

## Attachment 6

### Water Board Comments on the Program's November 15, 2004 Draft HMP Submittal and Program Responses

#### Cover Letter

1. This document is an excellent example of the organization you have brought to this effort. The cover letter gives us a clear indication of what the Program has been doing and where you are going with development of your HMP.

*No response required.*

2. The concept of adapting the continuous simulation approach for easier use in designing “integrated management practices” looks innovative and worthwhile. We commend the Program for its approach, from the outset, of determining how to make hydromodification control workable at small development sites. We look forward to learning the specifics as you develop them.

*No response required.*

3. On page 3, in the first bullet: you note that a determination was made that the Martinez gauge had a long enough record and was able to represent other areas of the County by completing some sort of adjustment. Please submit the technical report that includes the quantitative analysis completed and explains how the record can be adjusted to accurately reflect (for the purposes of hydromodification) the remainder of the County.

*To develop the equations for adjusting IMP sizing factors, the Program's consultant modeled the performance for one IMP using two different sets of hourly rainfall data from two different locations within the County. As described in Attachment 2, the equations adjust for differences in the 2-year storm as well as the 10-year storm, because these differences were found to affect the required IMP size. The Program will examine whether it is necessary or cost-effective to conduct additional modeling to further refine the adjustment equations (e.g. to create adjustment equations for each IMP).*

4. On page 3, in the fourth bullet: We concur that the event-based procedure should be abandoned.

*No response required.*

5. On page 5, first three paragraphs: This approach—simulation of 50 years of rainfall and runoff flows from a set of pre-designed devices—is interesting and seems reasonable. However, please submit the supporting analysis. (Please see our comments on the Appendices).

*The requested analysis is in Final HMP Attachment 2.*

6. On page 6, second paragraph: Proposes, "...The applicant may opt to assess the risk of downstream erosion and to develop additional watershed-specific measures." This responsibility cannot only be placed upon the applicant, without the Program first completing a detailed, step-by-step methodology, and ensuring its effectiveness through application to at least one and probably more stream systems/catchments. In essence, for the Program to hand over this potentially complex work to a developer without providing a product that is substantially ready to be easily applied does not ensure that the HMP will be carried through to compliance.

*The detailed, step-by-step methodology in Final HMP Attachment 4 fulfills the permit requirement to provide "a protocol to evaluate potential hydrograph change impacts to downstream watercourses from proposed projects," and the intent (expressed in the permit findings) that the Program should provide an "analysis template" to be used by developers. The methodology is ready to be applied and will be reviewed and refined through the Program's continuous improvement process.*

7. On Figure 1, square at lower left "Evaluate risk of contributing to downstream erosion...": Again, this step needs to be clearly developed by the Program, and should be comprised of a step-by-step approach to address both the cumulatively and individually significant impacts that a project may have. The HMP must insure, but does not yet, that it does not allow small increases in erosion from one project here, another project there, because that has the potential to result in cumulatively significant erosion that this section is intended to prevent.

*The flowchart is not included in the final HMP. In the final HMP, the potential for cumulative impacts is addressed by using conservative assumptions throughout the analysis and by selecting conservative standards to be applied to individual projects.*

### **Attachment 1: Hydrograph Modification Assessment Methodology Memo**

1. We support the concept that "if all new developed areas drain to appropriately sized IMPs, then the site runoff is considered controlled for peak flow and durations." Please describe how the discharge rate of the IMPs will be estimated. In addition, the long-term inspection and maintenance of the IMPs will be doubly important, and this should be addressed in the final HMP.

*Discharge from IMP underdrains is limited to one-half the pre-project runoff event with a recurrence interval of two years (0.5Q2). Actual discharge from underdrains and from overflows has been modeled using HSPF. Results are shown in Final HMP Attachment 2.*

*Hydrograph modification IMPs will be subject to the same operation and maintenance requirements as the Program currently requires for treatment IMPs. See the Stormwater C.3 Guidebook, Chapter Six and Appendix F.*

2. In the inputs for the Site Design IMP Sizing Worksheet, please explain how the average annual rainfall relates to flow duration control. Also, it is not clear where the maximum allowable release rate for underdrains is accounted for in the Worksheet.

*For IMPs in Type A and B soils, the sizing factor relates most closely to the volume and intensity of larger storms. The volume and intensity of larger storms are co-variant with average annual rainfall. These relationships allow us to use average annual rainfall (which is easily computed for a particular location based on existing isopluvial maps) to be used as a scaling factor for different locations in the County. Sizing factors for IMPs in Type C and D soils are more closely related to the volume and intensity of smaller storms (those that produce pre-project Q2), which are not co-variant with average annual rainfall. To adjust these sizing factors, the spreadsheet uses average annual rainfall to select the most similar rain gauge, then uses the ratio to adjust for differences in rainfall statistics between that gauge and the Martinez gauge.*

3. The text clearly states that if IMPs do not account for all runoff, then the user *either* does a Stream Vulnerability Risk Assessment *or* installs flow duration control BMPs. This is not so clear on the flow chart in Figure 1 of the cover letter. Please also clarify that IMP/BMPs must be implemented at the site unless the site discharges to an exempt water body.

