping and mixer washout waters. Permittees shall require construction site operators to adjust the pH of stormwater if necessary to prevent violations of water quality standards.

g. Permittees shall require construction site operators obtain written approval from the Department prior to using chemical treatment other than CO2 or dry ice to adjust pH.

10. Control De-Watering:

a. Foundation, vault, and trench de-watering water, which have similar characteristics to stormwater runoff at the site, shall be discharged into a controlled conveyance system prior to discharge to a sediment trap or sediment pond.

b. Clean, non-turbid de-watering water, such as well-point ground water, can be discharged to systems tributary to, or directly into surface waters of the state, as specified in 8, above, provided the de-watering flow does not cause erosion or flooding of receiving waters. Clean de-watering water should not be routed through stormwater sediment ponds.

c. Other de-watering disposal options may include: (i) infiltration; (ii) transport offsite in vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters; (iii) on-site chemical treatment or other suitable treatment technologies approved by the Permittee; (iv) sanitary sewer discharge with local sewer district approval, if there is no other option; or (v) use of a sedimentation bag with outfall to a ditch or swale for small volumes of localized de-watering.

d. Highly turbid or contaminated dewatering water shall be handled separately from stormwater.

11. Maintain BMPs:

a. All temporary and permanent erosion and sediment control BMPs shall be inspected, maintained and repaired as needed to assure continued performance of their intended function in accordance with BMP specifications.

b. All temporary erosion and sediment control BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed.

12. Protect Low Impact Development BMPs:

    a. Protect all Bioretention and Rain Garden BMP's, from sedimentation through installation and maintenance of erosion and sediment control BMPs on portions of the site that drain into the Bioretention and/or Rain Garden BMPs. Restore the BMP to its fully functioning condition if it accumulates sediment during construction. Restoration of the BMP must include removal of sediment and any sediment-laden bioretention/rain garden soils, and replacing the removed soils with soils meeting the design specification.

    b. Prevent compaction of bioretention and rain garden BMP's by excluding construction equipment and foot traffic as practical. Protect completed lawn and landscaped areas from compaction due to construction equipment as practical. Any areas that are unavoidably compacted should be scarified prior to BMP placement. **[COMMENT: This is not feasible on small lots where the entire site area is used for staging, thus the suggestion to add means to mitigate should compaction be unavoidable.]**

    c. Control erosion and prevent introduction of sediment from surrounding land uses onto permeable pavements and subbases. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment laden runoff onto permeable pavements.

13. Manage the Project:

    a. Development projects shall be phased to the maximum degree practicable and shall take into account seasonal work limitations.

    b. The Permittee must require construction site operators to maintain, and repair as needed, all sediment and erosion control BMPs to assure continued performance of their intended function.

    c. The Permittee must require construction site operators to periodically inspect their sites. For projects that disturb one or more acres, site inspections shall be conducted by a Certified Erosion and Sediment Control Lead who shall be identified in the SWPPP and shall be present on-site or on-call at all times.

    d. Permittee must require construction site operators to maintain, update and implement their SWPPP. Permittees shall require construction site operators to modify their SWPPP whenever there is a change in design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the state.

4.3 Minimum Requirement #3: Source Control of Pollution

All known, available and reasonable source control BMPs must be required for to all projects approved by the Permittee. Source control BMPs must be selected, designed, and maintained in accordance with Volume IV of the *Stormwater Management Manual for Western Washington* (2012) or an approved equivalent manual approved by the Department.

4.4 Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls

Natural drainage patterns shall be maintained, and discharges from the project site shall occur at the natural location, to the maximum extent practicable. The manner by which runoff is discharged from the project site must not cause a significant adverse impact to downstream receiving waters and down gradient properties. All outfalls require energy dissipation.

4.5 Minimum Requirement #5: On-site Stormwater Management

The Permittee must require On-site Stormwater Management BMPs in accordance with the following project thresholds to infiltrate, disperse, and retain stormwater runoff onsite ~~to the maximum extent~~ where feasible without causing flooding or erosion impacts.

[COMMENT: "Where feasible" reflects the PCHB decision that more LID should be used, whereas "maximum extent feasible" would create an additional uncertain standard.]

Project Thresholds

For projects required to comply **only** with Minimum Requirements #1 through #5, the following On-Site Stormwater Management BMPs are required where feasible:

- Roof Downspout Control BMPs, functionally equivalent to those described in Chapter 3 of Volume III of the Stormwater Management Manual for Western Washington (2012), at single family residential projects.
- Dispersion BMPs, functionally equivalent to those in Section 5.3.1 of Volume V, of the Stormwater Management Manual for Western Washington (2012) at single family residential projects
- A Soil Quality BMP , functionally equivalent to BMP T5.13 in Chapter 5 of Volume V, of the Stormwater Management Manual for Western Washington (2012) at all projects;
- Permeable Pavement[1] surfaces for public and private walks (not already mitigated by

[1] This is not a requirement to pave these surfaces. But where pavement is proposed, it must be permeable to the maximum extent feasible.

rain gardens), driveways, patios, plazas, sports/play courts, ~~roads~~ and parking lots at all projects ~~to the maximum extent~~ where feasible as determined using the feasibility criteria in Section 8 of this Appendix;

> Should permeable pavements or rain gardens be included in the above list of required on-site management BMP's that apply to projects subject only to requirements #1 - #5? **[COMMENT: As per edits above, Seattle agrees that geotechnical and engineering design work requirements for less than 5,000 SF of hard surface are appropriately less stringent. Suggested edits to feasibility section to reflect an equivalently lower tech permeable pavement option for single family projects similar to the downscaling from 'bioretention' to 'rain gardens'.]**

Rain Gardens, functionally equivalent to those described in Rain Garden Handbook for Western Washington Homeowners (WSU 2007 or as revised) to address runoff from rooftops, and public and private walks (not already mitigated with permeable pavement surfaces) at all projects ~~to the maximum extent~~ where feasible determined using the feasibility criteria in Section 8 of this Appendix. **[COMMENT: Edit intended to clarify how much is enough.]**

For non-PGIS areas of projects that discharge to exempt receiving water bodies, permeable pavements and rain gardens are not required.]

