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October 23, 2012

Mr. David Barker, P.E., Supervising Engineer
Surface Water Basins Branch
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4353

Subject: Model Water Quality Management Plan and Comments on Hydromodification Management Plan (Draft HMP) – Reference Place No. 658018:ebecker

Dear Mr. Barker:

The County of Orange received your letter of April 25, 2012, providing comments on the Draft South Orange County Hydromodification Management Plan (Draft HMP). We have since been advised that written comments are still pending on the proposed Standard Storm Water Mitigation Plan (referred to as the Model Water Quality Management Plan or Model WQMP). In response to your letter, please find attached a proposed Final HMP and a "Response to Comments" document that details how both the public comments and the comments of your staff have been addressed.

The practice of hydromodification management is still evolving. Indeed, it is an area of stream protection and management practice that can be characterized as lacking a definitive consensus amongst practitioners. Nonetheless, the Orange County Permittees believe that the Final HMP presents a highly credible and technically robust approach to hydromodification management that is appropriate for South Orange County and reflective of the "state of the art." Upon full implementation, it will advance how development projects are conditioned to address the hydrologic impacts of watershed imperviousness and effect a significant increase in stream protection compared with our 2003 program. However, the HMP will not require hydromodification control measures where this often challenging obligation will not contribute to a meaningful environmental outcome for South Orange County's creeks, streams, and rivers. Requiring hydromodification management at sites draining to engineered channels is an obligation that lacks a technical rationale and the HMP retains this exemption as well as an alternative compliance approach for the unique challenges presented by street projects.

The Permittees understand that the key question of when and when not to require hydromodification mitigation is not going to be readily resolved. The recent Hydromodification Management Workshop highlighted a lack of consensus which is emphasized by the different standards that continue to be promulgated in each of the Phase I municipal stormwater permits. For example, the Los Angeles County Municipal Permit currently being considered for adoption includes a clear exemption for "engineered channels."

At the same time, the Permittees are facing piecemeal implementation of the "runoff retention" approach in South Orange County. A workshop held on October 2, 2012 highlighted projects that have addressed the interim hydromodification standard; but the County has received positive feedback on the South Orange County Hydrology Model that has been developed and ready for implementation with the final HMP. Until such time as the Model WQMP provided to you in December 2011 is approved, however, development projects must still comply with the "treat and release" approach using the 2003 Model WQMP. By contrast, in north Orange County the Permittees have been implementing an integrated Low Impact Development and hydromodification management program for land development for over 15 months.

We are now three years into our five-year permit term and within a year, the new regional MS4 permit will be adopted by the San Diego Regional Board. The Permittees believe that we share a strong common interest in the expedited transition to the HMP as an integral element of the Model WQMP. Implementation of these documents would certainly be consistent with the expectation in Order No. R9-2009-0002 - F.1.h. and bring to closure the overlapping implementation of Third and Fourth Permit Term requirements. Such a transition would also serve our interest of being able to maintain a uniform countywide approach to how land development is conditioned for water quality protection as well as for the credibility of the stormwater mandate for the private sector and the public at large. We respectfully ask approval of the HMP and look forward to further refinements to the program as the monitoring data are analyzed and the state of the art in hydromodification science progresses.

Please direct any questions regarding this letter to Richard Boon at (714) 955-0670.

Very truly yours,

Mary Anne Skorpanich, Manager
OC Watersheds

Attachments:
Final Hydromodification Management Plan
Response to Comments

c: Ignacio G. Ochoa, Interim Director of OC Public Works
Tony Olmos, Assistant Director of OC Engineering
South Orange County Co-Permittees

This matrix references all the comments received by the Copermittees on the South Orange County HMP that was submitted to the San Diego Water Board on December 16, 2011. For each individual comment, the matrix includes a response describing, if necessary, how it was addressed in the October 2012 version of the South Orange County HMP.

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1	The draft HMP does not indicate that it was reviewed by the public, nor does it describe the entities involved in its development, such as any stakeholder groups. Permit requirement F.1.h(4) requires that the Copermittees submit a draft HMP that has been reviewed by the public. Please clarify whether or not this Permit requirement has been met.	In the revised version of the HMP: - Section 2 lists the workshops that the South OC Permittees, as members of the HMP Workgroup, have attended during the development process of the HMP. - It is also stated that the draft HMP was available for public review on the OC watershed website and comments were provided by Tory Walker Engineering. - South Orange County Copermittees are listed in Section 1.
2	The draft HMP states that the numeric criteria that shall be applied to all PDPs is as follows: All PDPs must use continuous simulation to ensure that post-project runoff flow rates and durations for the PDP shall not exceed pre-development, naturally occurring, runoff flow rates and durations by more than 10 percent for peak flow rates, from 10 percent of the 2-year runoff event (0.1Q2) up to the 10-year runoff event (Q10). (Emphasis added). Because this methodology addresses a range of flows that are predicted to be erosive (as opposed to any one "peak flow"), the San Diego Water Board requests that the text describing the numeric criteria be modified to eliminate the confusing "for peak flow rates" term.	The text was revised to "…runoff flow rates and durations by more **than 10 percent of the time**…" in Section 4.
3	The draft HMP discusses the value for the lower flow threshold (0.1Q2) to be used in South Orange County as compared to other HMPs being implemented in the state. The text, however, is unclear about whether this value is strictly literature based, or if data specific to Orange County was used for its development. If the value is literature based, please describe the suitability of its use under local	The lower flow threshold was selected based on other approved HMPs in California with similar hydrologic and geologic conditions and corresponds to the most conservative lower flow range identified in the San Diego HMP. Section 3.2 of the revised HMP identifies that South Orange County and San Diego County are located, for the most part, within the same Peninsular geomorphic zone.

