Construction Industry Coalition on Water Quality

April 4, 2007

Jeremy Haas
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
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RE: Tentative Order No. R9-2007-0002 (NPDES Permit No. CAS0108740) Waste Discharge Requirements for Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds of the County of Orange, the Incorporated Cities of Orange County, and the Orange County Flood Control District within the San Diego Region

On behalf of the more than 3,300 member companies of the Construction Industry Coalition on Water Quality (CICWQ) and the 2,000 member companies of the Building Industry Association of Southern California, we would like to thank the San Diego Regional Water Quality Control Board (Regional Board) for the opportunity to express our interest in the Draft south Orange County Municipal Separate Storm Sewer System Permit (Draft Permit). This cover letter outlines the issues and constructive suggestions that we have with the Draft Permit as written and is supported by a detailed technical memorandum authored by Geosyntec Consultants on behalf of CICWQ.

CICWQ is comprised of the four major construction and building industry trade associations in Southern California: the Associated General Contractors of California (AGC), the Building Industry Association of Southern California (BIA/SC), the Engineering Contractors Association (ECA) and the Southern California Contractors Association (SCCA). The membership of CICWQ is comprised of construction contractors, labor unions, landowners, developers, and homebuilders throughout the region and state.

These organizations work collectively to provide the necessary infrastructure and support for the region's business and residential needs. Members of all of the above-referenced organizations are affected by the Draft Permit, as are hundreds of thousands of construction employees and builders working to meet the ever-growing demand for modern infrastructure and housing in Orange County. Our organizations support efforts to improve water quality cost effectively and our comments and our suggestions were developed and presented in that context.

The Draft Permit introduces many new provisions that fundamentally change how land development and building projects are designed and perhaps more importantly, how they are conditioned and approved by the co-permittees. The attached technical memorandum is organized sequentially beginning with comments on page 6 of the Draft Permit and ending on page 41.

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The technical memorandum goes into great detail in several areas and suggests alternative approaches that the land development and building community feel will properly protect water quality while balancing the need to provide affordable housing and commercial development opportunities. These areas include implementation of LID approaches that truly consider all project scales within a watershed (not just lot-by-lot), consideration of watershed level planning for hydromodification control including using flow duration control methodologies during an interim period until the SCCWRP study is completed and management tools developed, and the utility of regional or shared treatment control BMPs to address a range of pollutants that are discharged within a watershed. Numerous other thoughts and ideas on alternative approaches are introduced and we respectfully ask for your consideration of these approaches.

The attached technical memorandum also addresses our approach to what constitutes “enhanced measures” for construction site BMPs and goes into detail about what enhanced measures could be implemented short of requiring expensive and technically challenging advanced stormwater treatment systems. The technical memorandum introduces but does not completely address the unknown question of what is the water quality cost-benefit of using advanced stormwater treatment systems in addition to or in lieu of existing erosion and sediment control BPS?

CICWQ has conducted extensive research over the past year into the feasibility of using advanced treatment systems, the capability of vendors to meet the demand required if existing MS4 permits are adopted as written, and the operational requirements of using such systems. Numerous questions still remain: paramount is what is the incremental water quality benefit (especially considering natural background loads of sediment in the receiving waters) that will be achieved in using these systems compared to a well managed construction site using a combined treatment train BMP scheme of erosion and sediment control BMPs? What is known, however, is that these systems are extremely expensive to plan for, install and operate, and that insufficient infrastructure exists on the part of system service providers to meet project demands.

With respect to cost, CICWQ’s analysis shows that requiring installation of an advanced treatment system to control sediment at any given site is on the order of $30,000 to $50,000 per acre for sites generally larger than 10 acres. Costs for sites less than 10 acres are not necessarily much less expensive because the costs to mobilize, staff the equipment, operate it, and monitor effluent are generally fixed.

We are confident that by working together, CICWQ can assist the Regional Board in achieving regulatory balance that will improve water quality while also meeting Ventura County’s housing and infrastructure needs. We thank you for your consideration of our comments.

If you have any questions, please feel free to contact me at (909) 396-9993 or mgrey@biasc.org.

Respectfully,

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Memorandum

Date: April 4, 2007

To: Mark Grey, CICWQ

From: Lisa Austin and Eric Strecker, Geosyntec Consultants

Subject: Comments on Draft South Orange County MS4 Permit, Tentative Order No. R9-2007-0002, NPDES No. CAS0108740

We have reviewed the Draft Orange County MS4 Permit (NPDES No. Tentative Order No. R9-2007-0002), dated February 9, 2007. We understand that protection of receiving water quality and beneficial uses is the ultimate objective of the Tentative Order and support that objective. In that light, we have identified and commented on the following technical issues, and have provided suggested alternative permit language:

Page	Comment
Pg. 6	**Finding C.8** discusses the relationship between the degree of imperviousness in a watershed and the degradation of the receiving water. Finding C.8 states that significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as 3 – 10 percent imperviousness. The studies to date that have related imperviousness to stream impacts occurred in watersheds that did not include stormwater mitigation facilities, or may have included flood control facilities or minimal treatment control BMPs that were not designed to current standards. Therefore, the finding would be more accurately stated to say that significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as 3 – 10 percent of <u>uncontrolled</u> imperviousness. The effect of imperviousness on hydromodification impacts is more complicated than a simple correlation with imperviousness. The limited hydromodification impact research to date has focused on empirical evidence of channel failures in relationship to directly connected impervious area (DCIA) or total impervious

area[1]. However, more recent research has established the importance of size of watershed; watershed soils; large scale watershed impacts such as grazing, fires, and agriculture; channel slope and bed/bank composition; vegetation types and conditions; sediment supply impacts of reservoirs or faults; and climatic and precipitation patterns (SCCWRP 2005a, Balance Hydrologics, 2005).

