Ecology Stormwater Management Manual for Western Washington

November 2011 Draft - Comments

Thurston County Water Resources Division, Department of Resource Stewardship
February 3, 2012

Section	Page	COMMENT/CONCERN	RECOMMENDATION
Volume I 1.6.7	1-19	"Any municipalities in areas where urban stormwater has been identified as a limiting factor to salmon recover should have an equivalent stormwater manual." Is there a reference to a document that identifies these areas? If so, include reference, if not describe how a municipality can determine if this applies.	Add reference to source for identifying areas that are a "limiting factor to salmon recovery."
Volume I 2.2 Exemptions: Road Maintenance:	2-3, 2-4	All three bullets under this exemption retain use of the terms "impervious surface" and "new impervious surfaces." Should revise to reflect use of new term "hard surfaces" where appropriate.	Change impervious surfaces to "hard surfaces" Recommend search entire document for reference to impervious surface and replace with "hard surfaces" where appropriate.
Volume I 2.3 Definitions: Bioretention BMPs CECSL	2-4, 2-5	Definitions refer to the *Stormwater Management Manual for Western Washington*. Don't need to reference the manual since this IS the SWMMWW. I assume these definitions were brought in from other documents such as permit language, etc. where the SWMMWW needed to be referenced.	Delete references to SWMMWW and only refer to the Volume & Chapter. Suggest searching the SWMMWW for this type of incorrect reference and revising.
Volume I 2.3 Definitions: Converted pervious surface	2-5	Application of the definition converted pervious surface has been difficult in practice. Many development projects occur on lands that have already been modified to some extent. If a development converts existing pasture land, a tree farm, an old cleared area that has grown up with a mix of indigenous and invasive species (scotch broom, blackberries) to lawn and/or landscape, should this be considered converted pervious surface. Other revisions to the SWMMWW have removed the reference to native vegetation, but this definition still retains it.	Suggest that definition of converted pervious surface should be any conversion of native vegetation, pasture, scrub/shrub or non-landscape non-native vegetation (e.g. scotch broom, Himalayan blackberry) to lawn/landscape and any conversion of native vegetation to pasture.

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Volume I 2.3 Definitions: Effective Impervious Surface	2-5	Definition of Effective Impervious Surface needs additional clarification. If an impervious surface sheet flows through 100-ft of native vegetation or meets the requirements of applicable dispersion BMPs to allow being treated as lawn/landscape for modeling purposes they should be not be considered "effective impervious surface". Why does dispersion through 100-ft of vegetation have to be per BMP T5.30. If dispersion of impervious surface through 100-ft of native vegetation makes it non-effective, then it should be non-effective impervious surface whether the land area limits/conditions of BMP T5.30 are met or not. Careful consideration of this definition is necessary for application of Flow Control requirements (MR #7). Under the current definition a site could disperse all impervious surface to 100-ft or greater of native vegetation (although not meeting BMP T5.30 land use limits), use hydrologic modeling to demonstrate <0.1 cfs increase in 100-yr flow and because the dispersed surfaces do not meet the strict definition of Effective Impervious Surface provided in this section a flow control facility would be required because "effective impervious surface" is still greater than 10,000 square feet. It is recognized that within the application of BMP T5.30, effective impervious surface will need to be defined separately, since that BMP limits effective impervious surface specifically.	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.

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Volume I 2.3 Definitions: Hard Surface	2-5	A definition of "Effective Hard Surfaces" needs to be provided. This term is used in other areas of the permit and is not defined. For example, is a vegetated roof or porous pavement that does not infiltrate 100% of incident precipitation considered "effective hard surface?" Green roofs can come in a multitude of different forms including intensive and extensive with differing properties. Should be a distinction, or a minimum standard to make green roofs non-impervious, or non-effective hard surfaces.	Define "Effective Hard Surfaces" Establish criteria for when a green roof can be considered "effective hard surface" or "impervious surface."
Volume I 2.3 Definitions: New Development	2-7	This definition includes: "subdivision, short subdivision and binding site plans" – However, in practice it is difficult to know how to regulate these types of development. For example; how do the impervious surface, land conversion, and clearing thresholds apply to a 2 lot large lot (>5 acre lots) subdivision that requires no construction of roads, etc. but simply intends to divide the property for future purchase and construction by another party at some indefinite future date? Should these be regulated as development? Thurston County has seen many of these types of large lot and short plat developments and has received intense civil engineer/developer opposition to our requiring drainage plans for a project where no construction occurs (but will only occur at some indefinite time in the future). The reference to RCW 58.17 might imply that large lot plats are excluded from the definition of development – except that the RCW states that the rules apply if individual jurisdictions establish ordinances regulating large lot plats.	Clarify how development thresholds apply to simple divisions of land without any infrastructure construction at the time of land division. Consider not including subdivisions of land into 5-acre or larger parcels for residential use within the definition of "common plan of development." For these types of large lot plats, project thresholds would apply to any necessary infrastructure construction (roads, common areas, etc.) but thresholds would not be applied to the individual lots created until their actual development. Thurston County has developed a policy to do this for large lot plats in the rural areas (outside of UGA's & NPDES permit boundary) of the county. This is available for your consideration on the Thurston County stormwater website.

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Volume I Definitions: Replaced impervious surface	2-9	Definition of Replaced Impervious surfaces is deleted in NPDES permit but retained here. Also need to add a definition of "replaced hard surface" that perhaps references the definition of replaced impervious surface.	Modify definition of Replaced Impervious Surface to accommodate the use of "hard surfaces" and/or add a definition of "replaced hard surface"
Volume I 2.5.2 MR #2 *Thresholds*	2-17	Second paragraph, first sentence needs reads incorrectly.	Correct grammar error, delete word "in"
Volume I 2.5.2 MR #2 Element 3: Control Flow Rates	2-19	It is not clear in this section what the standard is for controlling flow rates. Some sections state the standard as controlling flows from ½ the 2-year to the 10-year flow; in discussion of element #3 in Volume II the language related to local plan approval is retained (it is deleted in first paragraph of this section).	State the flow rate controls required for this element. Use consistent language between this section and Volume II.
Volume I 2.5.2 MR #2 Element 6: Protect Slopes	2-23	In discussion of flow rate for design of temporary pipe slopes references 1-hr flow rate from continuous simulation adjusted by 1.6; since many jurisdictions are moving toward 15-minute time steps, suggest adding language that allows use of the 15-minute time step flow rate without adjustment. This comment applies to numerous locations within the manual and won't be repeated for other locations.	Suggest searching document related to 1-hour time step flow rates and also indicating what flow rate using 15-minute time steps is allowed. Alternatively, a general statement early in the document or within the hydrologic modeling section related to 15-minute time step flow rates would be appropriate.
Volume I 2.5.2 MR #2 Element 12: Manage the Project	2-27	4th bullet has a typo. "(sites less than on acre)" should be "one acre"	Fix typo
Volume I 2.5.4 MR #4 *Supplemental Guidelines*	2-33	Regarding discharge requirements standards, the listed 0.2 cfs and 0.5 cfs limits are based on 1-hour time step flow rates. Suggest providing equivalent limits for 15-minute time step hydrologic models as is provided for the 0.1 cfs limit for flow control (i.e. 0.15 cfs for 15-minute time step model).	Add flow limits based on 15-minute time step model. Alternatively, provide a general guideline in the hydrologic analysis section that provides a standard adjustment – say increase standards by 1.5 for 15 minute time step modeling.