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	conditions.	
4	The draft HMP does not address how a project applicant would identify pre-development, naturally occurring flow rates and durations, in cases where the pre-project condition has been altered. Please include guidance or examples of how a project applicant might meet this requirement.	Subsection 3.7 entitled "Identification of naturally-occurring conditions" was created in the HMP. The discussion includes several publicly-available information sources that may help the developer characterize pre-development conditions, including geology, topography, soils, and vegetation.
5	Permit section F.1.h(1)(a) requires that a performance standard be created that ensures that the geomorphic stability within the channel not be compromised as a result of receiving runoff discharges from PDPs. Although the draft HMP states the numeric criteria that shall be applied to all PDPs, it is unclear that this numeric criteria satisfies the requirement to develop such a performance standard. The qualitative standard upheld by the draft HMP and required by the Permit should be clearly stated in the text.	Subsection 4.1 identifies the hydrologic element and the sediment supply element of the overall performance standard adopted by the HMP. Compliance with both standards will maintain the geomorphic stability of the channel. Demonstration of flow-duration matching for the range of geomorphically-significant flows constitute conformance with the hydrologic performance standard. An alternative hydrologic performance standard is also formulated for those projects not able to mitigate onsite or offsite.
6	Permit section F.1.h(1)(b) requires that, in the case of an artificially hardened channel, the lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable soft-bottom channel. The draft HMP must state that the proposed lower flow threshold (0.1Q2) will satisfy this condition. Additionally, if a PDP is allowed to do a site-specific analysis and potentially raise the lower flow threshold, then the draft HMP must clarify that the PDP must adhere to this Permit requirement.	Subsections 3.2 and 4.1 identify that "...the lower flow threshold corresponds with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a soft-bottomed channel…"
7	Draft HMP section 4.3 describes PDPs that are exempt from HMP criteria. For example, section 4.3.1 describes exemptions originating from Provision F.2.h.(3) of the Permit, to include: • PDPs that discharge runoff directly into underground storm drains discharging directly to bays or the ocean; and • PDPs that discharge runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to Ocean waters, enclosed bays,	Only engineered conveyance systems, which have the capacity to convey the 10-year flow for ultimate conditions and extend continuously to exempt receiving waters, are exempt from the requirements of this HMP. Such existing conveyance systems are not susceptible to hydromodification for the range of geormorphically-significant flows.

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	estuaries, or water storage reservoirs and lakes. The draft HMP states that "engineered sections" or "concrete channels" are exempt. However, the text broadly defines these areas as "metal, plastic, concrete, closed conduits, engineered earthen, concrete, reinforced concrete, riprap, and articulated concrete mat." This interpretation includes construction materials well beyond the scope of the Permit language, which narrowly includes channels "…whose bed and bank are concrete lined all the way from the point of discharge to [the receiving waterbody]." The expanded definition in the draft HMP does not meet Permit requirements and must therefore be removed. The text describing Figure 4-3 (nodes 4 and 5) has similar language describing the exemption, stating that for a PDP to qualify, "the existing hardened or rehabilitated conveyance system must continue uninterrupted to the exempt system." The text should be changed to state that "the existing concrete lined system must continue uninterrupted to the exempt system" to be consistent with Permit requirements.	
8	The draft HMP also includes an exemption from tidally influenced channel segments. The San Diego County HMP includes this exemption, but restricts it to lagoons. Additionally, the San Diego County HMP necessitates inclusion of an assessment by a certified biologist regarding the impacts caused by altered freshwater/saltwater balance from PDPs, and an energy dissipation system designed to mitigate the 100-year storm outlet velocity. Please include the same restrictions as the San Diego County HMP in the draft HMP or remove the exemption.	The exemption from tidally influenced channel segments was eliminated from the HMP.
9	Draft HMP section 4.3.2 describes an exemption for infill development projects, which is similarly included in the San Diego County HMP. This exemption is permissible in San Diego County because the performance standard is "…post-project runoff flow rates and durations shall not exceed pre-project runoff flow rates and	The exemption for infill development projects was eliminated from the HMP.

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	durations…" Under Order No. R9-2007-0001 (the San Diego County Municipal Storm Water Permit), there is no requirement that each project use the pre-development hydrology as the performance standard, only the pre-project hydrology. For example, a San Diego County redevelopment PDP replacing concrete with concrete may not necessarily include hydromodification management controls. In contrast, the Permit includes a requirement that PDPs meet the pre-development performance standard, which was intentionally included as a way to improve the watershed hydrology over time via redevelopment projects. Therefore, the blanket exemption for infill development is not appropriate under the Permit requirements and must be removed from the draft HMP.	
10	Draft HMP section 4.3.3 describes exemptions for in-stream flood control and restoration projects. This exemption is not explicitly allowed by the Permit, nor is it present in the San Diego County HMP. The San Diego Water Board recognizes that in order to protect public safety, the use of in-stream measures may be necessary, including the use of non-naturally occurring materials. However, it is not appropriate to provide a blanket exemption for such projects because this would discourage the project proponent from exploring more environmentally friendly options. We expect project proponents to explore all possible solutions for flood control, including solutions that would enhance creek beneficial uses, before the HMP requirements are concluded as technically infeasible. Therefore, this exemption must be removed from the draft HMP and flood control projects must be reviewed on a case-by-case basis.	The revised exemption for in-stream flood control and restoration projects obligates the Permittee to evaluate the feasibility of using natural materials for stabilization and rehabilitation projects on a case-by-case basis. If the use of natural materials is determined to be infeasible by the Permittee, the use of non-naturally occurring material will be allowed. (See subsection 4.3.ii)
11	In light of comments 7-10 above regarding draft HMP exemptions, please revisit the process associated with applicability of the draft HMP, as well as Figures 4-3, 4-4, 4-5, and 4-6 for accuracy.	Figures in Section 4 were revised accordingly.
12	Draft HMP section 4.4.1 describes alternative compliance options for PDPs unable to satisfy the numeric criteria due to technical	A revised formulation of the hydrologic performance standard identifies that, for offsite mitigation projects, the later must be capable of matching or reducing