For projects[2] that are required to comply with Minimum Requirements #1 through # 9, refer to the following thresholds to determine which On-Site Stormwater Management BMPs are required.

For basins either exempt from Minimum Requirement #7 or where the rules stated in Standard flow control requirement section Minimum Requirement #7 assigns the predevelopment condition of matching the existing land cover condition, the Permittee has the option of developing an alternative to the mandatory lists by using a menu of options and calculator approach for projects with greater than 5,000SF hard surface for the applicant to demonstrate implementation of LID where feasible.

If the project results in less than 10,000 square feet of new and replaced hard surface area, and /or converts less than 3/4 acres of native vegetation, the following On-Site Stormwater Management BMPs are required where feasible:

> Should Ecology allow local governments to accept LID performance standard compliance as an option to the specific BMP requirements as listed below for projects in this size range? **[Seattle supports having a LID performance standard as an option IF Ecology agrees to the suggested modification of the LID performance standard to include feasibility per discussion below.]**

[2] The Minimum Requirement applies to replaced hard surfaces at redevelopment sites only if the 50% threshold is exceeded. See Section 3.4.

- Roof Downspout Control BMPs, functionally equivalent to those described in Chapter 3 of Volume III of the *Stormwater Management Manual for Western Washington* (2012) at single family residential projects;
- Dispersion BMPs, functionally equivalent to those in Section 5.3.1 of Volume V, of the *Stormwater Management Manual for Western Washington* (2012) at single family residential projects;
- A Soil Quality BMP, functionally equivalent to BMP T5.13 in Chapter 5 of Volume V, of the *Stormwater Management Manual for Western Washington* (2012) at all projects;
- Bioretention BMPs, functionally equivalent to those in Chapter 7 of Volume V, of the *Stormwater Management Manual for Western Washington* (2012) at all projects ~~to the maximum extent~~ where feasible as determined using the feasibility criteria in Section 8 of this Appendix;
- Permeable Pavement[1] for public and private walks, driveways, patios, plazas, sports/play courts, roads and parking lots at all projects ~~to the maximum extent~~ where feasible as determined using the feasibility criteria in Section 8 of this Appendix.

For non-PGIS areas of projects that discharge to exempt receiving water bodies, permeable pavements and bioretention BMPs are not required.]

If the project results in 10,000 square feet or more of new and replaced hard surface area, and/or converts 3/4 acres or more of native vegetation, On-Site Stormwater Management BMPs are required in accordance with the table below where feasible:

Project Type and Location	Requirement
New development inside the UGA, or new development outside the UGA on a parcel less than 5 acres	LID Performance Standard where feasible or Mandatory List where feasible (applicant option). See Note 2)
New development outside the UGA on a parcel of 5 acres or larger	LID Performance Standard
Redevelopment inside the UGA, or redevelopment outside the UGA on a parcel less than 5 acres	LID Performance Standard where feasible or Mandatory List where feasible (applicant option. See Note 2)
Redevelopment outside the UGA on a parcel of 5 acres or larger	LID Performance Standard.

NOTE 1: This table refers to the Urban Growth Area (UGA) as designated under the Growth Management Act of the State of Washington. If the Permittee is located in a county that is not subject to GMA planning, the city limits shall be used instead.
NOTE 2: For basins either exempt from Minimum Requirement #7 or where the rules stated in

Standard flow control requirement section Minimum Requirement #7 assigns the predevelopment condition of matching the existing land cover condition, the Permittee has the option of developing an alternative to the mandatory list by using a menu of options and calculator approach for projects with greater than 5,000SF hard surface for the applicant to demonstrate implementation of LID where feasible.

Low Impact Development Performance Standard

Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 8% of the 2-year peak flow to 50% of the 2-year peak flow where feasible. ~~Refer to~~ Rules stated in the Standard Flow Control Requirement section in Minimum Requirement #7 for ~~information about the~~ assignment of the pre-developed condition also apply to Minimum Requirement #5. Project sites that must also meet minimum requirement #7 – flow control - must match flow durations between 8% of the 2-year flow through the full 50-year flow.

[COMMENT: For sites matching the pre-developed forested condition, this standard is only achievable with infiltration technologies; feasibility considerations for sites where infiltration is not appropriate should be incorporated. Ecology's version extends a more stringent flow control standard and is not consistent with PCHB ruling to use LID where feasible. If extending the flow control standard Ecology should move this requirement to flow control section #7.

COMMENT: During the LID committee meetings there seemed to be confusion on ECYs LID standard and how it relates to pre-developed forest runoff and basic or enhanced water quality treatment. Please refer to Herrera's June 2011 memo "LID Performance Standard Study" for analysis that may be helpful for Ecology to help clarify these questions. In short, Ecology's LID standard closely replicates average annual volume runoff of forested conditions. Enhanced water quality treatment for runoff from a site would not be achieved since less than 91% of the average annual volume is required to be removed from runoff.]