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Volume I 2.5.5 MR#5 Table 2.5.1 LID Requirements by Project Type and Location	2-34	New development outside of a UGA on parcels greater than 5-acres is almost exclusively residential single-family residences. Given the land area available, these sites are generally not highly engineered and the use of a checklist approach is as appropriate as it would be for smaller parcel sizes. Suggest allowing use of the checklist or performance standard in all locations. A supplement to this might be that if the use of the checklist results in all practices being infeasible, then the project must use the flow control standard.	Allow >5 acre lots outside UGA to use checklists as an option, but if nothing on checklists is feasible, then the LID flow control standard must be met using other practices.
Volume I 2.5.5 MR#5 Mandatory Lists (all)	2-35 to 2-37	Item 1 of all mandatory lists for roofs and other hard surfaces is Full Dispersion in accordance with BMP T5.30. Since the lists are intended to be mandatory unless not feasible – where feasibility is generally considered technical feasibility, many would argue for full dispersion is virtually always feasible. After attending Ecology workshop on the SWMMWW update, Ed O'Brian stated that it was not intended to mandate Full Dispersion. However, the way the mandatory lists are presented this intent is not obvious. A better approach would be to include a preface to all the mandatory lists that if Full Dispersion in Accordance with BMP T5.30 is used on a project site or within a threshold discharge area of a project site then MR#5 is met for that area.	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.
Volume I 2.5.6 MR#6 *Thresholds*	2-38	1st bullet – "(PGIS)" should be (PGHS). Also need to better define PGHS – is a green roof PGHS? Is it considered PGPS?	Clarify definition of PGHS regarding green roofs. Make editorial change (PGHS)

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Volume I 2.5.6 MR#6 *Thresholds*	2-38	Regarding PGPS (2nd bullet). Will green roofs be considered PGPS? Need to clarify what is meant by "surface discharge in a natural or man-made conveyance." Does this mean if landscape area sheet flows to adjacent property and there is no conveyance or natural channel at the point of discharge that treatment of those pervious surfaces is not required – similar question could also be asked for flow control since the same statement is used.	Clarify what if green roof is included in PGPS. Clarify conditions under which treatment isn't required for pervious areas discharging off-site but not to defined conveyance or channel.
Volume I 2.5.6 MR#6 Water Quality Design Flow Rate	2-39	Since infiltration (such as in bioretention) results in 100% TSS removal, consider reducing treatment flow volume for infiltration BMPs. 80% of 91% = 72.8% ==> If infiltrate 72.8% you are achieving treatment target. This would incentivize use of bioretention in more instances. Not suggesting that 72.8% is the right answer, but something less than 91% would still achieve the water quality objective of 80% TSS removal. A quick design exercise for infiltration using WWHM showed that at 0.5"/hr infiltration rate an 85% infiltration standard would reduce the required area of infiltration facilities by 19% and 32% for an 80% infiltration standard. This exercise does not include the additional sediment removal that occurs because of required pre-treatment facilities for infiltration treatment.	Delete proposed revision regarding 91% infiltration to meet water quality standard. Either allow jurisdictions to establish a level based on the "alternative methods" clause or specify something less than 91% that is reasonable.
Volume I 2.5.6 MR#6 Supplemental Guidelines	2-41	Regarding discussion of drywells, UIC guidance and requirements provides for discharges of PGIS with varying treatment standards based on soil type, depth to water table, and land use intensity. UIC program guidelines are also an Ecology standard but are inconsistent with the SWMMWW. Ecology should consider adopting UIC standards as a suitable alternative approach for infiltration or if not acceptable, modify the UIC guidelines consistent with the SWMMWW. Two have two different standards from same Department is inconsistent & confusing.	Consider incorporating infiltration standards of UIC program into SWMMWW, or alternatively modify UIC standards that are inconsistent with SWMMWW.

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Volume I 2.5.7 MR#7 *Thresholds*	2-42	First bullet – "effective impervious surfaces" should be "effective hard surfaces"	Change "impervious" to "hard"
Volume I 2.5.7 MR#7 *Thresholds*	2-43	Second bullet – regarding conversion to lawn/landscape – bullet still retains term "native" where other sections have deleted "native" in reference to native vegetation. Please revise consistent with other sections. Previous comment suggests that conversion should be from any non-maintained vegetation to lawn/landscape would be the criteria, whether that vegetation is native or non-native. This might include conversion from pasture to lawn/landscape.	Clarify use of term "native vegetation" to be consistent with changed thresholds earlier in Volume I.
Volume I 2.5.7 MR#7 *Thresholds*	2-43	Third bullet – refers to "effective pervious surface" – this is not defined.	Define "effective pervious surface"
Volume I 2.5.8 MR#8 *Additional Requirements*	2-47	Regarding allowed stormwater facilities in natural vegetated buffers, those BMPs that are not flow control or stormwater treatment BMPS, such as sheet flow dispersion, concentrated flow dispersion, etc. should be allowed within buffers, if allowed by the local jurisdictions. Suggest adding this provision to the first bullet.	Add to first bullet an allowance for dispersion areas and non-flow control/treatment facilities to be allowed in buffer with jurisdiction approval.
Volume I 2.8 Exceptions and Variances	2-54	The proposed edits appear to only allow exceptions/variances based on economic hardship. In actual practices variances/exceptions are more typically requested based on the deleted provision regarding special circumstances or conditions of the property, and typical variance language in most municipal codes does not limit variances to economic hardship. Suggest retaining the deleted bullet to allow for exceptions on other than a financial hardship basis.	Retain allowance for exceptions based on site conditions other than financial hardship, or clearly define "financial hardship".

