



March 6, 2007

Ms. Kerry Schmitz
Sacramento County Department of Water Resources
Storm Water Quality Section
827 7th Street, Suite 301
Sacramento, CA 95814

Re: Storm Water Quality Design Manual - Comments

Dear Ms. Schmitz:

I write on behalf of the North State Building Industry Association (BIA) to thank you and the Design Manual Steering Committee staff for meeting with our Sacramento Area Council on Wednesday, February 14, 2007. As our group discussed at the meeting, the newly proposed Storm Water Quality Requirements will considerably impact the homebuilding industry.

Many of the nearly 1,000 members we represent are directly affected by these requirements, and thus, the BIA intends to actively participate in the Storm Water Quality Design Manual's ("manual") development. We appreciate your diligent efforts to help protect our local waterways, and to ensure the most effective approach to that end, we want to partner with you to ensure that the implementation costs, both direct and indirect, are manageable, ultimately, for future homebuyers.

To provide the Design Manual Steering Committee with technical comments on behalf of the building industry, we have assembled seasoned local experts from engineering, planning and development backgrounds. Attached to this letter, you will find these comments in a format consistent with your request. In addition, the BIA is working with legal counsel to ensure that we can most effectively address these issues in light of the municipal permittees' obligations under their own permits and other legal parameters.

As you are aware, the Sacramento region is especially unique in its soil types and surface conditions. These and other unique Sacramento conditions lead to major questions regarding feasibility for some of your proposals.

We understand and appreciate your desire to proceed with this manual's adoption in an expedited manner. However, we respectfully urge you to thoroughly consider and address our attached comments.

In addition, we ask that you provide us with a reasonable amount of time to respond to your reply to our comments. And, we urge you to provide our membership with some future follow-up "workshop" opportunities before the adoption of the manual.

Please call me at (916) 677-5717 if you have any questions or suggestions.

Respectfully,



Ardie Zahedani
LEGISLATIVE ADVOCATE

Enclosures:

1. Comments from Youngdahl Consulting Group (18 pages)
2. Comments from Morton & Pitalo (3 pages and 1 page)
3. Comments from Wood Rodgers (11 pages)

cc: Mr. John Griffin, BIA Area Council Chairman
Mr. Tom Gamette, Subcommittee Chairman
Mr. Dennis Rogers, North State BIA
Members of the BIA Stormwater Subcommittee
Mr. George Booth, Sacramento County
Ms. Sue McConnell, California Regional Water Quality Control Board
Ms. Dalia Fadl, Sacramento County
Ms. Shriil Huun, City of Sacramento
Ms. Leslie Nguyen-Pickett, City of Elk Grove
Ms. Sarah Amaya, City of Folsom

Comments received by 5 PM January 18, 2007 will be addressed prior to publication of the public review draft in February 2007. Please submit comments using this form. Visit www.sacramentostormwater.org to download an electronic copy of this form. If possible, please submit comments electronically by selecting “Stay Informed” on the web site’s New Development page.

Name of Reviewer	Affiliation	Phone Number	E-mail Address
MES, BKS and JCY	Youngdahl Consulting Group, Inc.	(916) 933-0633	mail@youngdahl.net

General Comments

The following comments relate to Stormwater Quality, impacts of the measures on Geotechnical Engineering practice, as well as contradictions in design and document consistency. For the ease of review we have adhered to the comment format presented and provided the comments in sequential order, relative to the manual chapter and page, regardless of the nature of the comment.

Several technical writing comments are contained at the end of the Content Review.

Problem: Based on our review of the Manual, some particular Geotechnically related issues need to be addressed. In several sections of the Manual it describes how important infiltration rates are to the performance of infiltration trenches, dry wells, basins, etc. However, not all of the sections indicate the importance of having a Geotechnical and/or Geologic consultant involved in the initial design of these infiltration facilities and deciding where they may or may not be appropriate.

Comment: It should be noted that based on our experience with soils in the Sacramento and Placer County area, many of the surface soils are comprised of low permeability clays, cemented soils (hard pan) and shallow bedrock. These surface soil characteristics can create a perched groundwater condition that will not allow for favorable infiltration conditions. Where these perched groundwater conditions are present, localized rising of the seasonal groundwater table could occur and have an adverse impact on the performance of the infiltration system and any adjacent structural improvements. An additional limiting factor of any infiltration system is that engineered fill areas should not be used for these purposes since the soils in their compacted condition exhibit poor infiltration characteristics, and in most situations are not intended to be inundated with ponding water. Another issue to consider is that once the water is infiltrated, we have little to no control over where it goes. There will always be the potential for the water to migrate under structures, seep across property lines, seep out of slopes, seep at impervious horizons, etc.

Review of Chapter 5, Page 30 of the Sacramento Stormwater Management Program Development Standards Plan (DSP), dated December 1, 2003 substantiates our comment.

“Existing Infiltration and Groundwater Protection Restrictions

Infiltration BMPs are not commonly used in the Sacramento area, due to the prevalence of poor draining clay soils. Also, infiltration

facilities have a history of requiring more frequent maintenance to prevent clogging than other BMPs. These factors typically dissuade most local engineers from incorporating infiltration into their site designs”.

Consideration: Within the Planning and Siting Considerations section of all of the infiltration systems, consideration should be given to adding the comment to have the Project Geotechnical Engineer/Geologist evaluate the feasibility of these systems with regards to soil infiltration rates, their proximity to foundations, etc. Based on their evaluation the use of infiltration systems may or may not be appropriate for the project or site conditions.

Problem: Providing prescriptive design measures that encourage infiltration of surface water into the subsurface materials may be a good practice from a water quality perspective.

Comment: This type of treatment adjacent to structures is a direct contradiction to many of the geotechnical engineering design principles/standards of practice. Through years of trial and error, engineering judgment and prior failures, geotechnical design guidelines have evolved into the Standard of Practice we currently use. These Standards of Practice have been developed to provide structural support and protection to improvements constructed atop the soils.

These standards of practice include keeping water away from foundations, providing surface grades that promote rapid dispersion of surface water away from the foundations, not only to maintain the structural integrity of the supporting soils but also to provide moisture protection for the concrete slabs on grade. Moisture related issues/problems within structures supported on concrete slabs on grade have become a major issue in construction defect litigation. By not maintaining adequately dry foundation areas and encouraging infiltration near building pad areas, from a geotechnical perspective, this is not considered a desirable practice and could result in increased litigation. In addition, as discussed in the Sacramento Stormwater Management Program Development Standards Plan above, most local engineers are dissuaded from incorporating infiltration systems into their designs. When combined with the typical soil types in the area and the fact that water is relatively uncontrolled once infiltrated, infiltration practices adjacent to structural improvements will not likely be approved.