Mandatory List

Use all of the applicable BMP's on this list unless a BMP is considered infeasible in accordance with Section 8 of this Appendix.

- Roof Downspout Control BMPs, functionally equivalent to those described in Chapter 3 of Volume III of the *Stormwater Management Manual for Western Washington* (2012) at single family residential projects;
- Dispersion BMPs, functionally equivalent to those in Section 5.3.1 of Volume V, of the *Stormwater Management Manual for Western Washington* (2012) at single family residential projects;
- A Soil Quality BMPs, functionally equivalent to BMP T5.13 in Chapter 5 of Volume V, of the *Stormwater Management Manual for Western Washington* (2012) at all projects.

- Infiltration below pavement (permeable pavement or impermeable pavement with stormwater collection and redistribution below) at all projects for new and replaced hard surfaces, e.g., roads, parking lots, public and private walks, driveways, patios, sports courts;
- Bioretention BMPs (See Volume V, Chapter 7) through which all runoff ~~and overflow from permeable pavement storage basins~~ must pass at all projects. Bioretention BMPs should have a minimum area equivalent to ~~comprise~~ at least ~~7.5~~ X% of the impervious surface area for residential developments and ~~4~~ Y % of the impervious surface area for commercial developments (total horizontally projected surface area below the overflow); **[COMMENT: The sizing percentage for bioretention BMPs should be based on impervious surface area associated with a project. Otherwise using percentage of lot area may be seen as an unfair land use obligation. Additionally requiring of all permeable pavement overflow to go to bioretention is both redundant and technically infeasible in many locations.]**
- For a commercial building, a vegetated roof or an impervious roof with runoff routed below pavement. If the latter option is not used, a cost analysis is necessary to claim infeasibility of a vegetated roof.

For non-PGIS areas of projects that discharge to exempt receiving water bodies, permeable pavements, infiltration below pavements, and bioretention BMPs are not required.]

4.6 Minimum Requirement #6: Runoff

Treatment *Project Thresholds*

The following require construction of stormwater treatment facilities (see Table 4.1 below):

- Projects in which the total of pollution-generating hard surface (PGIS) – is 5,000 square feet or more in a threshold discharge area of the project, or
- Projects in which the total of pollution-generating pervious surfaces (PGPS) with the exception of permeable pavements – is three-quarters (3/4) of an acre or more in a threshold discharge area, and from which there is a surface discharge in a natural or man-made conveyance system from the site.

Treatment-Type Thresholds

1. Oil Control:

Treatment to achieve Oil Control applies to projects that have "high-use sites." High-use sites are those that typically generate high concentrations of oil due to high traffic turnover or the frequent transfer of oil. High-use sites include:

a. An area of a commercial or industrial site subject to an expected average daily

traffic (ADT) count equal to or greater than 100 vehicles per 1,000 square feet of gross building area;

b. An area of a commercial or industrial site subject to petroleum storage and transfer in excess of 1,500 gallons per year, not including routinely delivered heating oil;

c. An area of a commercial or industrial site subject to parking, storage or maintenance of 25 or more vehicles that are over 10 tons gross weight (trucks, buses, trains, heavy equipment, etc.);

d. A road intersection with a measured ADT count of 25,000 vehicles or more on the main roadway and 15,000 vehicles or more on any intersecting roadway, excluding projects proposing primarily pedestrian or bicycle use improvements.

2. Phosphorus Treatment:

The requirement to provide phosphorous control is determined by the local government with jurisdiction (e.g., through a lake management plan), or the Department of Ecology (e.g., through a waste load allocation). The local government may have developed a management plan and implementing ordinances or regulations for control of phosphorus from new/redevelopment for the receiving water(s) of the stormwater drainage. The local government can use
the following sources of information for pursuing plans and implementing ordinances and/or regulations:

a. Those waterbodies reported under section 305(b) of the Clean Water Act, and designated as not supporting beneficial uses due to phosphorous;

b. Those listed in Washington State's Nonpoint Source Assessment required under section 319(a) of the Clean Water Act due to nutrients.

3. Enhanced Treatment:

Enhanced treatment for reduction in dissolved metals is required for the following project sites that discharge to fish-bearing streams, lakes, or to waters or conveyance systems tributary to fish-bearing streams or lakes:

Industrial project sites,
Commercial project sites,
Multi-family project sites, and High
AADT roads as follows:

Within Urban Growth Management Areas:

- Fully controlled and partially controlled limited access highways with Annual Average Daily Traffic (AADT) counts of 15,000 or more
- All other roads with an AADT of 7,500 or greater

Outside of Urban Growth Management Areas:

- Roads with an AADT of 15,000 or greater unless discharging to a 4th Strahler order stream or larger;
- Roads with an AADT of 30,000 or greater if discharging to a 4th Strahler order stream or larger (as determined using 1:24,000 scale maps to delineate stream order).

However, such sites listed above that discharge directly (or, indirectly through a municipal storm sewer system) to Basic Treatment Receiving Waters (Appendix I-C of the *Stormwater Management Manual for Western Washington* (2012)), and areas of the above-listed project sites that are identified as subject to Basic Treatment requirements, are also not subject to Enhanced Treatment requirements. For developments with a mix of land use types, the Enhanced Treatment requirement shall apply when the runoff from the areas subject to the Enhanced Treatment requirement comprise 50% or more of the total runoff within a threshold discharge area.