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Volume I 3.1.1 Step 1	3-3	Step 4 – survey of native vegetation. In most cases a survey of native vegetation does not require a landscape professional. With the advent of GeoData and aerial mapping an evaluation of existing vegetation is relatively easy in most cases to generally characterize existing vegetation. Suggest revising this step to limit the requirement for a licensed professional to those instances in which the jurisdiction deems it is necessary.	Revise requirement for a licensed professional to those cases where a jurisdictions deems it is necessary.
Volume I 4.2 BMP & Facility Selection Process Step 1	4-1	Last sentence – insert "Use" in front of "Total new."	Correct incomplete sentence.
Volume I 4.2 BMP & Facility Selection Process Step V: Select Treatment Facilities	4-4	Regarding text box requesting input on whether to retain information on selecting treatment facilities. Suggest leaving Step V, providing a brief overview of treatment facility selection - i.e. identifying type of treatment and selecting facilities in accordance with Volume V.	Retain description of treatment facility selection in this step but also reference Volume V.
Volume I Appendix I-D Guidelines for Wetlands: Guide Sheet 1	D-2	It is not clear from the description whether the wetlands listed in items 1-4 of this page are the <u>only</u> wetlands that require protection in accordance with Guide Sheet 3. I.e. If you don't meet the criteria of on this page and don't plan to use the wetland for flow control or treatment then it appears that no further action is required to comply with MR#8.	Clarify which wetlands require compliance with flow guidance of Guide Sheet 3.

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Volume I Appendix I-D Guidelines for Wetlands: Guide Sheet 2	D-4	This guide sheet is not clear on what types of modifications are allowed to wetlands and when they would be appropriate. Other locations in the manual state that stormwater facilities aren't allowed within critical areas or their buffers. An example might be appropriate. The effort to modify the wetland guide sheets are good, but need to go further to be clear exactly when the flow standards are required to be met and when and what improvements can be made to impaired wetlands. Also, suggest that the key elements of which wetlands require Guide Sheet 3 protections and when wetlands can be modified for storm facilities be included in description of Minimum Requirement #8.	Clarify what wetland modifications are allowed and when they would be appropriate. Include in description of MR #8 pertinent elements of these guide sheets.
Volume I Appendix I-F II. Competing Needs	F-3	Item B. Delete reference to NPDES permit ("S5.C.5")	Delete reference to NPDES permit section.
Volume I Glossary	G–7	"Certified Pervious Surface" should be "Converted Pervious Surface" Also this definition should be expanded to explain situations like converting pasture land to lawn/landscape or converting scrub/shrub to lawn/landscape etc. Confusing to retain term "native vegetation" here while deleting it in other locations.	Fix typo and expand definition to include conversions from non-native vegetation to grass/landscape.
Volume I Glossary	G-11	"Converted Pervious Surface" – see comment above.	
Volume I Glossary	G-14	Definition of Dispersion should be expanded to include other forms of dispersion such as sheet flow dispersion and concentrated flow dispersion as a BMP. Also fix typo in definition of "Discharge" immediately above "Dispersion"	Expand definition of Dispersion. Fix typo in definition of "Discharge"

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Volume I Glossary	G-37	Permeable Pavement. Similar to Pierce County, recommend that permeable pavement that received flows from other areas, such as roof areas be considered "Permeable Pavement Facilities" – this would facilitate providing additional requirements for permeable pavements used as facilities.	Add definition of Permeable Pavement Facilities.
Volume I Glossary	G-42	Need to add definition of "Replaced Hard Surface" since this term is used in thresholds. For example, is standard pavement replaced with porous pavement considered replaced or new hard surface? Is a roof area replaced with porous pavement considered a replaced or a new hard surface? A careful consideration of the definition could help to increase the desirability of redevelopment. For example, if replacing an existing pavement with a porous pavement, neither should be considered replaced nor new impervious/hard surface. This would encourage redevelopment, while still providing for water quality benefit. The current threshold approach incentivizes retaining as much existing impervious surface as possible on a redevelopment to avoid having to provide stormwater controls to those surfaces.	Add definition for "Replaced Hard Surface" Consider in elements of definition an approach to better support redevelopment over new green field development.
Volume I Glossary	G-42	"Riprap" – It is defined as the protective slope facing here; however riprap is actually the material - not the slope protection - i.e. Riprap is defined by WSDOT as a type of aggregate. This definition describes channel or slope protection. Quarry spalls are another type of material used in slope/channel protection.	Revise Rip Rap definition consistent with WSDOT specifications.
Volume I Glossary	G-49	"Topsoil" – This is not a definition by a specification. Since ASTM standards are difficult to obtain and not available to all, suggest defining topsoil generally and putting detailed specification elsewhere – i.e. BMP T5.13	Revise definition – move soil specification to BMP T5.13, if applicable.
Volume II 2.3.2	2-10	2nd paragraph – typo in 2nd paragraph, "of" should be deleted.	Correct typo

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Volume II 3.1.5 & 3.2	3-4	References to specific section of the stormwater general permit (as well as municipal permits) should be deleted in the SWMMWW. Changes to the permit may make these references incorrect.	Delete section references within CSWGP.
Volume II 3.2.1 Narrative	3-4	Suggest organizing the description of the narrative in an order that is appropriate for the actual report. i.e. Project description 1st, 12 elements later.	Re-order this section.
Volume II 3.2.1 Narrative	3-5	Bullet beginning "Construction Phasing" – insert "and" between activities and "any"	Correct omission
Volume II 3.3.3 Step 3 All Elements	Begins at 3-11 and multiple locations	The first sentence in each Element is "Construction Stormwater General Permit and Municipal Permit Requirements" – Why state this for every element. If it is felt this is needed – suggest making a general statement at the introduction to this section. Not all users of this manual are either CSWGP or Municipal Permit holders, when I first read this it would confusing – for example is this element <u>only</u> required for those permit holders?	Delete 1st sentence of each element that starts "Construction Stormwater General Permit…" and add introductory text if needed. Might change heading to just "Requirements"
Volume II 3.3.3 Step 3 Element #3	3-13	This section doesn't state the controlling standard of ½ the 2-year to the 10-year, this should be stated. If the standard is different or up to the jurisdiction state this.	State construction flow control standard.
Volume II 3.3.3 Step 3 Element #3 Additional Guidance	3-14	Bullet beginning "even gently sloped…" Talks about "energy disbursement" – should this be energy dissipation? Correct in two locations. Also states that wattles/energy dissipation should be every 10-ft even on gentle slopes. Is 10-ft a standard or guidance, not sure this is consistent with specific BMPs for wattles and other BMPs.	Change "disbursement" to "dissipation" (2 locations). Delete reference to 10-ft spacing since it will depend on slope and BMP applied.
Volume II 3.3.3 Step 3 Element #5 Stabilize Soils	3-18	Bullet beginning "stabilize soil" – "protected" should be "protect" and located should be "locate"	Correct grammar.