Consideration: From a Geotechnical perspective, consideration should be given to designing joint utility trenches as a Runoff Reduction Control Measure and/or Treatment Control Measure. Although some utility companies may deny this, it has been our experience that joint utility trenches collect water due to the permeable nature of the sands typically used for bedding and shading materials. These bedding and shading materials rarely receive compactive effort except within street crossings (for fear of damaging the conduits), which by default would enhance infiltration. Joint utility trenches are typically constructed behind the sidewalk, which would make them a suitable infiltration system alternative with respect to collecting and treating water draining from residential building pads since in most situations, building pad grades slope to the front of the lots. Where the joint utility trench passes behind

drop inlets, a perforated pipe enveloped in filter media (i.e. crushed rock and filter fabric) could be installed from the back of the drop inlet to the joint utility trench at a proper overflow elevation. As field conditions dictate, where the perforated pipe penetrates the utility trench, a short (~5 foot) section of perforated pipe enveloped in the filter media could be placed within the trench to function as a collector. This system could be taken one step further by creating shallow grass swales within the lawn areas immediately behind the sidewalk where the surface water could collect and infiltrate into the joint utility trench.

This type of system would address several considerations; 1) it would provide a Control Measure, 2) it would help prevent the joint utility trenches from filling up entirely with water (by providing the drainage provisions), and 3) by draining the joint utility trenches we are providing a line of defense for keeping pavement subgrade and aggregate base areas dry, which in turn minimizes the potential for pavement distress.

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Disclaimer	6	Comment: Design Professional Liability-Although it has been briefly discussed and commented on that the project Civil Engineer should prepare and design the Water Quality exhibit, it should be noted that several professionals are influenced and ultimately could be held liable for unanticipated negative effects caused by use of these methods including the Geotechnical Engineer, Professional Geologist, Architect, Landscape Architect, Structural Engineer, HVAC Designer and Civil Engineer for any of the following; failure of the systems (i.e. infiltration basins becoming non functional due to natural plugging or consolidation over the life span of the facility), structural degradation over the lifespan of adjacent effected structures or litigation from adversely effected adjoining property owners (including vector issues, global settlement, seepage, moisture migration issues, etc..).
Disclaimer	6	Problem: “The contributing agencies do not claim any responsibility for [...] improper design or construction” Comment: Who is the entity responsible for verification or observation of construction of the proposed facilities? Most of the proposed facilities will require precise construction including line and grade, as well as, appropriate earthmoving methods and verification of any variations in subsurface conditions from those anticipated during design. It has already been noted during the public outreach meetings that on at least

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		one previous project the proposed methods have failed do to improper construction (It should be noted that without specific evidence of improper construction it may be difficult to distinguish, in some cases, between a construction flaw, failure to maintain or unforeseen natural degradation of several of the practices in this manual).
Disclaimer	6	<p>Problem: In the event that any of the measures indicated in this manual were found after completion and occupancy of the structure/facility that these measures caused an adverse effect on the integrity of an engineered structure or other unanticipated negative environmental/health and safety effect, what mechanisms are in place, by adoption of this design manual, to remove or render inoperable the water quality features?</p> <p>Comment: In the event of litigation (brought by tenants, HOAs, adjoining property owners, property owners, other regulatory agencies or other concerned parties) and the possible result of court orders requiring removal, bypass or abandonment of these features what mechanisms and requirements are created or imposed on the property and it’s owner by adoption of this manual? Proper abandonment procedures should be addressed in this manual.</p> <p>Consideration: The Manual should provide or at least discuss proper abandonment procedures.</p>
Disclaimer	6	<p>Problem: What is the design life of the proposed water quality measures? As part of the economic evaluation of development, as with all elements of the project (the structure, parking and other facilities), the design life of the constructed elements is integral in evaluation of site design.</p> <p>Consideration: Specifically, it is noted in later chapters that an infiltration basin may be come clogged with sediment and restoration of basin infiltration capacity may be difficult. This comment would be true even if high sediment loads are kept out of the basin, natural degradation of the functionality of the systems beyond prescribed maintenance should be discussed for the benefit of future owners and operators.</p>
1	1-1	<p>Problem: “Goals [...] Consolidate all design requirements for stormwater quality management into one document”. Not only should this be the goal of the manual, based on a review of the current Municipal permit CVRWQCB Order No. R5-2002-0206/NPDES No. CAS082597, the following requirement was</p>

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		<p>noted “Each Permittee shall incorporate water quality and watershed protection principles into planning procedures and policies such as: the General Plan or equivalent plans (e.g., Comprehensive, Master or Community Plan) to direct land use decisions and require implementation of consistent water quality protection measures for all development projects”.</p> <p>Comment: This seems to imply that the Manual needs to be adopted into each jurisdiction’s General Plan prior to implementation. However, it is our understanding some of the elements within the Manual are in conflict with current General Plans, planning protocols or ordinances within some jurisdictions, which may make adoption of the Manual in violation of applicable planning protocols or regulations.</p> <p>Consideration: Make sure any conflicts are resolved prior to adopting the Manual.</p>
1	1-2	<p>Problem: “For most projects, the maintenance requirements will also be incorporated into mandatory maintenance agreements or permits between the permitting agency and the property owner”.</p> <p>Comment: What if measures fail because of a lack of maintenance on the property owner? What if the lack of maintenance causes soils around the foundation to become inundated with water, resulting in moisture related foundation and concrete slab issues? The maintenance agreement will likely not keep the design professionals who developed these measures, the developer, or the contractor who constructed the measures out of litigation.</p>
2	2-5	<p>Problem: “Concentrate development on portions of the site with less permeable soils and preserve areas that will actively promote infiltration”.</p> <p>Comment: It should be noted that much of the near surface soils throughout Sacramento and Placer Counties are underlain by either clays, cemented soils (hardpan), or shallow bedrock, making most projects “less permeable”.</p>
2	2-5	<p>Problem: “Put Landscaping to work: All permitting agencies require landscaping [...] Stormwater quality features can often be integrated into landscape areas, including the site perimeter, parking medians roadside areas and so on. [...] may require some changes in the conventional approach ...]”</p>

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		<p>Comment: It has been noted that several planning procedures including existing preferred themes for landscaping, aesthetic preferences by planning agencies, water conservation practices and shade requirements would prevent the Design Professional from integrating any of the measures into “required” landscaping.</p>
2	2-6	<p>Problem: Minimize Impervious Surfaces “For all types of development, limit overall coverage of paving and roofs. [...] narrower and shorter streets and sidewalks,”</p> <p>Comment: The following quote is from CASQA Stormwater Best Management Practices Handbook, New Development and Redevelopment, January 2003. “<u>More than any other single element, street design has a powerful impact on stormwater quality.</u> Street and other transportation related structures typically can comprise 60-70% of the total impervious area coverage in urban areas [...] Many municipal street standards mandate 80 to 100% impervious land coverage in public right-of-way, and <u>are a principal contributor to the environmental degradation caused by development.</u>” Similar comments can be found in other publications.</p> <p>Consideration: As part of the overall goals of stormwater quality improvement in the Sacramento and southern Placer County areas the jurisdictions involved in the preparation of this manual should consider narrower or alternative street designs. As indicated in the referenced CASQA manual the Cities of Santa Rosa, Palmdale, San Jose, Novato and the County of San Mateo have already adopted narrow street standards. In fact an article from www.stormwatercenter.net indicates 17 jurisdictions across the country that have adopted narrow street standards.</p> <p>If the intent of this manual is to improve the Stormwater Quality in runoff from urban development, in the Sacramento and South Placer County areas, the manual should provide direction and approved options to the Design Engineer on alternative Public Street designs that are more environmentally friendly. (See previous comments on the Goals of the Manual.)</p>
2	2-6	<p>Problem: “Of course, infiltration is not appropriate where it would pose a threat to groundwater quality or cause other problems such as destabilizing a site”.</p>

