NRDC
THE EARTH'S BEST DEFENSE

Heal the Bay

April 10, 2009

Via personal delivery and electronic mail

Chair Lutz and Members of the Board
Los Angeles Regional Water Quality Control Board
320 4th Street, Suite 200
Los Angeles, CA 90013
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Re: Comments on February 24, 2009, Tentative Order for Ventura County MS4 Permit

Dear Chair Lutz and Members of the Board:

We write on behalf of the Natural Resources Defense Council ("NRDC") and Heal the Bay. We have reviewed Tentative Order No. 09-xxx, NPDES Permit No. CAS004002—the latest draft of the Ventura County Municipal Separate Storm Sewer System NPDES Permit, released on February 24, 2009. We appreciate the opportunity to submit the following comments on the Tentative Order.

I. Introduction

NRDC and Heal the Bay are concerned that the Tentative Order weakens key requirements contained in previous drafts of the Permit without any basis articulated either in the record or otherwise. We are troubled by the circumstances of these changes, which come after a series of meetings between Regional Board staff and some stakeholders. While we believe that permit applicants, like any stakeholder, have every right to make their views known, it is incumbent on the Regional Board to ensure that pollution control language is based on more than simply the desire to accommodate these stakeholders. The Regional Board has not done so, in our view, as described below; in many instances, staff have adopted submitted redline language *verbatim* or nearly so, typographic errors and all. Without evidence in the record to support these changes, this approach is effectively a self-regulatory one that is poor public policy and legally prohibited.

II. Standards Governing the Adoption of the Tentative Order by the Regional Board

In considering the Tentative Order, the Regional Board must not only ensure compliance with substantive legal standards, but it must also ensure that it complies with well-settled standards that govern the Regional Board's administrative decision-making. The Tentative Order must be supported by evidence that justifies the Regional Board's decision to include, or not to include, specific requirements. The Regional Board would be abusing its discretion if the Tentative Order ultimately fails to contain findings that explain the reasons why certain control measures and standards have been selected and others omitted. Abuse of discretion is established if "the respondent has not proceeded in the manner required by law, the order or decision is not supported by the findings, or the findings are not supported by the evidence." (Cal. Code Civ. Proc. § 1094.5(b); *see also Zuniga v. Los Angeles County Civil Serv. Comm'n* (2006) 137 Cal.App.4th 1255, 1258 (applying same statutory standard).) "Where it is claimed that the findings are not supported by the evidence, ... abuse of discretion is established if the court determines that the findings are not supported by the weight of the evidence." (*Phelps v. State Water Resources Control Bd.* (2007) 157 Cal.App.4th 89, 98-99.)

The administrative decision must be accompanied by findings that allow the court reviewing the order or decision to "bridge the analytic gap between the raw evidence and ultimate decision or order." (*Topanga Ass'n for a Scenic Cmty. v. County of Los Angeles* (1974) 11 Cal.3d 506, 515.) This requirement "serves to conduce the administrative body to draw legally relevant sub-conclusions supportive of its ultimate decision ... to facilitate orderly analysis and minimize the likelihood that the agency will randomly leap from evidence to conclusions." (*Id.* at 516.) "Absent such roadsigns, a reviewing court would be forced into unguided and resource-consuming explorations; it would have to grope through the record to determine whether some combination of credible evidentiary items which supported some line of factual and legal conclusions supported the ultimate order or decision of the agency." (*Id.* at 517 n.15.) In the case of the Tentative Order, the findings and Tentative Order Fact Sheet provide no support for the Regional Board's decision not to apply a 3% effective impervious area limitation to all regulated projects, nor any support for the Regional Board's decision to allow redevelopment projects (and other projects where onsite implementation is a concern) to comply merely with the SUSMP treatment criteria. They also do not explain or substantiate the failure to address the other issues described in this letter.

III. The Tentative Order Is Inadequate to Control Stormwater Pollution from New Development and Redevelopment and Fails to Ensure Compliance with the Maximum Extent Practicable Standard

The Tentative Order's Planning and Land Development Program section remains legally inadequate. As currently written, the Tentative Order would, as explained below, allow the implementation of relatively ineffective conventional treat-and-discharge

techniques at many development sites and is so confusingly drafted that some of its requirements are nearly impossible to discern. Moreover, it has been weakened in almost every respect from prior versions of the Permit, without any supporting documentation to demonstrate why such serial weakening is necessary. Without correction of the various problems in the Tentative Order, it cannot pass muster under the Clean Water Act.

The Planning and Land Development Program section is particularly critical for addressing the root causes of stormwater pollution, which is why we have focused significant attention in our comments here and in previous letters on these requirements. As the U.S. EPA has noted:

> Most stormwater runoff is the result of the man-made hydrologic modifications that normally accompany development. The addition of impervious surfaces, soil compaction, and tree and vegetation removal result in alterations to the movement of water through the environment. As interception, evapotranspiration, and infiltration are reduced and precipitation is converted to overland flow, these modifications affect not only the characteristics of the developed site but also the watershed in which the development is located. Stormwater has been identified as one of the leading sources of pollution for all waterbody types in the United States. Furthermore, the impacts of stormwater pollution are not static; they usually increase with more development and urbanization.[1]

A. The Standard of Practice in the U.S. Requires the Imposition of Low Impact Development Techniques Implemented with Clear Metrics for Development and Redevelopment Activities[2]

LID has been established as a *superior and practicable* strategy and, therefore, must be required. Accordingly, the United States Environmental Protection Agency has called upon Regional Boards across California to prioritize the implementation of LID, recently threatening to "consider objecting to the [San Francisco Bay region's] permit" if it does not include "additional, prescriptive requirements" for LID.[3] Along with the

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[1] U.S. Environmental Protection Agency (December 2007) *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices*, at v.

[2] We have advocated a 3% effective impervious area ("EIA") limitation, based on the technical work of Dr. Richard Horner. We continue to support this as the appropriate standard—however, because the Tentative Order imposes a 5% EIA limitation, we refer to the 5% standard throughout the letter.

[3] Letter from Douglas E. Eberhardt, EPA, to Dale Bowyer, San Francisco Bay Regional Water Quality Control Board (April 3, 2009), at 1.

prioritization of LID implementation, "EPA's primary objective for incorporating LID into renewed MS4 permits, especially for those that represent the third or fourth generation of permits regulating these discharges, is that the permit must include clear, measurable, enforceable provisions for implementation of LID.... [P]ermit[s] should [also] include a clearly defined, enforceable process for requiring off-site mitigation for projects where use of LID design elements is infeasible."[4] In South Orange County, EPA likewise observed that "the permit must include clear, measurable, enforceable provisions for implementation of LID.... We would not support replacing ... approaches [such as EIA] with qualitative provisions that do not include measurable goals."[5]

Other government agencies in California and around the U.S. have come to the same conclusions. The California Ocean Protection Council, for instance, strongly endorsed LID last year by "resolv[ing] to promote the policy that new developments and redevelopments should be designed consistent with LID principles" because "LID is a practicable and superior approach . . . to minimize and mitigate increases in runoff and runoff pollutants and the resulting impacts on downstream uses, coastal resources and communities."[6] In Washington State, the Pollution Control Hearings Board has found that LID techniques are technologically and economically feasible and must, therefore, be required in MS4 permits.[7] The National Academy of Sciences recently issued a comprehensive report with the same recommendation for stormwater management programs: "Municipal permittees would be required under general state regulations to make [LID] techniques top priorities for implementation in approving new developments and redevelopments, to be used unless they are formally and convincingly demonstrated to be infeasible."[8]

Critically, as demonstrated in the EPA comments quoted above, the prioritization of LID practices is insufficient by itself to meet the MEP standard and *must* be paired

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[4] *Id.* at 1-2.