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Volume II 3.3.3 Step 3 Element #6 Protect Slopes	3-20	Bullet beginning "BMP combinations" – "method of protect" should be "method of protecting" General note – there a few other grammar/typo errors in the new text of Volume II – suggest a general re-read and correction. Others found include pages 3-23, 3-26 (2 places), 3-28 , 4-112 (2 places)	Correct grammar
Volume II 3.3.3 Step 3 Element #12 Manage the Project	3-26	Bullet beginning "Maintaining an updated..." - Delete reference to specific sections of CSWGP – these requirements apply to projects not covered by the CSWGP.	Delete specific section references in CSWGP.
Volume II Table 4.1.1	4-2	Under Element #6 – wouldn't C121 Mulching, C122 nets & blankets, and C123 Plastic Covering also apply to Element #6 – Protect Slopes.	Add C121, C122, C123 to Element #6
Volume II BMP C122 Nets & Blankets	4-27	Web links for WSDOT & Texas do not take you to information on blankets, just to the general web-site.	Modify web links.
Volume II BMP C124 Sodding	4-32	Web link to Ecology web-site does not work.	Modify web link
Volume II BMP C126 PAM	4-38	Under "Alternate Method" – Change "powered" PAM to "powdered" – two locations.	Correct typo – two locations.
Volume II BMP C151 Concrete Handling	4-47	Design and Installation Specifications – Refers to "designated concrete washout areas" – suggest adding a reference to BMP C154 for description and specifics on how to do this – what is allowed for a designated washout area.	Add reference to BMP C154
Volume II BMP C202 Channel Lining	4-70	Suggest adding specific guidance on depth and size of lining material based on channel slope or flow velocity. Make this more prescriptive. See C209 – Outlet Protection for an example.	Add information to BMP to provide better guidance.

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Volume II BMP C203 Water Bars	4-73	Design & Installation Specifications – Without a figure showing how the design specifications apply, it is difficult to understand what the criteria are. Suggest adding a figure to make it clear what the dimensions and spacing referred t. Also what type of material to use within the section.	Add figure demonstrating specifications for water bars.
Volume II BMP C206 Level Spreader	4-82	Figures 4.2.4 & 4.2.5 – Dimensions in figure don't correspond with text. Also it is not clear where the gravel called out in the specifications is required to be placed. Suggest revising figures consistent with text and show all required details.	Revise figures consistent with text.
Volume II BMP C207 Check Dams	4-83	Design & Installation Specifications – Text states "rock used must be large enough to stay in place…" Without any specific guidance, it is unlikely that engineers will calculate rock size. Suggest adding a table of check dam rock size based on channel slope/flow/velocity to make selection more prescriptive.	Add table of check dam rock size based on channel characteristics and flow rates.
Volume II BMP C209 Outlet Protection	4-88	Guidelines for riprap protection don't' seem correct. States that for velocity of 5-10 fps use 2-ft to 4-ft rip rap! Minimum depth of 2-ft. This compares to velocity of <5 fps use 2"-8" rip rap. This is a big jump between 4fps and 6 fps. Is this a good design standard? It's not consistent with other tables for channel lining or even out let protection that I've seen. Suggest a review this specification with current national standards and revise as appropriate.	Review & revise specification for rip rap size & depth for 5 to 10 fps flow rates.
Volume II BMP C220 Storm Drain Inlet Protection	4-93	Figure references for *Block and Gravel Inlet Protection* and *Curb and Gutter Sediment Barrier* are incorrect. Should be Figure 4.17 and Figure 4.18 respectively. General Comment: Suggest review figure numbers and referencing for consistent format. In some locations use format X.X and others use X.X.X – Suggest not just renumbering figures in Volumes but apply a consistent format throughout entire SWMMWW.	Revise figure number references and/or figure numbers.

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Volume II BMP C233 Silt Fence	4-101	*Purpose* – Reference to Figure 4.19 should be 4.2.10. Also, Suggest adding a plan view of a silt fence installation demonstrating how silt fence should "J" hook at ends and to locate with respect to contours. We see many installations that do not properly install silt fence.	Revise figure reference and add plan view of typical silt fence installation.
Volume II BMP C241 Temporary Sediment Pond	4-117	Reference to Figure 4.2.15, 4.2.16 and 4.2.17 are incorrect – should be 4.2.16, 4.2.17 and 4.2.18 respectively.	Revise figure references.
Volume II BMP C241 Temporary Sediment Pond	4-118	Last paragraph regarding outlet design – The language in this BMP was modified in Section 3.3.3, Element #3 of this Volume with reference to MR #7 deleted. In addition, this discussion contradicts previous statements that use of the control structure is not appropriate since discharge needs to come from surface of pond.	Revise language in this BMP consistent with other guidance in other locations of this volume.
Volume II BMP C250 Construction Stormwater Chemical Treatment	4-125	2nd paragraph after bullets – States: "Ponds with constructed earthen embankments greater than six feet high require special engineering analyses." -- Provide a reference to where these special analyses are described in more detail.	Provide a reference to "special engineering analyses" required for 6-ft high embankments.
Volume II BMP C250	4-128	Sizing Criteria for Flow Control Water Bodies – This section provides a standard for flow control during construction – i.e. ½ 2 year to 10-yr flow – this and BMP C251 (pg 4-134) are the only locations in Volume II where this standard is referenced. If it is the standard – suggest providing it in all locations that discuss construction flow control.	Clarify if flow control standard for construction in this section is correct.
Volume III 2.1 Comp Stds	2-4, 2-5	"the Ecology" should be "Ecology" delete "the" – two locations	Correct grammar – 2 locations.

