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<b>General</b>			
	<p>The manual runs you through a procedure for selecting the treatment alternatives for a project however, due to space constraints (i.e. higher density projects); sometimes the only feasible alternative is end of pipe treatment. The manual does not provide alternatives to the types of acceptable end of pipe treatments.</p>	MacKay & Soms	<p>A new discussion on proprietary devices was added to Chapter 6, with reference to the stormwater web site for updated information on the Sacramento Program’s protocol for evaluating proprietary devices. The City of Roseville will have a list developed by Summer 2007.</p>
	<p>The standards currently in place lead to only one viable solution, which is an underground vault, sold by one manufacturer. Most solutions will add considerable cost to projects and will require more land area so it will make higher densities harder to achieve. The manual needs to provide more solutions that do not require additional land area in projects, such as water storage in PUE’s or within parkway strips in public right of ways.</p>	MacKay & Soms	<p>We believe this can be addressed better by early planning and site design involving the collaborative team, where you take advantage of the site features and determine how to integrate runoff reduction and/or treatment control measures while you are laying out the building and parking footprints. We recognize the challenges in meeting water quality requirements and satisfying density goals set by the local agencies and plan to continue working toward resolution of such issues. The comments about incorporating measures into public rights of way will be taken into consideration. Typically such decisions will be handled on a case-by-case basis by the local permitting agencies.</p>
	<p>The manual should clearly address the ownership and maintenance issues associated with in place Post Construction Measures. The onus should not fall entirely on the developers or homeowners when requiring long-term maintenance. If these constructed facilities are to be part of the overall drainage system required by the jurisdiction, then potentially many of them can and should be accepted as a public facility and as such maintained.</p>	MacKay & Soms	<p>The local agencies are requiring maintenance agreements or covenants (signed by the property owner) for several types of stormwater quality treatment control measures (see Appendix B). The time to consider future ownership and maintenance is during the earliest possible stages of site planning and design, so that facilities can be sized to collect runoff from larger areas and located/configured to facilitate maintenance by groups such as HOAs, rather than individual property owners, if desired. There are many examples of regional facilities (e.g., basins) in this area that were built by developers but are now owned and maintained by the public agency; these decisions need to be made early in the planning process with the approval of the permitting agency.</p>
	<p>It seems that the implementation of this manual is being fast tracked in order to meet a mandated approval of May 18, 2007. However during the discussions that took place at the focus group, it was apparent that the development of these standards is taking place on a departmental level. It is concerning that the design and acceptance of these costly measures is not being coordinated from the top down through the departments that enforce compliance. For instance, with development moving toward higher density type projects, the concept of post construction storm water quality needs to be considered and integrated into the development of the General Plan and the Zoning Ordinance in order to alleviate narrowing the options that Developers and Engineers may have when moving through the construction phases. Since the intent is to get projects to build these design concepts into the project development at the initial planning phases, it is imperative that all department heads be on board so that contradictory plan checking does not occur, translating into more time and money in obtaining project approvals.</p>	MacKay & Soms	<p>The local agencies are continuing their internal outreach processes to educate staff and managers at all levels and in all departments, but this is taking time and agency size and staff turnover is a constant challenge. The various agency departments are faced with the same water quality standards in designing their own facilities, roads and utilities. The agencies’ General Plans have recently been, or are currently, undergoing revisions, and general water quality principles are being integrated. The agencies will evaluate their other ordinances and policies and make adjustments as needed to achieve consistency. Thank you for your patience.</p>

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	The manual needs to identify good examples of SWQ projects in our area that have been built recently.	MacKay & Soms	The porous pavement fact sheet in Chapter 5 lists local projects that include pervious concrete. The stormwater agencies' web site will be updated in the near future to include other examples of locally constructed vegetated swales, sand filter, detention basins and stormwater planter. We have added a link from the web site <a href="http://www.sacramentostormwater.org">www.sacramentostormwater.org</a> (see "New Development" and "Other Resources") to 3 guidebooks showing case study examples located throughout the SF Bay Area. The guidebooks include photos, design notes, addresses and contact information for each technique featured.
	Address if there are any ground water contamination or related problems expected with infiltration basins or trenches.	MacKay & Soms	The groundwater separation criterion in the manual is intended to prevent contamination. However, if your project is in an area of known groundwater or soil contamination, infiltration may be prohibited. Notes were added to the text.
	Areas for SWQ not be counted in density calculations for RD-20, thus no penalty for reaching min. required density (planning item)	MacKay & Soms	We agree that densities for a particular project should be calculated based on net density, with open space and areas containing stormwater quality treatment facilities subtracted out when possible. We are doing our best to educate all agency planners about this; if you experience a problem, please contact the appropriate stormwater quality contact person for your jurisdiction (web site addresses have been added to Chapter 1 and web sites will be frequently updated with contact lists).
	Net SWQ areas from Affordable Housing calculations.	MacKay & Soms	See response above.
	SWQ needs to be part of planning and entitlement process to be effective.	MacKay & Soms	Agreed. Text reflects this.
	With the present trend of new residential developments shifting toward higher density single-family lots with minimal unpaved areas, many of the runoff reduction measures may not be applicable.	MacKay & Soms	We believe that early site planning and design is key to identifying opportunities to integrate these measures into high density development projects. The design team should take advantage of the site features and determine how to integrate stormwater quality measures while laying out the building and parking footprints. The agencies will develop a waiver program in the future to address cases where it is clearly infeasible to do anything.
	The manual should discuss in more detail the availability of a waiver program and/or potential fee mitigation.	MacKay & Soms	The waiver program will be developed after the design manual is completed. It is a separate project and subject to the provisions of the municipal stormwater permits.
	There may be a possibility of groundwater contamination with the infiltration based treatment control measures as areas of high ground water are largely present in the Sacramento area.	MacKay & Soms	The 10' groundwater separation criterion in the manual is intended to prevent contamination. The designer should verify that minimum depth to groundwater is available before determining site suitability of infiltration measures.

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	<p>A handout was made available at the 1/18/07 focus group meeting showing an example project, which included a generic Post Construction Storm Water Quality Plan. This example raised many questions and concerns; one was the need for a Professional Engineer to stamp the plan. On this plan was a compliance statement that certifies that the undersigned has checked and assures that all post construction storm water quality measures were constructed properly. I think you will find that Engineers will stamp the plan to certify the accuracy of the design but will not be willing to assume the liability of the Contractor's work. Record Drawings are normally prepared based on comments provided by the Agency Inspectors or Contractors and actual field verification by the Engineer is rare. Will the manual require that the Engineers field verify that all required measures are properly constructed and in place prior to final acceptance of improvement plans? This could potentially open up additional reviews for minor deviations to the initial design that do not affect the functionality of the proposed treatment. The manual needs to address this clearly because it could possibly affect the timing that Developers may have in regard to the start of home construction and allowing occupancy.</p>	MacKay & Soms	<p>At this time, Sacramento County will continue to require the engineer's certification on the post-construction plan (see County example in Appendix A). The other agencies have not committed to this requirement, but agree that some kind of certification is needed, and are continuing to explore options about the best mechanism for this. As policies are developed, the information will be placed on the website. If you don't find the information there, contact your local permitting agency for their approach.</p> <p>Note: It is already required that deviations to the initial design be resubmitted to the permitting agency for approval, prior to making any changes in the field.</p>
	<p>Focus of the manual should be on local conditions and long term success of these measures. In certain situations, it is a challenge to incorporate a water quality device in small sites. In areas of flat terrain, cover and hydraulic grade considerations enforce pumping from the water quality devices. We believe accommodating some treatment measures at the outfall to the natural streams should be considered on regional basis than incorporating these features in individual sites. Individual devices place huge maintenance burdens and it is hard to figure out if any of these devices are failing.</p>	MacKay & Soms	<p>We agree with the concept of a watershed-based approach to stormwater quality treatment in the right situation, and this is why many regional detention basins have been built throughout the area over the last 10 years. New communities, regardless of the total size and density, should be able to integrate open spaces and stormwater quality measures, especially if stormwater quality is planned early and compliance with density targets is based on <u>net density</u> (see earlier comment). The move toward dense, infill developments with no available open space is creating a new challenge. We are hopeful that a future waiver program will help address this, whereby in lieu of placing measures on infeasible sites, a fee is paid which goes toward a watershed-based facility or measure elsewhere in the same watershed.</p>
	<p>We suggest that the comments posted by other agencies be made available for review to everyone.</p>	MacKay & Soms	<p>This table was created to share all comments received and record response/action taken. All written comments received will be placed on the stormwater web site.</p>
	<p>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?</p>	Heather Hansen Morton and Pitalo	<p>The rules are not "new" for the Sacramento agencies; these requirements have been in place since the mid 1990s and were amended in May 2006. They are enforced through the environmental review, entitlement and plan review/permit issuance processes. The rules are new for Roseville, except that Roseville has begun conditioning projects already through its CEQA process.</p>
	<p>Overall, the tables and figures are wonderful! They are very clear and well presented. Great visual tool. The document is well organized in general. The tabs are helpful in flipping through the manual.</p>	Heather Hansen Morton and Pitalo	<p>NA</p>

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	A list of local vendors is vital. Great ideas, but are they feasible if no one in California can provide the materials?	Heather Hansen Morton and Pitalo	It is not possible for the local agencies to include a list of vendors in the design manual. We cannot endorse specific vendors; and vendors and products are changing all the time. For products such as pervious pavement, we have provided links to trade association web sites for more information.
	Resolve conflicts with Water Quality Manual and Public Works Improvement/Construction standards and other agency departments.	Greg Bardini Morton and Pitalo	The local agencies are continuing their internal outreach processes to educate staff and managers at all levels and in all departments. The agencies are, or are planning to, evaluate their other policies, ordinances, and standards and make adjustments as needed to achieve consistency.
	List of exclusions for infill and redevelopment projects?	Greg Bardini Morton and Pitalo	There are no exclusions to the water quality treatment requirements allowed at this time. The future waiver program is anticipated to address this; however, projects would not get an automatic “exclusion”. According to the current stormwater permit provisions, projects would need to demonstrate that it is infeasible to install stormwater quality measures before they would be granted a waiver. And a waiver would require payment of an “in-lieu of” fee.
	Generally, I am very happy to see so many planning and landscape issues and control measures. This is definitely a good direction to take.	Adam Kringel (ASLA) Carter & Burgess	NA
	This manual is well-conceived and provides an adequate level of technical guidance. The layout is very approachable and reads easily. Many options are provided to meet the partnership’s overall stormwater objectives—this is very important to the success of a region-wide implementation strategy. Well done.	Jeremiah Lehman CONTECH Stormwater Solutions	NA