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		<p>Comment: -Destabilizing a site should be expanded to include inundating engineered fills with ponded water, compromising slope stability, uncontrolled seepage flow onto neighboring properties, hydro-consolidation of trenches in streets, foundation distress within clay (or other highly moisture sensitive soil), slab moisture issues, etc.</p> <p>-The General Permit NPDES No. CAS082597 Section 19 g. “Infiltration and Groundwater Protection: To protect groundwater quality, the permittee shall apply restrictions to the use of structural BMPs designed to primarily function as infiltration devices (such as infiltration trenches and infiltration basins). Such restrictions shall ensure that the use of such infiltration structural treatment BMPs shall not cause a violation of applicable groundwater quality standards.”</p> <p>This manual should provide guidance as to the specific restrictions of these types of BMP’s related to ground water quality protection to assist the Design Professional and the Contractor in ensuring that any site specific variations, which may be necessary for construction of the devices, conform to the additional Ground Water Protection Restrictions.</p>
2	2-7	<p>Problem: Direct run-off from impervious areas to adjacent pervious areas or depressed landscape areas.</p> <p>Comment: This manual does not provide any alternative roadway designs which would allow for disconnection of the urban roadway system. See previous notes Chapter 2 Page 2-6 regarding roadways.</p>
3	3-4	<p>Note: Proprietary devices Foot Note (i) “Contact Local permitting agency for a list of acceptable devices.”</p> <p>Consideration: See comments below Chapter 3 Page 3-6</p>
3	3-4	<p>Problem: Table 3-2. Selection Matrix for Priority Project Categories, Hillside Developments $\geq 25\%$ Slope, indicates that treatment controls are required and lists that Constructed Wetland Basins, Infiltration Basins and Infiltration Trenches are acceptable.</p> <p>Comment: Review of the Siting Considerations in Chapter 6 for Wetland Basin and Infiltration Basin</p>

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		<p>systems indicate that they are not appropriate on fill or steep slopes. Review of the Siting Considerations for Infiltration Trench systems indicate a maximum contributing area slope of 5% and a maximum downstream slope of 20%. These considerations appear to be in direct conflict with the definition of a hillside (steep slope) development. From a geotechnical perspective, these facilities could be feasible within hillside developments provided they are appropriately sited, designed and constructed (with any appropriate input from all the design professionals, including the Geotechnical consultant).</p> <p>Consideration: Consideration should be given to providing consistent language and standards between the two chapters.</p>
3	3-4	<p>Problem: Table 3-2. Selection Matrix for Priority Project Categories, Treatment Controls Footnote (h) Some of the treatment devices may not be allowed in the public right-of-way or in areas where the local agency would be required to conduct maintenance. Contact the local permitting agency for requirements and restrictions.</p> <p>Comment: The footnote seems to be contradictory to the Goals of the manual as well as several of the fact sheets regarding Planning and Siting Considerations:</p> <ol style="list-style-type: none"> 1) Chapter 1 page 1-1 Goals “Consolidate all design requirements for stormwater quality management into one document” 2) Page CWB-2 Constructed Wetlands Basin “Integrate constructed wetlands into <u>open space, natural areas, and other planned landscape areas</u> when possible” 3) Page DB-3 Water Quality Detention Basin “Where possible, design water quality basins <u>as joint use with parks (passive recreation), opens space, wildlife habitat, aesthetic amenities and/or flood control detention facilities.</u>[...] Refer to the local agency for specific design criteria.” 4) Page IB-2 Infiltration Basin “Integrate infiltration basins into <u>open space buffers, undisturbed natural areas, and other landscape areas</u> when possible.” 5) Page IT-2 Infiltration Trench “Integrate infiltration trenches into <u>open space buffers, undisturbed natural areas, and other landscape areas</u> when possible.” 6) Page VS-2 Vegetated Swale “Integrate Vegetated swales into <u>open space buffers, undisturbed natural areas, and other landscape areas</u> when possible”

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		<p>7) Page VFS-2 Vegetated Filter Strip “Integrate vegetated filter strips into <u>open space buffers, undisturbed natural areas, and other landscape areas</u> when possible”</p> <p>In much of the Residential development designs that have been observed the preferred areas for the treatment features generally occur in the public areas under the maintenance purview of the Local agency.</p> <p>In addition a review of the “Long-term Maintenance” section of each of the Fact sheets it appears that only the Water Quality Detention Basin fact sheet contains provisions for maintenance by a local agency.</p> <p>On a technical note many, if not all, of the treatment features provided would require minimal to significant grading or earth moving activity. Although, “Undisturbed” natural areas should be considered beneficial for stormwater quality it is contradictory to imply that “undisturbed” natural areas are appropriate or used of these measures.</p>
3	3-6	<p>Note: Step 6: Select Treatment Control Measures “Proprietary devices, such as stormwater vaults, may also be allowed for the project.”</p> <p>Comment: This manual does not include any “proprietary” or vault type devices. In a review of the scattered documentation, available from the local agencies, it seems that Contech company has two vault type systems which are approved by Sacramento County and the associated cities (although the City of Folsom places additional design requirements on vault type systems per the DSP). In addition a review of the DSP indicates that a study was completed by Sacramento County and a decision was reached to accept the Contech Stormvault and later the Stormfilter. This manual and the DSP fall short of describing the nature of the acceptance and how the design professional should apply the acceptance criteria for the Contech systems to other vault type systems available.</p> <p>With regard to use of vault type systems this manual falls short of the goals outlined on Page 1-1 “Goals [...] Consolidate all design requirements for stormwater quality management into one document.” This manual continues to leave items for design of the storm water quality system in other documents.</p>