[5] Letter from Douglas E. Eberhardt, EPA, to Michael Adackapara, Santa Ana Regional Water Quality Control Board (February 13, 2009), at 2-3.

[6] California Ocean Protection Council (May 15, 2008) *Resolution of the California Ocean Protection Council Regarding Low Impact Development*, at 2.

[7] *Puget Soundkeeper Alliance et al. v. State of Washington, Dept. of Ecology et al.* (2008) Pollution Control Hearings Board, State of Washington, No. 07-021, 07-026, 07-027, 07-028, 07-029, 07-030, 07-037, Phase I Final, at 6, 46, 57-58.

[8] National Academy of Sciences, Committee on Reducing Stormwater Discharge Contributions to Water Pollution, National Research Council (2008) *Urban Stormwater Management in the United States*, at 500.

with a measurable requirement for the implementation of LID. Since its inception, the MS4 permitting program has been seriously hampered by a pervasive absence of numeric performance standards for the implementation of best management practices ("BMPs") such as LID. For this reason, in December 2007, the State Water Resources Control Board commissioned a report which found that "[t]he important concept across all of [the] approaches [described in the report] is that the regulations established a *performance requirement* to limit the volume of stormwater discharges."[9] The report also noted that "[m]unicipal permits have the standard of Maximum Extent Practicable (MEP) which lends itself more naturally to specifying and enforcing a level of compliance for low impact development."[10] Another study, completed for the Ocean Protection Council, recommended the following standard: "Regulated development projects shall reduce the percentage of effective impervious area to less than five percent of total project area by draining stormwater into landscaped, pervious areas."[11]

While we appreciate the fact that the Tentative Order does require some implementation of LID and includes an effective impervious area limitation, which we support in concept, its requirements have been unacceptably weakened and confused, due to the wholesale insertion into this draft of pages of language drafted by the permit applicants. The Regional Board must now reassert its regulatory role and make important revisions so as to issue a permit that meets the MEP standard and complies with the Clean Water Act.

B. The Planning and Land Development Program Section Has Been Significantly Weakened Pursuant to the Requests of the Permittees

During the last round of comments, the Permittees submitted a redline of the Permit draft.[12] Nearly every one of the Planning and Land Development Program suggestions in this document has been accommodated in the Tentative Order, with the effect of severely weakening the Permit. Staff have not just accommodated conceptual criticism, they have instead adopted *verbatim* approximately 1,000 words from the

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[9] State Water Resources Control Board (December 2007) *A Review of Low Impact Development Policies: Removing Institutional Barriers to Adoption*, at 23 (emphasis added) (hereinafter "SWRCB LID Report").

[10] *Id.* at 4.

[11] Ocean Protection Council of California (January 2008) *State and Local Policies Encouraging or Requiring Low Impact Development in California*, at 27.

[12] Letter from Gerhardt Hubner, Ventura Countywide Stormwater Management Program, to Tracy Egoscue, Los Angeles Regional Water Quality Control Board (May 27, 2008), Attachment A1 ("Permittees' redline").

Permittees' redline of the Planning and Land Development Program section, rejecting only about 70 words of proposed changes.[13] These unjustified revisions have had the impact of fundamentally altering the critical LID provisions and specifically affect the following:

- The applicability of the Tentative Order's numeric performance standard for post-construction controls (5% EIA) to all projects, including redevelopment (Tentative Order ¶ 5.E.III.1(b));
- The Planning and Land Development Program section's applicability criteria, in terms of both square footage and whether only impervious surface counts toward the threshold (Tentative Order ¶ 5.E.II.1);
- Exemptions for "routine maintenance activity" (Tentative Order ¶ 5.E.II.2(b));
- The grandfather clause (Tentative Order ¶ 5.E.II.3);
- The baseline for hydromodification analysis ("pre-development" vs. "pre-project") (Tentative Order ¶ 5.E.III.2(a));
- The creation of an entirely new section that allows the Permittees to waive compliance with the hydromodification control requirements (Tentative Order ¶ 5.E.III.2(a)(2));
- The elimination of any interim hydromodification requirements for projects disturbing less than fifty acres of land (Tentative Order ¶ 5.E.III.2(a)(3)(i));
- The revision of the interim hydromodification criteria for projects over fifty acres such that meeting an Erosion Potential of 1 is no longer strictly required (Tentative Order ¶ 5.E.III.2(a)(3)(ii)); and
- The allowance for Permittees to create interim hydromodification criteria that do not have to meet any standard (Tentative Order ¶ 5.E.III.2(a)(3)(A)(4)—this section number is not consecutive and appears to be mislabeled in the Tentative Order).

The Permittees even eliminated the provisions that granted the Regional Board enforcement authority over the Planning and Land Development Program section of the

[13] *Compare* Permittees' redline ¶ 5.E *with* Tentative Order ¶ 5.E.

prior draft, and Regional Board staff accepted this deletion in whole.[14] Some of these revisions are discussed in more detail below.

The degree to which staff apparently have not critically reviewed the Permitees' submissions (despite including them in the Permit) is evidenced by the Tentative Order's incorporation of the same typographical and syntactical errors as the Permittees' redline submission—*e.g.*, "BMP pollutant *removalperformance*;"[15] "[E]ach Permittee shall require *that* during the construction of a single-family home, the following measures *to be* implemented..."[16] These facts suggest that Regional Board staff simply accepted the Permittees' revisions *verbatim* and did not read these insertions critically. The result: the Permittees have been allowed in the Tentative Order *literally* to write vast portions of their own permit. This is a serious violation of law that undermines public confidence in the Regional Board. To the extent that the apparent delegation of regulatory duties to the permit applicants is the result of an oversight or is otherwise explained, this error must be fully corrected prior to issuance of the Permit.

Further reinforcing the self-regulation problem and lack of transparency in the permit-writing process, Regional Board staff have not—in the findings, Tentative Order Fact Sheet, or Response to Comments—provided any explanation of why weakening the Permit is necessary. Indeed, the Response to Comments never mentions the numerous ways in which the Tentative Order has been enfeebled through the incorporation of the Permittees' revisions, claiming instead in the vast majority of cases: "No changes required to address this comment." (*Compare, e.g.*, Response to Comments at 29-36 *with* the many substantive changes listed above.) In contrast, where Regional Board staff implemented some NGO suggestions for certain provisions, the Response to Comments specifically acknowledges the changes made. (Response to Comments at 36.)

Taken as a whole, the LID provisions in the Permit have been significantly changed, in virtually each instance in ways that reduce environmental protection. While we discuss many of the most important issues in separate sections below, the changes affect a wide range of key requirements. For example, at the behest of the Permittees, Regional Board staff have rewritten the applicability section, as mentioned above, such that it now will fail to ensure pollution control at a large number of development and redevelopment projects. Specifically, the Tentative Order doubled the number of square feet required for many development projects to be regulated (from 5,000 to 10,000) and now requires that only impervious surface be considered in calculating whether a project

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[14] *Compare* Tentative Order 08-xxx, NPDES No. CAS004002, Third Draft Ventura County MS4 Permit ¶ 5.E.IV.3 *with* Tentative Order ¶ 5.E.IV *and* Permittees' redline at 55.

[15] Tentative Order ¶ 5.E.IV.6(a)(1) (emphasis added); Permittees' redline at 57.

