SANTA MARGARITA REGION HYDROMODIFICATION MANAGEMENT PLAN

COMMENTS

1) Page 1, end of third line from the bottom: it says: (See **Section**). Please identify the section.
2) Page 1, last line from the bottom: (See **Section i**). Section I does not exist. Please correct.
3) Page 3, end of third paragraph and start of title: please add space before *"How to meet the hydrologic…"*
4) Page 3, first line after second italic title: It says **Section 2.3.,** Please eliminate period or complete the section number.
5) Page 10, 2nd line of last paragraph: It says "…criteria identified in **Section 2.2**." It should say: "criteria identified in this section."
6) Page 11, last line of second paragraph: please correct the format so that so many spaces are not inserted in a short length line.
7) Page 13, third paragraph: It says: "Use of the continuous modeling approach allows for the estimation of the frequency and duration by which flows exceed the lower flow threshold (adopted as 10% of the 2-year flow for this plan)." It should say: "Use of the continuous modeling approach allows for the estimation of the frequency and duration by which flows exceed *the significant flow range (with a lower flow threshold adopted as 10% of the 2-year flow for this plan, and an upper flow value adopted as 100% of the 10-year flow for this plan, which is considered the significant flow range)*." The change is proposed because the flow may not exceed the lower flow threshold itself, but it may exceed other flow values in the significant flow range, and also because significant flow range mentioned later is not defined.
8) Page 14, third paragraph: "… since the peak annual series does not perform as well in the estimation of such events due to limited data sets." It should say: "… since the peak annual series does not perform as well in the estimation of such events due to the bimodal nature of the precipitation of Southern California (few wet years with many events, many dry years with few events)"

   Explanation: Limited data is not the reason for peak annual series performing poorly. For example, even for the Tijuana River, where more than 80 years of daily runoff has been measured, peak annual series gives poor statistics. The reason is more complex: the bimodal nature of the precipitation in Southern California, and the clustered nature of it (this bimodal property is even more accentuated in runoff time series than in precipitation time series). In Southern California, more than half of the years of data are dry years with little to zero runoff. Therefore, selecting annual peaks imply that more than 50 percent of the annual peaks will corresponds with peaks in dry years, and will force Q_2 to be associated with a dry year. In wet years (which are roughly 20 to 25% of the years), many independent peak flows exceed the peak flow of a dry year. Therefore, many peaks are not selected in the statistical analysis, even if they have to be mitigated in the continuous simulation. This problem does not occur with partial duration series: the largest "N" peaks are selected in "N" years, and the peak selected as a representative of Q_2 does not belong to a dry year but to a moderately wet to wet year, since only 30% to 40% of the years have representation in the largest N peaks (and usually less than 35% of the years have representation in the largest N/2 peaks).

9) Page 14, numeral 2: it says: … is used to rank the selected peaks as the method was specifically developed for California-based streams…" It should say "… is used to rank the peaks selected by the partial duration

method as this method is the most adequate for statistical analysis of Southern-California-based streams…"

Explanation: Weibull method is not a method specifically tailored for Southern California; it is a typical statistical plotting position method similar to Cunnane, Blom, Gringorten and Hazen (see, among other references, Handbook of Hydrology, Chapter 18). All those methods determine the same Q_2 (which happens to be the median of the peaks selected) but differ in the inferred peak flows for larger Return Periods, and in particular for the Return Period of the largest observed value. Therefore, it is not correct to state that Weibull is a California based method.