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	infeasibility. The off-site mitigation option requires that a mitigation project be capable of treating the equivalent runoff volume that would have been treated from onsite hydromodification controls. However, the in-stream restoration option is less clear as to the minimum performance standard that would be required. If this option is to be reviewed on a case-by-case basis, then the draft HMP must indicate that the governing Copermittee is responsible for ensuring that the level of restoration is adequate given the PDP's impacts. For off-site mitigation or stream restoration, each Copermittee must require a mechanism to ensure completion of alternative compliance obligations by the project. Please describe in the draft HMP how the Copermittees will ensure that each project complete their obligations under the alternative compliance process.	the equivalent flow-duration curve (See subsection 4.1). Similarly, the revised text states that, for restoration projects, the governing Permittee is responsible of the performance equivalency of the project that will ensure the channel stability and restore the beneficial uses. In addition, a subsection entitled "Review Mechanism of Alternative Compliance Projects" (4.4.iii) was added to the document. The subsection provides guidelines to the Copermittees for establishing a mechanism that will ensure that the timing and financing of the project are secured. This will guarantee that construction will be completed and maintenance performed over the long term.
13	Please clarify that all PDPs that fail to meet the numeric criteria based on on-site management controls and that do not qualify for alternative compliance (due to technical infeasibility) are required to redesign the project (i.e. project approval shall not be granted unless criteria are met).	The revised subsection 4.1 states that "Priority Development Projects that fail to meet the dual performance standard or do not qualify for the alternate performance standard are required to redesign the project."
14	Draft HMP section 4.5.4 describes requirements for municipal roadway projects. The text states that projects that are not exempt have the option to implement a "green street approach" to meet compliance in lieu of standard requirements for both pollutant treatment and hydromodification mitigation. Please note that Permit section F.1.d applies to all streets, roads, highways, and freeways, and does not allow for deviation from standard requirements.	Municipal roadway projects have the option the implement a Green Street Approach, as advocated by the US Environmental Protection Agency, "…to provide source control of stormwater, limit its transport and pollutant conveyance to the collection system, restore predevelopment hydrology to the extent possible, and provide environmentally enhanced roads."
15	Draft HMP section 5.1 describes the process that will be required for all PDPs to ensure pre-project sediment supply. Please clarify how a project applicant would "replace" bed material supply if it is determined that land development would reduce the supply (Step 3, page 5-1).	Section 5.1 enumerates the sediment management measures to be successively considered by a project proponent, including (1) maintaining the pre-project bed material discharge from the site; (2) rerouting drainage pathways through coarse bed sediments onsite; or (3) providing additional mitigation in site runoff.
16	Draft HMP section 5.1 .2 describes the alternative compliance	Section 5.1.ii clarifies (1) the steps of the alternative compliance methodology

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	methodology for certain PDPs (as it relates to preserving sediment supply). Please clarify 1) how the alternative compliance methodology would function, 2) the trigger for when a project would be allowed to utilize this methodology, and 3) how this methodology would meet its goal of preservation of sediment supply.	and the role of the governing Copermittee; (2) the infeasibility of other onsite sediment management measures must be documented by a Professional Engineer to the governing Copermittee prior to pursuing this option; (3) maintaining the capacity-supply ratio within 10% of the unity will ensure the dynamic stability of the stream.
17	Draft HMP section 6.0 describes the proposed monitoring requirements in order to assess the effectiveness of the draft HMP. Please clarify how the proposed monitoring would accomplish an "effectiveness assessment" given the monitoring locations and monitoring frequencies proposed, as well as a description of what exactly will be assessed.	The revised Section 6 specifies that "The frequency and geographical distribution of the proposed monitoring actions is optimally selected upon identification of the scientifically-observed seasonal and geographical patterns of hydromodification and in-stream biological activity." In addition, a description of the hydrologic, geomorphic, and biological assessments to be performed as part of the effectiveness monitoring is provided in Section 6.
18	Please explain the difference between the geomorphic surveys and cross-section surveys, as described in section 6.4.	Subsection 6.4 describes the differentiation between geomorphic surveys and cross-section surveys. For instance, geomorphic assessments consist of characterizing the rate of change, if any, of bed material encountered, vegetation, and bed and bank lateral and longitudinal profiles that are derived from cross-section surveys.

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1	Page 1-1, Introduction, first paragraph, first lane: It says: "Hydromodification refers to the changes in magnitude and frequency of stream flows due to urbanization…" It should say: "Hydromodification refers to the changes in magnitude and frequency of stream flows and its associated sediment load due to urbanization or other changes in the watershed land use and hydrology …" Explanation: Urbanization is not the only factor contributing to hydromodification. Agricultural activities, construction of reservoirs, diversion of water and other human activities may affect sediment-water balance in a watershed and consequently cause hydromodification.	Noted. The sentence was reformulated as suggested.
2	Page 1-1, last lane of first paragraph: It says: "… below critical shear stress levels have little or no effect on the channel stability." It should say: "… below critical shear stress levels have no effect on the channel stability". Explanation: By definition, critical shear stress is the stress that causes incipient movement (Shields equation). Therefore, there is no sediment transport for flows that generate shear stress levels below such critical shear stress, and therefore such flows have no effect.	Noted. The sentence revised as suggested.
3	Page 3-1, second paragraph: It says: "The processes involved in aggradation and degradation are complex, but are caused by an alteration of the hydrologic regime of a watershed due to increases in impervious surfaces, more efficient storm drain networks, and a change in historic sediment supply sources." It should say: ""The processes involved in aggradation and degradation are complex, but are caused by an alteration of the	Agreed. "…, among other factors…" was added.

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	hydrologic regime of a watershed due to increases in impervious surfaces, more efficient storm drain networks, and a change in historic sediment supply sources, among other factors." Explanation: Urbanization is not the only factor contributing to hydromodification. Agricultural activities, construction of reservoirs, diversion of water and other human activities may affect sediment-water balance in a watershed and consequently cause hydromodification.	
4	Page 3-2, second paragraph: It says "Hydromodification BMPs differ slightly from those used to meet water quality objectives in that they focus more on matching undeveloped flow-regimes than on removing potential pollutants" It should say: "Hydromodification BMPs differ from those used to meet water quality objectives in that they focus more on generating a flow-duration curve that matches or reduces the undeveloped flow duration curve than on removing potential pollutants, …" Explanation: Differ slightly is a subjective qualification. It is not a slight difference between hydromodification BMPs and water quality BMP in my expert opinion, as the objective is different. Therefore, eliminate "slightly". Also, a hydromodification design can comply with HMP requirements simply by reducing the flow duration curve, as there are no requirements for flow duration comparison below a certain percentage of the flow or the time, only above certain percentage of the peak flow or the time duration. In other words, comparisons are made to be below the existing (or natural) flow duration curve, but not to be above certain percentage of the existing (or natural) flow duration curve. Consequently, the focus is not to match, it is to match or reduce the existing flow duration curve.	Agreed. As suggested, the sentence was revised.
5	Page 3-2, Flow Duration Control section: It says "Flow Duration Control matches both the duration and	Agreed. The sentence was corrected.