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		<p>Consideration: This manual should include the performance and technical data used to “approve” the Contech devices and under what pollutant loadings and for what land uses the approvals exist. No technical data is presented by which a Design Professional could evaluate the equivalence of any other options for the developer.</p> <p>Additional Comment: The list of Sacramento County approved “Proprietary” devices is not located at www.sacramentostormwater.org. The list of Sacramento County approved “Proprietary” devices is at http://www.msa.saccounty.net/sactostormwater/SSQP/treatment-options.asp.</p>
5	5-1	<p>Note: “The goal of runoff reduction control measures is to mimic a site’s predevelopment balance of runoff and infiltration [...]”</p> <p>Comment: As has been noted frequently soils in the Sacramento area are generally HSG C or D and demonstrate very low, if any infiltration characteristics. This would imply that the predevelopment conditions may have consisted of significant run off volumes and that modification of the engineered drainage features may not be necessary at a significant degree to “correct” runoff <u>volumes</u>.</p>
5	5-3	<p>Problem: “Work with your civil engineer and planner to the infiltration capacity of the soils and the future use of the site when making this determination”.</p> <p>Comment: The geotechnical engineer/geologist should also be consulted.</p>
5	PP-1	<p>Problem: Limitations section of Porous Pavements does not cover all issues.</p> <p>Comment: Other Limitations (From EPA Storm Water Technology Fact Sheet, Porous Pavement):</p> <ol style="list-style-type: none"> 1. Many pavement engineers and contractors lack expertise with this technology. 2. Porous pavement has a tendency to become clogged if improperly installed or maintained. 3. Porous pavement has a high rate of failure. <p>4. Anaerobic conditions may develop in underlying soils if the soils are unable to dry out between storm events. This may impede microbiological decomposition.</p>

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		<p>Other considerations:</p> <ol style="list-style-type: none"> 1. If porous pavements are used, they may require larger aggregate sections (whether it be to contain/infiltrate water for attenuation or for structural support) than non-porous pavements supported on aggregate base. The additional rock could be considered a burden on aggregate resources. 2. Porous pavements require additional maintenance (i.e. pressure washing, vacuuming, and annual inspections following large storms. 3. The Manual indicates that pervious pavements may need to be replaced after several years, depending on the amount of fine material deposited on the surface. This statement seems to imply that these pavements will not reach a typical 20 year design life. Developers will not want to install something requiring replacement every 5 to 10 years.
5	PP-2	<p>Problem: “Determine site soil type and permeability before selecting porous pavement; generally, Type A and B type soils are preferred. Your local permitting agency may require a soils test to verify suitability of this type of pavement. An underdrain connected to the storm drain (not sanitary sewer) will be required on sites with C and D soils. Additionally, an impermeable liner is recommended when installing porous pavement over D soils”.</p> <p>Comment: Many published porous pavement design guidelines (including the EPA report noted above) recommend minimum infiltration rates of 0.5 inches per hour (some publications prefer this value, others require it). Some published reports allow for infiltration rates as low as 0.27 inches per hour. According to the Glossary of Terms in the Manual, Hydrologic Soil Group, Type A soils have high infiltration rates of >0.3 inches per hour and Type B have moderate infiltration rates of 0.15-0.3 inches per hour. Depending on which design recommendations you reference, none of the soil types as they are defined, meet the minimum infiltration recommendations for design and construction of porous pavements, and only Type A soils meet it in others. The Manual should reflect the appropriate design methodology and should be adjusted in discussion, as this run off reduction control measure can not be applied as broad as implied.</p>
5	PP-12	<p>Problem: “A soils text may be required to verify suitability of this technique for the site. A qualified engineer must provide”</p>

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		<p>Comment: Sentence in not complete and it appears that text should be replaced with test.</p>
5	PP-13	<p>Problem: “Avoid over compaction of soils during construction to protect infiltration capacity of pervious materials”.</p> <p>Comment: This statement is in direct contradiction to Page PP-9, Figure PP-4, Reinforced Grass Pavement-Typical Sections, which indicates that the subgrade should be compacted to 95% Standard Proctor Density (this is also the only figure that provides a compaction requirement). This is a dangerous statement to use considering there may be <u>some</u> occasions where minimal compaction is acceptable, while other occasions where this would not be acceptable. Due to the litigious society we live in, even though we are trying to take advantage of infiltration, there are probably some pavement engineers that would never recommend a minimal degree of compaction within pavement areas.</p> <p>Consideration: Subgrade preparation and applicable compaction requirements should remain the purview of the pavement designer. Some mention of this should replace the above statement. In addition, all roadway and parking subgrade materials could be considered fill in terms of they should all be compacted to the requirements of engineered fill and should not be inundated with water. If pervious pavements are used, the design infiltration should be based on a properly compacted media.</p>
5	DP-1	<p>Problem: Disconnected pavements have been demonstrated to provide both reduction in runoff volumes as well as providing some benefit to the stormwater quality. The manual lacks information or design consideration for alternative roadway designs that would provide for disconnection of the public streets from the storm drain pipe system.</p> <p>Consideration: This manual does not provide any alternative roadway designs which would allow for disconnection of the urban roadway system. See previous notes Chapter 2 Page 2-6.</p>

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5	DP-1	<p>Problem: “Takes advantage of already-required landscape areas: on additional space required.”</p> <p>Comment: As noted in other discussions of consistence, this comment is only accurate when approved by all the departments of any agency.</p>
5	DRD-1	<p>Problem: Siting Considerations</p> <ul style="list-style-type: none"> • Soils: Infiltration structures are generally suitable for Type A and B soils. <p>Comment: As expressed above, much of the surface soils in the Sacramento and Placer County areas consist of clays, cemented soils (hardpan) and shallow bedrock. Much of these materials, as well as engineered fills would not be considered Type A and B soils.</p> <ul style="list-style-type: none"> • Setback: infiltration structures must be min. 10 feet from buildings (verify with local permitting agency) <p>Comment: The 10 foot minimum setback contradicts the 20 ft downslope and 100 ft upslope from foundations discussed in the Siting Considerations for infiltration basins (Chapter 6, IB-1) and infiltration trenches (Chapter 6, IT-1). These systems are essentially the same with respect to allowing water to infiltrate into the ground. Why is infiltration allowed to take place significantly closer in a Disconnected Roof Drain condition, other than to simply allow this drain to fit within the constraints of minimum building set backs? In addition, the EPA design criteria for porous pavements (i.e. another type of infiltration system) recommends minimum setbacks from building foundations of 10 feet down gradient, and 100 feet up gradient.</p> <p>Expanding on the EPA’s setback recommendations, it appears that they recognize that there is a problem associated with infiltration occurring too close to structural improvements (i.e. within a building pad). Again, from a Geotechnical perspective, due to the uncontrolled nature of water, infiltration on a building pad could cause multiple problems as the water migrates. Some of these problems include, but are not limited to, seepage onto adjacent down gradient lots, seepage out of down gradient slopes, seepage at impermeable down gradient soil contacts (i.e. cut/fill transitions), etc.</p>