10) Page 17. It could be helpful to provide Figure 2 in 11 x 17. A more detailed map could be available on the web for download.
11) Page 20. Figure 3. The use of urban-agriculture vegetation type contradicts the pre-development definition adopted by the Water Board (comparison should be made to Pre-Columbian / Pre-Project conditions conditions).
12) Page 23. Last time: (Note: Option 2(c) is available… It should say: (Note: Option 2 is available…
13) Page 30: Last line: … and a 2-year return period. It should be … and a 2-year runoff return period. The return period that is important is the runoff return period not the storm runoff period: depending on the antecedent moisture conditions of the soils, and especially taking into account the results of the continuous simulation, a 2-year storm does not necessarily corresponds with a 2-year runoff event, and those concepts are not interchangeable.
14) Page 33: fourth bullet point: eliminate or and include or in the fifth bullet point.
15) Page 35: Figure 5 explanation: a verb is missing in the middle. It says: "PDPs may also project-specific stream stability analysis…" It should say (I believe): "PDPs may also prepare a project-specific stream stability analysis…"
16) Page 47: Please correct format for paragraph in section 3.2.vi.
17) Page 54, second paragraph: It says: "The majority of Tier 2 projects are completed within a very limited amount of space, making it unlikely the applicant will be able to implement onsite management controls." It should say: "The majority of Tier 2 projects are completed within a very limited amount of space, making it likely the applicant will not be able to implement onsite management controls." There is a negative presumption in the first alternative, while in reality, despite the limited space, designers have been able to accommodate for hydromodification controls most of the time. Therefore, the second alternative is preferred.

DISCUSSION AND ADDITIONAL COMMENTS

1) Page 1, Second bullet-point from the bottom: The definition adopted is an incomplete definition because the 1-inch orifice does not guarantee in itself a given discharge. What is the discharge coefficient of the orifice? What is the head of the orifice? As an example, a ¾" orifice with a head discharge of 2 ft over the centroid (for example 2 ft of gravel in a bioretention cell) has the same discharge of a 1" orifice with a head discharge of 0.63 ft over the centroid (assuming same Cg). However, the former is not allowed while the latter is. I understand that the former is more likely to clog, but the size constrain should be tied to a minimum size orifice under a minimum head. Hydromodification is a complex issue: You may say that a given 0.75" orifice must be increased to 1" due to clogging issues, but in reality you could have designed the system with a lower head in the first place, a larger area of BMP, and a thicker amended soil layer (with an almost uniform discharge) so not to force the 1" criteria and deviate outside the range of compliance unless absolutely necessary. I think that a minimum orifice is a necessary constrain, but I believe the criterion as proposed is incomplete, and must be explained in more detail.

2) Page 1, Second bullet-point from the bottom: In addition to a better explanation in terms of when to apply the minimum 1 inch criterion, the document should state clearly a sentence like this: "If a given project does not control the entire range of analysis once the minimum size orifice of 1 inch with a reasonably low head has been designed, then Hydrologic and Sediment Control between $0.1 \cdot Q_2$ and the minimum discharge provided by the 1-inch orifice is exempted for hydromodification compliance"

3) Page 1, last bullet point: The drawdown criterion needs further explanation. Does it apply only to the surface portion of a bio-retention basin for example? Why is not 96 hours, as in the San Diego HMP, which is tied to the standards from the California Department of Public Health (CDPH) available here: http://www.cdph.ca.gov/HealthInfo/discond/Documents/BMPforMosquitoControl07-12.pdf

4) Page 7, third paragraph: there is a positive effect in base flow not discussed here. The positive effect in base flow due to irrigation that is now possible thanks to the water storage in the reservoir should be counted as a benefit in an overall analysis. Also, depending on the way the reservoir functions, it may include a relatively large amount of water that does not belong to the watershed (transported from other wetter regions, which is typical in SoCal) and assuming that every reservoir causes a reduction in base flow simplifies too much the complexity of the water movement in California. It would be desirable to include this discussion in this section.

5) Page 7, last paragraph: The discussion presented avoids the reality of low flows (perennial flows) that sometimes are observed in Temecula and Murrieta due to excessive irrigation. I live in this region, and many natural creeks along the French Valley area that do not have housing developments upstream are dry in most years by the middle of the summer; however, other tributaries with even smaller watershed in the same climatic conditions are permanently wet due to the excessive irrigation from development that percolates to those stream. I believe that a discussion of this type should be included in this section.

6) Page 10, second paragraph: Is the Susceptibility Analysis as developed by SCCWRP (Southern California Coastal Water Research Project) a valid tool to justify a low threshold other than $0.1 \cdot Q_2$? If so, it could be mentioned in this paragraph.