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	magnitude of a specified range of storms". It should say: "Flow Duration Control matches or reduces both the duration and magnitude of a specified range of storms". Explanation: A hydromodification design can comply with HMP requirements simply by reducing the flow duration curve, as there are no requirements for flow duration comparison below a certain percentage of the flow or the time, only above certain percentage of the peak flow or the time duration. In other words, comparisons are made to be below the existing (or natural) flow duration curve, but not to be above certain percentage of the existing (or natural) flow duration curve.	
6	Page 3-2, last paragraph: It says "Both methods employ continuous simulation to match flow-durations, but differences exist in how continuous simulation is used". It should say: "Both methods employ continuous simulation to match or reduce flow-durations, but differences exist in how continuous simulation is used". Explanation: Same explanation as in 5).	Agreed. The sentence was corrected.
7	Page 3-3, last paragraph (highlighted in yellow): It says "… (SOCHM) allows the user to match the flow duration curve …" It should say: "… (SOCHM) allows the user to match or reduce the flow duration curve …" Explanation: Same explanation as in 4).	Agreed. The sentence was corrected.
8	Page 3-4, first paragraph (fifth line): It says "Sizing factors are based on the soil type of the project site and are adjusted for Mean Annual Precipitation. " It should say: "Sizing factors are based on the soil type of the project site and are usually adjusted for Mean Annual Precipitation. " Explanation: the adjustment for mean precipitation is not always	Agreed. The adverb "usually" was added to the sentence.

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	considered. For example, in the HMP Document for San Diego County, the sizing tables are not adjusted by precipitation, as the entire County is divided in three sub-areas to size BMPs, and a given project belongs to Lindbergh, Oceanside or Wohlford area of influence, without adjusting for mean precipitation. In other words, there is an adjustment for location, but within the area of influence of the aforementioned stations there is no adjustment for mean precipitation, even if differences in mean precipitation are larger than 10%.	
9	Page 3-6, end of fourth paragraph: It says "The south Orange County program elected not to perform the extensive susceptibility mapping required to correlate channel reaches with variable low-flow discharge thresholds, since the return on investment for this type of analysis appears to be very low. " It should say: "The south Orange County program elected not to perform the extensive susceptibility mapping required to correlate channel reaches with variable low-flow discharge thresholds. Project proponents may use the susceptibility analysis method explained in the San Diego County HMP if they chose to do so, to determine if a receiving stream can be classified as having low, medium or high susceptibility and therefore optimize the design of hydromodification BMPs". Explanation: The justification for not using variable low-flow discharge thresholds is arbitrary, misleading, and contrary to scientific analysis, hydrology and sediment transport knowledge. It is also contrary to economical optimization of design, and gives an opinion without proper justification. From the scientific point of view, it negates the erosion and sediment transport concept of the beginning of sediment motion, and the applicability of the shields equation (see, among many others, Handbook of Hydrology, Chapter 12, and example 12.1 of how the sediment size affects the initial	Noted. No changes were made.

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	sediment movement). From the economical point of view, it describe a return of investment that is quantified as low, even though design tables in the San Diego HMP document show significant reductions in area and volume for HMPs designed under different thresholds with all other variables constant. For example, in soils type D, the reduction in Bio-retention area between a 0.1Q2 threshold and a 0.5Q2 threshold is more than 50%. Reductions in area and volume larger than 50% are common depending on the susceptibility of the receiving stream.	
10	Page 3-7, end of fourth paragraph: It says "It is also generally accepted that events more frequent than the 10-year flow are the most critical for hydromodification management, since flows within this range of return period (up to the 10-year event) perform the most work on the channel bed and banks. " It should say: "At this point, it is generally accepted that events more frequent than the 10-year flow are the most critical for hydromodification management, since flows within this range of return period (up to the 10-year event) are assumed to perform the most work on the channel bed and banks. However, it is recommended to analyze this point in river discharges for Mediterranean and semi-arid climates as those existing in Southern California, since the range of analysis may change in the future, increasing the low flow and high flow threshold to accommodate to the particular conditions of streams in Southern California. Explanation: Recent studies in the Santa Clara and Tijuana River suggest that events larger than the 10 year storm may have a larger importance than previously thought. Also, the importance of low events could be overestimated, so in the future the range of analysis for Mediterranean-like stream flows could be different. See also explanation in Question 1 of this document, after the comment	Noted. The revised sentence specifies that the range of analysis could potentially change if future studies would provide sufficient evidence warranting a modification.

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	section.	
11	Page 3-8, end of second paragraph: It says: "The implementation of HMPs in Northern California and in San Diego has shown that numerically larger low flow threshold generally have very limited applicability in practice. Accordingly, a base low flow threshold (0.1Q2) was selected for this HMP. Nonetheless, the applicant may compute a site-specific low flow threshold at their option." It should say: "~~The implementation of HMPs in Northern California and in San Diego has shown that numerically larger low flow threshold generally have very limited applicability in practice~~. According to recent experience in California, most applicants have chosen to use the low flow threshold (0.1Q2) to avoid a susceptibility analysis. Accordingly, a base low flow threshold (0.1Q2) was selected for this HMP. Nonetheless, the applicant may compute a site-specific low flow threshold at their option, following the methodology used in the San Diego County HMP Document". Explanation. The applicability of larger flow thresholds is not limited per se, but complex in its application and most applicants chose not to do it, due to the cost associated with a susceptibility analysis. For those project where it has been used (there are existing examples in the cities of San Marcos, Carlsbad and Poway), the susceptibility analysis have proven to be an effective tool to reduce significantly the size of the hydromodification BMPs, even if the simplified approach based on the Tables 7-1 to 7-4 of the San Diego HMP is used. Also, it is dangerous to compare hydromodification conditions in Northern California to Southern California, as the climate, precipitation patterns and distribution, total precipitation, influence of the snow in the stream discharge, and many other factors are completely different than in Southern California. Consequently, the initial statement regarding the limited applicability of numerically	Noted. The revised paragraph identifies that the low flow threshold was based on other approved HMPs in California with similar hydrologic and geologic conditions. In addition, the California Geological Survey identifies South Orange County and San Diego County to be within the same geomorphic zone (Peninsular Ranges).