[16] Tentative Order ¶ 5.E.II.1(a)(11) (emphasis added); Permittees' redline at 47.

meets the threshold. (Tentative Order ¶ 5.E.II.1.) These new criteria could hardly be construed as meeting the MEP standard since both the San Francisco Bay and North Orange County Phase I MS4 permits under consideration for adoption contain more stringent applicability criteria.[17] Additionally, the Tentative Order sets a catchall threshold of 1 acre (now with the additional requirement of at least 10,000 square feet of impervious surface), which is, arbitrarily, far higher than the catchall threshold for the San Francisco Bay permit. (Tentative Order ¶ 5.E.II.1(a)(1).). Even though NRDC mentioned this in our previous comment letter, the Response to Comments has not provided more than a cursory and unsupported explanation of staff's reasoning.

A second specific example of how wide-ranging the weakening of the Tentative Order is involves unexplained edits to the "grandfathering" provision such that all projects that have been "deemed complete for processing" or are "without vesting tentative maps" need not comply with the permit. (Tentative Order ¶ 5.E.II.3.) This is an unjustifiably weak requirement which also compares unfavorably with approaches taken by other Regional Boards. The draft San Francisco Bay regional MS4 permit, despite its many flaws, establishes a much more appropriate threshold: development projects must have received "final, major, staff-level discretionary review and approval for adherence to applicable local, state, and federal codes and regulation[s]."[18] The draft North Orange County MS4 permit also surpasses the Tentative Order and requires that projects have received approval of their "Water Quality Management Plan."[19] The inadequate language adopted by staff is taken directly from the Permittees' redline.

C. The Weaker Planning and Land Development Program Requirements Are Inconsistent with Evidence in the Record and the Longstanding Position of the Regional Board

Although Regional Board staff have clarified that appropriate numeric sizing criteria must be applied to BMPs used to render impervious surfaces "ineffective," various changes in ¶ 5.E.III.1 have created considerable internal inconsistency, arbitrary distinctions between projects, and impermissibly lacking requirements for large categories of projects. These changes have weakened the Tentative Order, as discussed above, and represent a considerable shift from the prior three drafts of the permit. Of all the revisions to the Planning and Land Development Program section requested by the

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[17] Tentative Order R8-2009-0030, NPDES Permit No. CAS618030, Orange County Draft MS4 Permit, at 47-49; Tentative Order R2-2009-00XX, NPDES Permit No. CAS612008, San Francisco Bay Draft MS4 Permit, at 16-19.

[18] Tentative Order R2-2009-00XX, NPDES Permit No. CAS612008, San Francisco Bay Draft MS4 Permit, ¶ C.3.c.ii.

[19] Tentative Order R8-2009-0030, NPDES Permit No. CAS618030, Orange County Draft MS4 Permit, ¶ XII.J.

Permittees and implemented by Regional Board staff, as noted above, every single one applies to a provision that has remained essentially unchanged through three drafts of the permit, with the exception of the grandfather provision, which came into being in the second draft. (*Compare* First Draft, Second Draft, and Third Draft Ventura County MS4 Permit *with* Tentative Order.) This, combined with the apparent reassignment of the lead permit author who is a National Academy of Sciences-level expert on stormwater, highlights the extent to which the recent revisions to the permit are arbitrary and do not reflect the application of agency expertise. (*See, e.g., CBS Corp. v. F.C.C.* (3rd Cir. 2008) 535 F.3d 167, 188 (agency interpretation set aside because no reasoned basis for departure from prior policy was provided and agency conclusion, "even as an interpretation of its own policies and precedent, [was] 'counter to the evidence before the agency' and 'so implausible that it could not be ascribed to . . . product of agency expertise.'").) Unfortunately, the effect of Regional Board staff's weakening of the Tentative Order is that the many changes in the Planning and Land Development Program section are bound to lead to poorer water quality results and will not adequately address impaired waters in Ventura County, as discussed below.

1. The New Development/Redevelopment Performance Criteria Have Been Weakened So that 5% EIA Is No Longer a General *Requirement* that Is Subject to Waiver Only in Situations of Technical Infeasibility

The Tentative Order states that reducing effective impervious area to 5% or less is a "goal." (Tentative Order ¶ 5.E.III.1(b).) This creates potential uncertainty regarding whether the 5% EIA limitation is, in fact, a requirement for all regulated projects, and indeed, it appears that it is *not* such a requirement since all redevelopment projects and any other development projects for which "the 5% goal is infeasible" may simply comply with the state-law-backstop SUSMP treatment criteria. (Tentative Order ¶ 5.E.III.1(b).)[20] Regional Board staff are essentially saying that LID techniques should not apply in redevelopment areas.[21] There is, however, a wealth of technical information to demonstrate that this exemption is nonsensical and vastly over-inclusive.

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[20] It bears mention that the definition of "redevelopment" is extremely broad and could encompass sites anywhere in Ventura County that have experienced any sort of development. Indeed, the only requirement to qualify as a redevelopment site is that the site must already have been "developed," a term which is not defined in the Tentative Order. (Tentative Order at 107.) This could include suburban areas, as well as downtown centers, so Regional Board staff cannot here legitimately claim to base this exemption on concepts of "smart growth" (which NRDC advocates) since the redevelopment of a suburban strip mall, for example, would do nothing to reduce vehicle miles traveled or to encourage denser development patterns.

[21] This is an especially problematic result because the Tentative Order has gutted the hydromodification section and no longer requires any hydromodification controls for

a. Technical Studies and Other National Standards for LID Implementation in Redevelopment Areas

A recent EPA report noted that "LID approaches can be used to reduce the impacts of *development and redevelopment* activities on water resources."[22] Similarly, a study completed for the State Water Board found that retention-based standards for LID implementation (like the 5% EIA limitation) are "appropriate models" for urbanized areas where most projects will involve redevelopment.[23] The study went even further in recommending LID retrofits as "a critical need" for existing development.[24] Another study analyzed one existing redevelopment site that had implemented LID, and not only was such implementation possible, but the authors found that "[t]he LID option produced a better return on initial investment, as measured by improvements to water quality, than did investments in conventional controls."[25]

The record for the Tentative Order even contains locality-specific analysis demonstrating that achieving 5% EIA is feasible for a wide range of sites in Ventura County, including a technical report by stormwater expert Dr. Richard Horner, which specifically addresses the feasibility and water quality and quantity benefits of imposing a 5% EIA limitation on development projects in Ventura County.[26] A recent study by

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projects under 50 acres, referring instead to "LID and/or source or treatment BMPs" as if they are adequate to address hydromodification. (Tentative Order ¶ 5.E.III.2(a)(3)(a)(i).) (This is a highly problematic assertion in the first place, as discussed below.) Yet, at the same time, the Tentative Order has also gutted the LID section of the permit by waiving the retention-based 5% EIA standard for all redevelopment projects. To the extent that this is not the result of an oversight, it resembles a "shell game" wherein one permit provision asserts that the required control elements exist in another section, but that section has been revised to delete the purported controls.

[22] U.S. Environmental Protection Agency (December 2007) *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices*, at 2.

[23] State Water Resources Control Board (December 2007) *A Review of Low Impact Development Policies: Removing Institutional Barriers to Adoption*, at 22-23.

[24] *Id.* at 23.

[25] ECONorthwest (November 2007) *The Economics of Low-Impact Development: A Literature Review*, at 14.