4. Basic Treatment:

Basic Treatment generally applies to:

- Project sites that discharge to the ground, UNLESS:
  1) The soil suitability criteria for infiltration treatment are met; (see Chapter 3 of Volume III of the *Stormwater Management Manual for Western Washington* (2012) for soil suitability criteria) or
  2) The project uses infiltration strictly for flow control – not treatment - and the discharge is within 1/4-mile of a phosphorus sensitive lake (use a Phosphorus Treatment facility), or within 1/4 mile of a fish-bearing stream, or a lake (use an Enhanced Treatment facility).
- Residential projects not otherwise needing phosphorus control as designated by USEPA, the Department of Ecology, or by the Permittee; and
- Project sites discharging directly to salt waters, river segments, and lakes listed in Appendix I-C of the *Stormwater Management Manual for Western Washington* (2012); and
- Project sites that drain to streams that are not fish-bearing, or to waters not tributary to fish-bearing streams;
- Landscaped areas of industrial, commercial, and multi-family project sites, and parking lots of industrial and commercial project sites that do not involve pollution-generating sources (e.g., industrial activities, customer parking, storage of erodible or leachable material, wastes or chemicals) other than parking of employees' private vehicles. For developments with a mix of land use types, the Basic Treatment requirement shall apply when the runoff from the areas subject to the Basic Treatment requirement comprise 50% or more of the total runoff within a threshold discharge area.

Treatment Facility Sizing

Water Quality Design Storm Volume: The volume of runoff predicted from a 24-hour storm with a 6-month return frequency (a.k.a., 6-month, 24-hour storm). Wetpool facilities are sized based upon the volume of runoff predicted through use of the Natural Resource Conservation Service curve number equations in Chapter 2 of Volume III of the *Stormwater Management Manual for Western Washington* (2012), for the 6-month, 24-hour storm. Alternatively, the 91st percentile, 24-hour runoff volume indicated by an approved continuous runoff model may be used.

Water Quality Design Flow Rate

1. Preceding Detention Facilities or when Detention Facilities are not required:

   The flow rate at or below which 91% of the runoff volume, as estimated by an approved continuous runoff model, will be treated. Design criteria for treatment facilities are assigned to achieve the applicable performance goal at the water quality design flow rate (e.g., 80% TSS removal). At a minimum, 91% of the total runoff volume, as estimated by an approved continuous runoff model, must pass through the treatment facility(ies) at or below the approved hydraulic loading rate for the facility(ies).

2. Downstream of Detention Facilities:

   The water quality design flow rate must be the full 2-year release rate from the detention facility.

   Alternative methods may be used if they identify volumes and flow rates that are at least equivalent.

   That portion of any development project in which the above PGIS or PGPS thresholds are not exceeded in a threshold discharge area shall apply On-site Stormwater Management BMPs in accordance with Minimum Requirement #5.

Treatment Facility Selection, Design, and Maintenance

Stormwater treatment facilities shall be:

- Selected in accordance with the process identified in Chapter 4 of Volume I of the *Stormwater Management Manual for Western Washington* (2012),
  - Designed in accordance with the design criteria in Volume V of the *Stormwater Management Manual for Western Washington* (2012), and
  - Maintained in accordance with the maintenance schedule in Volume V of the *Stormwater Management Manual for Western Washington* (2012).

Additional Requirements

The discharge of untreated stormwater from pollution-generating hard surfaces to ground water must not be authorized by the Permittee, except for the discharge achieved by

infiltration or dispersion of runoff through use of On-site Stormwater Management BMPs in accordance with Chapter 5, Volume V and Chapter 7, Volume V.

4.7 Minimum Requirement #7: Flow

Control *Applicability*

Except as provided below, the Permittee must require all projects provide flow control to reduce the impacts of stormwater runoff from impervious surfaces and land cover conversions. The requirement below applies to projects that discharge stormwater directly, or indirectly through a conveyance system, into a fresh water.

Flow control is not required for projects that discharge directly to, or indirectly through an MS4 to a water listed in Appendix I-E of the *Stormwater Management Manual for Western Washington* (2012) subject to the following restrictions:

- Direct discharge to the exempt receiving water does not result in the diversion of drainage from any perennial stream classified as Types 1, 2, 3, or 4 in the State of Washington Interim Water Typing System, or Types "S", "F", or "Np" in the Permanent Water Typing System, or from any category I, II, or III wetland; and
- Flow splitting devices or drainage BMP's are applied to route natural runoff volumes from the project site to any downstream Type 5 stream or category IV wetland:
    - Design of flow splitting devices or drainage BMP's will be based on continuous hydrologic modeling analysis. The design will assure that flows delivered to Type 5 stream reaches will approximate, but in no case exceed, durations ranging from 50% of the 2-year to the 50-year peak flow.
    - Flow splitting devices or drainage BMP's that deliver flow to category IV wetlands will also be designed using continuous hydrologic modeling to preserve pre-project wetland hydrologic conditions unless specifically waived or exempted by regulatory agencies with permitting jurisdiction; and
- The project site must be drained by a conveyance system that is comprised entirely of manmade conveyance elements (e.g., pipes, ditches, outfall protection, etc.) and extends to the ordinary high water line of the exempt receiving water; and
- The conveyance system between the project site and the exempt receiving water shall have sufficient hydraulic capacity to convey discharges from future build-out conditions (under current zoning) of the site, and the existing condition from non-project areas from which runoff is or will be collected; and
- Any erodible elements of the manmade conveyance system must be adequately stabilized to prevent erosion under the conditions noted above

If the discharge is to a stream that leads to a wetland, or to a wetland that has an outflow to a stream, both this minimum requirement (Minimum Requirement #7) and Minimum Requirement #8 apply.