Booth et al. (1997) reported finding a correlation between loss of channel stability and increases in DCIA. In Washington State, streams were found to display the onset of degradation when the DCIA increased to ten percent or more, and a lower imperviousness of five percent was found to cause significant degradation in sensitive watersheds (Booth 1997). The Center for Watershed Protection (Schuler and Holland, 2000) described the impacts of urbanization on stream channels and established thresholds based on total imperviousness within the tributary drainage area. It states "a threshold for urban stream stability exists at about 10 percent imperviousness." It further states that a "sharp threshold in habitat quality exists at approximately 10 percent to 15 percent imperviousness." These studies, however, addressed changes in very different climatic regions than Southern California (e.g. the Pacific Northwest and the Mid-Atlantic areas).

Although physical degradation of stream channels in semi-arid climates of California may be detectable when watershed imperviousness is between three and five percent, not all streams will respond in the same manner (SCCWRP, 2005b). Management strategies should account for differences in stream type, stage of channel adjustment, current and expected amount of basin imperviousness, and existing or planned hydromodification control strategies. The absolute measure of watershed imperviousness that could cause stream instability depends on many factors, including watershed area, topography, land cover, vegetation types, and soil types and compaction levels; development impervious area and connectedness; longitudinal slope of the river; channel geometry; and local boundary materials, such as bed and bank material properties and bank vegetation characteristics. For instance, the nature of terrains within a watershed is an important factor. Development that occurs on clayey soils will

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[1] Impervious area that drains directly to a storm drain system and then to the receiving water is considered "directly connected," whereas impervious area that drains through vegetation prior to surface waters or to infiltration facilities is considered "disconnected."

not alter uncontrolled runoff rates as much as development that occurs in areas with sandy soils. Sandy soils have considerable capacity to infiltrate stormwater and therefore development located within sandy terrains combined with hardened conveyances may significantly alter runoff conditions compared with natural conditions.

In summary, while the research on impervious cover and stream quality is compelling, it is doubtful whether is can serve as the sole foundation for legally defensible regulatory actions at this time. Key reasons include: 1) the research has not been standardized, so different investigators have used different methods to define and measure/estimate imperviousness; 2) the relative measure of watershed imperviousness that could cause stream instability depends on many factors, including watershed area, land cover, vegetative cover/condition, topography, and soil type and compaction level; historical land uses such as farming or ranching that have changed watershed conditions; recent fires; development impervious area and connectedness; longitudinal slope of the river; channel geometry; and local boundary materials, such as bed and bank material properties and vegetation characteristics; 3) most of the studies have been confined to a few ecoregions and few studies have been conducted in Southern California; 4) researchers have employed a wide number of techniques to measure stream quality characteristics that are not always comparable to each other; and 5) none of the studies has yet examined the effect of widespread application of effective stormwater treatment, LID controls, and/or hydromodification control practices on impervious cover/stream quality relationships.

Pg. 6 **Finding C.9** states: “Urban development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, … As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff.” This conclusion does not reflect the complex relationship between urban development land uses and pollutant loads and concentrations, or the effect that treatment control has on the quality of urban runoff. Nor does it take into account conversion of agricultural lands to urban land uses that, for many pollutants (e.g., nutrients) will reduce pollutant concentrations in runoff. Whether runoff from urban areas contains significantly greater pollutant loads than runoff from the same areas in the pre-development condition depends on pre-development land use and the type of pollutant.

The Los Angeles County Department of Public Works monitored pollutant concentrations from eight land use stations from 1995 through 2001 (LACDPW, 2000; LACDPW, 2001). The Ventura County Watershed Protection District monitored a station that collected drainage from the Oxnard Agricultural Plain, which is comprised almost entirely of agricultural land (primarily row crops), from 1997 through 2003 (VCFCD, 1997 - 2003). These monitoring data represent untreated urban and agricultural runoff quality. A statistical analysis of these data is provided in Table 1 below.

This analysis shows that stormwater runoff from open space had higher average total suspended solids, nitrate, and chloride concentrations than the runoff from some or all of the urban land uses. The agricultural runoff had higher concentrations of pollutants than runoff from all of the urban land uses, except for dissolved copper concentrations in runoff from the transportation land use area. Runoff treatment could further reduce pollutant concentrations in post-development runoff. Thus, pollutant concentrations in post-development runoff may have lower concentrations of pollutants than pre-development runoff, depending on the pre-development land use. For some pollutants, even though urban runoff concentrations may be lower, the pollutant loading may be higher due to increases in runoff volume. Lakes and estuaries would be more sensitive to load increases, while streams are generally more sensitive to concentration increases. Finding C.9 should consider the available technical data.