[26] R. Horner, *Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices ("LID") for Ventura County* (February 2007) ("Horner Report").

consultants for the Permittees also demonstrated the feasibility of implementing LID techniques in Ventura County through a water quality volume-based standard on constrained redevelopment sites.[27] The Tentative Order and its supporting documents, however, fail to provide any justification for the blanket waiver of the 5% EIA standard or any explanation for why no onsite maximization and accompanying offsite mitigation are required when a project cannot implement the 5% EIA "goal" onsite, which is effectively the recommendation of the United States Environmental Protection Agency in other similar scenarios in California:

> The permit should stipulate that use of these [LID] design elements must result in the onsite management of the total [water quality design storm] runoff... [T]he permit should be clear that the use of [any] conventional means ... would not be counted in determining whether projects meet the permit's LID requirements.... The permit should include a clearly defined, enforceable process for requiring off-site mitigation for projects where use of LID design elements is infeasible.[28]

The Tentative Order's waiver, like the other loopholes in the Planning and Land Development Program section, is not only inconsistent with technical analyses, but it is also inconsistent with prior drafts of the permit, which applied the 5% EIA standard to all regulated projects, and with other standards from around the country. In the Anacostia area of Washington, D.C., all projects must retain the first inch of rainfall onsite.[29] In Philadelphia, all projects must infiltrate the first inch of rainfall.[30] West Virginia's draft MS4 permit also requires that the first inch of rainfall be retained onsite. Additionally, Anacostia and Philadelphia face redevelopment constraints arguably much more challenging than Ventura County. Nonetheless, in all three of these jurisdictions, projects cannot receive exemptions from the onsite retention requirement unless they demonstrate

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[27] Geosyntec Consultants et al., *Low Impact Development Metrics in Stormwater Permitting* (January 2009). We have also attached separately a critique of this study by Dr. Horner, as well as our February 13, 2009, comment letter addressed to the Santa Ana RWQCB, which critiques this report and highlights several significant errors in its methodology and presentation—nonetheless, the report does show that implementing LID through a volume-based standard is feasible on the three case study sites.

[28] Letter from Douglas E. Eberhardt, EPA, to Dale Bowyer, San Francisco Bay Regional Water Quality Control Board (April 3, 2009), at 2.

[29] Anacostia Waterfront Corporation (June 1, 2007) Final Environmental Standards, at 16.

[30] City of Philadelphia, Philadelphia Stormwater Regulations § 600.5; City of Philadelphia (2006) *Philadelphia Stormwater Management Guidance Manual: Version 2.0*, at 1-1, Appendix F.4.1.

infeasibility, and in such cases, the relevant regulations call for offsite mitigation or in-lieu fee payment, as discussed below. Thus, even the most constrained redevelopment sites must achieve the same overall, watershed-wide results as other projects, even if they cannot comply with the onsite retention standards. The evidence in the record, the position of EPA, and evidence from other jurisdictions all lead to the conclusion that the Tentative Order must do the same to pass legal muster.

b. Water Quality Detriments from the Tentative Order's Waiver of LID BMPs for Redevelopment Projects

From the perspective of water quality, the most problematic aspect of the Tentative Order's allowance for all redevelopment projects to implement mere SUSMP treatment is that it spurns the use of LID practices, which, as highlighted above, are superior stormwater management techniques and must be included in MS4 permits.[31] Indeed, in the new draft of the Tentative Order, there is no requirement at all for the type of BMPs that would have to be installed at projects exempted from the EIA limitation. (Tentative Order ¶¶ 5.E.III.1(b), 5.E.III.4.) If conventional BMPs are used at redevelopment sites (which would likely be the case), water quality benefits will be severely diminished. In keeping with the observations of the ECONorthwest report quoted above, Dr. Horner demonstrated in his Ventura County-based study that using CDS units, for instance, would result in pollutant loading reductions of between 0% and 46%, whereas LID techniques would create reductions mostly in the 97% to 99% range.[32] This is in addition to the ancillary water supply benefits of retaining water onsite. With evidence in the record showing the widespread applicability and feasibility of LID onsite retention practices in Ventura County specifically and around the entire U.S. generally, passing the Tentative Order as drafted would be an abuse of the Regional Board's discretion. The current draft would not reduce pollution and improve water quality to the maximum extent practicable.

Overall, the Tentative Order's "New Development/Redevelopment Performance Criteria" provisions do not establish a comprehensive, numeric performance standard—they create, instead, a massive loophole for numerous projects in Ventura County, many of which would be able to comply with the 5% EIA standard onsite but are not required to by the Tentative Order. This loophole would allow the installation of poor-performing BMPs when vastly superior BMPs are available, cost-effective, and feasible for implementation. The criteria for granting an exemption from meeting the 5% EIA limitation onsite should be strictly based on technical infeasibility and not on an overbroad, blanket exemption for the very category of projects that may encompass most

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[31] *See, e.g.*, Letter from Douglas E. Eberhardt, EPA, to Dale Bowyer, San Francisco Bay Regional Water Quality Control Board (April 3, 2009).

[32] Horner Report at 12. 16.

of the development that takes place in Ventura County in coming years. The Tentative Order must be revised to specify that 3% or less EIA is a *requirement* or *design standard* (not a "goal") for *all* new development and redevelopment projects, and strict infeasibility criteria, paired with an alternative compliance/offsite mitigation requirement, must be imposed. Only in this manner will the implementation of LID, and thus the improvement of water quality, be maximized.

2. Whenever the Obligation for a Project to Meet the 5% EIA Limitation Onsite Is Waived for Infeasibility, the Project Must Be Required to Provide Offsite Mitigation for any Impacts Not Addressed Onsite.

Not only will the Tentative Order, as drafted, lead to inferior water quality results compared to those that are otherwise practicably attainable, but they will continue to allow watershed-wide degradation. By gutting the 5% EIA limitation and ignoring evidence in the record that the technically-justified requirement is 3% EIA, the Tentative Order is inconsistent with evidence that, absent such control, watershed and aquatic ecosystem health will decline. Dr. Horner explained the reasoning behind this concept in his report.[33] The flexibility and benefits of this watershed-oriented approach are apparent: even if the implementation of retention-based BMPs on a given site might not meet the 5% EIA standard, the same positive effects can be achieved through offsite mitigation and/or in-lieu fees used to construct pollution-reducing facilities elsewhere. Thus, to meet the MEP standard, the Tentative Order must be revised so that any instances of LID infeasibility on a particular site results in mitigation offsite, a result consistent with the evidence in the record and with EPA recommendations and now implemented in a wide range of permits nationally. This can be accomplished by the Permittees either through the RPAMP provision (¶ 5.E.IV.3) or through the otherwise applicable requirements of the Permit itself, such as the mitigation funding provision.

A system that allows for onsite noncompliance but requires commensurate offsite mitigation would parallel other stormwater regulations in the rest of the country. Anacostia, for instance, requires either physical offsets (at 1.5 times the volume not retained onsite) or in-lieu payments (at 2 times the cost of mitigating the volume not retained onsite).[34] The Philadephia Water Department has the discretion to accept offsite mitigation that provides water quality and/or quantity control equal to or greater than the

[33] Horner Report, Attachment A.

[34] Anacostia Waterfront Corporation (June 1, 2007) Final Environmental Standards, at 16.

onsite practices whose infeasibility has been demonstrated.[35] The West Virginia draft permit allows offsite mitigation in the same sewershed/watershed at a ratio of 1:1.5—at least 0.6 inches of the original volumetric obligation must still be retained onsite, however.[36] The same thrust guides the Tentative Order's RPAMP provision, but this requirement only comes into play if the Permittees submit and receive approval for an RPAMP.

In contrast to the standards outlined above, as currently written, the Tentative Order may allow all redevelopment projects, as well as other development projects where onsite compliance is infeasible, to avoid meeting the 5% EIA standard altogether. These provisions must be revised such that whenever a project applicant demonstrates the technical infeasibility of implementing the 5% EIA limitation onsite, the project applicant is required to implement the standard through alternative compliance measures that could take the form of offsite mitigation, in-lieu fees to pay for achieving the same retention and pollution reduction benefits in the subwatershed, or whatever else would have the watershed-wide effect of reducing EIA to 5%. The Tentative Order has already created provisions to address these various alternative compliance measures, and it already applies them to non-exempt projects. (Tentative Order ¶ 5.E.III.1(b).) Without requiring alternative compliance measures for all projects where onsite compliance is infeasible, the Tentative Order will be falling behind other parts of the country and granting unnecessary exemptions to many undeserving projects while allowing the implementation of BMPs that have been proven far less effective at pollutant removal than other available and appropriate practices.