*The requirements are clarified in the Program's HMP Policy (Final HMP Attachment 1).*

4. On page 1, first paragraph: "...areas up to 20 acres.... Projects larger than 20 acres may be subdivided for this purpose." Why has this 20-acre threshold been chosen? Is this because of stated detention basin limits? Where are the discussion and citations of literature to support this threshold? For example, if basins are the issue, where is the discussion and analysis showing why basins cannot be used/are never effective below 20 acres, and then connecting that idea to the use of this threshold? Why shouldn't this threshold be 1 acre? 5 acres? 50 acres? Why is it that IMPs are effective for areas of up to 20 acres? Please submit a technical analysis supporting this approach and the threshold.

Separately, what does it mean to "subdivide" a project that is larger than 20 acres down to 20 acres? Is this an area that would go to a single catch basin? A single outfall? A single creek system? While the concept may be sound, the absence of supporting data and analysis for the 20-acre threshold renders it presently unacceptable.

*In the final HMP, this threshold no longer applies to the use of IMPs. To use IMPs, applicants are required to divide the project site (regardless of size) into drainage management areas. Typically, the maximum size of a drainage management area will be determined by practical considerations in designing drainage to the IMP.*

5. On page 2, first full paragraph (discusses the idea of using off-the-shelf BMP designs to meet hydromod requirements): Parameters must be clearly spelled out and incorporated into conditions of approval, to be satisfied prior to the granting of occupancy permits (or a similarly effective restriction.)

*Contra Costa municipalities require submittal of a Stormwater Control Plan with applications for development approval. The Stormwater C.3 Guidebook will require Stormwater Control Plans that propose IMPs to incorporate the design parameters in Final HMP Attachment 2.*

6. Site Design IMP Sizing Worksheet: The worksheet appears to have only two input factors—predevelopment cover, and predevelopment soil type. It does not appear to address other issues that may be significant, and which we have previously identified should be addressed. These may include: slope, travel distance, and changes in drainage pattern. To take the approach of only using its two specified factors of cover and soil type, the Program should complete a technical analysis that appropriately demonstrates that other factors are individually and cumulatively insignificant, or that they are somehow accounted for in the spreadsheet analysis. As a note, here, cumulatively refers to both “other factors, taken together,” and “if this method is applied to many small projects, that the changes resulting from not incorporating the factors are cumulatively insignificant.”

Separately, the worksheet must incorporate, and we need to see, the minimum required design parameters for the specified controls. The design parameters should be basic items such as length, width, drainage time, soil porosity, presence/length/design of subdrains, etc. These design parameters must clearly address known significant problems, such as infiltration into tight soils, construction compaction, need to temporarily pond water in a control (e.g., ponding of a few inches in a swale by raising the storm drain inlet), and whether any deviation in designs is allowed, and under what circumstances.

*IMPs are designed and sized so that the outflow matches the pattern of pre-project flows; accordingly, the relevant factors are the factors that change when an undeveloped site is developed. The dominant factor that changes is perviousness, which is characterized by the change from pre-project soil type to impervious surface. (Sensitivity analyses showed estimated pre-project runoff is insensitive to the different vegetative cover types found in Contra Costa County.)*

*The sizing factors are conservative (i.e., post-project flows will be lower, most of*

*the time, than pre-project flows for each drainage management area and each project). This minimizes the potential for cumulative impacts. As part of continuous improvement of the HMP, the Program will model a watershed-scale scenario where IMPs are used on a number of projects in the same watershed.*

*Design parameters for IMPs are in Final HMP Attachment 2.*

7. On page 5, last paragraph "...the final HMP will provide guidance to developers on the use of...HSPF...": What does "guidance" mean? Our expectation is that developers will be provided an enforceable approach that has easy-to-measure outputs (although the process itself may be complex) enabling municipalities to determine whether a developer's approach/design is acceptable. Developers will be able to view the Program's completed and documented case studies, since those case studies will be completed as a part of the final HMP and included in it.

*The guidance (Final HMP Attachment 3) includes both general requirements for the modeling approach and specification of some input parameters. Co-permittees will require that Stormwater Control Plans for projects using site-specific modeling include documentation of the model construction and of the parameters used.*

8. On page 7: "Continuous Simulation Modeling Guidance." – provides list of items that will be included in the final HMP. Again, what does "guidance" mean (see previous comment)? Also, please submit drafts of these well before the due date of the final HMP, since these are "rubber-meets-the-road" sorts of details that can be controversial.