Table 1: Arithmetic Mean Concentrations from Lognormal Statistics for Land Use Monitoring Data[2]

	TSS	TP	NH3	NO3	NO2	TKN	Diss Cu	Tot Pb	Diss Zn	Cl
Land Use	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L
Commercial	63.5	0.364	0.913	0.505	0.115	2.81	11.5	9.55	152	44.5
Education	92.1	0.289	0.295	0.575	0.088	1.61	11.4	3.23	70.9	24.0
Light Industrial	151	0.265	0.345	0.563	0.071	2.19	10.4	7.34	268	9.38
Transportation	72.4	0.478	0.338	0.666	0.086	1.75	30.8	8.17	205	5.80
Multi-Family Residential	35.4	0.218	0.442	1.29	0.098	1.65	6.92	3.66	67.7	15.6
Single Family Residential	110	0.381	0.457	0.665	0.083	2.75	8.81	9.57	19.7	4.97
Vacant / Open Space	159	0.083	0.064	1.12	0.021	0.860	0.237	1.06	8.61[2]	6.62
Agriculture	998	3.00	1.81	13.8	0.120	7.54	19.7	27.3	37.0	49.6

1 – Urban and vacant/open space land use data collected by the Los Angeles County Department of Public Works (LACDPW, 2000; LACDPW, 2001). Agricultural land use data collected by the Ventura County Watershed Protection District (VCFCD, 1997; VCFCD, 1998; VCFCD, 1999; VCFCD, 2001; VCFCD, 2002; VCFCD, 2003).

2 – Dissolved zinc for open space was estimated from the total zinc analysis of LACDPW monitoring data. Four data points for dissolved and total zinc from the National Stormwater Quality Database gave an average ratio of dissolved to total zinc of 50 percent. For the open space land uses the variation of dissolved zinc was assumed to equal that of total zinc (i.e. same standard deviation) and the lognormal mean was set to give an average concentration of 8.6 µg/L for the open space land use, half of the average total zinc concentration of 17.2 µg/L.

Pg. 8 The Technical Report discussion of **Finding D.1.e.** cites several studies conducted in the last few years that have measured the effectiveness of urban runoff treatment BMPs in Southern Orange County. The report states that the results of these studies "demonstrate that treatment at MS4 outfalls for pollutants that have already been discharged into the MS4 is generally unlikely to reduce pollutant concentrations to levels that would support water quality objectives." These studies primarily focused on dry weather flow treatment systems and wet weather hydrodynamic devices, which would not be expected to be effective on a number of pollutants. These studies did not investigate many of the types of treatment control BMPs that are likely to be implemented in Southern Orange County, such as dry extended detention basins, wetponds, vegetated swales, filter strips, and bioretention systems. A summary of the performance data for these types of treatment control BMPs generally implemented for new development in South Orange County, provided in Table 2 below, shows that unlike the BMPs studied in the dry weather flow reports cited, these BMPs are likely to support water quality objectives in the receiving water. Finding D.1.e. should be based upon a more comprehensive look at treatment control BMP effectiveness, rather then using selected studies.

Pg. 9 **Finding D.2.b** states that end-of-pipe BMPs are: 1) typically ineffective during significant storm events, 2) often incapable of capturing and treating the wide range of pollutants that can be generated on a sub-watershed scale, 3) more effective when used as polishing BMPs, 4) do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP, and 5) do not aid in the effort to educate the public regarding sources of pollution and their prevention.

When the entire range of treatment control BMPs is considered, the statements in this finding are unsupported. Treatment control BMPs that are selected to address the pollutants of concern for a project, sized to collect and treat the water quality design storm, are installed correctly, and are adequately maintained can be effective at removing pollutants to below the water quality objectives (see Table 2 below).

Table 2: ASCE/EPA International BMP Database Mean Effluent Concentrations

Treatment Control BMP	TSS	TP	NO_3	TKN	Diss Cu	Tot Pb	Diss Zn
Wetponds/Wetlands	27.6	0.15	0.05	1.06	5.5	0.72	14.6
Dry Extended Detention Basins	42.7	0.33	0.89	1.81	12.8	31	56.5
Biofiltration (Swales, strips, bioretention)	30.7	0.46	0.46	1.67	7.8	9.6	32.6
Water Quality Objective/ Acute CTR Criteria (@ hardness = 100 mg/L)	Water shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses	5 – 10 mg/L	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses	13.0	82	120

End-of-pipe or shared treatment control BMPs provided at a sub-watershed scale provide many benefits as compared to only relying on smaller, distributed treatment control BMPs. Regional facilities can facilitate maintenance, incorporate multiple benefits such as irrigation water supply and recreational opportunities, and provide opportunities for public education. They also can be used to treat existing development areas along with new development if projects are encouraged to do so. Regional systems constructed as a part of a development project that provide retrofit treatment of existing development provide a cost-effective approach for addressing runoff from existing development areas.