D. The Tentative Order's Planning and Land Development Program Provisions Do Not Meet the Clean Water Act's "Maximum Extent Practicable" Standard for Stormwater Pollution Reduction

As discussed above, the Tentative Order represents in many regards a significant weakening of the requirements that previous drafts of the permit would have imposed. Now, unfortunately, the Tentative Order's provisions are far from legally adequate to meet the Clean Water Act's MEP standard, and they must be revised accordingly.

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[35] City of Philadelphia, Philadelphia Stormwater Regulations § 600.5; City of Philadelphia (2006) *Philadelphia Stormwater Management Guidance Manual: Version 2.0*, at 1-1, Appendix F.4.1.

[36] State of West Virginia (December 11, 2008) Department of Environmental Protection, Division of Water and Waste Management, Draft General National Pollution Discharge Elimination System Water Pollution Control Permit, NPDES Permit No. WV0116025 at 13-14.

1. The MEP Standard Requires that the Tentative Order Impose More Stringent Stormwater Control Measures and Performance Criteria

Section 402(p) of the Clean Water Act establishes the MEP standard as a requirement for pollution reduction in stormwater permits. "[T]he phrase 'to the maximum extent practicable' does not permit unbridled discretion. It imposes a clear duty on the agency to fulfill the statutory command to the extent that it is feasible or possible." (*Defenders of Wildlife v. Babbitt* (D.D.C. 2001) 130 F.Supp.2d 121, 131 (internal citations omitted); *Friends of Boundary Waters Wilderness v. Thomas* (8th Cir. 1995) 53 F.3d 881, 885 ("feasible" means "physically possible").) As one state hearing board held:

> [MEP] means to the fullest degree technologically feasible for the protection of water quality, except where costs are wholly disproportionate to the potential benefits.... This standard requires more of permittees than mere compliance with water quality standards or numeric effluent limitations designed to meet such standards.... The term "maximum extent practicable" in the stormwater context implies that the mitigation measures in a stormwater permit must be more than simply adopting standard practices. This definition applies particularly in areas where standard practices are already failing to protect water quality...

(*North Carolina Wildlife Fed. Central Piedmont Group of the NC Sierra Club v. N.C. Division of Water Quality* (N.C.O.A.H. October 13, 2006) 2006 WL 3890348, Conclusions of Law 21-22 (internal citations omitted).) The North Carolina board further found that the permits in question violated the MEP standard both because commenters highlighted measures that would reduce pollution more effectively than the permits' requirements and because other controls, such as infiltration measures, "would [also] reduce discharges more than the measures contained in the permits." (*Id.* at Conclusions of Law 19.)

Similarly, in Ventura County, we have demonstrated that an onsite retention standard based on the effective impervious area of a site would be a technologically feasible approach that would reduce stormwater discharges and pollution far better than conventional BMPs, which are now allowed for a large class of projects under the Tentative Order.[37] Additionally, the Tentative Order and its supporting documents have not offered concrete evidence that a single site in Ventura County could not meet the otherwise applicable 5% EIA standard or the 3% EIA standard supported by the record. The Tentative Order also has not justified the wholesale weakening of the permit's requirements in many other respects, as set forth above, to the significant detriment of water quality.

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[37] Horner Report at 9-17.

2. Other Stormwater Permits and Regulatory Documents Around the Country Have Adopted Stronger, Practicable Requirements for the Implementation of Post-Construction Stormwater BMPs

The widespread implementation of other far more stringent requirements (not to mention the technical reports that we have submitted) creates a presumption that such requirements would be practicable in Ventura County. These standards do not contain wholesale waivers for redevelopment projects and require equivalent alternative compliance where onsite compliance is infeasible, as discussed in section III.C.2 of this letter, above. The decision to waive the EIA requirement for many projects in Ventura County, with contrary examples elsewhere in the U.S. and without any technical justification for doing so or any obligation to provide equivalent offsite mitigation, evidences a disregard for the MEP standard.

E. The Planning and Land Development Program Section Contains Many Provisions that Would Allow the Permittees, in Essence, to Regulate Themselves, a Result at Odds with Federal Law

Permittee self-regulation and lack of direction are well-known and acknowledged problems. As EPA recently stated, "In our review of MS4 programs across our Region, we have found that it is common for permits to rely on the development of plans to achieve certain permit objectives, rather than including prescriptive requirements in the permits.... [T]he plans often result in a reliance on qualitative provisions rather than specific measurable criteria. As a result, we have found that there is often uncertainty among both the MS4 permittees and the permitting agencies as to specific permit expectations."[38] The Tentative Order must prevent this outcome by ensuring that the Regional Board exercises meaningful review authority over the Permittees' stormwater management programs so that they meet the MEP standard and contain the requisite "specific measurable criteria" through which permit expectations can be understood and progress toward them measured. This obligation is imposed by the Clean Water Act:

> [S]torm water management programs that are designed by regulated parties must, in every instance, be subject to meaningful review by an appropriate regulating entity to ensure that each such program reduces the discharge of pollutants to the maximum extent practicable.

(*Environmental Defense Center v. EPA*, 344 F.3d 832, 856 (9th Cir. 2003; *Waterkeeper Alliance*, 399 F.3d at 501-502 (discussing importance of review of management plans for concentrated animal feeding operations).) Meaningful review must mean *ensuring* that the MS4 permits are *in fact* designed to reduce pollutants in stormwater to the MEP. (33 U.S.C. § 1342(b) (States are allowed to issue NPDES permits only where, *inter alia*, the

[38] Letter from Douglas E. Eberhardt, EPA, to Dale Bowyer, San Francisco Bay Regional Water Quality Control Board (April 3, 2009). at 2.

state permitting programs "*apply, and insure compliance with,* any applicable [effluent limitations and standards].").) Without regulatory oversight by the Regional Board to verify that the program contains the necessary specificity to meet legal requirements, the program amounts to "impermissible self-regulation." (*EDC*, 344 F.3d at 843.)

The Tentative Order has, *de facto*, created an impermissible self-regulatory system (1) by failing to define a large number of operative terms and, relatedly, (2) by allowing the permittees to develop key control requirements without public review. First, a large number of key terms and provisions that determine the level of control required by the development and redevelopment provisions are undefined and not susceptible to clear and common definition. These are not minor drafting issues but, rather, create uncertainty about the scope of the requirements, thereby allowing misunderstanding of the Tentative Order's requirements and the possibility of implementation at levels that do not meet the MEP standard:

- The Tentative Order has not defined "land-disturbing activity," yet this is a critical part of the criteria for determining when a redevelopment project is regulated.

- The Tentative Order has not defined "developed site," yet this also is a critical part of the criteria for determining when a redevelopment project is regulated.

- Provision 5.E.III.1(d) defines how to render an impervious surface "ineffective," but the methods outlined in this provision appear to conflict with Provisions 5.E.III.1(a) and (c)'s concepts of "percolation, infiltration, storage, or evapo-transpiration" and "infiltrate[ion] and stor[age] for beneficial reuse," respectively, which are the acceptable methods (as NRDC supports) for reducing EIA; indeed, there is even a conflict between Provisions 5.E.III.1(a) and (c) insofar as percolation and evapotranspiration are included in one list and not in the other.

- Provision 5.E.III.1(b) mentions that "stormwater mitigation credits" may be used to meet the 5% EIA standard, but such credits are nowhere described in the Tentative Order.