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	<p><b>Problem:</b> 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.</p> <p><b>Comment:</b> 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.</p> <p>Review of Chapter 5, Page 30 of the Sacramento Stormwater Management Program Development Standards Plan (DSP), dated December 1, 2003 substantiates our comment: <i>“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”</i>.</p> <p><b>Consideration:</b> 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</p>	<p>Youngdahl Consulting Group</p>	<p>References to geotechnical engineers were added to the manual. However, we cannot require that a project applicant hire a geotechnical engineer. This is a decision that should be made by the applicant. A requirement was added to the Feb 2007 version of the manual for a permeability test to confirm the suitability of infiltration measures for a particular site.</p>

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	<p><b>Problem:</b> Providing prescriptive design measures that encourage infiltration of surface water into the subsurface materials may be a good practice from a water quality perspective.</p> <p><b>Comment:</b> 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.</p> <p>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.</p>	<p>Youngdahl Consulting Group</p>	<p>The fact sheets in the design manual for infiltration facilities include criteria regarding proximity to buildings and separation from groundwater that are intended to alleviate these types of concerns.</p> <p>Note: In the December 2006 draft manual, there were some inconsistencies between the criteria shown in the runoff reduction fact sheets in Chap 5 and the treatment fact sheets in Chap 6. This has been corrected. Fact sheets have been updated to be consistent with Geotechnical engineer comments (below).</p> <p><u>Geotechnical engineer response:</u> As a minimum any surface discharges (e.g. roof drains) should not be allowed closer than 5 feet from building walls and foundations and positive drainage away from building foundations and slabs should be required for another 5 feet, where possible. For infiltration structures with closed bottoms, a setback of 10 feet from buildings is recommended. For retention structures with bottom discharge or basins with bottom discharge, the setback criteria of 20 feet downslope and 100 feet upslope is recommended</p>
	<p>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.</p>	<p>Youngdahl Consulting Group</p>	<p>This proposal was evaluated by the local agencies and discussed with the BIA stormwater committee on April 11. Youngdahl clarified that the trench would be intended as a runoff reduction measure; there is no data to qualify the technique as a treatment control measure. The municipalities do not have any jurisdiction or utilities in these trenches, but they would specify the size of connection required from the trench drain to the municipal storm drain system. For example, the County would require a 12-inch connection. The municipalities are concerned about future maintenance responsibilities of the system. The private utility companies would need to be consulted with this proposal.</p>

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	Consideration of economic, technical and practical should be considered, MEP standard should apply.	Wood Rodgers, Inc.	The development standards established in May 2006, together with the presumptive design criteria approach specified in this manual, constitute MEP for this program, in compliance with the NPDES municipal stormwater permits. This was confirmed by the Regional Board representatives in the March 14 BIA meeting.
	Other department integration /buy-off appears to be lacking.	Wood Rodgers, Inc.	The permittees are doing their best to educate and inform all other departments, but this will be an ongoing process. Buy-off from senior management in each agency was secured when the amended design standards were established in May 2006.
	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).	Wood Rodgers, Inc.	For this manual, design criteria and examples used from other manuals were adapted to suit local climate and soil conditions. In general, long-term study data for California is lacking, and other agencies around the state similarly reference studies from the Pacific Northwest, Denver, east coast, Georgia and Florida.
	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 ( <a href="http://www.owp.csus.edu/research/">http://www.owp.csus.edu/research/</a> ). 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 3 meters of grass.	Wood Rodgers, Inc.	All measures in the manual are assumed to meet the MEP standard and address the pollutants of concern in the Sacramento region, if designed, installed and maintained as described in the manual. Pollutant removal information is included in each fact sheet as a further design guide. Life cycle information readily available from CASQA and other sources was added to Appendix B and is cross referenced in the maintenance tables shown at the end of the fact sheets. As stated earlier, any design criteria taken from other sources was adapted for local conditions to the extent possible. We recognize that the state of the practice is evolving with respect to swale design. Most of the design guidelines adopted for swale design specify a minimum hydraulic residence time of 9 minutes, based on the results of a single study conducted in Washington State. Other documents, including our 2000 guidance manual, reference a 7-10 minute range. In preparing its 2003 updated handbook, CASQA considered the Caltrans BMP study of 6 swales (referenced on CSUS OWP web site) but concluded that additional research was still needed. For this first version of the design manual, we are specifying a residence/contact time of 7 minutes. We will continue to review study information and literature as it becomes available (e.g, next update of CASQA handbook) and update design criteria if necessary in future updates of this manual.
	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.	Wood Rodgers, Inc.	See previous comments about MEP.

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<b>MEP Standard Discussion</b>	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.	Wood Rodgers, Inc.	Appendix B addresses maintenance. As explained therein, the verification of long-term maintenance is required by the local agencies' NPDES municipal stormwater permits.
	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.	Wood Rodgers, Inc.	Each fact sheet includes design requirements and criteria, in far greater detail than most other agencies' stormwater design manuals. Figures are also available for the treatment controls. Additional figures may be added in future updates if necessary. A standard plan will not be developed.
	The LID credit system is not very clear. The manual LID 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.	Wood Rodgers, Inc.	We welcome specific suggestions for streamlining the manual for future updates.
	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.	Wood Rodgers, Inc.	The featured runoff reduction measures are those that are featured in other manuals and have been installed in other locations throughout the country and state. Issues such as safety, flood potential and life span should be considered on a case-by-case basis by the project team and permitting agency. The individual agencies may conduct their own evaluations and restrict use of certain measures accordingly.
	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. 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.	Wood Rodgers, Inc.	BIA has extensive cost information. The local agencies encourage BIA to complete an analysis of typical development types subject to these requirements. See previous comments regarding MEP standard.
	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.	Wood Rodgers, Inc.	Regional control measures such as basins are the most likely type to be considered for use in public spaces, whereby an assessment or other means can be established to pay for long-term maintenance by a public agency. Most agencies will not allow smaller devices, such as underground vaults, in the public right of way, since there are no resources to maintain them. See other responses elsewhere in this table to similar comments.
	Critical that other department are incorporated into the development of these requirements so that the requirements are not in direct conflict with other requirements.	Wood Rodgers, Inc.	The permittees are doing their best to educate and inform all other departments and identify and resolve conflicts, but this will be an ongoing process. For the time being, if faced with conflicts, the project applicant should contact the applicable agency stormwater staff (see website for contact information) for resolution.
	Manual should focus more on actual topographic and soil conditions that are present in the region.	Wood Rodgers, Inc.	The design criteria has been adapted for local soil conditions.

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	No acknowledgement between facilities on public property versus private property.	Wood Rodgers, Inc.	The decision as to whether a stormwater quality control measure will be publicly or privately owned and operated will be made on a case-by-case basis, working with the permitting agency.
	The requirements should be written so that they actually address the purpose of protecting beneficial uses and water quality standards.	Wood Rodgers, Inc.	The entire approach taken by the local agencies is intended to ultimately protect beneficial uses and water quality. We welcome suggestions for specific language changes to clarify this.
Dis-claimer	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).	Youngdahl Consulting Group	This comment also relates to the certification being required as part of the Post Construction Stormwater Quality Control Plan (Appendix A). Please see response above.
Dis-claimer	<b>Problem:</b> “The contributing agencies do not claim any responsibility for [...] improper design or construction” <b>Comment:</b> 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 one previous project the proposed methods have failed due 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).	Youngdahl Consulting Group	The language has been revised to add a note that agencies will share the responsibility of verifying that publicly owned and maintained treatment controls are constructed properly; however, private controls are the owners’/applicants’ responsibility.

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Dis-claimer	<p><b>Problem:</b> 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><b>Comment:</b> 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><b>Consideration:</b> The Manual should provide or at least discuss proper abandonment procedures.</p>	Youngdahl Consulting Group	A building permit should be obtained for any replacement or significant change to a structural stormwater quality control measure. Maintenance agreements and/or covenants will also be amended as needed during the building permit process.
Dis-claimer	<p><b>Problem:</b> 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><b>Consideration:</b> 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>	Youngdahl Consulting Group	Information about project life span of the various types of control measures (readily available from CASQA and other sources) was added to Appendix B.
Dis-claimer	<p>1<sup>st</sup> paragraph: The Regional Board should read either Water Board or State Water Board.</p> <p>2<sup>nd</sup> paragraph: eliminate "should be" in 1<sup>st</sup> sentence.</p> <p>2<sup>nd</sup> paragraph: should read "and implemented in new and redeveloping areas in accordance...."</p> <p>3<sup>rd</sup> paragraph: Last line should read "for the design project being undertaken."</p> <p>4<sup>th</sup> paragraph: In the first line put a period after evolving, take out "and," and start a new sentence.</p>	Wood Rodgers, Inc.	The text was clarified. The Sacramento Areawide Phase I NPDES stormwater permit is issued by the Central Valley Regional Water Quality Control Board. The Phase II general permit, pertaining to Roseville, is issued by the State Water Board, but enforced by the Central Valley Regional Board. Other typos and grammar was corrected.
<b>Chap 1</b>	<b>Introduction</b>		
General	Chapter 1 seems somewhat fragmented, while chapters 2 and 3 seem more "polished."	Heather Hansen Morton and Pitalo	Some improvements were made.