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Volume III 2.2.2 Assumptions made in Creating WWHM	2-10	New paragraph beginning "The more recent versions of WWHM...," has several grammatical errors in the paragraph.	Correct grammar.
Volume III 2.2.2 Assumptions made in Creating WWHM	2-11	Since the term "interflow" generates so much confusion – recommend adding a discussion of what interflow is i.e. Shallow flow such as along a shallow till layer. Worth noting that in WWHM the Outwash PERLND does not have any interflow component (Jim Beyerlin, personal conversation).	Add discussion of interflow concept to this section.
Volume III 3.1.2 Downspout Dispersion Systems	3-12, 3-15	Item 6. On this page – states "non-native impervious surface" – should this be "non-native <u>pervious</u> surface" Same incorrect terminology is also in Item 3 on page 3-15. Also page 5-8 of Volume V.	Correct terminology
Volume III 3.2.1 Detention Ponds	3-20	Item 4 under "General" – States "...for steep slopes (i.e. Slopes over 15%)" – The term "steep slopes" is specifically defined in the manual as slopes over 40% - suggest deleting the term "steep slopes" and just stating "slopes over 15%" This type of language occurs throughout the SWMMWW – suggest searching for the term "steep slopes" and correcting in all location consistent with definition of steep slope. Also in some location, special requirements apply for slopes over 15%, other locations for slopes over 20%, etc.	Correct use of term "steep slope" throughout SWMMWW.
Volume III 3.2.1 Detention Ponds: Landscaping	3-27	New item "8." – should still be "7." To provide consistent numbering. Also previously, in this section states that Trees or shrubs may not be planted on portions of water-impounding berms taller than four feet high... Suggest restating that language in here.	Correct numbering and restate that trees / shrubs are not to be planted on berms greater than 4-ft height.

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Volume III 3.2.1 Detention Ponds: Maintenance	3-35	3rd paragraph on this page addressing pumping standing water to sanitary sewer – this provision should be updated to reflect stormwater solids policy provided in Volume IV. As stated in this section it is not a correct. Also, later on this page under "Sediment" similar reference to stormwater solids policy should be provided and language corrected consistent with the policy.	Revise paragraphs regarding discharge of standing water and sediments for maintenance consistent with policy of Volume IV.
3.2.3 detention Vaults: Structural Stability	3-45	References to 1998 Interim Revisions to AASHTO document. This reference should be updated – it is unlikely that the 1998 interim revisions is still the accurate reference.	Update reference.
Volume III 3.2.4 Control Structures	3-49	Design Criteria – Item 1. – States minimum orifice diameter is 0.5 inches. Later under bioretention limits orifice diameter to 0.25 inches – Should be consistent on which minimum is acceptable. Seems that all applications have the same concerns with clogging an orifice and one standard is appropriate. Also this paragraph references "flow throttling devices" - It is not clear what these devices are, suggest expanding this discussion and providing examples, details and figures if possible.	Clarify minimum orifice diameter standard. Expand discussion of "flow throttling devices"
Volume III 3.2.4 Control Structures	3-51	Riser and Weir Restrictor. Since the WWHM recommends the combination orifice and notched weir as the standard control structure for meeting flow control standards, suggest adding guidance regarding notched weir design. Is there a minimum notch width or a maximum width as a function of riser diameter, etc. Also are there any structural support requirements for notched weirs to keep weir width from being reduced from pipe compression. Also suggest adding a detail of a notched weir and orifice design with any new standards shown in the detail. (or add those details to existing figure in page 3-58.	Add addition information and standards for use of notched weirs as flow control structure. Add notched weir/orifice control structure figure.

Section	Page	COMMENT/CONCERN	RECOMMENDATION
Volume III 3.3. Infiltration Facilities	3-64	A general re-organization of this chapter might make sense. For example 3.3.4 includes a section on estimating SHC, then 3.3.5 also includes a section on infiltration rate determination, 3.3.6 is all a discussion of SHC determination, 3.3.7 includes a section on infiltration rates, many of these section repeat what is said in other sections. A re-write/re-organization of this chapter would make it easier to follow and could reduce redundancy.	General comment: re-organizing this chapter.
Volume III 3.3 Infiltration Facilities... 3.3.1 Purpose	3-64	Need to expand the purpose since the section includes analysis methods, site characterization, etc. Purpose statement is weak. This chapter is complicated and attempts to do several things that should be clarified at the start of the chapter. For example: "The purpose of this section is to describe the steps required to evaluate the suitability of a site for infiltration facilities, establish a design infiltration rate, and design facilities for infiltration." Also this section would benefit from an "Applicability" section – i.e. This section applies to infiltration ponds, trenches, vaults and tanks. It does not apply to downspout infiltration trenches or rain gardens."	Expand purpose to better describe chapter contents. Add "Applicability" section.
Volume III 3.3.4 Steps for the Design of Infiltration Facilities	3-67	States the simplified approach is derived from "high groundwater and shallow pond sites..." Is this still accurate considering elimination of ASTM/SCS Methods - PIT test is not based on high groundwater/shallow pond sites? I don't' believe Massmann is either. Since detailed method includes mounding evaluation – isn't it more appropriate for shallow groundwater sites?	Correct language consistent with new methods.

Section	Page	COMMENT/CONCERN	RECOMMENDATION
Volume III 3.3.4	3-68	States "...for facilities serving short plats or commercial development under 1-acre" - Is this for projects of less than 1-acre or for contributing area of less than 1-acre even if project is greater than 1-acre. Recommend that this should be appropriate for facilities with contributing area less than 1-acre regardless of project size. What about bio-retention facilities and porous pavements – would this method also be applicable to them? It isn't clear.	Clarify applicability of simple method to project sites or contributing area of <1 acre. Clarify if simple approach also applies to LID facilities – bioretention & porous pavement.
Volume III 3.3.4 – Step 5 – Determine Design Infiltration Rate	3-68	It is not clear at what point the "short-term" infiltration rate is established. For the PIT test is the short-term rate the actual test result prior to applying CFv, CFm, CFt? What about the grain size method – is the short-term rate the rate prior to CFm, CFv? This needs to be clarified, since it is important in determining feasibility of LID BMPs as well as Bioretention design.	Clarify at what point the PIT or grain-size method provides the short-term infiltration rate.
Volume III 3.3.5 – Site Characterization Criteria	3-72	Step 4 – Groundwater Monitoring Wells. It appears that groundwater wells are required in virtually all circumstances. Are there conditions where wells would not be required based on soil type, depth to groundwater, contributing area, etc. suggest adding criteria on when wells might not be required. In addition, the groundwater well requirement is restated in the infiltration receptor characterization section. Suggest deleting in one location and referencing the other or combining.	Delete repetition of groundwater well requirement in two locations in chapter. Consider conditions under which groundwater wells are not required and provide them in this section.
Volume III 3.3.5 – Site Characterization Criteria	3-72	Infiltration Rate Determination – Why repeat this section here. This discussion should be incorporated into step 5 of the simplified method steps; it says almost exactly the same thing. Infiltration rate determination is not really a site characterization issue.	Remove Infiltration Rate Determination from Site Characterization and consolidate under Step 5 of simplified method.