- Provision 5.E.III.1(b) also states that exempt projects must meet the surface discharge requirements of 5.E.III.4, a section that does not exist in the Tentative Order (presumably, this refers to 5.E.III.3, the SUSMP treatment sizing criteria).

- The "Mitigation Funding" provision, 5.E.IV.4, requires the creation of a "management framework" for "regional or subregional solutions to storm water pollution," but the four enumerated reasons for which such a framework is required of Permittees are never explained in the text of the Tentative

> Order, and the descriptions of these four reasons leave the reader confused as to the requirements that trigger mitigation funding. This provision—and other related provisions—should be changed to reflect the necessity for offsite mitigation or in-lieu payments whenever a project cannot meet the 5% EIA limitation onsite. The other bases for mitigation funding need clarification.

In each of these respects, there is nothing to stop a Copermittee from "misunderstanding or misrepresenting its own stormwater situation and proposing a set of minimum measures for itself that would reduce discharges by far less than the maximum extent practicable." (*EDC*, 344 F.3d at 855.)

Second, the Tentative Order has given the Permittees discretion to develop many of the critical performance standards and BMP requirements that will apply to new development and redevelopment projects. The Tentative Order, for instance, requires the Permittees to participate in the Southern California Storm Water Monitoring Coalition's Hydromodification Control Study, which will then become the hydromodification control requirements for Ventura County. (Tentative Order ¶ 5.E.III.2(a)(1)(E).) The Tentative Order also allows the Permittees to grant exemptions from hydromodification controls for a large set of projects—this section, as discussed, was in fact written by the Permittees and added to the permit in this draft. (Tentative Order ¶ 5.E.III.2(a)(2)(A).) The Tentative Order even enables the Permittees (in collaboration with project proponents, if they so wish) to develop their own interim hydromodification control requirements. (Tentative Order ¶ 5.E.III.2(a)(3)(A)(ii).)

Perhaps even more problematically, the Tentative Order does not require any Regional Board or public review *at all* of the many essential aspects of the Planning and Land Development Program section that have been left to the Permittees to determine. These aspects include: the abovementioned hydromodification provisions; the final hydromodification criteria to be developed by the Permittees (Tentative Order ¶ 5.E.III.2(a)(4)); the Mitigation Funding provisions (Tentative Order ¶ 5.E.III.4); and the Ventura County Technical Guidance Manual, which is to include "LID principles and specifications, including the objectives and specifications for integration of LID strategies" (Tentative Order ¶ 5.E.III.5).[39] These various documents and criteria are fundamentally necessary for assessing compliance with the permit, as well as the likely results of the permit's requirements. Without subjecting them to Regional Board and public review, the Tentative Order fails to meet the requirements of federal law, as described in *EDC* and *Waterkeeper*.

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[39] Notably, the only provision that does require Regional Board and public review is the RPAMP provision, which has been revised pursuant to our suggestions. We appreciate this change and hope that the Regional Board will make similar, necessary revisions to the other provisions mentioned above.

F. The Hydromodification Control Provisions Have Been Significantly Weakened in Key Respects that Fail to Protect Water Quality and Are Not Supported by Evidence in the Record

1. The Level of Protection Provided by the Hydromodification Control Criteria Has Been Weakened Arbitrarily and Is Not Scientifically or Technically Justifiable

Previously, the hydromodification control criteria established the proper, scientifically defensible "pre-development" condition as the baseline for comparison. Pursuant to the Permittees' comments, however, staff have changed this requirement to the "pre-project" condition. (Tentative Order ¶ 5.E.III.2(a).) The Tentative Order's current standard is acceptable only for new development on land that has remained in its natural state until the time of construction, but it is wholly unacceptable for infill and redevelopment projects where the land has already been developed.

Because of the prevalence of now-antiquated stormwater management practices that focused on peak flow and not on matching discharge rates and durations, *pre-project* rates and durations for infill and redevelopment sites will almost always represent measurements that we now want to avoid. Imagine, for example, the redevelopment of a 1950s-era surface parking lot: under the Tentative Order's standard, a developer could comply with the permit by doing essentially nothing to mitigate the effects of hydromodification—after all, a parking lot constructed in the 1950s would shunt all runoff directly to storm drains as rapidly as possible, resulting in the early, high peak flows that are at the root of the hydromodification problem. Nonetheless, under the Tentative Order, this unnatural hydrograph would be the standard against which the new project would be measured.

Instead of requiring projects not to exceed *pre-project* runoff rates and durations, the Tentative Order should require projects not to exceed *pre-development* runoff rates and durations. This will ensure that hydromodification criteria result in measurable progress and water quality benefits, rather than the institutionalization of detrimental, antiquated stormwater management practices. Technical experts have supported this type of standard. The Southern California Coastal Water Research Project, for instance, suggests that "attempting to have the post-development condition match *pre-development* runoff magnitude and duration should be an initial consideration for all circumstances."[40] Dr. Horner has also recommended, for other MS4 permits, the following standard:

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[40] SCCWRP, *Managing Runoff to Protect Natural Streams: the Latest Developments on Investigation and Management of Hydromodification in California* (Dec. 2005), at 11 (emphasis added).

> Post-development peak flow rates and volumes shall not exceed pre-development peak flow rates and volumes for all storms from the channel-forming event to the 100-year frequency stream flow.

Los Angeles County has implemented a standard of this sort: "Mimic undeveloped stormwater and urban runoff rates and volumes in any storm event up to and including the 50-year capital design storm event."[41]

The Tentative Order must be revised to reflect the hydromodification control baseline that was included in previous drafts of the permit. The backsliding that has taken place is ill-advised and unacceptable from the standpoint of stream ecology and geomorphology.

2. The Hydromodification Control Criteria Section Now Waives Compliance for Most Development Projects on an Interim Basis, With No Justification

As in the discussion above, Regional Board staff have heeded the suggestions of the Permittees and substantially weakened the interim hydromodification control criteria such that they are now far from meeting the MEP standard. While previous drafts of the permit imposed hydromodification requirements on projects disturbing less than 50 acres, the Tentative Order now would exempt all projects in this very large size range from hydromodification control altogether. (Tentative Order ¶ 5.E.III.2(a)(3).) Staff's apparent reasoning is that the LID and other control requirements are considered adequate to address hydromodification impacts. (*Id.*) This is an untenable proposition. First, as discussed in previous sections, LID BMPs are no longer required in the main, since they are not required for "redevelopment" projects. The hydromodification provision's reference, then, to LID BMPs when those BMPs are not required is a significant oversight, at best.

Second, even where sites do comply with the 5% EIA standard, the LID BMPs utilized for such compliance are not intended to prevent hydromodification and will not, in fact, serve that purpose. While LID BMPs, when required by the Tentative Order, may achieve some beneficial reduction in stormwater peak flows and volumes, their purpose is reducing pollution in stormwater runoff. As Dr. Mark Gold has observed, the LID approach is designed to capture and infiltrate or reuse the runoff generated by the 85th percentile storm. This approach will have negligible impact on flows generated by the 10 year, 50 year, or 100 year storms. These larger storms cause severe erosion, sedimentation and damage to riparian and wetland ecological communities. One only has to look at the sedimentation impairment of Mugu Lagoon to see a local example of the

[41] Los Angeles County Department of Regional Planning, LID Ordinance (effective Jan. 1, 2009), amending Los Angeles County Code § 12.84.440.

need for a hydromodification provision that reduces peak flows during these large, intense storm conditions. The BMPs now relied on by the Tentative Order are simply not adequate or properly calibrated to allow complete exemptions from controlling adverse hydromodification on sites as large as 50 acres, especially since the Tentative Order, as mentioned above, does not even require many projects to meet more than the basic SUSMP treatment standards.