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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.	Heather Hansen Morton and Pitalo	These general references were replaced with references to specific appendices in the February 2007 version.
General	The manual should not dictate who specifically should be involved in the specific design of particular project.	Wood Rodgers, Inc.	List given is an example of professionals typically involved in the design process. Project owners are encouraged, but not required, to employ the collaborative team approach.
1-1	<p><b>Problem:</b> “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 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><b>Comment:</b> 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><b>Consideration:</b> Make sure any conflicts are resolved prior to adopting the Manual.</p>	Youngdahl Consulting Group	<p>The individual agencies have already, or are in the process of adopting new water quality and watershed protection policies into their General Plans and other planning documents, as required by the Municipal Stormwater Permit. The Design Manual presents guidance for complying with development design standards adopted by each municipality. It is not intended to be adopted into General Plans or other policy-level documents.</p> <p>Related to the comment about conflicts with other codes, the agencies are working internally with all affected departments to identify and address conflicts and will make adjustments as needed to achieve consistency. Unfortunately it will not be possible to address all conflicts prior to publishing the May 2007 version of this manual, and new conflicts may arise in the next few years as the manual is implemented. In the interim, such conflicts will need to be addressed on a case-by-case basis. It will help tremendously if the design proposals for stormwater quality control are made as early as possible in the planning stages; affected departments can be informed through the pre-application meeting and/or submittals. Also, if conflicts arise, the applicant should contact the agency’s stormwater quality staff (listed at the front of this manual) for resolution.</p>
	<p><b>Problem:</b> “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><b>Comment:</b> 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>	Youngdahl Consulting Group	Once agreements are in place, presumably the property owner will be liable for any damage caused by failure to properly maintain the control measure(s).
1-3	Recommend that agencies do not reference entire manual into any construction specifications or special provisions. The manual does not lend it self to being incorporated in to legally binding contract documents and may be a source of liability or claims with Contractors.	Wood Rodgers, Inc.	Text was modified. Each agency will determine how best to reference the design manual in updates to its codes and standards.

**Stormwater Quality Design Manual for Sacramento and South Placer Regions  
Response to Comments Received on Dec 11, 2006 and Feb 16, 2007 Drafts**

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
<b>Chap 2</b>	<b>An Integrated Approach to Effective Stormwater Management</b>		
General	Chapter 2 was thorough without going overboard. I enjoyed the ideas presented and explanations of why “smart growth” was necessary.	Heather Hansen Morton and Pitalo	NA
General	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 may 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.	Wood Rodgers, Inc.	The agencies will be working with internal departments to evaluate codes and standards and revise as needed to ensure consistency. Also, annual training is provided to other departments to satisfy the NPDES permit requirements.
2-2	At bottom of page, add a bullet to include Geotechnical Engineer	Candido Ramirez MHM Engineers	Text was revised.
2-2	Community benefits section states that “landscape-based features typically have less maintenance needs” than underground facilities. Is there research supporting this claim? As all stormwater treatment measures require maintenance to operate correctly, a more effective message would provide specific maintenance guidelines based on actual field experience (as required for structural BMPs). My suspicion is that no such data exists for the Sacramento area—in which case general statements like this should be avoided.	Jeremiah Lehman CONTECH Stormwater Solutions	The text was revised.
2-4	Preserve Valuable Site Features- Recommend modifying first sentence to read: “Below are techniques that will facilitate preserving natural and environmentally sensitive features on your site.” Otherwise the sentence may be misinterpreted by plan checkers to mean that the techniques must be followed.	Wood Rodgers, Inc.	Language was revised.

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
2-5	<p><b>Problem:</b> “Concentrate development on portions of the site with less permeable soils and preserve areas that will actively promote infiltration”.</p> <p><b>Comment:</b> 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>	Youngdahl Consulting Group	Agreed that most of area is clay soils, but this statement will apply to those sites (e.g., in Folsom, parts of Sacramento) where there is some permeable soils and opportunities exist.
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.	Wood Rodgers, Inc.	Language was revised.
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.	Wood Rodgers, Inc.	Text was added to clarify that these are <i>considerations</i> that will result in reduced environmental impacts, not requirements.
2-5	<p><b>Problem:</b> “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> <p><b>Comment:</b> 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>	Youngdahl Consulting Group	The permittees are doing their best to educate and inform all other departments (including planners) and identify and resolve conflicts, but this will be an ongoing process. Water conservation practices and shade requirements should not prevent implementation of stormwater quality requirements. For the time being, if faced with conflicts, the project applicant should contact the agency stormwater staff (see contact list at the beginning of the design manual or the website) for resolution.

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
2-6	<p><b>Problem:</b> Minimize Impervious Surfaces “For all types of development, limit overall coverage of paving and roofs. [...] narrower and shorter streets and sidewalks.”</p> <p><b>Comment:</b> The following quote is from CASQA Stormwater Best Management Practices Handbook, New Development and Redevelopment, January 2003. “<b><u>More than any other single element, street design has a powerful impact on stormwater quality.</u></b> 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 <b><u>are a principal contributor to the environmental degradation caused by development.</u></b>” Similar comments can be found in other publications.</p> <p><b>Consideration:</b> 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 <a href="http://www.stormwatercenter.net">www.stormwatercenter.net</a> 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>	Youngdahl Consulting Group	Alternative street design concepts are not a part of this manual version, but may be addressed in the future as the local agencies adopt policies and design guidelines encouraging or requiring such concepts as part of new development projects. We agree that such efforts to minimize impervious areas will benefit water quality. The City of Seattle, Portland Metro, and more recently, the City of San Francisco, are examples of agencies which have adopted, or are currently drafting, “green” street standards which seek to reduce imperviousness, among other things.

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
2-6	<p><b>Problem:</b> “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> <p><b>Comment:</b>                      -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.                      -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.”                      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>	Youngdahl Consulting Group	The groundwater separation requirement for infiltration is intended to address groundwater protection. Also, infiltration will not be allowed on sites with existing soil or groundwater contamination. Also, a requirement has been added to conduct on-site testing to confirm the suitability of infiltration facilities for the project site. In the future, the design manual may be amended to include additional guidelines about infiltration, similar to the C.3 technical guidance prepared by Alameda and Contra Costa Clean Water Programs.
2-7	<p><b>Problem:</b> Direct run-off from impervious areas to adjacent pervious areas or depressed landscape areas.</p> <p><b>Comment:</b> 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>	Youngdahl Consulting Group	Agreed that roadway applications are not highlighted, but vegetated swales and filter strips are two examples of measures that can be used alongside roadways to filter and treat runoff.
2-4	<p><b>Problem:</b> “<b>Opportunities</b> 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).</p> <p><b>Comment:</b> There appears to be a ) missing after controls.</p>	Youngdahl Consulting Group	Typo was corrected.
2-7	2 <sup>nd</sup> paragraph, last sentence, the word <b>isles</b> should be replaced with <b>aisles</b>	Youngdahl Consulting Group	Typo was corrected.
<b>Chap 3</b>	<b>Steps to Managing Stormwater Quality</b>		
3-2	Flow chart runs you through the process for determining storm water quality measures for a project, however it does not address how Tentative Map, Improvement Plan, and Final Map approvals fit into the process.	MacKay & Soms	We will consider changes to Fig 3-1 to address this comment, but the concern is making the figure work in general terms for all the local agencies involved.

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
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.	Wood Rodgers, Inc.	This comment was addressed in the Feb 2007 draft.
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.	Wood Rodgers, Inc.	The project designer should consider pollutants associated with the applicable land use in selecting the control measure(s) for the project. Pollutants of concern were taken into account when preparing Table 3-2 and selecting the treatment controls for this design manual..
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?	Wood Rodgers, Inc.	Page number will be added. Footnote (h) applies to all types of projects. The website for proprietary devices is now provided in Chapters 3 and 6.
3-4	The source control measures required for hillside developments are too stringent. The source control measures for hillside developments should be the same as those required for single family residential.	Wood Rodgers, Inc.	This will be the case for hillside residential development. For commercial development in hillside areas the source controls required would depend on specific activities to be conducted at the site. Waste management, fueling areas, etc should be designed per the fact sheets in Chapter 4.
3-4	Table 3-2: 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.	Heather Hansen Morton and Pitalo	This was a challenging table to create. We welcome specific suggestions about how to improve the presentation.
??	It seem like roof materials such as PVC would not require treatment. The manual should make exceptions to treat such surfaces.	Candido Ramirez MHM Engineers	All types of roof surfaces (except ecoroofs) are required to be treated. Atmospheric deposition can contribute pollutants to roof runoff, regardless of the roofing material. Also, the agencies are considered with the additional volume of water generated from this impervious surface.
3-4	<b>Note:</b> Proprietary devices Foot Note (i) "Contact Local permitting agency for a list of acceptable devices." <b>Consideration:</b> See comments below Chapter 3 Page 3-6	Youngdahl Consulting Group	The information about proprietary devices has been added to Chapters 3 and 6.
3-4	<b>Problem:</b> 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. <b>Comment:</b> Review of the Siting Considerations in Chapter 6 for Wetland Basin and Infiltration Basin 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). <b>Consideration:</b> Consideration should be given to providing consistent language and standards between the two chapters.	Youngdahl Consulting Group	Table has been revised. Infiltration measures and constructed wetland basins will not be allowed on hillside developments.