7) Page 13, last paragraph before bullet points: **"The SMRHM is the only software that is approved by the District and the Copermittees**. However, the project proponent may opt to develop its own model using publicly-available software, which performs continuous hydrologic simulations over the available period of rainfall records (over 30 years). The use of a different model than SMRHM is subject to prior approval by the governing Copermittee. The following public domain software models may be used:"

   In my opinion, this is a very dangerous precedent, and is against the use of widely accepted public domain software for hydromodification analysis by the Professional Engineer. It is also against typical language in already operational HMP Documents, especially in southern California (San Diego and also Orange County). This sentence (and the explanation that follows in the same paragraph about the use of a different model) establishes that for a different model to be used the Copermittee has to approve it, instead of being first approved in the HMP and then the Copermittee (and its consultant of choice) establishing guidelines for its use, as in San Diego County. Some of the problems with this all-eggs-in-one-basket approach follow:

- Establishes a monopoly for SMRHM as the only acceptable model
- Assumes a priori the infallibility of SMRHM, despite of the multiple shortcomings that the model has had in San Diego (SDHM) in terms of simplifications in the statistical analysis methodology that leads to overdesign, un-calibrated variables that cannot be modified, lack of consideration for the routing process (i.e. peak flows per unit area are constant regardless of the contributing area size), and errors in the determination of the discharge equations that control the behavior of BMPs.
- Makes the use of other options almost impossible, and therefore, prevents the use of models that can be better optimized such as SWMM, where more than 40 Projects have been designed in San Diego County with millions of dollars in savings without compromising compliance

   This sentence should be changed in a similar fashion as in the San Diego County-HMP (or a similar alternative with the same intent):

   "The SMRHM is the preferred software that is approved by the District and the Copermittees. However, the project proponent may opt to develop its own model using publicly-available software, which performs continuous hydrologic simulations over the available period of rainfall records (over 30 years). ~~The use of a different model than SMRHM is subject to prior approval by the governing Copermittee~~. The following public domain software models may be used to assess hydromodification controls for storm water facilities to meet Hydromodification Criteria:"

   After the bullet points, the document may add (similarly to SDC-HMP):

   Third party and proprietary software can be used to meet the Hydromodification Criteria provided that the software incorporates minimum design parameters summarized below: *(see pages 4-11 and 4-12 of the San Diego County HMP for complete language)*.

8) Page 24, second paragraph: It says: 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. The technical feasibility study must include the project constraints and detailed technical justification as to why the project constraints prevent implementation of onsite controls.

   It should say: "If PDPs are unable to meet the HMP criteria by incorporating onsite hydromodification controls *or if in the location of the project it has been established by the corresponding Copermittee that a regional solution is a more efficient and suitable alternative*, 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 *or refer to the technical study where it has been established that regional controls is the most appropriate solution to hydromodification control in the location of the project*. The technical feasibility study must include the project constraints and detailed technical justification as to why the project constraints prevent implementation of onsite controls, *or as to why a regional solution has been selected as the preferred option*.

   Explanation: Without trying to force a language (which has only been suggested by the comment) the idea behind this discussion is to encourage Copermittees to perform technical and benefit/ratio analysis to implement solutions in watersheds associated with restoration projects or similar regional projects. Many times tryING to solve hydromodification problems in certain watersheds by only forcing the proponents of new projects to spend money in site-specific hydromodification controls is inefficient at best, and a waste of limited resources at worst, without accomplishing improvements of significance. The HMP document should encourage studies where mitigation banks are not only an alternative *but more importantly the preferred alternative* for those sub-watersheds where such solution is the most adequate and efficient. As written, the permit only uses mitigation control as an alternative when onsite control is not feasible, regardless if it such controls are unpractical or if it makes less sense to perform onsite control over more efficient mitigation opportunities somewhere in the watershed.