Nowhere else in the state are projects up to 50 acres in size exempted from hydromodification control criteria, as now proposed for Ventura County.[42] This very misguided revision in the Tentative Order must be reversed and a range of larger storms must be considered, as noted above, or else the threshold for exemption in Provision 5.E.III.2(a)(3)(A)(i) must be lowered by several orders of magnitude. Currently, the Tentative Order requires far less than MEP in this arena.

IV. The Tentative Order Fails to State Explicitly that Waste Load Allocations from Applicable TMDLs Must be Enforceable Permit Limitations

TMDLs establish WLAs—or the maximum amount of a pollutant that each point source discharger may release into a particular waterway—that constitute a form of water quality-based effluent limitation. (*See* 33 U.S.C. 1313(d)(4)(A); 40 C.F.R. § 130.2.) Once a TMDL has been adopted, NPDES permits are required to include WLAs and contain effluent limitations and conditions consistent with the assumptions and requirements of the TMDL from which they are derived. (40 C.F.R. § 122.44(d)(1)(vii)(B).)

The Tentative Order incorporates numeric WLAs for TMDLs applicable to the permittees in Part 6.V. Under Finding E.15, the Tentative Order identifies eight separate TMDLs that "have been or will be incorporated into the Basin Plan within the term of the Order." (Tentative Order finding E.15.) TMDLs currently in effect in some Ventura County waters include those for toxicity, chlorpyrifos, and diazinon, for metals and selenium, and for organochlorine pesticides, PCBs and siltation in Calleguas Creek, its tributaries, and Mugu Lagoon; for trash in Revolon Slough and Beardsley Wash; and for bacteria in harbor beaches of Ventura County. (*See* Tentative Order ¶¶ 6.V.1 through 6.V.8.)

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[42] Tentative Order No. R8-2009-0030, NPDES Permit No. CAS618030, Orange County Draft MS4 Permit, ¶ XII.D; Order No. R9-2007-0001, NPDES No. CAS0108758, San Diego County MS4 Permit, ¶ D.1.g; Tentative Order R2-2009-00XX, NPDES Permit No. CAS612008, San Francisco Bay Draft MS4 Permit, ¶ C.3.g; Tentative Order No. R9-2009-0002, NPDES No. CAS0108740, South Orange County Draft MS4 Permit, ¶ F.1.h.; Los Angeles County Department of Regional Planning, LID Ordinance (effective Jan. 1, 2009), amending Los Angeles County Code § 12.84.

While the Tentative Order repeatedly states that it "incorporates provisions to assure that Ventura County MS4 permittees comply with WLAs and other requirements of TMDLs covering impaired waters impacted by the permittees' discharges" (Tentative Order ¶ 6.I),[43] it seems to allow Permittees to "attain the storm water WLAs . . . by implementing BMPs in accordance with the MS4 effluent quality workplan and source identification approved by the Executive Officer." (Tentative Order ¶ 6.II.) This appears to be a requirement not fully consistent with the basic requirement that a permit must assure the imposition of adopted WLAs and compliance therewith as a basic and clearly stated condition of the permit.

Further, while the Regional Board may view implementation of BMPs as a means of achieving WLAs, U.S. EPA policy requires that a permit "demonstrate that the BMPs are expected to be sufficient to comply with the WLAs."[44] There is nothing in the Tentative Order or its supporting documents to demonstrate that the management practices it requires will result in compliance with the WLAs, or even that the practices were designed to do so or to address specific pollutants of concern.[45] Hence, even if the Regional Board means to require only compliance with specified management practices as a means of meeting a WLA (which we contend is a degree of separation that is flatly unlawful), it could in any case only do so based on evidence that it has not referenced and that does not exist regarding the expected control efficacy of the specifically required BMPs.

For example, the Tentative Order's implementation of the TMDL for Organochlorine (OC) Pesticides, Polychlorinated Biphenyls (PCBs) and Siltation for Calleguas Creek, its Tributaries, and Mugu Lagoon states only vaguely that Permittees "shall implement BMPs to achieve the interim WLAs" identified in the Tentative Order, and then requires only compliance monitoring, creation of a "Pesticide Collection

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[43] *See also*, Tentative Order finding F.2 (where adopted, "this Order requires Permittees to implement controls to achieve the WLAs within the compliance schedule provided in the TMDLs"); finding D.5 ("This Order incorporates applicable WLAs that have been adopted by the Regional Water Board and have been approved by the Office of Administrative Law and the U.S. EPA. The TMDL WLAs in the Order are expressed as water quality-based effluent limits in a manner consistent with the assumptions and requirements of the TMDL from which they are derived.")

[44] Letter from Douglas E. Eberhardt, U.S. EPA, to Dale Bowyer, San Francisco Regional Water Quality Control Board (April 3, 2009), at 6.

[45] To the extent that the Tentative Order intends to condition implementation of BMPs on meeting requirements of previously adopted TMDL workplans, the workplans are not incorporated in the Order, nor are they readily available for review on the Los Angeles Regional Board's website.

Program," and performance of a series of future studies targeted at the pollutants addressed by the TMDL. (Tentative Order ¶ 6.V.3.) The specific implementation provisions for the TMDL for Bacteria in Harbor Beaches of Ventura County require even less since, while compliance monitoring must be conducted by the permittees, "compliance with the TMDL may be either through structural and non-structural BMPs or implementation of other measures," and "[s]pecial studies are not required . . . though conducting special studies is within the discretion of the responsible parties." (Tentative Order ¶ 6.V.8.) For both TMDLs, the Permit requires only the use of further BMPs in the event that WLAs are not achieved, stating "[i]f any WLA is exceeded at a compliance monitoring site, permittees shall implement BMPs in accordance with the TMDL Technical Reports Implementation Plans or as identified in the Basin Plan Amendment." The Permit must state that compliance with the WLAs is required. (Tentative Order ¶ 6.V.3.(b)(2); ¶ 6.V.8.(b)(2).)

The U.S. EPA has noted that, "given the uncertainties in the performance of many of the BMPs commonly used for stormwater pollution control, it is often difficult to make . . . a determination" that selected BMPs will comply with WLAs.[46] The Tentative Order, in setting out a program of poorly defined requirements for TMDL implementation, does not demonstrate that BMPs to be implemented by the Permittees will achieve such compliance. Thus, the Tentative Order must be revised to state explicitly that implementation of BMPs does not in itself constitute compliance with WLAs. Effectively, the Order should "explicitly state that the wasteload allocations (WLAs) established by . . . TMDLs are intended to be enforceable permit effluent limitations and that compliance is a permit requirement."[47] The Tentative Order fails to meet this obligation, and should be revised accordingly.

V. The Tentative Order Allows the Discharge of Pollutants from New Dischargers and Sources

Approval of the Tentative Order will authorize the discharge of pollutants to impaired water bodies from "new sources" or "new dischargers" in violation of the CWA's implementing regulations. 40 C.F.R. § 122.4(i) explicitly prohibits discharges from these sources, stating that:

No permit may be issued:

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[46] Letter from Douglas E. Eberhardt, U.S. EPA, to Dale Bowyer, San Francisco Regional Water Quality Control Board (April 3, 2009), at 6.

[47] Letter from Douglas E. Eberhardt, EPA, to Michael Adackapara, Santa Ana Regional Water Quality Control Board (February 13, 2009), at 3.

