Alameda Countywide
Clean Water Program
A Consortium of Local Agencies

Glossary for the
Flow Duration Control Review Worksheet for HM Submittals

The worksheet and glossary are intended to assist the development community and municipal staff in determining whether the HM submittal complies with the HM standard as mandated in the Municipal Regional NPDES Permit (MRP) reissued by the San Francisco Bay Regional Water Quality Control Board on October 14, 2009 as Order R2-2009-0074, NPDES Permit No. CAS612008.
For projects using the Bay Area Hydrology Model to meet the HM Standard, this worksheet may be used to assist project engineers in determining the correct BAHM settings to use; municipal staff may use the worksheet to determine if the software has been used properly to demonstrate compliance with the HM Standard. All questions must be checked "Yes" for the project to be in compliance.

Glossary of Terms

Bay Area Hydrology Model (BAHM) – A computer software application, available for downloading from www.bayareahydrologymodel.com, for analyzing the potential hydrograph modification effects of land development projects, and sizing specialized flow duration control facilities to mitigate the increased stormwater runoff from these projects and assist project applicants in meeting the requirements of the HM standard permit amendment.

DOC file – An electronic report file produced by the Bay Area Hydrology Model (BAHM), which can be read by Microsoft Word or any text-editing program, and must be included in HM submittals that include flow duration controls and are designed using the BAHM.

Flow duration controls – Specialized detention and discharge structures designed to reduce excess post-project flow duration for a designated range of flows based on continuous simulation models of runoff from both pre-project and post-project site conditions, comparing flow durations for the designated range of flows, in order to mitigate development-caused hydromodification.

Hydrologic source controls – The HM Standard uses the term hydrologic source controls to refer to site design techniques that minimize and/or slow the rate of stormwater runoff from the site. There is considerable overlap between site design measures that minimize and/or slow the rate of runoff and site design measures that reduce impacts to water quality and beneficial uses. Because municipal staff are familiar with the term "site design measures" and already require site design measures to reduce impacts to water quality/beneficial uses, the HM Applicability Worksheet does not use the term hydrologic source controls, and instead uses the term "site design measures," specifying that when site design measures are incorporated to meet the HM standard, they must serve to minimize and/or slow the rate of runoff.

Hydromodification - The modification of a stream's hydrograph, caused in general by increases in flows and durations that result when land is developed (e.g., made more impervious). The effects of hydromodification include, but are not limited to, increased bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding.

Hydromodification Management (HM) Standard – Stormwater discharges from applicable new development and redevelopment projects shall not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition. Increase in runoff flow and volume shall be managed so that post-project runoff shall not exceed estimated pre-project rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts to beneficial uses due to increased erosive force. Such management shall be through implementation of the hydromodification requirements the HM Standard permit provision and its Attachment B.

Impracticability Provision – Provision C.3.g.2 (Attachment B of the MRP) of the HM Standard, which identifies conditions under which a project may be allowed to meet the requirement for flow duration control by contributing financially to an alternative HM project.

In-stream measures - In-stream measures involve modifying the receiving stream channel slope and geometry so that the stream can convey the new flow regime without increasing the potential for erosion and aggradation. In-stream measures are intended to improve channel stability and prevent erosion by reducing the erosive forces imposed on the channel boundary.

Site Design Measures - Site planning techniques to conserve natural areas and/or limit the amount of impervious surface at new development and significant redevelopment projects. Site design measures may be employed for the purpose of reducing impacts to water quality and beneficial uses, or for the purpose of minimizing and/or slowing the rate of runoff offsite and thereby reducing potential for hydromodification of creek channels. Site design measures that minimize and/or slow the rate of runoff are also called hydrologic source controls. In practice, many site design measures accomplish both purposes described above.

WD2, WDM and WHM Files – project files that are created by the Bay Area Hydrology Model (BAHM), which must be included in HM submittals that include flow duration controls and are designed using the BAHM.

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Flow Duration Control Review Worksheet for HM Submittals

(To be completed for projects that include flow duration controls. Terms in bold text are defined in the glossary section of the HM Applicability Worksheet Guidance and Glossary.)