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		<p>Consideration: Due to the highly variable nature of the soils, even within the same project/re-development area, the use of any infiltration system should be evaluated by the project geotechnical engineer/geologist so that they can make a determination as to the suitability of such a system. Particularly systems that could discharge in close proximity to foundations.</p> <p>One of the features of a Disconnected Roof Drain system is a splash block to direct downspout water away from the foundation. As a geotechnical consultant, if somebody were to ask us about which device to use to direct downspout water away from the foundation, the preferred alternative would be to use a tight pipe to collect the water and direct it away from the foundation. With the increase in construction defect litigation associated with concrete slab moisture issues, devices that create the potential to discharge water in close proximity to the foundations are not recommended.</p> <p>Another item to consider is that the Building Code as well as Housing and Urban Development (HUD) requires that sites be graded to promote positive drainage of surface water away from foundations/structural improvements. The process of infiltration adjacent to structural improvements appears to be a contradiction of the above Codes.</p>
5	DDR-1	<p>Note: Although use of On-lot Treatment methods, if addressed properly, may reduce run-off volume, pertaining to residential, the following information from USEPA should be considered when identifying Pollutant Sources and where effective pollutant removal techniques may be more desirable. “Although the practices used for on-lot applications can have relatively high pollutant removals [...], it is unclear that these pollutant removal rates can be realized, since the pollutant concentrations entering the systems are generally low.” ref: http://cfpub1.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=81</p> <p>Consideration: Identifying the significant pollutant sources and developing the methods and designs most likely to remove them may provide a long-term actual benefit to Sacramento Urban Stormwater Quality. Systems that have a likelihood of causing more harm than benefit should be avoided.</p>
5	DRD-3	<p>Problem: “For single family residential development, pop-up emitters must daylight no less than three</p>

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		<p>feet and no more than 5 feet from the building. The five feet limit is to allow for maximum travel distance across the yard.</p> <p>Comment: Again, with all of the recent litigation concerning moisture related problems for concrete slabs-on-grade (particularly for residential construction), devices that create the potential to discharge water in close proximity to the foundations are not recommended.</p> <p>Consideration: One method for removing a possible source of the water is to connect all downspouts to a tight pipe discharge system, allowing the water to be directed away from the structure until a downstream point of discharge several feet away from the structure.</p>
6	IT-2	<p>Problem: When reviewing the Manual, the importance of providing a consistent set of requirements and to consolidate all of the design requirements for storm water quality management into one document is expressed. However, with the creation of this document, one of the many items that are not clear is whether all of the jurisdictions and divisions within the jurisdictions will accept/approve any appropriate measures incorporated within the construction plans for any particular project.</p> <p>Note: Infiltration Trenches “Planning and Siting Considerations, · Integrate trenches into openspace buffers, undisturbed natural areas and other landscape areas when possible”. This manual should provide the design criteria that is acceptable to all agencies and departments that will allow for proper and appropriate siting of infiltration trenches away from foundations, pavements and other engineered features in appropriate open spaces, parks etc.</p> <p>For example, as part of the forward planning, the Civil Engineer in conjunction with consultation with the Geotechnical Engineer proposes to design infiltration trenches and vegetated swales in appropriate areas adjacent to either open space buffers or undisturbed natural areas within the park site. Assume at this juncture the design meets with the DWR and Planning approval. Since the design is in conformance with the Manual, and approved, does this imply that it meets the approval of the Parks Department.</p> <p>Comment: The intent of this example is to make sure that the goals of this manual as described in chapter 1 page 1-1 that this manual consolidates all design requirements for stormwater quality management into</p>

Specific Comments

Chapter	Page No.	Comment
		one document. This scenario is an example of treatment control that would address the Siting and Vector Considerations for infiltration. From a Geotechnical perspective, open space/non-structural areas would be the only place where infiltration into the subsurface materials could potentially be planned for without jeopardizing structural support or creating moisture related problems to foundations or other structural improvements.
		Additional Technical Comments
2	2-4	Problem: “ Opportunities might include existing natural areas, low areas, oddly configured or otherwise un-buildable parcels, easements and landscape amenities including open space and buffers (which potentially can double as locations for stormwater controls, and differences in elevation (which can provide hydraulic head for structural treatment control measures). Comment: There appears to be a) missing after controls.
2	2-7	2 nd paragraph, last sentence, the word isles should be replaced with aisles
5	DRD-4	Figure DRD-1, the word very should be replaced with vary
5	PP-2	Fourth paragraph, drive isles should be replaced with aisles .
5	PP-5/PP-12	Problem: Table PP-1, Design Criteria for Porous Pavement, Pervious Concrete/Asphalt (Figure PP-1) Comment: Figure PP-1 only illustrates a typical pervious concrete section. Consideration: The figure should be revised to be reflect both surfaces.
5	PP-5/PP-12	Problem: Table PP-1, Design Criteria for Porous Pavement, Pervious Concrete/Asphalt, describes an 8” minimum of coarse aggregate over 4” minimum sand over 3” minimum coarse aggregate. Comment: Figure PP-1 illustrates a 8” minimum coarse aggregate over 7” of sand.

Specific Comments

Chapter	Page No.	Comment
		Consideration: Figure PP-1 and Table PP-1 should be made consistent.
5	PP-5/PP-12	<p>Problem: Table PP-1, Design Criteria for Porous Pavement, Pervious Concrete/Asphalt says: “use a gravel trench or perforated pipe embedded in a 8-12-inch layer of crushed rock”.</p> <p>Comment: Figure PP-1 illustrates a 6” minimum trench depth, which appears to contradict the 8-12 inch layer.</p> <p>Consideration: This should be clarified and, if applicable, Figure PP-1 and Table PP-1 made consistent.</p>
5	PP-7/PP-12	<p>Problem: Table PP-1, Design Criteria for Porous Pavement, Modular Block Pavement, describes a 12” minimum of coarse aggregate.</p> <p>Comment: Figure PP-3 illustrates an 8” minimum coarse section.</p> <p>Consideration: Figure PP-3 and Table PP-1 should be made consistent.</p>
5	PP-10/PP-12	<p>Problem: Table PP-1, Design Criteria for Porous Pavement, Cobblestone Block Pavement, describes a 12” minimum of coarse aggregate.</p> <p>Comment: Figure PP-5 illustrates what appears to be a 7” minimum coarse aggregate over 7” minimum of sand, the materials within the section are not clearly defined.</p> <p>Consideration: The materials should be more clearly defined, and the Figure PP-5 and Table PP-1 should be made consistent.</p>
5	PP-11/PP-12	<p>Problem: Table PP-1, Design Criteria for Porous Pavement, Porous Gravel Pavement, describes a 12” minimum of coarse aggregate over 4” minimum sand over 3” minimum coarse aggregate.</p> <p>Comment: Figure PP-6 illustrates a 12” minimum coarse aggregate over 7” of sand.</p>

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Chapter	Page No.	Comment
		Consideration: Figure PP-6 and Table PP-1 should be made consistent.

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Name of Reviewer	Affiliation	Phone Number	E-mail Address
Scott Pedersen	Morton & Pitalo, Inc.	(916) 927-2400	spedersen@mpengr.com

General Comments

<u>Pervious Surfaces</u> : Will permeability tests from a geotechnical firm be required at the planning level if pervious surfaces are considered in preliminary site design? How do we address spills and groundwater contamination?
<u>Stormwater Vault</u> : Depending on the existing site constraints and proposed development intent, a developer may prefer the “expensive and maintenance intensive” stormwater vault over the treatment control measures outlined in the Manual. Stormwater vaults can be placed under parking areas and drives thus preserving buildable area. If stormwater vaults are going to continue to be used/approved, it would seem a more defined selection of “approved” proprietary devices in the Manual would save time for the agencies and the developers.
Basin Sizer still appropriate?