Permittees may petition Ecology to exempt projects in additional areas. A petition must justify the proposed exemption based upon a hydrologic analysis that demonstrates that the potential stormwater runoff from the exempted area will not significantly increase the erosion forces on the stream channel nor have near-field impacts (see Section 7 of this Appendix).

Thresholds

The following require construction of flow control facilities and/or land use management BMPs that will achieve the standard flow control requirement for western Washington (see Table 4.2):

- Projects in which the total of effective impervious surfaces is 10,000 square feet or more in a threshold discharge area, or
- Projects that convert 3/4 acres or more of native vegetation to lawn or landscape, or convert 2.5 acres or more of native vegetation to pasture in a threshold discharge area, and from which there is a surface discharge in a natural or man-made conveyance system from the site, or
- Projects that through a combination of effective hard surfaces and effective pervious surfaces cause a 0.1 cubic feet per second increase in the 100-year flow frequency from a threshold discharge area as estimated using the Western Washington Hydrology Model or other approved model and one-hour time steps (or a 0.15 cfs increase using 15-minute time steps).

  [COMMENT: Effective pervious surfaces needs to be defined.]

That portion of any development project in which the above thresholds are not exceeded in a threshold discharge area shall apply Onsite Stormwater Management BMPs in accordance with Minimum Requirement #5.

Standard Flow Control Requirement

Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. The pre-developed condition to be matched shall be a forested land cover unless:

- Reasonable, historic information is available that indicates the site was prairie prior to settlement (modeled as "pasture" in the Western Washington Hydrology Model); or
- The drainage area of the immediate stream and all subsequent downstream basins have had at least 40% total impervious area since 1985. In this case, the pre-developed condition to be matched shall be the existing land cover condition. The map in Appendix XX of the 2012 Stormwater Management Manual for Western Washington depicts those areas which meet this criterion. Where basin-specific studies determine a stream channel to be unstable, even though the above criterion is met, the pre-developed condition assumption shall be the "historic" land cover condition, or a land cover condition commensurate with achieving a target flow regime identified by an approved basin study.

This standard requirement is waived for sites that will reliably infiltrate all the runoff from hard surfaces and converted pervious surfaces.

Western Washington Alternative Requirement

An alternative requirement may be established through application of watershed-scale hydrological modeling and supporting field observations. Possible reasons for an alternative flow control requirement include:

- Establishment of a stream–specific threshold of significant bedload movement other than the assumed 50% of the 2-year peak flow;
- Zoning and Land Clearing Ordinance restrictions that, in combination with an alternative flow control standard, maintain or reduce the naturally occurring erosive forces on the stream channel; or
- A duration control standard is not necessary for protection, maintenance, or restoration of designated beneficial uses or Clean Water Act compliance.

See Section 7 Basin/Watershed Planning of this Appendix for details on how alternative flow control requirements may be established.

Additional Requirement

Flow Control BMPs shall be selected, designed, and maintained in accordance with Volume III of the *Stormwater Management Manual for Western Washington* (2012) or an approved equivalent.

4.8 Minimum Requirement #8: Wetlands

Protection *Applicability*

The requirements below apply only to projects whose stormwater discharges into a wetland, either directly or indirectly through a conveyance system. These requirements must be met in addition to meeting Minimum Requirement #6, Runoff Treatment.

Thresholds

The thresholds identified in Minimum Requirement #6 - Runoff Treatment, and Minimum Requirement #7 - Flow Control shall also be applied for discharges to wetlands.

Standard Requirement

Discharges to wetlands shall maintain the hydrologic conditions, hydrophytic vegetation, and substrate characteristics necessary to support existing and designated uses. The hydrologic analysis shall use the existing land cover condition to determine the existing hydrologic conditions unless directed otherwise by a regulatory agency with jurisdiction. A wetland can be considered for hydrologic modification and/or stormwater treatment in accordance with Guide Sheet 1B in Appendix I-D on the *Stormwater Management Manual for Western Washington* (2012).

Additional Requirements

Stormwater treatment and flow control facilities shall not be built within a natural

vegetated buffer, except for:

- Necessary conveyance systems as approved by the Permittee; or
- As allowed in wetlands approved for hydrologic modification and/or treatment in accordance with Guidesheet 1B in Appendix I-D of the *Stormwater Management Manual for Western Washington* (2012).

An adopted and implemented basin plan prepared in accordance with the provisions of Section 7 of this Appendix may be used to develop requirements for wetlands that are tailored to a specific basin.

4.9 Minimum Requirement #9: Operation and Maintenance

Permittees must require an operation and maintenance manual that is consistent with the provisions in Volume V of the *Stormwater Management Manual for Western Washington* (2012) for all proposed stormwater facilities and BMPs. The party (or parties) responsible for maintenance and operation shall be identified in the operation and maintenance manual. For private facilities approved by the Permittee installed to achieve LID performance standard or minimum requirement #6-#8, a copy of the operation and maintenance manual shall be retained onsite or within reasonable access to the site, and shall be transferred with the property to the new owner. For public facilities installed to achieve LID performance standard or Minimum requirement #6-#8, a copy of the operation and maintenance manual shall be retained in the appropriate department. A log of maintenance activity that indicates what actions were taken shall be kept and be available for inspection by the local government.