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	larger low flow thresholds is misleading and should be eliminated.	
12	Page 3-12, second paragraph, stream power definition: It says: "Stream Power, which is related to the square root of total discharge, is the most comprehensive..." It should say: "Stream Power, which is linearly related to the square root of total discharge, is the most comprehensive..." Explanation: Stream power is the rate of energy dissipation against the bed and banks of a river or stream per unit downstream length. It is given by the equation: $\Omega = \rho g Q S$ where Ω is the stream power, ρ is the density of water (1000 kg/m3), g is the acceleration due to gravity (9.8 m/s2), Q is the discharge (m3/s), and S is the channel slope.	Agreed. The revised sentence defines a linear relationship between stream power and the total discharge.
13	Page 3-21, first paragraph: It says: "In addition, the Ackerman study (Table 3-3, item No. 3) published a set of generalized parameters that aggregates or "spatially lumps" the contributions of different soil/land use combinations in the upper watershed" It should say: "In addition, the Ackerman study (Table 3-3, item No. 4) published a set of generalized parameters that aggregates or "spatially lumps" the contributions of different soil/land use combinations in the lower watershed" Explanation: The Ackerman study refers to the lower reaches of Malibu Creek (per Table 3-3). Please review the paragraph to see if the intent of the text is the intent of what the authors wanted to say.	The corrected sentence specifies that the Ackerman study focuses on the lower reaches of Maliby Creek.
14	Figure 4-3: HMP Decision Matrix. There is a lack of correspondence between the Decision Matrix and the bullet points at the end of page 4-1 and the beginning of page 4-2. The last two bullet points (in-stream flood control or restoration project and projects discharging to large rivers) are not included in the Decision Matrix. Please correct the error.	The revised matrix includes all the decisional steps that a proponent should go through to determine if the project is subject to the requirements of this HMP.

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15	Figure 4-7: PDP Tiers. In the third oval it says "Small-sized Projects (< 1 acre)" and it should say "Small-sized Projects (< 1 acre that are PDP)" Explanation: Not all small-sized projects are PDPs.	The revised oval calls out for "Small-Sized Projects (< 1 acre) identified as PDPs".
16	Figures 4-9 and Figure 4-10. In the first rectangle to the left, on-site sediment supply is identified, but such a plan is not part of the HMP Criteria of 4.1. Either eliminate or add the criteria in section 4.1.	The performance standard of the HMP includes a hydrologic element and a sediment supply element. Subsection 4.1. identifies that a project proponent must meet the two elements of the performance standard to comply with the requirements of the HMP.
17	Figures 4-9 and Figure 4-10: No difference. Other than the oval at the top, there is no difference between Figure 4-9 and Figure 4-10. Why then two different matrix of decision are added in the permit when such matrices are exactly the same? Was the intent of the authors to have different matrices of decision and they simply copy one figure into another and forgot to update the second one? Please explain.	Small-project proponents are allowed to conduct a simplified technical feasibility study to determine if onsite management controls are feasible, as opposed to medium-sized project proponents, which are required to conduct a full-scale technical feasibility study of stricter requirements. Figure 4-9 and Figure 4-10 reflect this difference.
18	Page 5-2, fifth paragraph and second to last paragraph: It says: "The Geotechnical Engineer shall render an opinion …" and "The Geotechnical Engineer shall rate the site as having …" It says: "The Engineer shall render an opinion …" and "The Engineer shall rate the site as having …" Explanation: The permit should be more general. Typically a Geotechnical Engineer may not be knowledgeable in sediment transport, fluvial geomorphology, or related fields. A Civil Engineer with hydraulic specialization, a Hydrologist or a Geo-morphologist could be other options, but in general it should be The Engineer. Note: In general, avoid the use of the term Geotechnical Engineer and replace by Engineer. Geotechnical Engineers are not necessarily experts on sediment transport or fluvial geomorphology.	Agreed. The terms "Professional Engineer" or "Engineer" are consistently referenced throughout the document.
19	Page 5-3, first paragraph after bullet points: It says: "The Engineer will qualitatively assess the receiving stream using the metrics noted and rate the potential …."	Noted. The sentence was revised to "The Engineer will qualitatively assess the receiving stream using the **gathered observations** and rate the potential…"

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	It should say: "The Engineer will qualitatively assess the receiving stream using the metrics noted observations gathered and rate the potential …." Explanation: there are no metrics. A high, medium, low rating is not considered a metrics, and the sieve analysis is not associated with a threshold, an equation or a table. Basically, the method is a professional judgment based on perception.	
Q1	Page 3-2, Hydrograph Matching Section: Concern: Please explain the following statement: "this method generally does not take into account the smaller, more frequent storms where a majority of the erosive work in stream channel is done and is therefore not widely…" or eliminate the text in bold letters. Explanation of concern: Provide a justification of why the majority of the erosive work in stream channels is done for smaller storms. In studies performed in Southern California (see for example Warrik and Milliman, (2003). "Hyperpycnal Sediment Discharge from Semi-arid Southern California Rivers: Implications for Coastal Sediment Budgets". Geology.2003; 31: 781-784) some rivers located in the Transverse Range in Southern California show highly pulsating sediment discharges associated with extreme events. For example, in Santa Clara River, 75% of the sediment transport has occurred in 30 days in the last 50 years (0.15% of the total period analyzed).Also, the author has study 73 years of the Tijuana River data and concluded that most of the sediment transport (60 to 75% depending on the sediment transport equation used) can be carried in less than a day per year, based on daily measurements performed by the USGS and the IBWC. From the analysis of Southern California data, it seems that larger extreme events, although infrequent, carry most of the sediment and cause of the geomorphologic changes in Southern California climate. It is important that any reference mentioned in	Several susceptibility studies, including one in San Diego County, have documented that events more frequent than the 10-year flow perform the most work on the channel bed and banks. The range of analysis could potentially be changed in the future if future studies provide sufficient evidence regarding the impact of rarer events on stream stability. The revised sentence conveys this position: "…this method generally does not take into account the smaller, more frequent storms **that are identified by the actual state of the science as performing a majority** of the erosive work in stream channel and is therefore not widely accepted for HMP compliance nor recommended for use as a part of this plan..."

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	terms of sediment transport is associated with climatic conditions similar to those of Southern California (Mediterranean to semi-arid) and not with conditions similar to those in the North-East or the North-West of the Country where precipitation frequency and distribution is completely different.	
Q2	Page 3-5, second paragraph: "Urbanization can reduce the mass of bed material transported through the elimination of alluvial channel sections. This occurs in site development when first order and particularly larger streams are lined or placed into underground conduits. There are two general approaches for managing the bed material load relative to urbanization and channel stability. The first approach attempts to correct for the change in bed material load by increasing or decreasing the discharge rate as appropriate to generally maintain the balance described by Lanes relation. While theoretically a sound approach, this option requires a significant amount of detailed information that is difficult to obtain and requires good calibration of sediment models. Sediment transport models are non-linear and relatively sensitive to the rate of sediment supply and particle size distribution. Guidance for site specific analysis is provided in Appendix D." Concern: This entire paragraph should be re-done. The Lane relation is not an equation. The Lane relation is a simple attempt to explain factors that affect sediment transport. Therefore, it is not a balance equation per se, not a theoretical sound approach to do sediment transport model as the paragraph implies. Also, Appendix D does not provide any guidance for specific analysis as it not suggest any sediment transport model. Among sediment transport models, the author of this notes can mention The Duboys Formula, the Meyer-Peter Formula, the Einstein Bed Load Function, the Modified Einstein Procedure, the Colby's Method, and many other methods like	Noted. Lane's interrelationship conceptualizes the balance between hydrologic and geomorphic processes; this is stated in the revised paragraph. In addition, the revised HMP does not recommend any specific sediment transport equation or model, but rather provides a non-exhaustive list of models to be considered by the designer for a specific site analysis.