Specific Comments

Chapter	Page No.	Comment
4	2	<u>Source controls for residential</u> to include informational brochures to new home owners (and existing) outlining suggested watering schedules, fertilizing, car maintenance, pool emptying, etc. <u>Commercial/industrial</u> to include information on parking lot pressure washing <u>Auto repair and retail gasoline outlets</u> may be required to meet EPA SPCC requirement as a source control measure, (http://www.epa.gov/oilspill/spcc.htm), although a modified SPCC plan for all hydrocarbon storage facilities could be useful.
4	3-7	<u>Waste Management</u> : Narrative and details are unclear. Enclosures to be hydraulically isolated (reverse grading, curbing, area drains? Sounds like sewer connected?). Figure WM-3 shows sanitary connection at rear of enclosure with positive drainage out the front of the enclosure? Is there a berm missing, or is the slope arrow facing the wrong direction?

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Name of Reviewer	Affiliation	Phone Number	E-mail Address
Heather Hansen	Morton and Pitalo, Inc.	(916) 927-2400	hhansen@mpengr.com

General Comments

Overall, the tables and figures are wonderful! They are very clear and well presented. Great visual tool.
Chapter 1 seems somewhat fragmented, while chapters 2 and 3 seem more “polished.”
Chapter 2 was thorough without going overboard. I enjoyed the ideas presented and explanations of why “smart growth” was necessary.
The document is well organized in general. The tabs are helpful in flipping through the manual.
A list of local vendors is vital. Great ideas, but are they feasible if no one in California can provide the materials?
How will the Counties/Cities enforce these new rules? What incentives are there to persuade developers to construct LID’s rather than using old methods?

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Specific Comments

Chapter	Page No.	Comment
1	2,3	Continually refers to material at the “end of the chapter.” It seems the material should be in a more specified location, such as an appendix.
3	4	I have seen this table before and have always found it confusing. I have spoken with other professionals in the industry that found it to be unclear as well.
5	2	“...see the references at the end of this chapter...” Maybe the manual should include an appendix with a list of references and/or local vendors.
5	2	“-which is a good thing-” I think there is a more professional way to phrase that statement.
5		Excellent fact sheets! Very informative.
5	INT	Is it possible to include a current list of approved trees? I understand it may not be feasible due to regular changes. I think the idea of interceptor trees is great.
5	ER	Do we have any local vendors for the ecoroof? Maybe a vendor from the northwest would be willing to come out and give a presentation. Educating developers is the first step.
5		The new ideas presented in chapter 5 are wonderful. However, are the measures mentioned here all-inclusive? Are any other methods acceptable? If so, specs should be included for them as well.
5	1,2	The text of Chapter 5 seems too brief. The items discussed are good, but developers need more than 3 options.

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Name of Reviewer	Affiliation	Phone Number	E-mail Address
Tim Crush, Mike Engle, Mark Rayback, Chris Ferrari, Mike Nowlan, Jennifer O’Neal	Wood Rodgers, Inc.	916-341-7760	terush@woodrodgers.com mengle@woodrodgers.com Mrayback@woodrodgers.com mnowlan@woodrodgers.com cferrari@woodrodgers.com joneal@woodrodgers.com

General Comments

<p>Consideration of economic, technical and practical should be considered, MEP standard should apply. Other department integration /buy-off appears to be lacking.</p>
<p>The manual incorporates examples from Northwest (Portland, Seattle) or Rocky Mountains (Denver) that have drastically different weather patterns, soil types and terrain. The manual should incorporate examples from climates similar to Sacramento Region (semi-arid seasonal with rain in winter 3-4 months).</p>
<p>Treatment BMPs or runoff reduction measures should be selected based upon pollutant removal efficiency, life cycle length, economics and whether or not a specific measure meets or exceeds the MEP criteria. It appears that many of the measures were simply copied from other municipalities that have different topography, climate or soil types. Recommend reviewing research that has been completed by the CSUS Office of Water Programs (http://www.owp.csus.edu/research/). For example the 7-minute contact times is not substantiated by actual research, while there has been research completed that indicate 90% of pollutant removal is completed over the 9 meters of grass.</p>
<p>It does not appear that the manual takes into consideration economic benefit when determining that the measures proposed are required for compliance with the Municipal NPDES Permits.</p>

<p>MEP Standard Discussion</p> <p>The in perpetuity maintenance requirements should be included in an economic benefit analysis and should be more clearly explained. Throughout the manual there are references to required Maintenance Agreements, a Maintenance Plan (Section 3-2, Figure 3-1) but there is not a guidance given as to the required content of a Maintenance Plan or sufficient justification for a long-term maintenance agreement. Many of the Storm Water Treatment devices and source control measures have a finite life cycle but this is not addressed within the manual.</p>
<p>The manual does not provide specific detail to aid designers in ensuring a specific design of a storm water treatment measure or source control measure meets the design criteria established by the manual. Standard plans and specifications would be helpful to ensure consistency.</p> <p>The LID credit system is not very clear. The manual contains a lot of information that is not relevant. It would be easier for a developer or designer to understand what is required to be completed or addressed if the manual was more streamlined.</p>
<p>It does not appear that many of the LID measures (runoff reduction measures) or the sources control measures have been evaluated for safety, potential for flooding or life length of life cycle. It is important that all of those issues are clearly evaluated and researched prior to global implementation.</p>
<p>Recommend the County or the Focus group complete an actual cost benefit analysis for a typical types of development projects that would be subjected to the requirements of this manual.</p> <p>Cost benefit, life cycle analysis and cost for maintenance should all be discussed when determining if any specific measure meets or exceeds the MEP standard. MEP includes identifying whether cost of installing and maintaining a BMP does not greatly out way the probably benefit associated with the increase in receiving water quality.</p>
<p>Recognize that treatment will be required but would like to see a better job of coordinating requirements with other requirements (shade requirements, landscape, etc...). Find way to incorporate into existing business practices.</p>

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Corporate into public open space or areas that are in public domain. City should take facilities into fee title. City should evaluate user utility fee.
Critical that other department are incorporated into the development of these requirements so that the requirements are not in direct conflict with other requirements.
Manual should focus more on actual topographic and soil conditions that are present in the region.
No acknowledgement between facilities on public property versus private property.
The requirements should be written so that they actually address the purpose of protecting beneficial uses and water quality standards.
Vegetated contact of 9 feet versus 7 minutes. Incorporate Caltrans research.
Manual should not identify a specific patented Stormvault but should identify generic facility that can be adopted as a standard plan.
Disclaimer (page 6) 1 st paragraph: The Regional Board should read either Water Board or State Water Board. 2 nd paragraph: eliminate “should be” in 1 st sentence. 2 nd paragraph: should read “and implemented in new and redeveloping areas in accordance...” 3rd paragraph: Last line should read “for the design project being undertaken.” 4 th paragraph: In the first line put a period after evolving, take out “and,” and start a new sentence.
Appendix D Cannot complete Form D-1f. Missing Table D-1d and Figure D-1a.