Section	Page	COMMENT/CONCERN	RECOMMENDATION
Volume III 3.3.5 – Site Characterization Criteria	3-73	States: "Such site testing is necessary to refine preliminary infiltration rate estimates based on soil size distribution or textural analysis." Retaining this implies that preliminary site testing might use textural analysis (i.e. ASTM/USDA methods). However, these methods are deleted in this chapter. Suggest retaining those methods – but allowing their use for general characterization of the site, not for determining design infiltration rates.	Retain USDA/ASTM methods for use in preliminary site evaluation – but not for design infiltration rate determination.
Volume III 3.3.5 – Site Characterization Criteria	3-73	Soil Testing – Recommend moving this section to be a sub-heading under subsurface characterization and combine with preparing soil logs.	Move soil testing to subsurface characterization.
Volume III 3.3.5 – Site Characterization Criteria	3-73, 74	Since groundwater wells not required for depth to groundwater greater than 50-ft, suggest not requiring infiltration receptor characterization for those sites also.	Allow sites with >50-ft to groundwater to not have to do infiltration receptor, since GW wells not required.
Volume III 3.3.5 – Site Characterization Criteria	3-74	Step 2. Estimating volumetric holding capacity… This step is vague on how it must be done, what it is being used for, etc. Suggest trying to make this more specific – i.e. What is the question being asked, what data is needed, and how is the evaluation performed.	Clarify requirements for estimating volumetric holding capacity.
Volume III 3.3.6 Design SHC Large Scale PIT	3-83	States: "At conclusion of testing, over-excavate the pit to see if the test water is mounded on shallow restrictive layers…." Need additional guidance on what this would look like if it were occurring, what it means, and what is required if it occurs.	Clarify actions if over-excavation indicates mounding.
Volume III 3.3.6 Design SHC Small Scale PIT	3-85	Need to add a section regarding data analysis to be consistent with the large-scale PIT method.	Add data analysis section to small-scale PIT text.
Volume III 3.3.6 Design SHC Grain Size Method	3-86	Last paragraph on this page discusses use of PIT test. This discussion should be included in the PIT test description or deleted.	Move discussion of PIT test to PIT test method.

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Section	Page	COMMENT/CONCERN	RECOMMENDATION
Volume III 3.3.6 Design SHC Correction Factors	3-88	Phrase beginning "CFT is used in step 5… "This is a fragment sentence. Also suggest additional clarification on which CF's need to be applied (if any) to distinguish between the long-term and short-term infiltration rate.	Correct fragment sentence and clarify long-term vs. short-term infiltration rate.
Volume III 3.3.6 Design SHC Correction Factors	3-88	Uncertainty of test method – Suggest adding some explanatory test. Why were these values selected, what is the basis for the CF.	Add explanatory text to Uncertainty of Test Method discussion.
Volume III 3.3.7 Site Suitability Criteria	3-90	Suggest this entire section should be located within or immediately preceding site characterization.	Re-organize to move this section to earlier in chapter.
Volume III 3.3.7 Site Suitability Criteria	3-90	SSC-1: The setback criteria listed for drainfields, etc. are inconsistent with setback recommended within BMPs for downspout infiltration and bioretention. For larger facilities, these might be appropriate; however, for smaller infiltration facilities, the setbacks should be consistent between bioretention and downspout infiltration BMPs. Also, distinguish between drainfield for SFR and community system.	Apply consistent setback criteria – compare to bioretention setback standards.
Volume III 3.3.7 Site Suitability Criteria	3-91	SSC-4 – If PIT test is used how is the infiltration rate down to 2.5x facility depth or 6-ft determined? Gradation method requires sampling to those depths so statement is ok for that method. Suggest that the PIT test result can be used directly as representative of the infiltration rate to the appropriate depth.	Clarify how PIT results can be used to confirm infiltration rate for treatment.
Volume III 3.3.7 Site Suitability Criteria	3-92	SSC-5 – Depth to bedrock… Since a 1-ft separation is allowed for small scale Bioretention – suggest stating that here also.	Add 1-ft depth to GW for bioretention to this SSC.
Volume III 3.3.7 Site Suitability Criteria	3-94	SSC-9 – Verification Testing of the Completed Facility – Why is this a site suitability factor. It is really part of the design process and in fact is stated as a step in each method. In addition, this provision states its "recommended" other provisions indicate it is required. Recommend delete this as a site suitability factor.	Delete SSC-9 – it is addressed in other provisions.

Section	Page	COMMENT/CONCERN	RECOMMENDATION
Volume III 3.3.8 Detailed Approach	3-94	This section should be moved to just after the Simplified Approach – seems out of place at the end of the chapter. In addition, the terminology simplified approach and detailed approach don't fit the process. Recommend combining 3.3.8 and 3.3.4 into one section. Similar to flow process for selecting treatment BMP, the decision as to when each step is required could be spelled out within that step.	Combine 3.3.8 with 3.3.4 for one "Steps for Designing Infiltration Facilities" section.
Volume III 3.3.8 Detailed Approach Figure 3.27	3-97	Title of figure includes term "Using the Continuous Hydrograph Method" - this is the first and only use of this term. Suggest revising figure title to change this to "Detailed Method"	Change title of Figure.
Volume III 3.3.8 Detailed Approach	3-100	Since later in the method it is stated the Dpond should use 0.25 of max pond depth, should state that in this section. Also, this whole section uses several terms for K including cm/sec, ft/day, in/hr, etc. Mixing units like this will likely result in a misapplication. Suggest rewriting to use consistent terms – recommend inches/hr for K & F, feet for pond depths, etc. and square feet for Areas. I realize this would take some effort but since this section mixes and matches different methods from different sources in the end one uniform set of units will make it easier to use.	Refer to Dpond as 0.25 of max pond depth. Rewrite all formulas and descriptions in uniform set of units (in/hr, ft, sq ft), etc.
Volume III 3.3.8 Detailed Approach	3-102	Regarding Pond Aspect Ratio – At what pond depth is the L/W taken? Is it just the bottom area? Mid-depth? 0.25xdepth?	Clarify at what depth the pond aspect ratio should be calculated.