End-of-pipe, shared treatment BMPs at a sub-watershed scale can be effective at capturing and treating pollutants. For example, the Natural Treatment System (NTS) Master Plan, comprised of a network of constructed wetlands, was evaluated for treatment effectiveness of dry weather base flows and runoff from smaller more frequent storms in the Upper Newport Bay watershed (Strecker, et al, 2003; www.naturaltreatmentsystem.org) in Orange County. The goal of the "regional retrofit" wetland network is to serve as an integral component in a watershed-wide water quality control strategy, supplementing onsite BMPs to enhance compliance with water quality standards and pollutant loading limits (TMDLs) for many pollutants of concern, including sediments, nutrients, pathogen indicators, pesticides, toxic organics, heavy metals, and selenium. The NTS Plan was assessed with planning-level water quality models that accounted for the integrated effects of the 44 planned NTS facilities. The NTS Plan was estimated to achieve total nitrogen (TN) TMDL for base flows, and in-stream TN concentrations would be reduced below current standards at most locations. Total phosphorous TMDL targets would be met in all but the wettest years. The fecal coliform TMDL would be met during the dry season, but not all wet season base flow conditions, and not under storm conditions. The NTS Plan was not designed to completely meet the sediment TMDL, as much of the sediment sources are in-stream, but would capture on average about 1,900 tons/yr (1,724,000 kg/yr) of sediment from urban areas. The wetlands were estimated to remove 11 percent of the total copper and lead, and 18 percent of the total zinc in storm runoff from the entire, mostly built-out watershed.

The San Joaquin Marsh, a NTS System wetland located at the bottom of the San Diego Creek Watershed is another example of a regional treatment BMP that is helping to remove pollutants of concern from runoff from existing development on a watershed-scale and also provides significant opportunities for public education. The San Joaquin Marsh is a 202-acre facility, consisting mostly of a series of lakes, permanent wetlands, and riparian habitat areas. It is a managed system. Surface water flows from San Diego Creek are diverted through the Marsh, where flows remain for about two weeks and are then returned to the Creek. Monitoring data indicates removal of about 200 lbs/day or nitrate during dry weather, substantially improving water quality in Upper Newport Bay (BonTerra Consulting, 2004).

The NTS Plan provides a cost-effective alternative to routing dry-weather flows to the sanitary treatment system or to expensive dry weather flow treatment plants. This type of system also provides for retrofit of existing, but partially modified (semi-natural/semi-improved) channels, as well as flood control facilities, in a manner that restores some natural water quality and biological function and value to the watershed. Finally, the NTS program includes an agency (the Irvine Ranch Water District) that will provide maintenance of the facilities in perpetuity. As a result, the NTS restores some natural treatment of stormwater runoff from existing development. Although site design and source control BMPs are very important, regional end-of-pipe treatment control facilities can also be used to effectively support water quality objectives in receiving waters.

Finding D.2.b should be amended to reflect the above considerations.

Pgs. 9 & 26 **Finding D.2.c** states that Low Impact Design (LID) site design BMPs at new development projects can be an effective means for minimizing the impact of urban runoff discharges from development projects on receiving waters. **Section D.1.d(4)** requires each Priority Development Project to implement site design BMPs and lists required site design techniques for all projects. These proposed site design BMP requirements do not provide for projects that have addressed site design at a sub-watershed and/or watershed scale as part of a larger plan of development. From the perspective of geomorphologically-based watershed planning principles, in many instances, applying the proposed BMP site requirements at a project level may lead to poor project design compared to applying these requirements at a broader sub-watershed and watershed level of analysis.

The imposition of standardized site design BMP for all projects, without consideration of project scale or geographic location, is particularly contrary to smart growth concepts. Smart growth is best described as a set of 10 principles (U.S. EPA, 2005):

1. Create a range of housing opportunities and choices.
2. Create walkable neighborhoods.
3. Encourage community and stakeholder collaboration.
4. Foster distinctive, attractive places with a strong sense of place.
5. Make development decisions predictable, fair, and cost effective.
6. Mix land use.
7. Preserve open space, farmland, natural beauty, and critical environmental areas.
8. Provide a variety of transportation choices.
9. Strengthen and direct development toward existing communities.
10. Take advantage of compact building design.

As discussed in the EPA document (page 23), requirements for conventional and site design BMPs should be related to the development context. Some approaches will work in most settings (at different levels of implementation), while others pose challenges in existing urban areas and in the development of new town centers or other compact districts that are constructed in greenfield projects. The imposition of a standardized site design BMPs without consideration of other watershed factors and land use considerations could lead to more “sprawl” as projects will require more land to meet the requirement. In the case of urban infill, redevelopment, and dense districts in new development projects as identified in the smart growth principles, the use of LID techniques may be difficult at the individual project or lot level because sufficient space on a particular lot may not be available for devotion to permeable area for irrigation. However, these types of projects could be considered a LID practice (clustering development and/or locating it per smart growth principles) if examined at the watershed scale. Another consideration is that when a new project can also provide treatment for existing development runoff in a larger regional treatment system along with runoff from the new project (i.e., provide retrofit of existing development), requiring that LID must be employed instead of providing regional treatment could reduce the opportunities and resources for retrofit treatment.

The use of some LID techniques in Brownfield (contaminated sites) situations can be problematic and should be considered in how these techniques are being mandated.

Site design BMP requirements should not be mandated for projects desiring to reuse stormwater for irrigation (integrated water resource management). In the case of reuse, site design techniques would reduce the volume of runoff that could be stored and reused.