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	Engelund and Hansen, Ackers and White, Tofalleti, and Yang. Different models can give responses of almost an order of magnitude even with good data, and sediment transport is one of the most complex and not well understood fields associated with hydrology. The paragraph actually confuses the designer and does not provide any specific guidance on how the sediment transport is intended to be used for modeling or design purposes.	
Q3	Page 3-5, third paragraph: "The second approach to maintaining sediment supply is physically based, relying on a field assessment of site locations that may supply bed material load to the receiving channel, and protecting those sources during the site planning and development process. With this approach, the project proponent need only provide engineered solutions for flow mitigation. Protection of site bed material sources is the preferred approach since it is physically based and potentially less prone to error. Guidelines for field assessment of bed material sources are provided with the Sediment Supply Management approach, which is described in Section 5.1." Concern: This entire paragraph should also be re-written. Section 5.1 does not provide any specific guidance for the complex sediment yield analysis. It only provides an entirely subjective approach that is not based on technical expertise. Questions or concerns related to section 5.1 are also part of this document.	Noted. "**General guidance only** for site specific analysis is provided in Appendix D. "
Q4	Page 3-9, second paragraph from the bottom: "The ability of a stream to transport sediment is proportional to the amount of flow in the stream: as flow increases, the amount of sediment moved within a channel also increases. The ability of a stream channel to transport sediment is termed stream power, which integrated over time is work. Leopold (1964) introduced the concept of effective work, whereby the flow-frequency relationship of a channel is multiplied by sediment transport rate. This gives a mass-	Agreed. Leopold's findings (1964) derive from studies performed in other hydrologic and geomorphic conditions. However, mentioning Leopold's findings in this HMP is important as it describes the history of hydromodification management measures. Leopold's findings had originally led to the adoption of the hydrograph matching measure of the dominant discharge. This methodology has been demonstrated to be ineffective in several other studies. Recent California-based studies have demonstrated that a range of geomorphically-significant flows perform the most work in streams, which serve as the basis for

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	frequency relationship for erosion rates in a channel. Flows on the lower end of the relationship (e.g., two-year flows) may transport less material, but occur more frequently than higher flows, thereby having a greater overall effect on the work within the channel. Conversely, higher magnitude events, while transporting more material, occur infrequently so cause less effective work. Leopold found that the maximum point on the effective work curve occurred around the 1-to 2-year frequency range. This maximum point is commonly referred to as the dominant discharge. It corresponds roughly to a bankfull event (a flow that fills the active portion of the channel up to a well-defined break in the bank slope)." Question: Are Leopold findings associated with streams similar to those encountered in Southern California, or for wetter climates where there is a base-flow, an important component of snow-melt related runoff, and other conditions that are not applicable to Southern California? Can the maximum point of effective work we displaced towards higher flows in Southern California, as measurements in the Santa Clara and Tijuana Rivers suggest?	this HMP. Warrick's study suggests that 40% of the cumulative loads discharged to the Pacific Ocean are associated with hyperpycnal events (rarer than 10-year flow) for the San Luis Rey River. The finding is certainly interesting for further scientific investigations as several unknowns remain before applying it for hydromodification purposes: uncertainty associated with load calculations, relationship between sediment transport and sediment yield, effective work performed in the channel, etc. As stated in the document, the upper flow threshold is based upon the actual state of the science and other approved HMPs in California. The range of geomorphically-significant flows could potentially change in the future if studies were to consistently prove (not suggest) the importance of higher flow events.
Q5	Page 3-10, 4th paragraph: "SCVURPPP expressed Qc as a percentage of the two-year flow in order to develop a common metric across watersheds of different size, and allow for easy application of HMP requirements. For the two watersheds studied in detail in the SCVURPPP study, a similar relationship was found where Qc corresponded to 10 percent of the two-year flow. This became the basis for the lower range of geomorphically significant flows under the SCVURPPP HMP and is referred to as Qcp to indicate that it is a percentage of flow. That program also adopted the 10-year flow as the upper end of the range of flows to control with the justification that increases in stream work above the 10-year flow were small for urbanized areas. Questions: Is the two-year flow in the SCVURPPP study a continuous-	The revised HMP identifies the methodologies used in the Santa Clara HMP to determine both the two-year and the ten-year flows. In occurrence, the two-year flow was computed based on either the rational method or continuous simulation, depending on the cross-section being considered. Ultimately, the selected methodology must relate the identified dominant discharge to a critical shear stress initiating movement of bed material. This HMP recommends that the two-year flow be determined based on continuous simulation by applying a Weibull ranking schema (See Section 3.3). In the San Diego HMP, the identification of the low-flow threshold is based on 170 hydrogeomorphic scenarios including 5 different types of bed material and 36 different channel conditions, which covers the majority of hydrogeomorphic settings of Southern California. This South Orange County HMP selects the most conservative critical flow category as a basis for development. However, a