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
3-4	<p><b>Problem:</b> 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><b>Comment:</b>                      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:                      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 as <u>joint use with parks (passive recreation), open space, wildlife habitat, aesthetic amenities and/or flood control detention facilities.</u>[...] Refer to the local agency for specific design criteria.”                      Page IB-2 Infiltration Basin “Integrate infiltration basins into <u>open space buffers, undisturbed natural areas, and other landscape areas</u> when possible.”                      4) Page IT-2 Infiltration Trench “Integrate infiltration trenches into <u>open space buffers, undisturbed natural areas, and other landscape areas</u> when possible.”                      5) Page VS-2 Vegetated Swale “Integrate Vegetated swales into <u>open space buffers, undisturbed natural areas, and other landscape areas</u> when possible”                      6) 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”                      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.                      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.                      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>	Youngdahl Consulting Group	<p>Regional control measures such as basins are the most likely type to be considered for use in public spaces, whereby an assessment or other means can be established to pay for long-term maintenance by a public agency. Most agencies will not allow smaller devices, such as underground vaults, in the public right of way, since there are no resources to maintain them.</p> <p>The design manual text encourages the project designer to think about integrating features into natural areas and open spaces. One should not presume that such areas will always be publicly held. In some cases, the natural area could remain part of the private property. In other cases, the natural area could be owned and operated by a homeowners’ association or conservancy group. In all cases, the key issue is which group will pay for maintenance and what funds are available.</p>

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
3-6	<p>Related to Step 6: Select Treatment Control Measures “Proprietary devices, such as stormwater vaults, may also be allowed for the project.”</p> <p><b>Comment:</b> 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> <p><b>Consideration:</b> 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><b>Additional Comment:</b> The list of Sacramento County approved “Proprietary” devices is not located at <a href="http://www.sacramentostormwater.org">www.sacramentostormwater.org</a>.</p>	Youngdahl Consulting Group	<p>The December 2006 draft manual did not include information on proprietary devices or a reference to the appropriate web site address for the relevant information on proprietary control measures. This was corrected in the February 2007 version.</p> <p>Also: The City of Folsom does not place any additional requirements on the use of the two vault systems, different than what is required by the City or County of Sacramento.</p> <p>The 12/03 DSP is recommended reading for background purposes only. For the most current description of local agency requirements, refer to the agency’s development standards and the design manual.</p>
3-7	<p>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.</p>	Wood Rodgers, Inc.	<p>Most of the permitting agencies already require a maintenance agreement or covenant, so this is not a new requirement, and the local agencies are required by their NPDES stormwater permits to verify long term maintenance. See Appendix B.</p>
3-7	<p>Step 8 indicates that sizing calculations and other information that may not be relevant to the actual construction of the device be placed in the improvement plans. Recommend not placing information that is not necessary for construction on the improvement plans. The plans mostly geared towards providing information relevant to construction of any specific feature. Recommend pulling out all information that is not relevant to construction into a separate report.</p>	Wood Rodgers, Inc.	<p>As noted in Appendix A, each permitting agency may do this differently.</p>
3-7	<p>Recommend that the agencies implement standard maintenance procedures for all of the approved storm water measures rather than requiring a developer to re-invent the maintenance standards for every device.</p>	Wood Rodgers, Inc.	<p>Each fact sheet includes a stand-alone table at the end of the sheet which lists recommended inspection and maintenance procedures. The intent is for this table to be amended by the project designer if needed and then attached to the maintenance agreement with the applicable agency.</p>

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
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.	Wood Rodgers, Inc.	Education and training of private homeowners, homeowners' associations and other groups will be a continuing need as the manual is implemented. Also, it is the developer's responsibility to provide information and restrictions to the homeowners for stormwater quality control measures placed on their lot or subdivision.
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 too 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.	Wood Rodgers, Inc.	When conflicts arise, the project applicant should contact the applicable agency stormwater quality staff (see website for contact information) for resolution.
3-8	Step 10- 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.	Wood Rodgers, Inc.	The language has been modified somewhat. Each permitting agency will need to determine what constitutes a properly functioning control measure before a project will be accepted.
<b>Chap 4</b>			
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.	Wood Rodgers, Inc.	The text was modified.
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.	Wood Rodgers, Inc.	This will be fixed in the final version of the manual.
4-2	Table 4-1 should be clarified because it is in conflict with the table on 3-4 (Requirements for hillside developments).	Wood Rodgers, Inc.	The conflict was addressed.
4-2	References used to develop chapters and design requirements should be taken from sources that are indicative of the area in which the requirement will be implemented. Care should be taken not to intermingle the recommendations or requirements for porous pavement from areas such as Portland Oregon and Washington State because many of these may not be applicable to the Sacramento area.	MacKay & Soms	We believe that the basic design criteria included in the manual is applicable to the local area and in many cases, we have adapted the criteria taken from other areas to apply better to local conditions. For some of the control measures (e.g., vegetated swales and water quality detention basins), the criteria reflects local experience installing and monitoring swales and basins in the Sacramento area. But we still lack sufficient local demonstration projects for many of the other control measures. Even the SF Bay Area and Statewide handbooks rely on studies conducted in other parts of the country. Until local study data is available, we will need to continue to rely on 10+ years experience from other areas such as the Pacific Northwest, Denver, North Carolina, Texas and Florida.

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
4-2	Source controls for residential 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, <a href="http://www.epa.gov/oilspill/spcc.htm">http://www.epa.gov/oilspill/spcc.htm</a> , although a modified SPCC plan for all hydrocarbon storage facilities could be useful.	Scott Pederson Morton & Pitalo	Operational measures such as these are not covered in this design manual. Such measures are addressed by the local stormwater quality agencies through their public outreach and industrial inspection programs. Also, developers who place stormwater quality control measures on private property could provide this type of information to new homeowners, homeowners' associations, etc.
	<b>Waste Management Areas Fact Sheet</b>		
WM-3 to -7	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?	Scott Pederson Morton & Pitalo	Design details and requirements for trash enclosure areas will be specified by the individual permitting agencies. The design manual has been revised to include general requirements and criteria, with no specific design details. Some agencies will allow the sewer connection in certain situations (e.g., Roseville), but others will not.
SD-1	The signage requirements should be clarified. Recommend developing standard plans for signage.	Wood Rodgers, Inc.	Most agencies are requiring a permanent concrete stamp for new drain inlets and a reflective decal (epoxied to concrete) for existing drain inlets. A standard detail will be added to fact sheet.
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.	Wood Rodgers, Inc.	Requirement was deleted.
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.	Wood Rodgers, Inc.	As mentioned previously, the agencies are working to identify and resolve conflicts, but the process is going to take time. If a conflict arises, the project applicant should contact the local agency stormwater quality staff for resolution.
LA-1	Same comment as previous.	Wood Rodgers, Inc.	Same as above.
WA-1	Same comment as previous.	Wood Rodgers, Inc.	Same as above.
WM-3	Same as previous.	Wood Rodgers, Inc.	Same as above.
WM-5	Any standard drawings should be developed by registered engineer.	Wood Rodgers, Inc.	Standard details have been omitted; each agency will specify their own standard design.

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
<b>Chap 5</b>	<b>Runoff Reduction Control Measures</b>		
General	The runoff reduction measures such as porous pavement and alternative driveways may not function well in many areas of Sacramento County owing to low permeability of surface soils. It will be helpful if examples of locally built successful projects are incorporated within the manual.	MacKay & Soms	The porous pavement fact sheet in Chapter 5 lists local projects that include pervious concrete. The stormwater agencies' web site will be updated in the near future to include other examples of locally constructed vegetated swales, sand filter, detention basins and stormwater planter. We have added a link from the web site <a href="http://www.sacramentostormwater.org">www.sacramentostormwater.org</a> (see "New Development" and "Other Resources") to 3 guidebooks showing good case study examples located throughout the SF Bay Area.
General	Runoff reduction is related but not mandated as part of SWQ measures.	MacKay & Soms	Correct.
General	The recurring details for the 3" or 4" HDPE should include information on perforations and should allow geocomposite drains which are less costly and more effective. This is repeated throughout the document.	Reed & Graham	Text stating "or equivalent, as approved by the local agency" (as recommended by the geotechnical engineer; see comment below) will be added to Chapter 5. Also, reference will be made to the Caltrans specifications. <u>Geotechnical Engineer Response:</u> HDPE specification should include perforation details. In a general introduction section of the manual, an option should be allowed for equivalent alternatives as determined by the design engineer. In general, however, we recommend that drains be of the type that can include inspection and cleanout features such that observation of sediment buildup can be made and a clean-out procedure included in periodic maintenance. Guidance for perforations, alternatives, permeable materials, cleanouts and vents are provided in Section 68 of the Caltrans Specifications, May 2006 and may already exist in the Standard Specifications of participating counties and cities of the manual production.
General	ASTM C-33 sand allows a high degree of fines and therefore is less desirable as a filter layer as it will inhibit flow and can plug the filter fabric. This is specified consistently as the sand layer. The layer is also thicker than necessary as the filtration occurs in the very first inch or inches of the sand. A graded sand with less than 5% passing the 30 sieve is a much better filter with much higher flow rates.	Reed & Graham	Changes to the ASTM-33 references will be considered in consultation with the geotechnical engineer reviewer.
General	Has the potential to greatly impact drainage studies. Retention vs. detention	Wood Rodgers, Inc.	Comment noted. The LID approach emphasizes mimicking the natural hydrologic regime on a site. The most common way to do this is retention/infiltration.