Section 5. Adjustments

Adjustments to the Minimum Requirements may be granted by the Permittee provided that a written finding of fact is prepared, that addresses the following:

- The adjustment provides substantially equivalent environmental protection.
- Based on sound Engineering practices, the objectives of safety, function, environmental protection and facility maintenance, are met.

Section 6. Exceptions/Variances

Exceptions/variances (exceptions) to the Minimum Requirements may be granted by the Permittee ~~following legal public notice of an application for an exception or variance, legal public notice of the Permittee's decision on the application, and written findings of fact that documents the Permittees determination to grant an exception. Permittees shall keep records,~~

~~including the written findings of fact, of all local exceptions to the Minimum Requirements.~~
using variance standards stated in the Permittee's land use control ordinances and development regulations and consistent with state law.

[NOTE: See comments provided in Seattle Attachment 1 Comments Letter]

~~Project-specific design exceptions based on site-specific conditions do not require prior approval of the Department. The Permittee must seek prior approval by the Department for any jurisdiction-wide exception.~~

~~The Permittee may grant an exception to the minimum requirements if such application imposes a severe and unexpected economic hardship. To determine whether the application imposes a severe and unexpected economic hardship on the project applicant, the Permittee must consider and document with written findings of fact the following:~~

- ~~The current (pre-project) use of the site, and~~
- ~~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 requirements; and~~
- ~~The possible remaining uses of the site if the exception were not granted; and The uses of the site that would have been allowed prior to the adoption of the minimum requirements; and~~
- ~~A comparison of the estimated amount and percentage of value loss as a result of the minimum requirements versus the estimated amount and percentage of value loss as a result of requirements that existed prior to adoption of the minimum requirements; and~~
- ~~The feasibility for the owner to alter the project to apply the minimum requirements.~~

~~In addition any exception must meet the following criteria:~~

- ~~The exception will not increase risk to the public health and welfare, nor injurious to other properties in the vicinity and/or downstream, and to the quality of waters of the state; and~~
- ~~The exception is the least possible exception that could be granted to comply with the intent of the Minimum Requirements~~

Section 7. Basin/Watershed Planning

[NOTE: Seattle's comments on Ecology's proposal for watershed planning are provided in Seattle Attachment 1 Comments Letter.]

Basin/Watershed planning may be used by the Permittee to tailor Minimum Requirement #5 On-site Stormwater Management, Minimum Requirement #6 Runoff Treatment, Minimum Requirement #7 Flow Control, and/or Minimum Requirement #8 Wetlands Protection. Basin planning may be used to support alternative on-site stormwater management, treatment, flow control, and/or wetland protection requirements to those contained in Section 4 of this

Appendix. Basin planning may also be used to demonstrate an equivalent level of treatment, flow control, and/or wetland protection through the construction and use of regional stormwater facilities.

Basin planning provides a mechanism by which the minimum requirements and implementing BMP's can be evaluated and refined based on an analysis of a basin or watershed. Basin plans may be used to develop control strategies to address impacts from future development and to correct specific problems whose sources are known or suspected. Basin plans can be effective at addressing both long-term cumulative impacts of pollutant loads and short-term acute impacts of pollutant concentrations, as well as hydrologic impacts to streams, wetlands, and ground water resources.

Basin planning will require the use of computer models and field work to verify and support the models. USEPA has developed the SUSTAIN model (System for Urban Stormwater Treatment and Analysis Integration) that can be used with continuous runoff models to facilitate basin planning. Permittees who are considering the use of basin/watershed plans to modify or tailor one or more of the minimum requirements are encouraged to contact Ecology early in the planning stage.

Some examples of how Basin Planning can alter the minimum requirements are given in Appendix I-A from the *Stormwater Management Manual for Western Washington* (2012).

In order for a basin plan to serve as a means of modifying the minimum requirements the following conditions must be met:

- The plan must be formally adopted by all jurisdictions with responsibilities under the plan; and
- All ordinances or regulations called for by the plan must be in effect; and
- The basin plan must be reviewed and approved by Ecology.

Section 8. Feasibility Criteria for Selected Low Impact Development Best Management Practices

I. Site/Engineering-based Conditions (any listed condition triggers an infeasibility decision)

Licensed Professional Engineer has determined given BMP is not feasible due to reasonable considerations specific to the site consistent with generally accepted engineering practices.
[COMMENT: LID BMPs area a growing field and there are likely to be reasonable considerations not addressed in this list. For example a recent applicant justified a greenroof was not feasible due to the intense shading at the roof location]

A. Roof Downspout Control BMPs are considered infeasible where:

Minimum flow path of XX cannot be achieved per Chapter 3 of Volume III of the stormwater manual.

B. Dispersion is considered infeasible where:
Minimum flow path of XX cannot be achieved per Chapter 3 of Volume III of the stormwater manual.

C. Bioretention BMP's and Rain Gardens are considered infeasible where:

Land for bioretention is within area designated as a Landslide Hazard Area.

Site cannot be reasonably designed to locate bioretention facilities on slopes less than 15%, or if bioretention is within roadway right-of-way and the right-of-way cannot be feasibly designed to locate bioretention facilities on slopes less than 8%. **[COMMENT: Weir spacing for 6-inch ponding and 8% slope is 3-feet, subsequent construction of weirs will use all the potential infiltration area.]**

Within 50 feet from the top of slopes that are > 20% and have a height greater than 10-feet. **[COMMENT: Ecology's wording does not consider the height of the slope or the subsurface soil conditions.]**

Geotechnical engineering evaluation recommends infiltration not be used anywhere within the project area due to reasonable concerns about erosion, ~~or~~ slope failure, or concern that that native soil stratigraphy would result in infiltrating water threatening existing adjacent or below grade structures.