Pg. 10 The Technical Report discussion of **Finding D.3.b.** cites a 1992 USEPA guidance document that provides: "the municipality must demonstrate that it has adequate legal authority to control the contribution of pollutant in stormwater…control in this context, means not only to require disclosure of information, but also to limit, discourage or terminate a stormwater discharge to the MS4." Technical Report page 53. It may not be feasible to safely terminate an existing stormwater discharge into the MS4 in many circumstances. Presumably, the only alternative discharge location for an existing stormwater discharge would be onsite infiltration, as stormwater discharge to the sanitary sewer (as opposed to discharge of *dry weather flows* or *process wastewater*) is not an acceptable alternative due to a number of practical and NPDES permit issues. Opportunities to implement such a solution would be limited and could potentially cause flooding, geotechnical, and/or public safety hazards. Also, if the stormwater discharge from a site is contaminated to the extent that termination of the discharge to the MS4 is considered, then infiltration of this discharge to groundwater is unlikely to be a better alternative. Development and implementation of BMPs to control the pollutants in the stormwater discharge is a practicable requirement. The Technical Report should be revised to state that the Regional Board does not consider the termination of an existing stormwater discharge into the MS4 to constitute MEP in most circumstances.

Pg. 22 **Section D.1.c(6)** includes requirements for infiltration and groundwater protection. Infiltration will be an important implementation method for hydromodification control, so it is important that these provisions be protective of groundwater quality but not so overly conservative as to impede the use of infiltration. Provided below are comments on the requirements in this section of the tentative order.

(b) Dry weather flows. Infiltration of pretreated dry weather flows is an important management method to prevent dry weather flow impacts to receiving waters. As this subsection is written in the Tentative Order, it is difficult to interpret the term "dry weather flows containing significant pollutant loads." A suggested alternative is to eliminate this subsection, and to incorporate dry weather flows into subsection a, such that suggest language for subsection a is:

(a) Urban runoff, <u>including dry weather and stormwater flows</u>, must undergo pretreatment such as sedimentation or filtration prior to infiltration to remove pollutants of concern to groundwater and to remove suspended solids that may cause the infiltration facility to fail.

(e) Depth to groundwater. Most BMP design documents recommend or require a minimum depth to groundwater of 3 feet or more. This criterion is a based on the hydraulic consideration of groundwater mounding, as well as the treatment consideration of soil filtration. If the native soil has low organic matter or CEC or if there is fractured bedrock, a minimum depth to groundwater of 10 feet is appropriate and additional pretreatment should be required as is stated in the Tentative Order. However, if the soils have a high adsorptive capacity, as required by subsection (f) of this provision, a minimum depth of 3 feet should be adequate to be protective of groundwater quality.

Also, infiltration of treated runoff for hydromodification control purposes should be allowed with a minimum of 3 feet of separation to groundwater. In this case, infiltration relies on the use of highly draining soils and the concern is strictly related to the hydraulic considerations of mounding versus relying on the soil properties to provide runoff treatment.

Suggested language for subsection (e) is:

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet, <u>except as provided in this subsection</u>. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained. <u>If infiltration soils have a high adsorptive capacity, as required by subsection (f) of this provision, a minimum depth of</u>

at least three feet is allowed. Additionally, infiltration of runoff that is treated, prior to infiltration, in a treatment control BMP that addresses the pollutants of concern in groundwater and is implemented in accordance with Section D.1.d(6) of this permit is allowed with a minimum of 3 feet of separation to groundwater.

(f) Soil specifications. The soil specifications in this subsection are applicable to the use of infiltration for runoff treatment, but not the use of infiltration for hydromodification control. These soils specifications will limit infiltration rates, and therefore are not amenable to infiltration used for hydromodification control. Coarse soils that allow for rapid infiltration should be allowed for infiltration of fully treated runoff as indicated in the comment for subsection (e) above.

Suggested alternative language would be to add the following at the end of subsection (f):

Infiltration of treated urban runoff is allowed for hydromodification purposes in other soils as set forth in subsection (e) above.

(g) High threat to water quality land uses. Areas of mixed land uses that include the land uses listed in this subsection should be allowed to use infiltration for treatment control and/or hydromodification control. Suggested alternative language would be to add the following at the end of subsection (g):

Areas of mixed land uses that include a low percentage of high threat to water quality land uses and activities may use infiltration treatment control BMPs, provided sufficient pre-treatment is provided. Also, runoff from these areas that is treated, prior to infiltration, in a treatment control BMP that addresses the pollutants of concern in groundwater and is implemented in accordance with Section D.1.d(6) of this permit may be infiltrated for hydromodification control purposes.

(h) Separation from water supply wells. Water supply wells used for agricultural consumption should not be included in the 100 feet separation requirement. The language at the end of subsection (h) should be edited to state:

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells used for domestic consumption.

Pg 25 **Section D.1.d(2)(g)** includes a trigger for priority development projects to include those located within or directly adjacent to or discharging directly to an ESA that increase the area of imperviousness on a proposed project site to 10 percent or more of its naturally occurring condition. This trigger is presumably based on the existing literature that correlates watershed imperviousness with the biological integrity and physical habitat of streams and other receiving waters. Use of this 10 percent value is premature as it has not been developed for local watersheds, nor considers the impact avoidance effects of BMPs. Also, the proposed trigger also does not consider spatial scale on which the project occurs. As the correlation between watershed imperviousness and receiving water impact is based on a watershed scale, the trigger should be tied to the increase in imperviousness in the project's watershed, not project site imperviousness. As is, this requirement would encourage sprawl.