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
General – Chapter s 5 and 6	<p>I would like to see more specific specifications provided on standard details in reference to geosynthetic filter fabric, I would also like to see more flexibility in allowing designers to deviate from standard details when they include geosynthetic products in their design. Deviations may include, but are not limited to:</p> <ul style="list-style-type: none"> <li>• Reduction of the depth of aggregate required in sand infiltration beds and grassy swales using geosynthetics</li> <li>• Variance in structural design of porous pavement base and sub base using geosynthetics</li> <li>• Application of select media in aggregate filtration beds using geosynthetics</li> <li>• Use of Geocomposites in lieu of rock for subsurface storage, conveyance and filtering.</li> </ul>	Dan Clark, P.E. Reed & Graham	<p>In some cases, rather than place this kind of detail in the design manual, the agencies may choose to leave these decisions up to the project geotechnical engineer. Deviations to any of the details shown in the design manual may be allowed, on a case-by-case basis, in consultation with the local permitting agency. But keep in mind that such deviations may extend the plan review process. Language such as “or equivalent...” will be added to Chapter 5 where appropriate, to address the geotechnical engineer’s comments (see below).  <u>Geotechnical Engineer Response:</u> In a general introduction section of the manual, an option should be allowed for equivalent alternatives as determined by the design engineer.</p>
General – Chapter s 5 and 6	<p>I would like to see some specific guidelines so that design creativity is encouraged. Too often I hear the statement: “just build it with the standard detail, because any variance will slow down the approval process”. Creativity is needed to deal with changing site parameters related to soil types, topography, project size, elevation constraints, water table constraints, foundation bearing pressures and area constraints.</p>	Dan Clark, P.E. Reed & Graham	<p>We agree that creativity and innovation are desired, but at the same time, many engineers and agency plan reviewers want “black and white” requirements to remove some of the subjectivity and ensure regional consistency. This also allows helps to avoid delays during the plan review and approval process.                      Some text changes were made to indicate that there is flexibility in the process, but that may extend the time for review.</p>
General – Chapter s 5 and 6	<p>I would also like to see two items in reference to “proprietary products”:</p> <ul style="list-style-type: none"> <li>• Allow proprietary products given that third party testing is completed satisfactorily</li> <li>• Provide discretion to specify proprietary products that offer secured performance warranties.</li> <li>• Exclude basic products such as geocomposite subsurface drains from the “proprietary” list if they meet specific national standards.</li> </ul> <p>Geosynthetics are widely used to reinforce, separate, drain and stabilize surface and subsurface soils. Geosynthetic composites include Plastic Leaching Chambers, subsurface drains, multiple layered liners, and drainage devices designed to improve both the strength and water transmissivity, and segregation of water as it passes through native soils. Some products are proprietary, and many are not. Many products allow designers and contractors to work more effectively with native soils, avoiding disturbance of habitat, bridging over unsuitable soils, providing subsurface drains without extra excavation and import of aggregate materials, and providing void space for water storage in lieu of import of aggregate materials in subsurface reservoirs. Standards for material, design, and installation are covered in organizations such as the Geosynthetics Research Institute, ASTM and the Geosynthetic Materials Association.</p>	Dan Clark, P.E. Reed & Graham	<p>We would like to clarify that when we talk about “proprietary” devices in the design manual or on the stormwater web site, we are referring to proprietary treatment control measures. For the purposes of this manual, none of the products mentioned by the reviewer qualify as “treatment” control measures. Information has been added to Chapter 6 to explain the Sacramento agencies’ protocol with regards to accepting certain types of proprietary treatment control measures. The agencies do not intend to mention any other specific proprietary products in the design manual.                      Language such as “or equivalent...” will be added to Chapter 5 where appropriate, to address the geotechnical engineer’s comments (see below).  <u>Geotechnical Engineer Response:</u> In a general introduction section of the manual, an option should be allowed for equivalent alternatives as determined by the design engineer. In general, however, we recommend that drains be of the type that can include inspection and cleanout features such that observation of sediment buildup can be made and a clean-out procedure included in periodic maintenance.</p>

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
General-Fact Sheets	Excellent fact sheets! Very informative. 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.	Heather Hansen Morton and Pitalo	At this time, no other measures are going to be included in the manual. Designers are free to propose something else, but this will be subject to the approval of local permitting agency and may extend the plan review process.
General-Credits	Runoff reduction credits are a great idea. What other incentives could we use to gain developer participation?	Heather Hansen Morton and Pitalo	We are hoping to have more local case studies to share with the local community. We need help from developers and designers in coming up with good demonstration projects which show not only the application of the methods, but the economic impacts. In the meantime, we encourage the development community to review the SF Bay Area guidebooks for case studies (see "Other Resources" on our web site) and visit these types of projects. In the future, we will discuss the possibility of co-sponsoring tours with the local BIA or other groups.
General - Credits	I was not able to find out how exactly to calculate credits (or whatever mechanism is used to determine approval/success) within the sections that describe the measures. I admit that I did not read the appendices though.	Adam Kringel (ASLA) Carter & Burgess	The credit system is shown in Appendix D. We will review Chapter 5 and determine if better cross-referencing is needed to clarify.
5-1, 2	The text of Chapter 5 seems too brief. The items discussed are good, but developers need more than 3 options.	Heather Hansen Morton and Pitalo	Currently, there are more than three options, but they are grouped into three categories. We welcome specific suggestions for improving the text and are hopeful that additional options can be included in future updates to the manual.
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.	Heather Hansen Morton and Pitalo	References are included at the end of each chapter and the end of most fact sheets. The agencies do not intend to provide a list of local vendors in the design manual; see earlier related comment.
5-2	"-which is a good thing-" I think there is a more professional way to phrase that statement.	Heather Hansen Morton and Pitalo	The text was revised in the February 2007 version.
5-1	<b>Note:</b> "The goal of runoff reduction control measures is to mimic a site's predevelopment balance of runoff and infiltration [...]" <b>Comment:</b> 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> .	Youngdahl Consulting Group	It is correct that the difference in runoff volume between the predeveloped and post development condition in areas with clay soils/hardpan may be small. When hydromodification management requirements are eventually established for this area, that situation will likely pose a benefit to developers. Regardless, treatment controls are still needed to ensure that pollutants in post construction runoff (generated from auto-related and other human uses) are reduced to the maximum extent practicable prior to discharge to the local drainage system and creeks/rivers. Runoff reduction measures are introduced in this manual as a means to reduce the flows or volumes requiring treatment, which may in turn, reduce land area and/or costs for the developer.

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
5-3	<p><b>Problem:</b> “Work with your civil engineer and planner to study the infiltration capacity of the soils and the future use of the site when making this determination”.</p> <p><b>Comment:</b> The geotechnical engineer/geologist should also be consulted.</p>	Youngdahl Consulting Group	Text was revised.
	<b>Porous Pavement (PP) Fact Sheet</b>		
General	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?	Scott Pedersen Morton & Pitalo	The agencies all agree that permeability testing should be required, since soils tests will not provide the necessary information. The fact sheets have been revised accordingly.
5-4, PP-1 – PP-17	References used to develop chapters and design requirements should be taken from sources that are indicative of the area in which the requirement will be implemented. Care should be taken not to intermingle the recommendations or requirements for porous pavement from areas such as Portland Oregon and Washington State because many of these may not be applicable to the Sacramento area.	MacKay & Soms	See response to same comment made in Chapter 4, page 4-2.
PP-3	Banister Park is a great example of pervious concrete. It would be good to include comments from maintenance personnel.	Candido Ramirez MHM Engineers	Bannister park is included in Table PP-3 as one of the local installations. We will try to get information from Fair Oaks Rec & Park District about their standard maintenance procedures.
PP-5	<ul style="list-style-type: none"> <li>• concrete does not have to be poured monolithically, as long as proper joints and sealants are specified</li> <li>• specify acceptable plastic material and spec requirement</li> <li>• allow plastic leaching chambers in lieu of the bottom aggregate used to store water</li> <li>• allow geosynthetic vertical and horizontal subsurface drains in lieu of aggregate trench drain with perforated plastic pipe</li> <li>• provide material design specs for pervious concrete</li> <li>• include precast pervious concrete pavers</li> <li>• allow variance from ASSHTO no. 3 base aggregate</li> <li>• recognize design specific pollutant reduction within the pavement section based upon depth of aggregate, type of aggregate, and retention time</li> </ul>	Dan Clark, P.E. Reed & Graham	<p>We refer to the project geotechnical engineer and/or trade associations such as Calif. Nevada Cement Promotional Council (CNCPC) for material design specifications for pervious concrete and other control measures. This would include specifications for pouring concrete, use of plastics, suitable aggregate base material, and/or use of subsurface chambers/pipes to drain/detain water. We expect that the project geotechnical engineer will design the pavement to be structurally capable of supporting the intended loads and facilitating drainage. The property owner will be required to sign a maintenance agreement to ensure continued performance of the products/installation for the life of the development.</p> <p>We were not able to locate sufficient data about performance to warrant adding precast pervious concrete pavers to the design manual at this time. We will evaluate any data that reviewers can supply, if the information is received in a timely manner. Otherwise, the technique can be considered for future updates to the design manual.</p> <p>We do not intend to recognize assumed pollutant loading reductions of any of the control measures featured in the design manual.</p>

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
PP-6	The detail shows a water barrier separating the pervious concrete from the existing pavement. A far more desirable solution is to have an edge drain at the interface. Conventional dense graded asphalt is permeable even though not as permeable as pervious concrete. Water in the base aggregate is very deleterious in terms of load bearing capacity. An impermeable membrane simply damn up the water on either side. In comparison, an edged drain removes water from either source.	Reed & Graham	We revised the text to allow either a water barrier or an edge drain. <u>Geotechnical Engineer Response:</u> The geofabric and/or impermeable liner are shown in the section (Figure PP-2) to encompass the AB and drain pipe as it should. The extended concrete curbing is a good idea adjacent to landscape areas to block landscape water from infiltrating to the base rock.
PP-9	Design of base and sub-base should vary depending upon loading conditions and native soil conditions	Dan Clark, P.E. Reed & Graham	<u>Geotechnical Engineer Response:</u> Parking or driveway areas that are very lightly traveled with automobile loading only might qualify for design based on the sections shown. Any areas with truck, fire, trash, and high automobile traffic should be designed by civil or geotechnical engineer. This is reflected in text.
PP-10	Permittivity has 2 t's	Reed & Graham	Typo was corrected in the February 2007 version.
PP-5, PP-10	PP-10: Note on AOS <i>Otherwise use a geotextile filter cloth w/ 50-70 pores per inch.</i> I do not believe such a measurement exists; simply refer to AOS of 50-70. On PP-5 the note; <i>Non-woven geotextile w/ 40 to 60 pores per inch.</i> Again, I am not aware of such a measurement by the industry and <u>Wovens</u> normally have 40-60 AOS while non-wovens have 70-100.	Reed & Graham	Fig PP-10 was revised.
PP-1	<b>Problem:</b> Limitations section of Porous Pavements does not cover all issues. <b>Comment:</b> Other Limitations (From EPA Storm Water Technology Fact Sheet, Porous Pavement): 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. 4. Anaerobic conditions may develop in underlying soils if the soils are unable to dry out between storm events. This may impede microbiological decomposition. <b>Other considerations:</b> 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.	Youngdahl Consulting Group	When the EPA fact sheet was published in 1999, the only installations of porous pavement that we were aware of were done on the east coast by Cahill and Associates. However, the technique is being used more and more, and there are organizations like the <a href="#">Concrete Promotion Council of Northern California (PCPNC)</a> and Calif Nevada Cement Association offering certification programs for contractors and other technical assistance. The early installations of porous pavement did experience a high rate of failure, largely because they were installed improperly or not protected adequately from excessive fine sediment loads during construction. The details shown in the manual do specify a larger aggregate section than would normally be required for conventional pavement. Aggregate availability should be considered in selecting this control measure. The maintenance recommendations in the manual include vacuuming and power washing. Projected life span information was added to Appendix B. New requirement for permeability testing will help identify whether site soils are suitable and whether an underdrain is required.