Within 100 feet of a known contaminated or hazardous waste site; or an abandoned or active landfill.

Within 100 feet of a drinking water well, or a spring used for drinking water supply.

Within 10 feet of small on-site sewage systems and greywater reuse systems. For setbacks from a "large onsite sewage disposal system", see Ch 246-272B WAC.

Within 10 feet of an underground storage tank.

Within local setbacks from structures, utilities, areaways, stairwells, pole foundations, or trees roots. **[COMMENT: We appreciate Ecology allowing local jurisdictions to define setbacks; this is critical in retrofit situations typical of urban development]**

The drainage area is less than 5,000 sq. ft. of pollution-generating impervious surface, or less than 10,000 sq. ft. of impervious surface; or less than 3/4 acres of pervious surface, and the minimum vertical separation of 1 foot to the seasonal high water table, bedrock, or other impervious layer is not achieved.

The drainage area is more than any of the above amounts, and cannot reasonably be broken down into amounts smaller than those designated above, and the minimum vertical separation of 3 feet to seasonal high water table, bedrock, or other impervious layer is not achieved.

The field testing indicates potential bioretention/rain garden sites have an initial (i.e. without safety factors) native soil saturated hydraulic conductivity less than 0.75 ~~0.15~~ inches per hour and subsequent geotechnical investigation determines that the design native soil infiltration rate is less than 0.5 inches per hour. In these instances bioretention/rain gardens can be built with an underdrain. If the subsequent geotechnical investigation determines that the design native soil infiltration rate is less than 0.15 inches per hour, bioretention with or without an underdrain is not required.

Ecology would appreciate comments concerning a minimum initial saturated hydraulic conductivity of native soils for bioretention or rain garden use. Sites in soils with less saturated hydraulic conductivity could still use bioretention/rain gardens for stormwater treatment. But would gain only nominal flow reduction benefit that would vary with the location of the underdrain. **[COMMENT: Minimum native soil hydraulic conductivity infiltration should be a minimum of 0.25 to 0.5 in/hr. Native soils infiltration is primary predictor of bioretention and permeable pavement function. If infiltration is mandated on sites where SHC rates are questionable to the project success there is a high risk of failure, and subsequent pushing back by development community on LID use globally. Seattle Ballard Roadside Raingarden Pilot project experience was a high visibility example where SHC rates were pushed to this boundary. Three of the project blocks had initial native soils SHC in the 0.2in/hr to 0.3in/hr range. The construction on those sites resulted in bioretention cells that remained full of water all winter, even after numerous days of no rain. To empty the cells required a vactor truck. It is clear to Seattle that additional geotechnical engineering beyond just test pits is necessary for any sites with slow draining soils. Comments above reflect Seattle's experience and our recommendation for how to incorporate the lessons**

They are not compatible with surrounding drainage system as determined by the local government (e.g., project drains to an existing stormwater collection system whose elevation or location precludes connection to a properly functioning bioretention facility).

The only area available for siting would threaten the safety, ~~or~~ reliability or structural integrity of pre-existing underground utilities, ~~or~~ pre-existing underground storage tanks, structures, areaways, stairwells, pole foundations or tree root systems.

At re-development sites ~~T~~there is a lack of ~~usable~~ space for rain garden/bioretention facilities ~~at re-development sites~~, or space for pre-treatment of surface water runoff or gravity flow from underground pre-settling basins to bioretention cannot be provided. Space limitations

include areas occupied by existing underground utilities, trees, structures, furnishings, utility poles, sidewalks, parking, etc.

D. Permeable Pavements Surfaces (only receives Direct Precipitation) are considered infeasible where:

Within setbacks required to maintain integrity of structures, utilities, areaways, stairwells, pole foundations, or trees roots. **[COMMENT: Copied this relevant piece from bioretention above. For example, City geotechs have restricted installation of permeable pavement surfaces in Seattle within 10 feet of a structural foundation or existing building that lacks a subsurface drainage system.]**

The site cannot reasonably be designed to have a porous asphalt surface at less than 5 percent slope, or a pervious concrete surface at less than 6 percent slope. Portions of pavements that must be laid at greater than 5 percent slope must prevent drainage from upgradient base courses into its base course.

Site design cannot avoid putting pavement in areas likely to have long-term excessive sediment deposition after construction (e.g., construction and landscaping material yards) or locations subject to substantial tree litter and moss growth that could clog surface.

Down slope of steep, erosion prone areas that are likely to deliver sediment.

Where the risk of concentrated pollutant spills is more likely such as gas stations, truck stops, and industrial chemical storage sites or other "High Use" designations.

Where seasonal high groundwater creates prolonged saturated conditions at the ground surface, within the wearing course, or within one foot of the bottom of the lowest gravel base course.

Fill soils are used that can become unstable when saturated.

Regular, heavy applications of sand occur to maintain traction during winter.

In locations where secondary surface water collection and conveyance system cannot be provided via gravity flow and native soils cannot accommodate infiltration of all precipitation.