Section	Page	COMMENT/CONCERN	RECOMMENDATION
Volume III 3.3.8 Detailed Approach	3-102	Step 9 – Size the Facility – States the desirable pond depth is 3-ft, maximum is 6-ft and 1-ft of freeboard. These type of design criteria should not be "hidden" in this process but suggest they be included in the design specification (BMP description) for infiltration facilities. Also, the requirement to drain the maximum pond depth in 24-hours isn't included in the simple method – is this intentional? Or, should that requirement also be in the simple method description.	Move facility design criteria to the BMP description. Clarify if 24-hour drawdown requirement applies to simple method also.
Volume III 3.3.8 Detailed Approach – Step 10 Groundwater Mounding Analysis	3-102	Require groundwater mounding analysis for projects "larger than short plats" Project size should not be based on the type of plat, some short plats (i.e. Large lot plats) may have extensive road systems requiring stormwater management and some subdivisions may have relatively short roads. Suggest that when a mounding analysis is required should be based on a combination of factors including depth to groundwater, soil type/infiltration capacity, risk of mounding to adjacent properties/facilities, etc. The detailed method itself accounts for impacts of mounding on the infiltration rate (conservatively so, as stated in the text on page 3-100) the purpose of the mounding analysis required by Step 10 should be to determine if any detrimental impacts may occur downstream – basement flooding, drainfield flooding, seepage onto slopes, etc. as a result of mounding. Thurston County addressed these issues for the 2009 Drainage Manual update and has provided some criteria that Ecology might like to review and consider for this section.	Clarify when mounding analysis should be conducted based on project size / contributing area and what is to be evaluated for and that the mounding analysis isn't for purposes of establishing the design infiltration rate, but of estimating impacts of potential mounding. Consider Thurston County requirements related to mounding.

Section	Page	COMMENT/CONCERN	RECOMMENDATION
Volume III 3.3.8 Detailed Approach – Step 10 Groundwater Mounding Analysis	3-103	Requirement to use MODRET should be modified to allow use of other analytic methods that are acceptable to the jurisdiction. I believe some analytic methods are available that when applied using conservative assumptions provide a reasonable estimate of mounding impacts. MODRET/MODFLOW can be very complicated to use properly when considering calibration and other design factors required. This modeling should not be required except for those complicated designs that contain potential risks to downstream areas justifying the cost/effort. Thurston County experiences with applying mounding requirements in the Salmon Creek Basin indicate that these efforts can be very complicated and expensive.	Relax requirement to use MODRET or MODFLOW for mounding analysis in all cases.
Volume III 3.3.8 Detailed Approach – Step 10 Groundwater Mounding Analysis	3-103	Last paragraph of this section refers to post-construction testing – should be its own step, i.e. Step 11.	Make post-construction testing Step 11 of Detailed Method.
Volume III 3.3.9 *Design Criteria – Sizing Facilities*	3-104	(A)(2) – Reference to section 3.3.8 should be 3.3.6	Change section reference.
Volume III 3.3.11 Infiltration Trenches	3-108	Figure references are incorrect. Figures now start with 3.28.	Renumber figure references.
Volume III 3.4 Bioretention & Permeable Pavement	3-115	Since this is a standalone section, it is not clear when the other requirements of the simple or detailed method are required - such as site characterization - groundwater wells, winter water study, test pit excavations to 5x pond depth, infiltration receptor characterization. Since bioretention is a form of infiltration, the same standards apply to infiltration trenches and ponds should apply also to bioretention.	Clarify when simple or detailed approach and site characterization/suitability is required for bioretention & porous pavement.

Section	Page	COMMENT/CONCERN	RECOMMENDATION
Volume III 3.4.2 Description	3-115	States that PIT testing should occur between December 1st and April 1st – but this criterion isn't stated for infiltration testing for other facilities. Suggest either deleting here or adding as a general requirement to the PIT test section 3.3.6	Add time horizon for testing to section 3.3.6 or delete in this section.
Volume III 3.4.2 Description Bioretention	3-115	Requires PIT testing every 50-ft for linear bioretention facilities. This seems excessive, especially for linear facilities that are only receiving sheet flow from an adjacent roadway. Might be reasonable for a facility that receives concentrated flow from larger area, but for a linear facility, such as a roadside bioretention swale, frequency of testing could be increased to 150-ft consistent with testing requirement for porous pavement roadways.	Re-consider 50-ft spacing for infiltration testing on linear bioretention facilities.
Volume III 3.4.2 Description Bioretention	3-115	Last sentence on this page require groundwater mounding for facilities serving >1-acre. Should require that the detailed method be used, not just the mounding analysis. In addition, the mounding analysis criteria should include depth to groundwater, soil type, risk downstream, etc. as previously discussed.	Clarify mounding analysis requirement for bioretention serving >1 acre.
Volume III 3.4.2 Description Porous Pavement	3-116	Requiring infiltration testing for every 2,500 square feet of porous pavement is excessive. Given that only incident rainfall is being infiltrated (unless it is also serving as a facility – i.e. receiving other flows), the risk is low, and a testing frequency should reflect that. Infiltration ponds only require testing every 5,000 square feet, and they are a more critical application. Suggest using one test per 5,000 square feet for porous pavement facilities (see above) and 7,500 square feet porous pavements only receiving incident rainfall. Testing at WSU indicates that 100% infiltration will likely occur on even the tightest soils with adequate storage course and excessive testing will push developers to attempt to bypass use of porous pavement by demonstrating infeasibility.	Revise testing frequency for infiltration rate on porous pavements to >2,500 square feet.