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
PP-2	<p><b>Problem:</b> “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><b>Comment:</b> 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 &gt;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>	Youngdahl Consulting Group	The definitions in the glossary were revised.
PP-12	<p><b>Problem:</b> “A soils test may be required to verify suitability of this technique for the site. A qualified engineer must provide”</p> <p><b>Comment:</b> Sentence is not complete and it appears that text should be replaced with test.</p>	Youngdahl Consulting Group	Typo and sentence structure was corrected.
PP-13	<p><b>Problem:</b> “Avoid over compaction of soils during construction to protect infiltration capacity of pervious materials”.</p> <p><b>Comment:</b> 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><b>Consideration:</b> 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>	Youngdahl Consulting Group	Changes were made to the fact sheet in consultation with our Geotechnical Engineering Reviewer. <u>Geotechnical Engineer Review Comments:</u> Manual should eliminate label on sections regarding compaction. The designer should define compaction criteria for roadway sections components.

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
PP-2	Fourth paragraph, drive <b>isles</b> should be replaced with <b>aisles</b> .	Youngdahl Consulting Group	Typo was corrected.
PP-5/PP-12	<b>Problem:</b> Table PP-1, Design Criteria for Porous Pavement, Pervious Concrete/Asphalt (Figure PP-1) <b>Comment:</b> Figure PP-1 only illustrates a typical pervious concrete section. <b>Consideration:</b> The figure should be revised to be reflect both surfaces.	Youngdahl Consulting Group	We recently made contact with Asphalt Association and received information from them regarding typical section, etc. that we are not sure we agree are suitable for this area. We will try to resolve these questions before the final publication, or provide additional details in a future update to the manual.
PP-5/PP-12	<b>Problem:</b> 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. <b>Comment:</b> Figure PP-1 illustrates a 8” minimum coarse aggregate over 7” of sand. <b>Consideration:</b> Figure PP-1 and Table PP-1 should be made consistent.	Youngdahl Consulting Group	Table PP-1 was revised.
PP-5/PP-12	<b>Problem:</b> 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”. <b>Comment:</b> Figure PP-1 illustrates a 6” minimum trench depth, which appears to contradict the 8-12 inch layer. <b>Consideration:</b> This should be clarified and, if applicable, Figure PP-1 and Table PP-1 made consistent.	Youngdahl Consulting Group	Table PP-1 was revised.
PP-7/PP-12	<b>Problem:</b> Table PP-1, Design Criteria for Porous Pavement, Modular Block Pavement, describes a 12” minimum of coarse aggregate. <b>Comment:</b> Figure PP-3 illustrates an 8” minimum coarse section. <b>Consideration:</b> Figure PP-3 and Table PP-1 should be made consistent.	Youngdahl Consulting Group	Table PP-1 was revised.
PP-10/PP-12	<b>Problem:</b> Table PP-1, Design Criteria for Porous Pavement, Cobblestone Block Pavement, describes a 12” minimum of coarse aggregate. <b>Comment:</b> 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. <b>Consideration:</b> The materials should be more clearly defined, and the Figure PP-5 and Table PP-1 should be made consistent.	Youngdahl Consulting Group	Table PP-1 was revised
PP-11/PP-12	<b>Problem:</b> 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. <b>Comment:</b> Figure PP-6 illustrates a 12” minimum coarse aggregate over 7” of sand. <b>Consideration:</b> Figure PP-6 and Table PP-1 should be made consistent.	Youngdahl Consulting Group	Table PP-1 was revised

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
	<b>Disconnected Pavement (DP) Fact Sheet</b>		
DP-1	<p><b>Problem:</b> 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><b>Consideration:</b> 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>	Youngdahl Consulting Group	Providing alternatives for treatment of roadway runoff is one of the various challenges we face; it is an issue for the municipal agency departments of transportation as well as private developers. We recognize that this is an area that needs further work, including researching methods that have been demonstrated to be effective by Caltrans and others. We look forward to working with BIA and others to study this more and evaluate alternatives.
DP-1	<p><b>Problem:</b> "Takes advantage of already-required landscape areas: no additional space required."</p> <p><b>Comment:</b> As noted in other discussions of consistence, this comment is only accurate when approved by all the departments of any agency.</p>	Youngdahl Consulting Group	Agreed. See previous comments about internal work being done by each agency to resolve conflicts.
	<b>Disconnected Roof Drains (DRD) Fact Sheet</b>		
DRD-1	<p><b>Note:</b> 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.</p> <p>"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."</p> <p>ref:  <a href="http://cfpub1.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=bro_wse&amp;Rbutton=detail&amp;bmp=81">http://cfpub1.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=bro_wse&amp;Rbutton=detail&amp;bmp=81</a></p> <p><b>Consideration:</b> 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>	Youngdahl Consulting Group	<p>This design manual and the new development controls are just one piece of a comprehensive stormwater management program. Source control is an integral part of the comprehensive program. The Sacramento Stormwater Quality Partnership has a target pollutant reduction program that includes identifying the potential sources of target pollutants in urban runoff and implementing control strategies to eliminate/minimize those sources. For residential land use, there are aggressive outreach programs designed to educate homeowners about alternative landscaping and pesticide practices that will reduce these pollutants in site runoff. On a more regional scale, there are organizations like SACOG trying to reduce air pollution through land use planning strategies that reduce dependency on the automobile. Over time, this should help reduce the amount of auto-related and atmospheric deposited pollution on surfaces which gets washed into the storm drains and waterways.</p> <p>The treatment control measures selected for this manual are those suitable for treating most typical urban runoff pollutants.</p>
DRD-3	<p><b>Problem:</b> "For single family residential development, pop-up emitters must daylight no less than three 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><b>Comment:</b> 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><b>Consideration:</b> 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>	Youngdahl Consulting Group	<p>Changes were made to the fact sheet to address this comment, in consultation with our geotechnical engineer reviewer (see his comment below).</p> <p><b>Geotechnical Engineer Response:</b> At a minimum, any surface discharges (e.g. roof drains) should not be allowed closer than 5 feet from building walls and foundations and that positive drainage away from building foundations and slabs should be required for another 5 feet, where possible. For infiltration structures with closed bottoms, a setback of 10 feet from buildings is recommended. For retention structures with bottom discharge or basins with bottom discharge, the setback criteria of 20 feet downslope and 100 feet upslope is recommended.</p>

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
DRD-4	Figure DRD-1, the word <b>very</b> should be replaced with <b>vary</b>	Youngdahl Consulting Group	Typo will be corrected in final version.
	<b><i>Interceptor Trees (INT) Fact Sheet</i></b>		
General	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.	Heather Hansen Morton and Pitalo	The list was revised in the February 2007 version to include a comprehensive list of all trees approved locally, but designers need to check with the local permitting agency to verify use of any particular tree in a particular setting.
General	Think of unintended consequences. If you give more credit to evergreen trees without any maximums, nothing is to stop developers from using only evergreens in their developments. This is not an environmentally good thing to do in our climate because deciduous trees are necessary to allow passive solar heating during winter months. A neighborhood full of evergreens would use more energy to heat and light during the winter. Furthermore, coniferous evergreen trees have smaller canopies and a smaller shading ability (and I suspect a smaller stormwater intercepting capacity). Nothing is specified to limit their use. The solution is to not allow credit for more than 10-20% evergreen trees in neighborhoods. Please consider all of the environmental consequences of these measures, not just stormwater.	Adam Kringel (ASLA) Carter & Burgess	The credits will remain as they are, but the project applicant should check with the permitting agency for a possible cap on the number or percentage of evergreens allowed.
Tree List	Some very poor species are listed (eg Ailanthus is a bad weed tree). A landscape architect or arborist should be consulted.	Adam Kringel (ASLA) Carter & Burgess	Tree list was revised.
INT-1	Do interceptor trees require a certain depression (3-6 inches?) around the tree?	Candido Ramirez MHM Engineers	A note will be added to the interceptor tree fact sheet if this is the case.
	<b><i>Ecoroof Fact Sheet</i></b>		
p. 115-117	It appears that “ecoroofs” which infiltrate and convey water may employ recommendations of product suppliers. Why not allow the same flexibility when the receiving area is in landscape on the ground, or driveways and parking lots??	Dan Clark, P.E. Reed & Graham	Question not clear. Waiting for response from Dan Clark.
	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.	Heather Hansen Morton and Pitalo	We do not intend to list vendors in the design manual. However, we will explore the possibility of co-sponsoring an educational presentation with the local BIA or other groups. In the meantime, designers can contact the designers of projects in the SF Bay Area that have used ecoroofs. See the link from our web site <a href="http://www.sacramentostormwater.org">www.sacramentostormwater.org</a> (see “New Development” and “Other Resources”) to 3 guidebooks describing several ecoroofs projects in the SF Bay Area.