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	modeling Q2 or a Q2 obtained with a hydrology manual and based on a synthetic precipitation distribution? Are 2 watersheds considered as a statistically representative sample of potential conditions of low flow threshold for endless possibilities of geomorphologically diverse watersheds? Is the climate in those two watersheds similar to the typical Mediterranean climate in Southern California, with the same total precipitation and precipitation pattern distribution?	project proponent is allowed to compute its own low-flow threshold. The susceptibility tool that was developed as part of the San Diego HMP may be used at this purpose. Finally, the 36 different channel settings considered in the San Diego HMP are based on three types of annual rainfall depths.
Q6	Page 3-11, first paragraph after Table 3-1: "As noted previously the South Orange County HMP has selected a low flow threshold (0.1Q2) as a default value. The project proponent may put forth other low flow thresholds for individual projects, but other low flow thresholds will require site-specific justification using modeling or field tests to support the unique threshold value." Question: Is the San Diego HMP susceptibility analysis method valid in South Orange County?	According to the California Geological Survey, South Orange County and San Diego County are located within the same geomorphic zone (Peninsular Range), thus exhibiting similar macro-scale geomorphic trends. The San Diego HMP susceptibility analysis is applicable to South Orange County.
Q7	Page 3-17, fourth paragraph: "For the statistical analysis of the rainfall record, partial duration series events have been separated into discrete rainfall events assuming the following criteria. 1. To determine a discrete rainfall event, a lower flow limit was set to a very small value, equal to 0.002 cubic feet per second (cfs) per acre of contributing drainage area. 2. A new discrete event is designated when the flow falls below 0.002 cfs per acre for a period of 24 hours." Concern: The previous approach is not a precise approach, and leads to underestimation of Q2, especially in Southern California. A better method is to estimate a mathematical peak flow with a given threshold based on distance of the peak to adjacent peak flows. Explanation of concern: Please refer to Appendix 1 of this Document. The methodology of calculation must be changed to perform a better estimation of Q2.	Agreed. The flow-frequency methodology included in the San Diego HMP leads to underestimated two-year flows, and subsequently oversized mitigation BMPs. The South Orange County Hydrology Model and the revised South Orange County HMP are based on: - A minimum interval of 24 hours between peaks is applied to capture those peaks generated from back-to-back storms. - The Weibull plotting method is used to rank the selected peaks as the method was specifically developed for California-based streams, where wet-weather and dry-weather years produce two populations of flood events.

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Q8	Page 3-18, second line of Table 3-2: Inclusion of Sulphur Creek Reservoir Data. Concern: The data from Sulphur Creek may not be statistically similar or comparable to the Laguna Beach Data or Trabucco Canyon Data. It does not include the wet 80's decade, and it may generate unrealistic results. The problem with southern California precipitation is that differences in precipitation can be larger than 10% even among 30 years of data at the same location, so a statistical analysis must be performed to see if the Sulphur Creek Reservoir data has statistical significance when compared to Laguna Beach and Trabuco Canyon. A simple way to analyze this problem is the following: obtain the mean precipitation and daily standard deviation of the Laguna Beach (and Trabuco) data from the total record of analysis and then do the same in Laguna Beach (and Trabuco) for the 1991-2006 data. If differences are not significance within Laguna Beach (and within Trabuco) then the 1991-2006 period is statistically representative; otherwise, Sulphur data needs to be excluded or modified.	A statistical comparison revealed that rainfall depths at the Sulphur Creek station differ by less than 3% than that at the Laguna Beach station over the 1991-2006 period. The disaggregation of hourly rainfall data at the Laguna Beach station from real-time rainfall data at Sulphur Creek is statistically justified. In addition, rainfall information from the Sulphur Creek station is not integrated into the South Orange County Hydrology Model.
Q9	Page 4-12, last three lines of the second paragraph: "… These findings apply to the south Orange County region as the physiographic, geomorphic, and environmental conditions are similar to those encountered in San Diego County." Concern: The HMP document claims that there are similarities between Orange County and San Diego County in terms of physiography, geomorphology, and environmental conditions (which I believe is true). However, the parameters presented in Table 3-4 for continuous simulation modeling couldn't be more different than those recommended in San Diego. Question: please explain why the differences (especially in the following parameters: BASETP, CEPSC, DEEPFR, INFILT, INTFW, KVARY, LZETP, LZSN, UZSN), and if those differences are not an indication of the difficulty to work with such a complex model with	The base set of HSPF parameters selected for SOHM derives from the Bay Area Hydrology Model (BAHM) developed by Clear Creek Solutions. Clear Creek Solutions modified the base parameters for the SOHM based on their best professional judgment and their HSPF modeling expertise to better match the vegetation categories that are specific to South Orange County. The revised text reflects this process. Finally, the SOHM tool integrates four categories of overland slope: flat (0-5%), moderate (5-10%), steep (10-15%), and very steep (higher than 15%). The modeler may select the appropriate land slope for each project subcatchment based on field or desktop measurements.

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	too many parameters to calibrate properly. Also explain why Orange County model only uses one value of overland flow slope (0.2 per Table 3-4) as such parameter is easy to determine in the field or with contour lines.	
Q10	Page 4-15, (last three lines) and page 4-16 (first line): "If PDPs are unable to meet the HMP criteria by incorporating onsite hydromodification controls, and a HMP mitigation bank is available, the PDP can apply to participate in the bank. The application must include a technical feasibility study to identify why onsite hydromodification controls cannot be incorporated into the project." Question: Why a feasibility study is needed if a bank is available? I believe that this actually defeats the purpose of the bank, as does not give any incentive to the proponents of a project to participate in a bank but instead to do onsite hydromodification, which may not be the best use of the resources.	Comment noted. The implementation of onsite controls is a Permit requirement and should be considered as the first option by the project proponent. In addition, establishing such a mitigation bank will require significant resources and coordination from and between the governing jurisdictions.
Q11	Page 4-18, first bullet-point (and also Figure 4-8, left rectangle mentioning sediment supply): Meet the HMP Criteria identified in Section 4.1 by mitigating flow and duration through on-site hydrologic control measures and addressing sediment loss through onsite management controls Question: Other than a simplified high-medium-low methodology of sediment evaluation, and an avoidance of construction in areas that could generate beneficial sediment production (using an evaluation method not described) how the permit expect the proponent to address the sediment loss? How can a small project add a sediment supply into a stream with the myriad of regulations tied to stream modification?	Comment noted. The implementation of sediment management measures is a Permit requirement.
Q12	Page 4-20, first paragraph: "Tier 2 includes medium size development projects of area comprised between one acre and 100 acres, as well as re-development projects of one acre or more. The two boundaries define Tier 2. Tier 2	Comment noted. Projects, which result in the disturbance of one acre or more land, are classified as Priority Development Projects per the Permit definition. Reducing the imperviousness on a project will ultimately facilitate a project proponent meet the hydrologic and sediment supply standards.