1. Project Location or Address:_____, CA

2. Project Name (if applicable): _____

3. Design Engineer:_____ 3a. Phone No.:_____ 3a. Email:_____

4. Parcel/Tract No.: _____ 4a. Lot No.:_____ 4b. APN # _____

Required Project Information

5. Check the "Included" box if the submittal includes the following documents, or check "NA" if NOT applicable. All applicable documents must be included.	Included	NA
5a. Site plans with pre- and post-project impervious areas, surface flow directions of entire site, locations of flow duration controls and site design measures per HM site design requirement[2].	❑	
5b. Soils report or other site-specific document showing soil types at all parts of site.	❑	
5c. If project uses the Bay Area Hydrology Model (BAHM), a list of model inputs.	❑	❑
5d. If project uses custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves), goodness of fit, and (allowable) low flow rate.	❑	❑
5e. If project uses the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of start up, entity responsible for maintenance).	❑	❑
5f. If the project uses alternatives to the default BAHM approach or settings, a written description and rationale (see also Question 7 below).	❑	❑

Hydromodification Management (HM) Site Design Requirement[2]

6. Do plans include appropriate site design measures that minimize and/or slow rate of runoff from site?
   - ❑ Yes. *Continue to Question 7.*
   - ❑ No. Incorporate appropriate site design measures prior to approval, or explain why this is impracticable:

Bay Area Hydrology Model (BAHM)

7. Is the Bay Area Hydrology Model used to demonstrate compliance with the HM standard?
   - ❑ Yes. *Continue to Question 8.*
   - ❑ No. *Describe the method used to comply with the HM standard and attach an evaluation of the method and results, indicating whether the HM standard has been met. Skip to Question 29.*

   Alternative method(s): ❑ Modified design criteria in BAHM ❑ Alternate modeling software ❑ In-stream measures ❑ Full channel stability assessment ❑ Other:_____

8. Soil types used for BAHM are based on: ❑ Project geotechnical report by_____ ❑ NRCS soils map ❑ Other/unknown (describe):

Checklist for BAHM Project Review (All boxes must be checked Yes for approval.)	Yes	No
9. Were required project files (WDM, WHM, WD2) received?	❑	❑
10. Was the BAHM report (DOC) file received?	❑	❑
11. Do the project files load to reviewer's computer properly?	❑	❑
12. Does the project location in submittal match location on the BAHM screen?	❑	❑
13. Does the Pre-Project scenario run properly?	❑	❑
14. Does the Post-project Mitigated scenario run properly?	❑	❑
15. Compare BAHM Report screen with report file:		

Checklist for BAHM Project Review (All boxes must be checked Yes for approval.)	Yes	No
15a. Project location descriptions match.	❑	❑
15b. Precipitation gages and precipitation factors match.	❑	❑
15c. Flow frequency results match.	❑	❑
15d. All flow duration values PASS. (Flow values are non-zero.)	❑	❑
15e. Any pervious area (PERLND) changes?	❑	❑
15f. Any impervious area (IMPLND) changes?	❑	❑
15g. Any scaling factor changes?	❑	❑
15h. Any duration criteria changes?	❑	❑
15i. Pond (or vault or tank) dimensions match.	❑	❑
15j. Pond Discharge Structure information matches.	❑	❑
16. Do the BAHM pond/vault/tank dimensions match drawings?	❑	❑
17. Compare Discharge Structure(s) in BAHM report to drawings:		
17a. Do configuration and dimensions match, including low-flow orifice?	❑	❑
17b. If low-flow orifice is enlarged on plans, is the difference mitigated via design features consistent with Appendix D of the User Manual?	❑	❑
18. Is the pond surface area included in the Post-project Mitigated basin?	❑	❑
19. Are the Precipitation Applied and Evaporation Applied options used appropriately for each type of element?	❑	❑
20. Infiltration: a. Is this turned ON for each infiltration pond or LID element?	❑	❑
b. Is selection of Infiltration Reduction Factors consistent with Appendix D?	❑	❑
21. Does total BAHM drainage area match drainage maps/drawings?	❑	❑
22. Does Post-project Mitigated drainage area(s) match Pre-project?	❑	❑
23. Is Pre-project vegetation correct? (e.g. lawns shown as Urban, not Grass)	❑	❑
24. Are Post-project Unmitigated land use areas correct?	❑	❑
25. Do low impact development (LID) options correspond to the site design measures to minimize/reduce runoff rate, or other stormwater management measures shown on plans?	❑	❑
26. Are the routing and connectivity of drainage areas and LID or stormwater management measures consistent with plans?	❑	❑
27. Does the pond usually drain in 5 days or less, according to the Drawdown Table?	❑	❑
28. If claiming treatment credit on a volume basis for the pond, are documentation or calculations provided and consistent with volumes shown in Drawdown Table?	❑	❑

HM Submittal Approval	Yes	No	N/A
29. Is documentation provided for any required review or approval by other agencies (e.g. ACFCWCD, Zone 7, local groundwater managers)?	❑	❑	❑
30. Do other issues need correction before project is approved? Describe:_____	❑	❑	
31. Is the HM submittal APPROVED? NOTE: Operation & maintenance agreement required prior to occupancy.	❑	❑	