9) Page24, second paragraph from the bottom: coarse sediment (bed material) should be properly defined. Although it is loosely defined in the last paragraph of this page, there is no indication of the expect size range that bed material is supposed to be. Typically, coarse sediment could be coarse sand (1 -2 mm), coarse gravel (64 – 128 mm), or coarse gravel and boulders (128 – 256 mm; see among others, Handbook of Hydrology, Table 12.1.2).

10) Page 25, second paragraph, last 2 lines: "… by avoiding development in areas that are a significant contributor of bed material load to the receiving channel". Please define significant in this context. Is an area that produces 5 times more sediment than the average sediment production of the sub-watershed a significant contributor? Or is it 10 times more? Or 100 times more? Or only two times more? Taking into account the expected changes in sediment yield that can occur in a watershed as a consequence of the soil type, slope, vegetation cover, geology, etc., it is expected that significant contributor could be probably an order of magnitude above the average sediment load.

11) Page 25, second paragraph from the bottom: how can a project proponent compensate for the reduction of bed material? By adding an environmentally approved sand or gravel load to the stream as a function of the runoff volume? And how such mechanism is supposedly going to take place from a practical point of view?

12) Page 28, second paragraph: the term “similar gradation” is not defined. What is considered similar gradation? A similar average and standard deviation size from a given number of samples? Additionally, similar gradation in itself does not imply that the materials on the site are important for the materials on the bed; additionally, gradation reduces in size downstream due to the natural erosion process as the sediments move downstream, so different gradation does not imply that the site is not important for the composition of the bed material either.

13) Page 31, point 4. “Evaluate the bedload proportion of sources and calculate the yield rate. The bedload proportion of the sources should be done by comparing the sieve analysis in the channel with that in the identified supply areas on the site. The yield is computed by multiplying the total yield, by the bedload proportion and the sediment delivery ratio”. It is not clear what the HMP document wants as a calculation here. How the bedload proportion is estimated from the comparison of the sieve analysis? What equations are recommended? Why equations are not presented in the appendices to explain the methodology? Why terms such as sediment delivery ratio, sediment yield, and others are not explained?

14) Page 31, point 6. “Calculate and compare the total pre- and post- development bedload yield to estimate the average annual amount of material that should be replenished to the stream”. How is the Professional Engineer supposed to do this task? What is the recommended methodology? How the replenishment, if needed, can be accomplished in practice?

15) Page 31, second paragraph: please explain. Methodology is confusing, and does not correlate properly the flow duration curve with a hypothetical sediment duration curve. Besides, sediment loads are not proportional to flow amount, as a review of the technical literature suggests, because the concentration of sediments increases with the increase in flow.

16) Page 37, Figure 6: It is not clear why the creek downstream of Lake Skinner is not susceptible, when the lake controls the hydrology of the upstream contributing area, while the creek downstream of Vail Lake is not susceptible (as it should), when both are subject to similar hydrologic conditions. There could be a reasoning behind such difference, but to my knowledge, such explanation is not provided anywhere in the document. Additionally, it is recommended to have Figure 6 available on internet at a larger size and a more detailed resolution.

17) Pages 38 and 39: A suggestion: It may be advisable to display the not susceptible creeks that are located in non-exempt areas with a different color that those located in potentially exempt areas.

18) Page 54: the sediment performance standard is not shown in the discussion. It should be clearly established on this section that any project smaller than 1 acre is not required to perform sediment control performance standards (if that was the intention of the Tier 2 classification).

19) Page 56: second paragraph from the bottom: The term TPG is not properly defined. Is it TPG Transportation Project Guidance? It seems that SMR TPG means *Development Guidance and Standards for Transportation Projects for Santa Margarita Region*, which implies that TGP means *Development Guidance and Standards for Transportation Projects*. If this is the case, the sentence "…complete and submit a TPG" does not make sense. Please clarify.

Prepared by:

Luis A. Parra, PhD, PE, CPSWQ, ToR, D.WRE
Applied Hydrology Professor, SDSU.
Applied Hydraulic Professor, SDSU.
Advanced Topics in Water Resources Professor (Hydromodification), SDSU.