Specific Comments

Chapter	Page No.	Comment
1		The manual should not dictate who specifically should be involved in the specific design of particular project.
2		Chapter 2 An Integrated Approach to Effective Stormwater Management The agencies adopting the manual should take an integrated approach to the manual by incorporating other Departments in the implementation of the manual (Planning/Community Development, Transportation, Parks, etc...). An integrated approach would include a review of zoning codes, landscape and setback requirements by the Planning/Community Development Department to allow the incorporation of the required stormwater facilities in onsite landscaping and setbacks. Merely adding the requirements for additional stormwater facilities without allowing the facilities to meet landscape and setback requirements will require additional land to meet the stormwater requirements in addition to the landscape and setback requirements. Projects will lose 10-20% of the available development area. This will result in less dense development and be counter productive to increasing densities. Low impact development will result in higher impact development due to the loss of available space to develop thereby requiring more land be converted to development to reach the same number of units or square footage of building space.
2	2-5	The following bullet should be deleted- “Avoid disturbing steep slopes and erodible soils”. In the Region, most of the soils are considered erodible.
2	2-5	The following bullet should be deleted- “Avoid excessive grading and disturbance of vegetation and soils”. This requirement is too stringent and could be interpreted by a local agency in a manner that would prohibit mass grading.
3	3-3	Last paragraph states. “Single family residential projects of 10 units or more and less than 20 acres require runoff reduction measures (Chapter 5).” This is not listed in Table 3-2, and probably should be.
3	3-3	The manual should approach BMP selection by starting with identifying pollutants of concern. Such a constituent that is causing a specific water body to be identified as impaired.
3	3-4	Page number missing. Does footnote (h) apply only to single family residential, or all case? Footnote (i): is there a website that one could look up the most current list of accepted proprietary devices?

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Chapter	Page No.	Comment
3	3-4	The source control measures required for hillside developments are too stringent. The source control measures for hill side developments should be the same as those required for single family residential.
3	3-7	The maintenance requirements will place an undue burden on property owners and do not take into consideration the life cycle of any specific treatment BMP, runoff reduction measure or source control measure.
3	3-8	Who is responsible for maintenance of swales, rain gardens, etc. in front of a single family home? If it is the homeowner, they are not skilled nor do they understand how to care for low impact development. Education and training will need to be incorporated.
3	3-8	We are currently experiencing resistance from City of Sacramento staff on the installation of low impact development practices described in this document. Several of the comments are the ground will be to wet and soggy to mow increasing the chances of tractors getting stuck in the mud. Other comments revolve around the low funding for maintenance and lack of skill and training in maintaining these practices.
3	3-8	The requirements under the construction section have the potential to hold up building permits, opening of roads, or obtaining substantial completion from a local agency. Many vegetative BMPs take multiple years to establish. This requirement should be better defined so it reduces the potential for misinterpretation.
4	4-1	The language addressing non-storm water flows in paragraph 3 should be clarified to address exempted non-storm water discharges as stated by the Phase 1 and Phase 2 NPDES Permits.
4	4-2	The source control measures listed in Table 4-1 should be in the same order as the fact sheets for ease of reading and understanding the manual.
4	4-2	Table 4-1 should be clarified because it in conflict with the table on 3-4 (Requirements for hillside developments).
4	SD-1	The signage requirements should be clarified. Recommend developing standard plans for signage.
4	SD-2	Any maintenance agreement for the drain inlet marking should be limited to the life cycle of the actual marker. In addition, there should be clause that if another entity reconstructs a specific drain inlet or modifies it that the maintenance agreement would then be voided.

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Chapter	Page No.	Comment
4	FA-1	The manual should specifically take into account conflicting requirements and burden the property owner or developer with finding out how to address them.
4	LA-1	Same comment as previous.
4	WA-1	Same comment as previous.
4	WM-3	Same as previous.
4	WM-5	Any standard drawings should be developed by registered engineer.
5 Runoff Reduction Control Measures	PP-1	Porous Pavement: To integrate the use of porous pavement Agencies should adopt standards for porous pavement to allow in public streets in addition to onsite. Coordinate the approval of porous pavement with other departments (planning/community development, transportation, parks, etc...)
5	DRD-3	Even with ongoing maintenance debris and silt from the clay soils in the Sacramento Valley will eventually work there way into the perforated pipe and/or dry well and ultimately clog the system. The only way to repair is to completely tear out and replace.
5	PP-4	Pervious Concrete and Asphalt: Agencies should adopt standards for pervious concrete and asphalt so it can be used in public streets in addition to onsite. If agencies will not allow the use of these materials in public streets and public building sites how can stormwater be integrated. Coordinate the approval of porous pavement with other departments (planning/community development, transportation, parks, etc...)
5	PP-7	Modular Block Pavement: Agencies should adopt standards for modular block pavement so it can be used in public sites in addition to private onsite applications. If agencies will not allow the use of these materials in public building sites how can stormwater be integrated. Coordinate the approval with other departments (planning/community development, transportation, parks, etc...)see comment above .
	PP-8	Reinforced Grass Pavement, see comment above
	PP-10	Cobblestone Block Pavement, see comment above.
	PP-11	Porous Gravel Pavement, see comment above.

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Chapter	Page No.	Comment
	PP-1 thru PP-11	Agencies will need to revise zoning codes to allow these materials for parking areas. Current zoning codes are specific to requirement for asphalt paving for parking areas, landscape, shade and curb requirements. Has consideration been given to additional maintenance cost? Before requiring materials or methods that implement additional costs the manual should investigate the economic impacts and whether they are practical.
	PP-13	Long-term Maintenance: Maintenance agreements with public agencies are not practical. Requires inspection and additional ongoing cost to insure compliance.
	DP-3	Commercial parking lots: Confirm with other permitting agencies/zoning codes that use of landscape areas can in fact be utilized for stormwater quality control measures. The parking lots area required to have specific shade requirements that identify specific tree types that may not be appropriate for water quality measures. Confirm with other permitting agencies that they will allow this joint use of facilities.
	AD-3	Hollywood Driveways: Cars are typically parked in driveways for long periods of time which results in dead grass. Shared Driveways: Requires changes to zoning codes to allow one driveway for more than one lot. This is not practical with single-family residences. Manual frequently provides examples that are not practical, public will not accept (won't buy a house with a shared driveway).
5		Has the potential to greatly impact drainage studies. Retention vs. detention
6 Treatment Control Measures	CWB-6	Long-Term Maintenance: Manual should coordinate with other agencies to confirm CWB can be a public amenity that meets open space/park requirements and can be constructed on public land with public maintenance. Land requirement will be large and can be designed as joint use water quality/detention facilities therefore should be on public land and not private land. CWB will generally serve areas in excess of 30 acres therefore meet "trunk drainage" criteria. Maintenance agreements will be difficult to enforce and add cost and policing requirement.