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
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...)	Wood Rodgers, Inc.	Currently porous pavement is not allowed in high traffic/loading areas, which would include public streets and drive aisles on-site. Local fire agencies are still uneasy about use of the materials in fire access lanes, because they do not want to lose apparatus when arriving to fight a fire. We expect to see more and more demonstration or pilot projects for use of the alternative materials in such applications.
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.	Wood Rodgers, Inc.	We recognize that most of these measures will require retrofitting or replacement at some point in the future, as with other types of on-site systems such as sewer laterals or water lines. Regular maintenance should prolong the life as much as possible. A table showing projected life spans for most of the measures has been added to Appendix B.
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...)	Wood Rodgers, Inc.	See comment about use of pervious pavements in public streets and other high traffic areas. These measures may be used on public building sites.
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 .	Wood Rodgers, Inc.	See comment above.
PP-8	Reinforced Grass Pavement, see comment above	Wood Rodgers, Inc.	See comment above. (Note that the Metro Fire District has experience with one of their trucks sinking in reinforced grass pavement that was probably not installed properly.)
PP-10	Cobblestone Block Pavement, see comment above.	Wood Rodgers, Inc.	See comment above.
PP-11	Porous Gravel Pavement, see comment above.	Wood Rodgers, Inc.	See comment above.
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.	Wood Rodgers, Inc.	The local agencies will be evaluating and revising as needed, local codes and standards. See earlier comment about MEP standard . Economic analysis will not be conducted for this manual.

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
PP-13	Long-term Maintenance: Maintenance agreements with public agencies are not practical. Requires inspection and additional ongoing cost to insure compliance.	Wood Rodgers, Inc.	The verification of long term maintenance is a requirement of the agencies' NPDES stormwater permits and many of the agencies have determined that agreements or covenants are the best mechanism. Most agencies already require a maintenance agreement/covenant. Roseville is exploring the possibility of a new permit program for stormwater quality control measures. Revenues from permit fees would be used by the City to conduct inspections to verify that maintenance is being performed.
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.	Wood Rodgers, Inc.	There are numerous examples of previously approved vegetated swales in parking lots around the Sacramento area, whereby the stormwater quality feature was integrated into the required landscape. Check out Elk Grove Marketplace, Gateway Oaks, RAS on Expo Parkway, SMUD and others. Contact the Sacramento Stormwater Quality Partnership for a list. The agencies hope to make this list available on the web site in the future, similar to the SF Bay Area guidebooks.
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).	Wood Rodgers, Inc.	There are numerous examples of healthy "Hollywood driveways" in the older parts of Sacramento (neighborhoods built in early 1900s). In addition, newer neighborhoods have been built in Natomas with this feature, and there are many examples elsewhere in the state. The agencies will evaluate the current zoning codes and made changes as needed. In terms of practicality, there is a shared driveway residential development in Livermore (Dunsmuir Homes) that is reportedly working fine. Cars park on either side of the driveway in front of the respective garages, so as not to block the neighbor at any time. Home values in the development are high. If buyers were informed about the environmental benefits of the shared driveway and this was one of the early sales strategies ("live in a green development") we don't agree that they wouldn't buy into the concept.
<b>Chap 6 Treatment Control Measures</b>			
General	Generally, the options offered were presented in a clear, logical way. The sub-sections were fairly easy to understand. However, I didn't go into depth in reviewing the hydraulic formulas, which I assumed already followed sound Water Resources principles.	Edwin Yu Morton & Pitalo	NA
General	Treatment measures, existing wetlands – will they count for treatment? Same for created wetlands...?	MacKay & Soms	Existing wetlands are classified as "Waters of the State" and cannot, therefore, be used to treat runoff. For the purposes of this manual, treated wetlands which are designed and constructed following the design criteria in the design manual are acceptable treatment control measures and are considered either part of a private property owner's drainage system or the municipal storm drain system and not a "Water of the State". A property owner may want to pursue a "safe harbor agreement" or similar with the Army Corps of Engineers to ensure that they will always be able to maintain the wetland.

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Fact sheets	All fact sheets for landscape-based treatment controls list maintenance requirement “maintain vegetation as is done for any landscaped areas.” Landscaped areas not meant for stormwater control are typically maintained by activities including application of fertilizers and pesticides, chemicals which would impair the water quality of receiving bodies. As maintenance activities for LID stormwater controls are typically performed by landscaping crews who are not trained to distinguish between site landscaping features, more explicit guidelines may be appropriate.	Jeremiah Lehman CONTECH Stormwater Solutions	The maintenance tables in each of the vegetation-based control measure fact sheets encourage use of integrated pest management practices. We will consider changes to the first page of these fact sheets for consistency.
Proprietary Devices	Chapter 6 did not include a section on approved proprietary treatment devices (e.g., Contech Stormvault Mitigation System, Contech Stormwater 360, etc.). The manual should include some verbage to the approved treatment devices in case the site cannot accommodate a WQ basin, grassy swales, infiltration basins, etc. This is lacking.	Edwin Yu Morton & Pitalo	A new discussion on acceptable proprietary devices was added to Chapter 6 in the February 2007 version, with reference to the stormwater web site for updated information on the Sacramento Program’s protocol for evaluating proprietary devices. The City of Roseville intends to develop a policy by summer 2007.
Proprietary Devices	Need list of proprietary devices acceptable to each agency.	Greg Bardini Morton & Pitalo	Same as above.
Proprietary Devices	Provide more proprietary treatment alternatives.	Candido Ramirez MHM Engineers	See comments above. Additional alternatives will not be noted in the design manual until sufficient data is available to demonstrate effectiveness in compliance with protocol.
Proprietary Devices	<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.	Scott Pederson Morton & Pitalo	See comments above. The Sacramento program is continuing its investigation of proprietary devices and will add others as data demonstrates pollutant removal effectiveness according to protocol.
Proprietary Devices	Develop a standard plan (construction standards) for the Stormwater Vault.	Greg Bardini Morton & Pitalo	We will refer to the device manufacturer for this information; however, certain minimum specifications are described on the web site (see above comments).
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.”	Wood Rodgers, Inc.	Appendix E is correct. The text in Chapter 6 will be revised.

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6-3	5 <sup>th</sup> 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?	Wood Rodgers, Inc.	The project applicant should always try to provide a means of diverting runoff around the site. If it is combined with other site runoff it may be subject to treatment requirements, depending on the local agency. Each situation will be handled on a case-by-case basis. The text will be clarified as needed.
6-4	Section refers to a monitoring study for field verification of proprietary treatment controls. Will the testing requirements follow the current guidelines (Appendix M of the 2000 manual)? The Sacramento Partnership has been one of the only jurisdictions in the State to require a robust field testing protocol—please include a reference to the testing requirements in this section.	Jeremiah Lehman CONTECH Stormwater Solutions	See above comments. A reference has been added to refer to the web site for published protocol. Each agency will individually determine if it will allow other “non-approved” proprietary devices to be installed as pilot projects, and site-specific monitoring requirements for such cases. At this time, the requirements are the same as Appendix M from the 2000 guidance manual, but check back to the web site regularly for any updates.
<b>Constructed Wetland Basin</b>			
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.	Wood Rodgers, Inc.	The use of these features in open spaces as public amenities should be discussed on a case by case basis with the applicable permitting agency.
CWB-8	Figure label should be on previous page (CWB-7) with figure.	Wood Rodgers, Inc.	Correction was made.
<b>Detention Basin Fact Sheet</b>			
General	Basin Sizer still appropriate?	Scott Pederson Morton & Pitalo	No, Appendix E in the Design Manual specifies method for sizing basins. For those wishing to find out more about “Basin Sizer” program (developed for Caltrans), see the CSUS web site: <a href="http://stormwater.water-programs.com/BasinSizer/Basinsizer.htm">http://stormwater.water-programs.com/BasinSizer/Basinsizer.htm</a>
General	Can the “first flush” be stored below the outlet pipe in a Water Quality Basin?	Candido Ramirez MHM Engineers	It depends on what is meant by “first flush”. If SWQ flow (WQV), then the answer is yes. In wet or combination detention basins that are used for both flood and SWQ flows; the SWQ volume is stored below the flood volume. A low flow pipe is used to drain the SWQ permanent pond volume, and a larger outlet pipe, sized to drain the flood flows. This concept is shown in the figure in the design example in the appendix. The key concern is that the basin be sized/designed appropriately to meet the specified detention/hold time.
DB-2	Limitations of SW Detention basins: “May need a supplemental water source to replenish and maintain the permanent pond”. Small sized wet basins (which do not support mosquito fish) should not be required to maintain permanent pond in summer.	MacKay & Soms (Sidhu and Handy)	If the responsible party (e.g., entity owning and/or maintaining the basin long term) cannot guarantee a year-round source of supplemental water to keep the permanent pool wet, then the basin needs to be designed as a dry basin. This critical element needs to be addressed during the initial drainage design phase when decisions are made about the basin footprint, since wet basins will typically require less surface area than dry basins.

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DB-4	2% longitudinal slope criteria (Table DB-1) for dry basins should be relaxed. Generally, the downstream outfall conditions (downstream HGL's) are generally high owing to flat grades in the Sacramento Valley area. At 2% longitudinal slope, considerable elevation is lost which may force a basin to be designed as a wet basin. However, a 2 % transverse slope (perpendicular to direction of flow) toward the low flow channel can be mandated to keep the basin bottom dry.	MacKay & Soms (Sidhu and Handy)	New figures were added to the fact sheet that will help address this comment.
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?	Wood Rodgers, Inc.	All references to wet channel have been deleted from the fact sheet.
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.	Wood Rodgers, Inc.	Language will be clarified.
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)?	Wood Rodgers, Inc.	The 48-hr drawdown curve is for measures such as the detention basin. The curves for 12 and 14-hour drawdown time apply to other control measures (e.g., stormwater planter).
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.	Wood Rodgers, Inc.	Changes were made to address these comments.
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.	Wood Rodgers, Inc.	The 4:1 is a conservative value for safety and ease of maintenance. A 3:1 slope may be approved depending on the permitting agency.
	<b><i>Infiltration Basin Fact Sheet</i></b>		
IB-4	Long-Term Maintenance: same comments as CWB above.	Wood Rodgers, Inc.	See above.
IB-6	Figure IB-1: Cutoffs are recommended on drain pipes through earth-retaining dams to prevent water from piping through the fill. Shutoff valves, if any, should be accessible during storm events.	Dan Clark, P.E. Reed & Graham	Fact sheet was revised in consultation with geotech engineer (see his comment below) <u>Geotechnical Engineer Response:</u> Yes both cutoff collars along such pipelines should be planned at regular intervals (say every 10 to 20 feet; shutoffs are also recommended.
IB-6	Figure IB-1: How does the water get in to the relief underdrain? It would seem that the portion of the drain pipe under the storage area would be permeable and the portion under the embankment would not be. That is not indicated.	Reed & Graham	Fact sheet was revised in consultation with geotech engineer

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	<b><i>Infiltration Trench Fact Sheet</i></b>		
IT-1 thru 4	Confirm with other permitting agencies that IT can be incorporated in buffer, setbacks as part 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.	Wood Rodgers, Inc.	All of these comments were addressed in previous responses to Wood Rodgers' comments.
IT-2	Geocomposite geosynthetic units should be allowed as an option for washed stone or gravel.	Reed & Graham	Language such as "or equivalent..." will be added where appropriate, to address the geotechnical engineer's comments (see below). <u>Geotechnical Engineer Response:</u> In a general introduction section of the manual, an option should be allowed for equivalent alternatives as determined by the design engineer. In general, however, we recommend that drains be of the type that can include inspection and cleanout features such that observation of sediment buildup can be made and a clean-out procedure included in periodic maintenance.