Pg. 34 The following comments are all related to ***Section D.1.h***, requirements for hydromodification and downstream erosion.

Section D.1.h(1) The onsite hydromodification control waiver included in D.1.h(3)(c) should excuse a project from further compliance with the requirements in D.1.h(2) and (3)(a) and (3)(b). Therefore, D.1.h(3)(c) would be better located as D.1.h(1)(b), after the existing first paragraph as D.1.h(1)(a). See further the comment on D.1.h(3)(c) below.

Section D.1.h (3)(c). The proposed waiver thresholds (an increase of less than 5% total impervious cover on a new development site and at least a 30% decrease in total impervious cover in a redevelopment project) seem arbitrary and are not based on the current knowledge of hydromodification impacts.

There is much discussion about the reliability of imperviousness as a "predictor" of potential impacts from new development. In fact, the effects of imperviousness on hydromodification impacts is much more complicated than a simple correlation with imperviousness. The limited hydromodification impact research to date has focused on empirical evidence of channel failures in relationship to directly connected impervious area (DCIA) or total impervious area. However, the more recent research has established that channel failures correlate, though loosely, more directly with DCIA. Therefore, waiver conditions tied to total impervious area do not reflect the most current available scientific information.

Further, more recent research has established that, in addition to the amount of DCIA present, the size of the watershed, channel slope and materials, vegetation types, and climatic and precipitation patterns are critical to accurately predicting receiving water response to DCIA (SCCWRP 2005a) (see discussion above).

Although physical degradation of stream channels in semi-arid climates of California may be detectable when watershed imperviousness is between three and five percent, not all streams will respond in the same manner (SCCWRP 2005b). Management strategies need to account for differences in stream type, stage of channel adjustment, current and expected amount of basin imperviousness, and existing or planned hydromodification control strategies.

The absolute measure of watershed imperviousness that could cause stream instability depends on many factors, including watershed area, topography, land cover, and soil type; development impervious area and connectedness; longitudinal slope of the river; channel geometry; and local boundary materials, such as bed and bank material properties and vegetation characteristics.

The first part of the waiver, as written, also does not account for the existing imperviousness in the project's watershed, nor the potential cumulative imperviousness of non-priority projects that could occur within the subject watershed.

In summary, it is important to not prejudge these thresholds without proper consideration of local watershed and channel stability factors. Instead, the Tentative Order should allow the SMC study and Copermittee hydromodification control planning process to occur, so as to develop appropriate thresholds based on best available science and localized watershed conditions.

Section D.1.h(1) should be revised as follows. Section D.1.h(3)(c) should then be deleted.

(1) Assessment of Downstream Erosion

(a) Each Copermittee must require evaluation of the adjacent and downstream conditions of receiving waters (i.e., waters of the U.S. and State) when evaluating Priority Development Projects. Factors to evaluate must include the designated beneficial uses of the receiving waters, type of channel receiving discharges, the stage of channel adjustment/alteration, channel slope, composition of bed and bank materials, underlying geology, watershed position (e.g., stream order and location), and connections between the streams and adjacent floodplains.

(b) Onsite hydromodification control waivers: Copermittees may develop a strategy for waiving hydromodification requirements for onsite hydromodification controls (not site design BMPs) in situations where assessments of downstream channel conditions and proposed discharge hydrology clearly indicate that adverse hydromodification effects to present and future beneficial uses are unlikely. The waivers must be based on the following determinations:

(i) Watershed-specific waivers: Waivers may be implemented for new development and redevelopment projects within a watershed where a watershed management plan or study has been prepared that establishes thresholds for project waiver based on watershed-specific factors. The watershed plan or study shall establish when potential for substantial hydromodification impacts is not present based on appropriate assessment and evaluation of relevant factors, including: runoff characteristics, soils conditions, watershed conditions, channel conditions, and proposed levels of development within the watershed. The plan or study may also indicated systems where, due to current hydromodification impacts, the best course of action is to address hydromodification with in-stream restoration techniques.

(ii) Redevelopment project waivers: Waivers may be implemented where redevelopment projects do not increase the potential for hydromodification impacts over the existing site conditions, by both no increase in impervious area and no decrease in the infiltration capacity of pervious areas.

(iii) Degraded stream channel condition: Waivers may be implemented in situations ~~where receiving waters are severely degraded (highly unstable due to irrevocable changes to its form);~~ the receiving system is concrete-lined or significantly hardened (e.g., with rip-rap, sackcrete, etc.) downstream to their outfall in bays or the ocean; or the project would discharge into underground storm drains discharging directly to bays or the ocean.

(iv) Modified channel conditions: Conditional waivers for onsite controls may be implemented in situations where receiving waters are severely degraded (highly unstable due to irrevocable changes to its form). In this situation, conditional waivers shall include requirements for in-stream measures designed to improve the beneficial uses adversely affected by hydromodification. The measures must be implemented within the same watershed as the Priority Development Project.

(c) The requirements in sections D.1.h(2) and (3) below do not apply to Priority Development Projects that meet the waiver requirements in subsection (b) above.