Specific Comments

Chapter	Page No.	Comment
6 and Appendix E	6-3	Paragraphs describing volume-based design and flow-based design mention “drainage area that is <i>directly</i> connected to storm drain system or treatment control measure.” What constitutes “directly connected?” This statement is in contrast to the description in Appendix E for the Sac County Volume-Based Design Method, which states that drainage shed, should include “all areas that contribute runoff”...”whether or not they are <i>directly or indirectly</i> connect to the control measure.”
6	6-3	5 th paragraph states, “measures must be sized appropriately to <i>handle</i> any runoff sources from the project or adjacent properties that are not routed/diverted around the control measure.” Does this mean that the control measure needs to be sized to treat the adjacent runoff or just convey it? Who is responsible for offsite/adjacent runoff draining through a project site?
6	CWB-8	Figure label should be on previous page (CWB-7) with figure.
6	DB-1	Last sentence in right column mentions a wet channel. Is this the same as a vegetative swale? Can a vegetative swale be used within a non-water-quality detention basin for primary treatment?
6	DB-2	Sentence states that dry basins “may require more land than combination and wet ponds.” Might want to restate to clarify that although the design volume for dry basins (1*WQV) is less than that of a combo or wet pond (1.125*WQV and 1.25*WQV, respectively), the required surface area may be larger.
6	DB-3	Is a 48-hour drawdown time required? If so, then why are Figures E-1 and E-2 included in document (curves of maximized detention volume for 12-hour and 24-hour drawdown times, respectively)?
6	DB-6	Page number missing. Dry detention basin figure should include label of required WQV (1*WQV). Combo basin figure should include label of 0.5*WQV for dry portion of basin and should also list required drawdown times more clearly.
6	DB-8	Step 6 – Do embankment slopes really need to be 4:1 or flatter on the inside? 3:1 should be sufficient for both inside and outside slopes.
6	VS-3	What is the minimum allowable slope that can be used with an underdrain? What is the maximum allowable slope that can be used with a check dam? CASQA BMP TC-30 recommends a grass height of 6-inches, not 5-inches. Is there any reference material available for minimum contact time requirement?
	DB-17	Long-Term Maintenance: Same comments as CWB above.

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Chapter	Page No.	Comment
	IB-4	Long-Term Maintenance: same comments as CWB above.
	IT-1 thru 4	Confirm with other permitting agencies that IT can be incorporated in buffer, setbacks as park of landscaping requirement without requiring additional loss of acreage. If this is not agreed to by other agencies will merely take additional space resulting in loss of density and higher impact development due to need for additional land. Confirm parks/planning will accept this type of facility in joint use buffer setback area. Long-Term Maintenance: maintenance agreements not practical require additional monitoring, policing of private property.
5	INT-4	Planting a significant amount of evergreen trees next to houses and building structures decreases the ability for solar heating in the winter months. Although it appears evergreen trees to not drop their leaves, they actually drop their leaves year round. Therefore they are actually more maintenance intensive than deciduous trees. The leaves are smaller in size and also create more problems with clogging up drainage systems.
5	INT-8	The zoning code requires 50% shade in parking lot areas, these trees definitely serve a dual purpose and will also act as tree interceptors and credit should be given for all trees planted within 25' of impervious paving. The 25% percent should be removed.
	SF-11	Long-Term Maintenance: maintenance agreements not practical require additional monitoring, policing of private property.
	SP-1 thru 5	Confirm with other permitting agencies (planning/community development, building, etc...) that SP will be accepted as part of site landscaping. Long-Term Maintenance: maintenance agreements not practical require additional monitoring, policing of private property.

Specific Comments

Chapter	Page No.	Comment
6	SP-6	Assuming this is on one edge of a parking lot or roadway there is no place to plant trees in the planter. This will have a dramatic effect on the aesthetics of the area.
6	VS-1	<p>The vegetated swale is a great idea but one that poses many problems with the existing zoning codes and city standards. For example: trying to put a vegetated swale in a parkway strip per the current zoning codes will not work. The current City of Sacramento ROW is 26'-6" (15' travel lane, 8" curb, 5'-10" planter, 5' sidewalk). The planter width is 5'-10" wide which is already too small when trying to plant a 30' diameter street tree within the ROW. Per the City of Sacramento Tree Shading Design and Maintenance Guidelines trees 30' diameter need a minimum planter width of 6'. When you add the fact that the we cannot plant trees within the swale center line the parkway strip will need to grow upwards of 15' to 16'.</p> <p>This also holds true for parking lots. Planter islands will need to become larger to effectively manage the storm water run-off and still meet the zoning code requirement for 50% shade in parking areas. Holding all things constant (i.e. building square footage and parking lot size) the addition of the planter areas will actually require more raw land be developed. At site that once could be accommodated by a 1 acre parcel is effectively in need of 1.5 acres.</p>
	VS-1 thru 5	<p>Confirm with other permitting agencies (planning/community development, building, etc...) that VS will be accepted as part of site landscaping.</p> <p>Long-Term Maintenance: maintenance agreements not practical require additional monitoring, policing of private property.</p> <p>Confirm will not merely add to land area requirements turning low impact development into higher impact development by loss of density.</p>
	VFS-1 thru 4	<p>Confirm with other permitting agencies (planning/community development, building, etc...) that VFS will be accepted as part of site landscaping.</p> <p>Long-Term Maintenance: maintenance agreements not practical require additional monitoring, policing of private property.</p> <p>Confirm will not merely add to land area requirements turning low impact development into higher impact</p>

Specific Comments

Chapter	Page No.	Comment
		development by loss of density.
Appendix D-1		It is not clear in this document whether open space and park areas need to be included in WQF/WQV calculations. Form D-1e and D-1f use A_{AT} and A_T , which excludes open space/parks. Form D-1g uses A , which includes open space/parks. Form D-1f should also be labeled “Roseville Method” and Form D-1g should be labeled “Sacramento Method” or similar. Form D-1f references Table D-1d and Fig. D-1a, which I could, not located in the document.
Appendix D-3	1	Under assumptions. Seems like landscaped areas and lawns might have fertilizers that would require treatment.
Appendix D-3	4	First paragraph: capitalize all occurrences of <i>mannings</i> 's.
Appendix E	1	According to the City and County of Sacramento Drainage Manual and SacCalc, the 2-year, 6-hour precipitation (Sacramento Method) is 1.06 inches, not 0.5-inches as indicated in Appendix E.
Appendix E	5	First regression equation is shown wrong. Need to format exponents.
Appendix E	6	Would a combined volume-based and flow-based design ever be required? Why would a developer want to construct a comb system? Not clear.