E. Permeable Pavements Facilities (receives runoff from impermeable surfaces) **are considered infeasible where:**

Note: These criteria also apply to impervious pavements that would employ stormwater collection and redistribution below the pavement

Project is less than 5,000 SF of hard surface and geotechnical evaluation is not required. For these projects only permeable pavement surfaces receiving direct precipitation need to be evaluated.

Any of the feasibility restriction from section D Permeable Pavement Surfaces applies.

Road Type: Ecology would appreciate input concerning a basis for an infeasibility decision concerning any particular road category (e.g., arterials, highways), or roads exceeding a certain design Annual Average Daily Traffic (AADT) count. **[COMMENT: Until more information is available regarding life cycle costs, pavement rehabilitation (structural and surface), pavement maintenance requirements/ costs and funding mechanisms, permeable pavements should not be considered feasible for roadways, especially on roadways with greater than 250 AADT.]**

In the Right of Way, and the road is classified as an principal arterial, minor arterial , collector street, or traffic is more than 250 AADT, or location is subject to bus, freight, and other "heavy" vehicle traffic.
[COMMENT: Requiring permeable pavement for the above road types/ loading is moving beyond the 'known' aspects of AKART]

Within an area designated as a Landslide Hazard Area.

Geotechnical engineering evaluation recommends infiltration not be used anywhere within the project area due to reasonable concerns about erosion, ~~or~~ slope failure concern that that native soil stratigraphy would result in infiltrating water threatening existing adjacent or below grade structures.

Within 100 feet of a known contaminated or hazardous waste site; or an abandoned or active landfill.

Within 100 feet of a drinking water well, or a spring used for drinking water supply.

Within 10 feet of a small on-site sewage disposal drainfield. For setbacks from a "large on-site sewage disposal system", see Ch 246-272B WAC.

Native soils below the permeable pavement do not meet the soil suitability criteria for providing treatment (pertinent to pollution-generating surfaces only). Note: In these instances, the applicant has the option of placing a six-inch layer of media meeting the site suitability criteria (Volume III, Section 3.3.7), or the sand filter specification (Volume V, Section 8.6).

The Engineer of Record or Geotechnical Engineer determines that the existing native soil subgrade is not suitable for infiltration due to high likelihood of infiltration failure or because of pavement structural concern including subgrade soils underlying impermeable pavement or adjacent to permeable pavement are categorized as soils that become unstable or expansive when saturated and/or are prone to swelling and heaving as a result of freeze thaw cycles. [**COMMENT: Installation of permeable pavements in these locations is not "known" and does not fit within AKART.]**

Infiltrating and ponded water below new permeable pavement area would compromise adjacent impervious pavements. **[COMMENT: Thank you for adding this. At some locations surface water from the infiltration area will travel laterally into existing pavement sections that were not originally designed for saturated base course and subgrade soil conditions. An existing pavement section that is in good condition, with a compacted base course and subgrade constructed at appropriately prescribed moisture content will lose strength when large quantities of water will move laterally from the infiltrating area into the existing pavement base course and subgrade. Saturating the existing pavement base course and subgrade soils would most likely reduce the overall pavement life that was not originally designed for a saturated base course condition. This is especially true for full depth asphalt pavement sections that rely on the strength of the underlying base course and subgrade soils for the overall strength of the pavement section.]**

Infiltrating water below new permeable pavement area would threaten existing adjacent or below grade ~~basements~~ structures.

Installation of permeable pavement would threaten the safety or reliability of pre-existing underground utilities or pre-existing underground storage tanks.

Ecology would appreciate comments regarding a minimum saturated hydraulic conductivity for native soils below which permeable pavements would be considered infeasible. **COMMENT: Minimum native soil hydraulic conductivity infiltration should be a minimum of 0.25 to 0.5 in/hr.**

A. Vegetated Roofs are considered infeasible where:

Roof design has a slope greater than 20%.

Building cannot technically be designed to accommodate structural load of a ~~green~~ vegetated roof.

II. Competing Needs

1. The On-site Stormwater Management requirement can be superseded or reduced by:
   a. Other federal and state requirements. ~~Note: Growth Management Act requirements are generally considered compatible with LID.~~

   b. Incompatibility ~~with~~ of an on-site stormwater management BMP with site plan features that are required or allowed by local regulations~~. an existing development layout or aesthetics that are mandated by local code or rules (e.g., no building setback from public right-of-way could preclude use of bioretention along road because of inadequate space).~~ This only applies to ~~areas~~ basins that are already substantially developed ~~(75% or more of lots with pre-existing development~~), (e.g. basins that had at least 40% total impervious area since 1985).

Ecology would appreciate comments concerning the type of competing needs that can be considered as a defensible reason to forego use of an on-site stormwater management BMP.
[COMMENT: In addition to items below, see Seattle comments letter for additional comments.]

Examples of site plan features that could limit or eliminate the space available for LID BMPs include, but are not limited to:

a. Private stormwater facilities and BMPs are not required to be located or allowed in public rights of way.
b. Zero-lot line development or minimum setbacks of 5 feet or less in an urban village or center;
c. Required outdoor amenity area for public access or use by building occupants;
d. ADA accessibility;
e. Pedestrian, bicycle or automobile circulation;
f. Preservation of historic landmark structures; and
g. Required parking.

III. Cost

Within UGA reasonable consideration of cost can be included in feasibility.
[COMMENT: Ecology should insert a metric that determines economic feasibility in relation to typical or standard construction and includes the additional cost for research, investigation and design (geotechnical evaluation, borings etc.), the actual construction cost of the LID BMP, and total lifecycle cost including operations and maintenance.]