Section D.1.h (5) Hydromodification Criteria Interim Requirements for Large Projects requires that *all* Priority Development Projects larger than 20 acres implement specific hydrologic control measures to address hydromodification impacts. This requirement should not apply to Priority Development Projects where the project discharges stormwater runoff into creeks or storm drains where the potential for erosion, or other impacts to beneficial uses, is minimal or nonexistent. Such situations may include discharges into creeks that are concrete-lined or significantly hardened (e.g., with rip-rap, sackrete, etc.), storm drains discharging directly to the ocean, lake, or other waterbody that is not susceptible to erosion, and construction of infill projects in highly developed watersheds where the potential for single-project and/or cumulative impacts is minimal. This condition should also not apply to redevelopment projects that do not increase impervious surfaces, or that reduce impervious surfaces, as these projects would not cause new hydrologic impacts. Having the last few projects being developed employ significant hydromodification controls in watershed where channel degradation is already occurring would not solve the existing hydromodification problem. There should be an allowance for the use of geomorphically-referenced stream stabilization techniques and/or larger regional hydromodification control where possible in these cases.

Section D.1.h (5)(a)(ii). Hydromodification Criteria Interim Requirements for Large Projects subsection (ii) requires disconnecting impervious areas from the drainage network and adjacent impervious areas. This requirement is redundant of the requirement in subsection (i), and should not be required if the impervious area is being directly connected to a downstream regional hydromodification control facility prior to discharge to a sensitive receiving water.

Subsection (i) should be revised to read as follows:

(i) On-site or off-site storm water reuse, evapotranspiration, and/or infiltration for small precipitation events, based on limitations imposed by soil conditions and groundwater contamination potential, prior to discharge to the receiving water;

Subsection (ii) should be deleted.

Section D.1.h (5)(a)(iii). Hydromodification Criteria Interim Requirements for Large Projects subsection (iii) provides for a hydrograph matching interim hydromodification control criterion. Palhegyi et al (2005) compared three flow control criteria in terms of effectiveness at controlling potential channel erosion: peak flow controls, hydrograph matching, and flow duration matching. While hydrograph matching was found to be far more effective than peak flow control, the analysis indicated an unacceptably high risk of future instability with hydrograph matching. Study results showed that hydrograph matching based on the 2-year discrete event resulted in a 100% probability of channel instability, based on field observations at over 45 study sites across 3 sub-watersheds in the Santa Clara Valley (SCVURPPP, 2005). Even matching the hydrograph of the 50-year discrete event corresponded to an approximately 70% probability of instability. Flow duration control, which maintains the continuous distribution of pre-development sediment transporting flows, was the only flow control method that was sufficiently protective.

A suggested flow duration control-based interim hydromodification criteria to replace the proposed Interim Hydromodification Criteria in subsection (iii) is as follows:

(iii) Control runoff by matching the pre-development flows and durations for the continuous range of return periods from 10 percent of the two year to the 10-year, based on long-term rainfall records. Within this range, the post-project flow duration curve shall not deviate above the pre-project flow duration curve flows by more than 10 percent, and shall not deviate above the pre-project flow duration curve flows over more than 10 percent of the length of the curve. A site specific critical flow may substitute for the lower return period (10 percent of the two year) if available.

Revise subsection (iv) to read as follows:

(iv) Establish buffer zones and setbacks for channel movement where appropriate based on the resource value of the drainage and consistent with watershed and subwatershed planning. ~~Consider various alternatives where in-stream controls are necessary.~~ Where in-stream controls are necessary, use geomorphically-referenced channel design techniques for channels that are substantially natural in the existing condition.

To assist in the implementation of the interim hydromodification control requirement for large projects, a local implementation tool based on flow duration control in the form of nomographs relating percent impervious area and soil type (infiltration rates) to BMP volume and land area requirements could be to developed within a 6 month to one year timeframe. The nomographs would be derived from continuous simulation modeling, using Southern Orange County-specific rain gauge records and local soil types. Ideally, the model would be calibrated using local, undeveloped and gauged watershed data. Each large development project, and/or the Copermittee, would be required to assess appropriate hydromodification standards and controls via the following protocol, as recommended by available literature: first conduct an assessment of the physical sensitivity of the downstream system. Then, if needed based on downstream sensitivity and ability to effect change in the watershed, implement hydrological source control BMPs and size hydromodification controls using the nomograph tool based on the percent imperviousness of the proposed project. Finally, require the project proponent to provide the indicated storage and infiltration volume and area, either in the form of a single basin or in smaller units distributed throughout the project.

Pg. 41 ***Section D.2.d(1)(c)*** Designate enhanced BMPS for 303(d) impairments and ESAs. It is unclear what constitutes "enhanced measures" for construction site BMPs. It should be clarified that "enhanced measures" are not exclusively "Advanced Sediment Treatment". The following discussion provides some proactive erosion and sediment control requirements for consideration by the regional board.

The stormwater provisions of the Clean Water Act require the implementation of BMPs to control and abate the discharge of pollutants in stormwater discharges from construction sites utilizing the best available technology economically achievable (BAT) and best conventional pollutant control technology (BCT). In order to achieve this goal with respect to the discharge of sediment from construction sites, the following five major objectives should be accomplished at every construction site:

- To minimize exposed areas and provide erosion control practices on disturbed areas during the rainy season;
- To provide properly designed drainage facilities to control concentrated flows;
- To provide sediment control practices around the perimeter of the construction site and at all internal inlets to the storm drain system during the rainy season;
- To reduce the tracking of sediment off site all year; and
- To reduce wind erosion all year.