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IT-2	<p><b>Problem:</b> 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><b>Note:</b> Infiltration Trenches “Planning and Siting Considerations, · Integrate trenches into open space 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 [drainage and planning department] 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><b>Comment:</b> 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 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.</p>	Youngdahl Consulting Group	<p>The design criteria shown in the infiltration facility fact sheets related to separation from building have been agreed to by all agencies and the geotechnical engineer (see below).</p> <p><u>Geotechnical Engineer Response:</u> As a minimum any surface discharges (e.g. roof drains) should not be allowed closer than 5 feet from building walls and foundations and that positive drainage away from building foundations and slabs should be required for another 5 feet, where possible. For infiltration structures with closed bottoms, a setback of 10 feet from buildings is recommended. For retention structures with bottom discharge or basins with bottom discharge, the setback criteria of 20 feet downslope and 100 feet upslope is recommended.</p>
IT-5	<p>Table IT-2: It appears that no purification credit for lateral flow is allowed in infiltration trenches. Lateral flow through aggregate applies to porous and nonporous pipe layouts.</p>	Dan Clark, P.E. Reed & Graham	<p>The infiltration criteria presented in the manual is consistent with industry design criteria. We welcome any published study data demonstrating purification of lateral flows and will consider such data in future updates to the manual.</p>
IT-7	<p>Figures IT-2, -3: Allow plastic leaching chambers in lieu of aggregate for water storage. Why not allow roof drains to discharge on the surface of infiltration trenches, and then you eliminate the need to clean a filter? Modify the detail to give alternatives to the proposed filter, which can become a maintenance problem.</p>	Dan Clark, P.E. Reed & Graham	<p>Plastic perforated chambers may be allowed on a case by case basis. Check with local agency. The text has been changed to make this clear.</p>

Page No.	Comment	Reviewer	Notes/ Response/How comment was addressed
	<b><i>Sand Filter Fact Sheet</i></b>		
SF-5	SF-5: The trench underdrain includes to layers of geotextile fabric and drainage matting. This seems quite labor intensive and could easily be replaced with a geocomposite drain.	Reed & Graham	Text was revised to allow either the layers or the drain and to check with local permitting agency for approval.
SF-10	Figures SF-4, -5: (comment also applies to other details) Sand is typically installed over filter fabric to act as a filter against clogging, especially when fines may enter. Sand filter testing proves that depths indicated in the drawing are excessive, and that filtering takes place within the top inches of the filter. If the goal here is removal of particles, then that happens on the top. Provide flexibility to specify aggregate depth depending upon pollutant removal requirements.	Dan Clark, P.E. Reed & Graham	We are not familiar with the “sand filter testing” that is being referenced here. The depths indicated in the drawing were taken from other sources (Austin Sand Filter type) and to our knowledge this specification is working in other areas. We welcome additional comments and specific citations related to this subject. But we do not intend to allow flexibility in design for this or any other type of control measure based on pollutant removal requirements. Our program is presumptive and does not specify pollutant removal requirements for each project.
	<b><i>Stormwater Planter Fact Sheet</i></b>		
General	Concrete side walls add too much cost and require too much energy and material to install. This would negate the positive benefits of stormwater measures. Plastic lining and other softer methods should be encouraged.	Adam Kringel (ASLA) Carter & Burgess	Figures SP-1 and SP-2 already states that “other structural material with waterproof membrane” can be used.
SP-1 and SP-2	ASTM C-33 sand is specified which is far from the best choice of filter media, then a filter fabric, then gravel layer then perforated pipe. A geocomposite drain embedded directly in the appropriate sand backfill would be much more effective and less costly.	Reed & Graham	Reference to Caltrans guidance and various alternatives will be made (see geotechnical engineer comments below) Geotechnical Engineer Response: Guidance for perforations, alternatives, permeable materials, cleanouts and vents are provided in Section 68 of the Caltrans Specifications, May 2006 and may already exist in the Standard Specifications of participating counties and cities of the manual production.
SP-5	Stormwater Planter Maintenance - Since these will probably be filled with tree roots, it is impractical to remove and replace the soil layer. You should not assume that this can be done.	Adam Kringel (ASLA) Carter & Burgess	This is an excellent point. Waiting for response from City of Portland on how they handle this aspect.
SP-6	Figure SP-1 indicates 75% sand and 25% peat mix for the filtration section. Peat mix is not readily available in the Sacramento region. Please specify an alternate material.	Candido Ramirez MHM Engineers	Alternate materials may be accepted on a case by case basis, as long as the desired infiltration time is achieved for 12-hour drawdown. Also check the most recent errata published by Contra Costa related to the media mix for stormwater planters. Note will be added to Table SP-1
	<b><i>Vegetated Swale Fact Sheet</i></b>		
General, Fig VS-1	All of the same recommendations would be made – see Reed and Graham comments printed previously in this table relative to use of geocomposite drain.	Reed & Graham	See above responses.

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VS-3	Design criteria listed for Vegetated Swale in Table VS-1 recommends that tributary drainage area be $\leq 10$ acres which considerably reduces the application of this treatment method. It will be good to investigate if areas exceeding 10 acres reduce the functionality of the swale. We believe that with the use of grade control structures (to prevent erosion) and providing a 7-minute contact time, fairly satisfactory results should be achievable. In addition, grassy swales seemingly present a better aesthetic alternative in comparison to wet basins. Also, a longitudinal slope criterion is listed as 1-4%. The lower limit of 1% seems steep for the Sacramento Valley area. City of Woodland criteria (Table 5-4. Grass Swale Filter Design Criteria) lists minimum slope in flow direction 0.2%.	MacKay & Soms (Sidhu and Handy)	Several swales could be proposed for a single site, each for a different shed sized less than 10 acres each. It would very difficult to treat areas that are larger than ten acres with a grassy swale. It is difficult to spread the flows across the width of a swale for a large shed, channelization would most likely occur. 10 acres is consistent with CASQA. The 1% slope requirement is to promote drainage and prevent ponding.
VS-3	a. What is the minimum allowable slope than can be used with an underdrain? b. What is the maximum allowable slope that can be used with a check dam ? c. CASQA BMP TC-30 recommends a grass height of 6-inches, not 5-inches. d. Is there any reference material available for minimum contact time requirement?	Wood Rodgers, Inc.	a. We will research this and add text as needed. b. We will research this and add text as needed. c. Key is that WQF should be below grass height. Five-inch grass height is consistent with 2000 guidance manual. d. Related to 7-minute contact time, see earlier response to similar comment posed by Wood Rodgers.
<b>Appendices</b>			
<u>App D</u> Runoff Reduct. Sheets	Very complicated calculations for the common layperson. Appears to be discouraging.	Heather Hansen Morton and Pitalo	We are continuing to refine the worksheets and welcome any specific suggestions for improving them.
<u>App B</u> Post Constr. Plan Submittal	Improvement Plans are construction contract documents between the contractor and owner/agency. The Post Construction Storm Water Quality Control Plan (PCSWQCP) has a lot of information (sizing calculations, certificates, shed lines, etc) which are unrelated to construction. The remaining information on the PCSWQCP typically already shows up on other sheets. 1. There is no need to duplicate information. 2. Sizing calculations should be in a separate bound document. If a PCSWQCP is absolutely required, make it a separate plan.	Candido Ramirez MHM Engineers	This comment was addressed in revisions to Appendix A. A basic list of all submittal requirements is included, with a note that each agency will make its own determination as to what needs to be submitted and in what format, to meet their agency's needs. Some permitting agencies may not require this type of information in the improvement plan set. It depends on the agency.
<u>App E</u>	City of Roseville Volume Based Design Method, Step 4, Please clarify how to read the "Capture Runoff"	Candido Ramirez MHM Engineers	This will be clarified.
<b>Appendix D</b>	Cannot complete Form D-1f. Missing Table D-1d and Figure D-1a.	Wood Rodgers, Inc.	This comment was addressed in the revised work sheets.

<b>Page No.</b>	<b>Comment</b>	<b>Reviewer</b>	<b>Notes/ Response/How comment was addressed</b>
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.	Wood Rodgers, Inc	The parks and open space is subtracted for the purpose of calculating an adjusted I value, but the WQV equations have to use total area by definition.
Appendix D-3 page 1	Under assumptions. Seems like landscaped areas and lawns might have fertilizers that would require treatment.	Wood Rodgers, Inc	Education of owners and maintenance staff is necessary to minimizing use of fertilizers and pesticide that could affect water quality.
Appendix D-3 page 4	First paragraph: capitalize all occurrences of <i>manning's</i> .	Wood Rodgers, Inc	Changes were made.
Appendix E page 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.	Wood Rodgers, Inc	This language has been revised after recommendations from our technical reviewer, Mark Kubik
Appendix E page 5	First regression equation is shown wrong. Need to format exponents.	Wood Rodgers, Inc	Equation has been corrected.
Appendix E page 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.	Wood Rodgers, Inc	This section of Appendix E has been deleted.