Section	Page	COMMENT/CONCERN	RECOMMENDATION
Volume III Appendix B	B-7	Runoff Credits – An entire appendix is provided on runoff credits – do not need to repeat here. Either Delete this section or just reference Appendix C.	Delete Runoff Credits section from Appendix B
Volume III Appendix B	B-9	Section lists detailed criteria for bypassing flows around flow control facility. This is a valuable discussion and should be included in the body of the manual – perhaps include in discussion of Minimum Requirement #7 in Volume I.	Move description of bypass flows to Volume I, MR #7
Volume III Appendix B	B-9	Section also describes how to handle off-site flows. These are important criteria that should be specifically included in MR#4 and MR#7.	Include off-site flows discussion in Volume I, MR#4,7
Volume III Appendix C	C-5	7.1.2 Design Criteria for Permeable Pavements - This shouldn't be in the appendix. Design criteria for permeable pavement should be specifically described under the permeable pavement BMP. This section should be limited to modeling approach in WWHM.	Move design criteria in this appendix to the appropriate BMP, focus on WWHM, nod facility design criteria.
Volume III Appendix C	C-7	7.2 Dispersion – Similar to above comment – why include all the details of BMP T5.30 in this appendix. It should just reference T5.30 and delete design criteria here and only focus on modeling since that is the subject of Appendix C. Note: In general, there is a great deal of detailed BMP standards and specifications in this appendix. They should be in each BMPs description and not repeated here. Suggest completing reworking this appendix to focus on modeling and not design issues.	Delete specific criteria related to BMP T5.30. Having information in multiple locations risks its being overlooked. Similarly, for other BMP design criteria contained in this Appendix.
Volume III Appendix C 7.4 Rainwater Harvesting	C-12	Need guidance on how credit for harvesting would be applied (if any) for irrigation use of rainwater. It is not clear what is meant by the restriction related to 4 homes/acre and lower densities. Please clarify.	Clarify harvesting for irrigation – what credit, how 4/homes/acre restriction applies.
Volume III Appendix C 7.6 Pin Foundations	C-13	Without an exhibit or figure, it is difficult to understand how the formula for dispersion related to step-foundations is to be applied. Suggest adding a figure to clarify.	Add a figure clarifying step foundation dispersion.

Section	Page	COMMENT/CONCERN	RECOMMENDATION
Volume III Appendix C 7.7 Tree Retention	C-14	It is not clear how the tree canopy area is to be measured. Is it the tree canopy within 20-ft of impervious surface? Since a tree can be within 20-ft and get credit, the canopy of the tree would extend beyond 20-ft from the pavement. Please clarify.	Clarify how tree canopy measurement is to be made.
Volume III Appendix C 7.9 Bioretention	C-23	General comment - why is so much detailed design criteria on all these BMPs in an Appendix? The detail should be provided in description/standards for each BMP. Regarding application of CF's to soils for bioretention – There is general confusion as to what exactly is considered the short-term vs. long-term infiltration rate. If I do the PIT test, is the result the short-term rate? Or is the rate after applying CFt and CFv? It is not clear and should be. I would suggest that the raw test result should be the short-term rate for use in bioretention design. CFv might be applied if trying to lump several tests together. I think the interpretation of CFv is confusing. It should be based on general assessment of site variability, not how many tests are performed in a given area. In both instances, CFv should be applied. The CFm would not be applied to the native soils of the bioretention facility. Without more information on what the CFt is and what its values were based on it is hard to have an opinion as to whether it should be applied to get short-term rate. The bigger question of this whole section is that the testing for Ks for the bioretention facility should be referred to Chapter 3, and specifically to Section 3.4. However, section 3.4 probably needs to be revised to be consistent with section 3.3 for Infiltration facilities - bioretention is an infiltration facility and should not necessarily have separate standards applied to it. A small infiltration trench should be treated similarly to a small bioretention facility in terms of the design infiltration rate and required soils/groundwater characterization.	Re-evaluate inclusion of detailed design information in this Appendix. Re-evaluate how CFv is being applied.

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Volume IV BMPS for Maint & Repair of Vehicles & Equipment	41	Applicable Treatment BMPs – States: "...followed by a basic treatment BMP..." -- Since site may be subject to enhanced treatment, phosphorous treatment, etc. this shouldn't say "basic treatment" should say "followed by the appropriate runoff treatment BMPS in accordance with Volume I"	Delete reference to basic treatment.
Volume IV BMPs for Storage of Liquid, et. Al	61	Pollutant Control Approach – Uses term "place a filet" – have never heard this term used in this context. Suggest defining "filet" or use an alternative term.	Replace "filet" with alternative term.
Volume IV BMPs for Storage of Liquids...	65	Reworded sentence beginning "Heat above ground tanks with..." does not have the same meaning as original sentence. Reword	Reword sentence in which meaning is incorrect.
Volume IV Appendix G	G-13	Last few paragraphs mention "Permittees" – What permit? Why reference NPDES permit now? If retain- suggest rewording "for permittees under the NPDES Phase I or Phase II permit meeting the local sewer authority's conditions is a permit requirement." - Users of this manual are not necessarily permittees and references to NPDES permits should be explicit as to why they are being referenced.	Reword or delete reference to "permittees" in this Appendix. Consider throughout SWMMWW when and how to use NPDES permittee requirements that won't be applicable to non-permittees.
Volume V 2.1 Step-by-Step Process	2-2	First bullet on this page (Water clean-up Plans) does not make sense after proposed edits. Reword	Reword sentence.
Volume V 4.4 Facility Liners	4-7	Description of Treatment liners should be revised consistent with changes made in Volume III, i.e. 12 in/hr short term F etc.	Revise description of treatment liners consistent with Volume III
Volume V 4.4.2 Design Criteria for Treatment Liners	4-8	Required organic content was changed to 0.5% in Volume III. Still states 5% in this section.	Revise organic content % per Volume III.
Volume V	7-18	2nd to last bullet on page references 2005 SWMMWW – delete reference and just reference applicable section of this manual.	Delete reference to 2005 SWMMWW.

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Section	Page	COMMENT/CONCERN	RECOMMENDATION
Volume V BMP T8.40 Media Filter Drain	8-24	Throughout this BMP, reference is made to figures and departments of WSDOT. Suggest re-writing to eliminate these references. Examples: HRM Resource Web Page; See Table RT.07.1 (in figures); contact the Maintenance Office (pg 8-31), references to HRM sections, etc. etc.	Rewrite this BMP to eliminate WSDOT specific references.
Volume V Chapter 12 12.5	12-4	Much of the discussion in this section is repeated from Section 12.4, suggest consolidating discussion of GULD, CULD, PULD into one section to shorter chapter.	Consolidate discussion to shorten chapter.
Volume V Appendix C	C-3	Tables 1 and 2 reference WSDOT standard specifications from 1998 – The values in the table should be evaluated against current WSDOT standard specifications and revised as appropriate.	Update geotextile specifications per current WSDOT standard specifications.