However, stating these objectives alone in a permit does not provide the desired degree of specificity and guidance for the designer and contractor to decide when and what types of erosion and sediment control practices are needed, and how much erosion and sediment control is enough. Adding language with more specific design criteria applicable to all sites is suggested below. In addition, suggestions for "Enhanced Measures" for high risk sites (e.g., those that drain directly to water bodies that are 303(d)-listed for sediment constituents or that drain to other water quality sensitive areas as determined by the local jurisdiction) are provided below.

1. Require that **erosion control practices** be provided on disturbed areas during the rainy season. In order to address the timing of implementation of these measures, the permit should specify that all disturbed areas that will not be re-disturbed for a certain length of time (e.g., 20 days) shall be provided with erosion control measures within a certain length of time (e.g., 10 days) from last disturbance. The erosion control practices should achieve and maintain a specified minimum soil coverage (e.g., 90 percent of the soil being treated shall be covered) until the permanent vegetation or other permanent stabilization provides the intended long-term erosion control function at the site. In addition, more guidance should be provided through the California BMP Handbooks or other appropriate mechanism to for minimum erosion and sediment controls based on slope, season, and anticipated duration of inactivity. Dry season requirements should be based predominately on wind erosion control requirements, below.

Enhanced practices to consider for high risk sites include increased BMP inspection and maintenance requirements for high risk sites (e.g., requiring inspection by the SWPPP preparer/engineer or third party inspector at the time of BMP installation and at specified frequencies during the wet and dry seasons, limitations (but not necessarily prohibitions) on wet weather grading, and limiting the area of disturbance to the area that can be effectively controlled during wet weather.

2. Require that on-site **drainage facilities** for carrying concentrated flows be designed to control erosion, to return flows to their natural drainage courses, and to prevent damage to downstream properties.

3. Require that **sediment control practices** be provided around the down gradient perimeter of the construction site and at all internal inlets to the storm drain system during the rainy season. These sediment control measures may include filtration devices (such as silt fences, straw bale barriers, and inlet filters) and/or settling devices (such as sediment traps or basins). Filtration devices that are designed for sheet flow shall be installed and maintained properly in order to perform effectively. Sediment traps or basins shall be designed and maintained in accordance with requirements of the California General Construction Permit.

   Enhanced practices to consider for high risk sites include enhanced sediment basin controls such as the addition of baffles or other controls required to meet water quality objectives on a site-specific basis. Enhanced sediment basin controls should target portions of the site that cannot be effectively controlled by standard proactive erosion and sediment controls described above and not necessarily required throughout a site.

4. Require that practices be implemented and maintained to **reduce the tracking of sediment off site** at all times. This may be accomplished by stabilized construction entrances, wheel wash facilities, or other appropriate and effective measures designed in accordance with the most current CA BMP Handbooks; and

5. Require that practices be implemented and maintained to **reduce wind erosion** at all times. This may be accomplished by limiting the area of disturbance, applying dust control measures, and stabilizing disturbed areas in

a timely manner, and should be designed in accordance with the most current CA BMP Handbooks.

The standard principles of proactive and effective construction site erosion and sediment control identified above are consistent with the current erosion and sediment control manuals. However, these principles are not necessarily implemented appropriately at all construction sites due to a lack of permit specificity and design guidance. Additionally, these requirements would be relatively easy for a designer to specify, a contractor to implement, and a resident engineer, site superintendent, or site inspector to evaluate and enforce in the field.

Pg. 41 ***Section D.2.d(1)(c)(i).*** This subsection requires the use of "Advanced Sediment Treatment" for construction sites that are determined by the Copermittee to be an exceptional threat to water quality. The report by the State Water Resource Control Board's Stormwater Panel on Numeric Limits (SWRCB, 2007) included the following "reservations and concerns" on Advanced Sediment Treatment (called Active Treatment Systems in the Report):

1. The active treatment systems have generally been employed on sites five acres or larger. While the systems are technically feasible for sites of any size, including sites or drainages as small as an acre or less, the cost may be prohibitive. The cost-effectiveness of active treatment systems is greatly enhanced for large drainage areas, at which construction occurs for an extended period of time, over one or more wet season. There is also a more "passive" active system that is employed in New Zealand that uses captured rainfall to release the chemical into flows entering a detention system that requires less instrumentation and flow measurement infrastructure. Even more passive systems such as the use of polymer logs and filter bags are currently under development for small sites. Regardless, the Panel recommends that the Board give particular attention to improving the application of cost-effective source controls to small construction sites.
2. In considering widespread use of active treatment systems, full consideration must be given to whether issues related to toxicity or other environmental effects of the use of chemicals has been fully answered. Consideration should be given to longer-term effects of chemical use, including operational and equipment failures or other accidental excess releases.
3. Active treatment systems could result in turbidity and TSS levels well below natural levels, which can also be a problem for receiving waters. One of the

causes of stream degradation impacts is the elimination of sediment producing areas in a watershed. Releasing runoff with virtually no sediment load can increase channel downcutting or bank erosion

These concerns and recommendations should be considered by the Board prior to requiring the use of active treatment systems.

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