*We regret we were unable to submit drafts "well before" the due date of the final HMP, as we received these Water Board comments only eight weeks before that date.*

## **Attachment 2: Development of IPM Sizing Factors**

1. In the second paragraph, we recommend using a "goodness of fit" standard<sup>1</sup>, rather than simply stating the post-development curve shall not exceed the pre-development curve.

*The HMP Policy (Final HMP Attachment 1) includes a standard based on a Washington Department of Ecology standard.*

2. Would it make sense to include porous pavement and permeable pavers with underground water detention capacity in the worksheet along with the other IMPs?

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<sup>1</sup> As described in Appendix F (pp. 5,6) of the Santa Clara Valley Urban Runoff Pollution Prevention Program's, "Hydromodification Management Plan—Public Review Draft, June 2004"

*These treatments may be incorporated into “self-retaining areas,” which are disconnected from the storm drain system for the purposes of the HMP.*

3. A good deal of technical analyses and assumptions have gone into development of this methodology and are not presented in this brief memorandum. For example, the use of Q2 and upper and lower discharge bounds (Q10 and 0.5Q2) must be explained. In general, we would like to have more information about the development of sizing factors.

The hydrologic models you mention should be explained and fully named—for example, “HSPF” should be spelled out and referenced in the bibliography.

*Technical analyses and assumptions are explained in Final HMP Attachments 1 and 2.*

4. Page 1 “[Using the Martinez gauge record]...we will apply adjustment factors to the basic rainfall record to reflect the range of average annual rainfall experienced throughout the county.” Please submit the supporting technical analysis demonstrating how this is done and that it appropriately reflects local variations. Such a technical analysis may include comparisons to other existing County rainfall records that incorporate statistical and/or other analyses demonstrating that the adjustments are appropriate and, as applied, will result in meeting the standards listed in the Permit.

*This is addressed in Final HMP Attachment 1. See also the response to a similar comment above.*

5. On page 2, Table 1 (cover/soil class factors): What variables are not included (see earlier comment that the Program needs to demonstrate that a two-parameter model is sufficient)? Also, please submit the detailed, County-specific information that was used to develop these numbers (e.g., the impervious surface percentage for each type of density. For example, “low” is a relative descriptor that has different meanings in different local planning documents, so the definitions of these terms must include clear definitions of what land use intensities are related to each stated cover class, in commonly available terms (e.g., DU/ac for a particular development style/type). We share the Program’s goal here of trying to have an analytical descriptor that all can be confident appropriately describes ultimate built conditions on the ground.

*In the final HMP, the IMP sizing procedure is not based on land use; rather, the applicant must directly calculate square footage of pervious and impervious surfaces.*

*See response to earlier comment regarding the use of soil type as the key parameter needed to compare pre-project to post-project runoff.*

6. On page 3, second paragraph: What is the “recommended depth” for each site design IMP? That is, what does “recommended depth” mean? What are the other factors that will be specified (e.g., soil type, relative compaction, side slope min/max, width, etc.)? It is acceptable not to specify a factor, as long as the IMP’s effectiveness is not a function of that factor.

*Final HMP Attachment 1 includes the key design parameters for each IMP.*

7. Page 3, Sizing Factor Example (1): Please include a reference to the necessary mulch layer at the top of the bioretention example.

*Mulch is recommended but optional, as it is not critical to performance of the bioretention area.*

8. Page 3, Sizing Factor Example (2): States “...Assume the vertical transport rate in the planter is high relative to the other terms, so the planter fills from the bottom up during a rainstorm, and that planter soil becomes saturated before any discharge from underdrains occurs.” It was not obvious to us that this is a conservative assumption with respect to hydromod and the planter design. Could you explain this assumption further?

*In the final HMP, Appendix A to Attachment 2 contains a detailed discussion of the physics of water movement through soil.*

### **Attachment 3: Stream Classification Methodology**

1. From the limited information presented, this appears to not be a precise enough method for exempting water bodies from HMP requirements. It is not evident that cumulative impacts of development on streams, among other things, are considered.