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	development or re-development projects will be subject to a large panel of spatial, environmental, financial, technical, and permitting constraints". Question: What happens if a re-development project reduces the impervious area? Isn't the project by definition improving hydromodification conditions?	
Q13	Page 5-1, last lines of the third paragraph: "The resiliency of receiving channels to forestall changes in the watershed due to urbanization varies with the magnitude of the change and characteristics of the channel (bed and bank material, vegetation, channel cross section and slope). It is difficult to quantitatively predict the response in a receiving channel to changes in the fundamental variables described by Lane (1955) of discharge, bed material grain size, channel slope and sediment supply. Accordingly, the most effective approach to ensuring channel stability may be to avoid changes in the fundamental variables (Lane's relationship) during urbanization through the implementation of stream channel management guidelines. In the case of bed material sediment supply, this will be accomplished by avoiding development in areas that are a significant contributor of bed material load to the receiving channel". Question: What are the criteria or methodology to establish if an area is a significant contributor of bed material load to the receiving channel?	The triad approach, as detailed in Section 5.1.i., identifies the analyses that a project proponent or the inducted Professional Engineer must conduct to determine if a project site is a significant contributor of bed material to the receiving streams. The analyses include: on-site and in-stream sieve analyses, estimation of sediment delivery potential, and characterization of existing and future geomorphology of the receiving channel.
Q14	Page 5-1, general approach, points 1, 2, and 3: "The general approach to ensure maintenance of the pre-project sediment supply is a three-step process: 1. Determine whether the site is a significant source of bed material to the receiving stream. 2. Avoid significant bed material supply areas in the site design. 3. Replace significant bed material supply areas that are	See response to question #13. The triad approach, as detailed in Section 5.1.i., identifies the analyses that a project proponent or the inducted Professional Engineer must conduct to determine if a project site is a significant contributor of bed material to the receiving streams. The delineation of areas identified as significant contributors of bed material will be performed as part of the second step in the triad approach. If it is infeasible to avoid on-site streams that contribute significant bed material

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	eliminated through urbanization." Questions: how the determination of significance is made? What equations or methodologies are suggested? How to delineate areas of significant bed material? What are the metrics used for significance? How the replacement of significant bed material supply is intended to occur?	load in the design of the site plan, the drainage may be moved and replicated elsewhere on the site.
Q15	Page 5-1, last paragraph: "An alternative compliance option allows the project applicant to model the site conditions and the receiving stream and provide additional mitigation in site runoff to compensate for the reduction (or addition) of bed material. This option may only be used if the general approach outlined above is deemed infeasible by the permitting authority, or if the project site design requires significant alteration of on-site streams". Questions: what model is recommended, a sediment production model (Universal Soil equation, for example), a sediment yield model, or a sediment transport model? How the permit intent the proponent compensates for potential lack of sediments? Adding sediments to the stream? Are sediments considered a pollutant?	If the significant replacement of bed material supply is deemed infeasible by the permitting authority, an erosion potential management objective will serve as the alternative performance standard. The option consists of adjusting the flow duration curve to achieve an optimum capacity-supply ratio within 10 percent of the unity, which has proven to ensure the dynamic stability of alluvial streams. In an effort to offer sufficient flexibility to the Professional Engineer, the South Orange County HMP does not suggest using a specific sediment transport model, but rather provides an overall framework for achieving the alternative performance standard. A non-exhaustive list of sediment transport models is provided in Section 3.
Q16	Page 5-3, fourth bullet point: "Transport vs. supply limited streams. Receiving streams that are transport limited may be better able to buffer changes in bed material load as compared to streams that are supply limited". Question: what methodology the permit suggests to determine such classification?	Question noted. The identification of short-term and long-term erosional and/or depositional processes in a specific receiving stream is not specifically stated in the Permit. A non-exhaustive list of sediment transport models is provided in Section 3 and it will be the Engineer's responsibility to make that determination.
Q17	Page 5-3, third paragraph from the bottom: "The final recommendation will be guided by the triad assessment. Projects with predominantly high values for each of the three assessment areas would indicate preservation of on-site streams. Sites with predominantly medium values may warrant preservation of some of the on-site streams, and sites with generally low values	In an effort to offer sufficient flexibility to the Professional Engineer, the South Orange County HMP does not specify any particular sediment transport model, but rather provides an overall framework for meeting the sediment supply performance standard.

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	would not require site design considerations for bed material." Comment: The "triad" assessment is a very basic approach of a very complex problem. It does not use any sediment yield method, or sediment transport method, any threshold of significance, or any analytical method of significance to establish a very basic "low – medium – high" determination of an extremely complex situation. As presented, this approach can be used for any possible problem and may generate a different response for different professionals rendering an opinion.	
Q18	Page 5-4, Step 3: "Step 3 If it is infeasible to avoid on-site streams that contribute significant bed material load in the design of the site plan, the drainage(s) may be moved and replicated elsewhere on the site, provided the Engineer will certify that the relocated drainage course has a similar potential to generate bed material load. The Geotechnical Engineer will also certify that the revised drainage location is in substantially similar material as the natural stream location. " Comment: Replace Geotechnical Engineer by Engineer. Question: What sediment yield method / sediment transport method is preferred to prove that the drainage has been properly replicated? Is there any geomorphologic parameters or thresholds that should to be satisfied?	The title "Engineer" or "Professional Engineer" was consistently employed throughout the management plan. Several sediment yield methods or sediment transport methods are available in the literature for the project Engineer. The recent SCCWRP Report # 667 summarizes several of these methods and constitutes a good starting reference. Each project site will face its own challenges and constraints and identifying one particular method would not necessarily be appropriate for certain site conditions, thus limiting the opportunities to meet the performance standard. The governing jurisdiction will ultimately decide whether the method used to determine compliance with the sediment supply standard is justified and appropriate.
Q19	Page 5-4, section 5.1.2, numeral 2: "2. Sediment transport model of the receiving stream for the project baseline condition and proposed condition" Question: What sediment transport method is preferred? The Duboys Formula, the Meyer-Peter Formula, the Einstein Bed Load Function, the Modified Einstein Procedure, the Colby's Method, or any other methods like Engelund and Hansen, Ackers and White, Tofalleti, and Yang?	Noted. The revised HMP does not recommend any specific sediment transport equation or model, but rather provides a non-exhaustive list of models to be considered by the designer for a specific site analysis. Each project site will face its own challenges and constraints and identifying a particular sediment transport model would not necessarily be appropriate for certain site conditions, thus limiting the opportunities to meet the performance standard.

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Q20	Appendix D, numeral 5. Sediment transport modeling has inherent uncertainty. The agency may not approve a site specific analysis if it is apparent that the change in conditions that will be modeled are about the same magnitude as the model uncertainty. Comment: Numeral 5 should be eliminated unless a scientific approach, threshold or other measurable parameter is established to determine the relative uncertainty of a model compared to the change in surface conditions. Numeral 5 establishes a dangerous precedent in terms of the approval of a technical study. It basically establishes that a site specific analysis may not be approved regardless of the quality of the assessment, as by definition, model uncertainty in sediment transport is often as large as the change in conditions in the watershed.	Comment noted. The uncertainty of results should always be considered.