*Where project runoff flows to storm drains, hardened channels, tidally influenced streams, or depositional streams, (i.e., “low risk”) we propose to require only “maximum extent practicable” limitations on imperviousness. This is consistent with Permit Provision C.3.f.ii.*

*Final HMP Attachment 4 contains a more detailed methodology for distinguishing “medium risk” from “high risk” situations.*

2. While three risk classifications are given (high, medium, and low), this memorandum does not state how the classifications are to be applied. We infer that projects discharging to “low risk” streams will be exempt from hydromodification controls. Also, project proponents and municipal reviewers can “use their professional judgment in borderline cases”: does this mean medium risk streams are decided on a case-by-case basis? We do not necessarily see the benefit in applying professional judgment on a case-by-case basis, because the

room left open for interpretation does not insure compliance with the Permit. A system that classifies water bodies as either exempt (low risk) or non-exempt would seem to have more merit. Please look back to the permit language, which gave examples of the types of creeks and storm drains where the potential for erosion or other impacts to beneficial uses is minimal, for guidance on exempting creeks.

*To implement Provision C.3.f.vi.6, which calls for: “stream buffers and stream restoration activities, including restoration-in-advance of floodplains, revegetation, and use of less-impacting facilities at the point of discharge, etc.,” Co-permittees will have to apply professional judgment on a case-by-case basis of the potential for stream erosion as well as professional judgment on a case-by-case basis of the effectiveness of the alternative measures.*

*These staff suggestions to classify water bodies as either exempt or non-exempt, while also disallowing Co-permittees to use professional judgment in determining equivalent limitation of impacts, would make it effectively impossible to implement Permit Provisions C.3.f.vi.6 and C.3.f.vii.*

3. It seems somewhat contradictory that the Program emphasizes simplifying the design of hydromodification controls for individual projects, while leaving the burden of classifying streams to each developer. Will the Program provide an inventory of all hardened channels in the final HMP (or before)? What field work or other data collection will the Program do to identify unstable or eroding streams?

*The Program’s policy will encourage applicants to use IMPs to control runoff to pre-project peaks and durations, rather than attempting to establish exemptions. The Program does not plan to conduct field inventories, except as needed to establish guidance for stream classification.*

4. On page 3, 1st full paragraph: Mentions “concrete brick” and “gabions.” These need to be better defined. For example, do gabions include thinner rock “mattresses,” and is there a specified required thickness for them? Does “concrete brick” include sackrete and reinforced concrete erosion control products? Please clearly define what is included in each category. Water Board staff will consider whether it is appropriate to accept increases in erosive flows for creeks lined with such products, but not with straight concrete. To accept these types of hardening as effectively exempt is not something the Water Board has done previously.

*Provision C.3.f.ii. states in part: “Such situations may include discharges into creeks that are concrete-lined or significantly hardened (e.g., with rip-rap, sackrete, etc.)...”*



5. Page 3, 2nd full paragraph: "...we propose developing empirical relationships so that channels that are depositional or very low gradient can also be designated as low-risk after an initial assessment." This approach could be acceptable, as long as this is confirmed in the field and an acceptable analysis of potential changes in boundaries between depositional and transport/erosive reaches is completed. It seems unlikely, at first glance, that we would want to accept this proposal for "low gradient" creeks, since it is not immediately clear that the set of low-gradient creeks and the set of non-erodable creeks intersect, or fully intersect. Depositional creeks and non-erodable creeks seem a much closer fit, at first glance. The analysis should also address potential bank erosion—frequently an issue in trapezoidal flood control channels, even where the creek bottom may not be downcutting (because of bank saturation and/or flow velocities in the creek and associated limited vegetation). Such creeks should be excluded from the "low-risk" category.

*We agree that depositional and non-erodable creeks are a closer fit, as reflected in the final HMP Policy (Attachment 1).*

6. Page 3, Section 4.2.2, Medium Risk Channel Definition: To have this category does not appear to be a conservative approach. The Program can propose it, but the proposal should be accompanied by the level of analysis and scientific substantiation needed to demonstrate the protectiveness of the approach.

Also, the proposal (further down in the same section) to allow municipal reviewers to use their best professional judgment in borderline cases is not acceptable. There needs to be a specifically defined deciding factor created by initial analyses and/or the current more highly-trained and experienced consulting crew. We recognize that there are huge pressures to approve developments, and that there may be concomitantly huge pressures to avoid fully mitigating HMP impacts, where such mitigation may be viewed as slowing a project. To leave this up to the best professional judgment of engineers and planners whose training is largely in other subjects is unacceptable; it does not insure that the HMP will be carried through to compliance with the Permit. In general, the Medium-Risk category should be eliminated, in favor of just two categories (Low/High). If the Medium-Risk category is included, then these analyses should be completed now, for review by Board staff (and subsequent Board review), or a very detailed approach should be prepared and practiced on one or more stream systems, and the results provided as a part of the HMP and for future projects.

*"Medium risk" is defined in final HMP Attachment 1, which also details the options available to an applicant upon a "medium risk" finding. The approach and guidance for evaluating "medium risk" vs. "high risk" is in final HMP Attachment 4.*