> ... (i) To a new source or a new discharger, if the discharge from its construction or operation will cause or contribute to the violation of water quality standards. The owner or operator of a new source or new discharger proposing to discharge into a water segment which does not meet applicable water quality standards or is not expected to meet those standards ... and for which the State or interstate agency has performed a pollutants load allocation for the pollutant to be discharged, must demonstrate, before the close of the public comment period, that:
>
> (1) There are sufficient remaining pollutant load allocations to allow for the discharge; and
>
> (2) The existing dischargers into that segment are subject to compliance schedules designed to bring the segment into compliance with applicable water quality standards.

(40 C.F.R. § 122.4(i).) Under 40 C.F.R. § 122.2, a "new discharger" is defined as "any building, structure, facility, or installation: (a) From which there is or may be a 'discharge of pollutants;' . . . (c) Which is not a 'new source;' and (d) Which has never received a finally effective NDPES permit for discharges at that 'site.'" (40 C.F.R. § 122.2.) A "new source" is defined as "any building, structure, facility, or installation from which there is or may be a 'discharge of pollutants . . .'" that may be subject to applicable standards of performance under section 306 of the Clean Water Act. (40 C.F.R. § 122.2.) Thus, the Tentative Order may not authorize the development or redevelopment of any building or structure, including, without limitation, a new subdivision, industrial facility, or commercial structure, within the Permittees' jurisdiction, if runoff from the new discharge adds any pollutant to discharges from the MS4 that "will cause or contribute to the violation of water quality standards" for a water body impaired for that pollutant. Furthermore, the applicant for the permit must prove the availability of any exception to this provision, as set forth above.

In *Friends of Pinto Creek v. U.S. E.P.A.*, the Ninth Circuit Court of Appeals vacated an NPDES permit issued by the U.S. EPA to a new discharger on the grounds that the Permittees' "discharge of dissolved copper into a waterway that is already impaired by an excess of the copper pollutant" would violate the CWA. ((9th Cir. 2007) 504 F.3d 1007, 1011.) Citing 40 C.F.R. § 122.4(i), the court stated that "The plain language of the first sentence of the regulation is very clear that no permit may be issued to a new discharger if the discharge will contribute to the violation of water quality standards." (*Id.* at 1012.) The court noted that a single exception to this rule exists where a TMDL has been performed, and the "new source can demonstrate that, under the TMDL, the plan is designed to bring the waters into compliance with applicable water quality standards." (*Id.*) Thus, where no TMDL has been completed for a specified water body and pollutant, new discharges that add pollutants that will cause or contribute to a violation of water quality standards are prohibited absolutely. Additionally, the court

in *Friends of Pinto Creek* observed that unless a TMDL explicitly provides that existing discharges into the impaired water body are "subject to *compliance schedules* designed to bring the segment into compliance with applicable water quality standards," issuance of a permit for new discharge is also prohibited under 40 C.F.R. § 122.4(i). (*Id.* at 1013.) In effect, a permit for new discharges may not be issued, even when a TMDL for the relevant pollutant exists, unless it firmly establishes that "there are sufficient remaining pollutant load allocations under existing circumstances." (*Id.* at 1012.)

For the reasons set forth, under the holding of *Friends of Pinto Creek*, the Regional Board is prohibited from approving a permit that allows new sources or dischargers of any pollutant to waterbodies already impaired by that pollutant, unless the Tentative Order demonstrates that an existing TMDL specifically provides sufficient waste load allocations for the discharge.

As of 2002, there were "in excess of 160" waterbodies that exceeded water quality standards for at least one pollutant within the jurisdiction of the Los Angeles Regional Board.[48] Many of these are located in jurisdictions and municipalities covered by the Tentative Order.[49] Water bodies within the Permittees' jurisdictions are impaired for, among other pollutants, PCBs, bacteria, nutrients, pesticides, and metals.[50] The Tentative Order acknowledges that "Municipal point source discharges of runoff from urbanized areas remain a leading cause of impairment of surface waters in California," (Tentative Order finding B.3), and under finding B.1, states that "[b]ased on the Ventura Countywide Storm Water Monitoring Program's Water Quality Monitoring Reports . . . the dry weather and wet weather Pollutants of Concern (POC) in urban stormwater include an anion, bacteria, conventional pollutants, metals, a nutrient, organic compounds, and pesticides . . . Many of the POC listed are causing impairments identified on the federal Clean Water Act (CWA) § 303(d) list of impaired waterbodies." (Tentative Order finding B.1.)[51]

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[48] Los Angeles Regional Water Quality Control Board (December 2002) Draft Strategy for Developing TMDLs and Attaining Water Quality Standards in the Los Angeles Region, at 3. http://www.swrcb.ca.gov/rwqcb4/water_issues/programs/tmdl/02_1210_strategy%20121002.pdf.

[49] See 2006 CWA Section 303(d) List of Water Quality Limited Segments. For example, in addition to the eight TMDLs identified in the Permit for Ventura MS4 permittees, the Ventura River and Ventura River Estuary are identified as impaired for algae, Calleguas Creek is identified as impaired for fecal coliform, and the Santa Clara River is identified as impaired for toxicity, bacteria, pesticides, chlorpyrifos and diazinon.

[50] *Id.*

[51] The Permit characterizes stormwater runoff generally under finding B.2., stating that

The Tentative Order Fact Sheet further elaborates on these concerns, stating that "[t]he water quality monitoring data submitted by the Ventura MS4 Permittees (Annual Monitoring Report 04-05) reveal that a number of constituents, such as metals, PAHs, [and] pesticides exceeded the receiving water quality standards during wet events." (Tentative Order Fact Sheet at 27.) The 2008 Annual Monitoring Report for the Ventura MS4 Permittees stated that "[e]levated pollutant concentrations were observed at all monitoring sites during one or more monitored wet weather storm events," and at certain mass emission stations "during one or more dry weather events."[52] The 2008 Annual Report identified "[c]onstituent concentrations above Los Angeles Region Basin Plan, California Toxics Rule, and/or California Ocean Plan water quality objectives" for pollutants including bacteria, metals, nutrients, PAHs and other organic compounds, PCBs and pesticides. (2008 Annual Report at 9-3 – 9-5.) The 2004-2005 Annual Report demonstrated that samples from land use monitoring sites specifically "designed to characterize stormwater discharges"[53] contained the same list of pollutants.[54] The adopted Basin Plan Amendment for the Calleguas Creek Watershed Metals TMDL specifically identifies urban runoff as a "significant source[] of metals and selenium."[55]

These findings are further borne out by research that has consistently "identified stormwater runoff as a major contributor to water quality degradation in urbanizing watersheds."[56] Studies have repeatedly shown that "[s]tormwater runoff typically

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"Common pollutants in urban storm water and their respective sources are: bacteria from animal droppings and illegal discharges; Polycyclic Aromatic Hydrocarbons (PAHs) from the products of internal combustion engine operation and parking lot sealants wash off; nitrates from fertilizer application; pesticides from pest mitigating applications and from plant mitigating applications; bis (2-ethylhexyl) phthalate from the break down of plastic products; mercury from atmospheric fallout and improper disposal of mercury switches; lead from fuels, paints and automotive parts; copper from brake pad wear and roofing materials, zinc from tire wear and galvanized sheeting and fencing; sediment from land disturbance and erosion; and dioxins as products of combustion." (Tentative Order finding B.2.)

[52] 2008 Annual Report at 9-3.

[53] 2008 Water Quality Monitoring Report at 2.

[54] 2004-2005 Annual Report at 9-5 – 9-6.

[55] Calleguas Metals TMDL at 4.

[56] Earl Shaver et al. (2007) *Fundamentals of Urban Runoff Management: Technical and Institutional Issues*. North American Lake Management Society, at 3-46.

contains dozens of pollutants that are detectable at some concentration," including "sediment, nutrients, metals, hydrocarbons, bacteria and pathogens, organic carbon, MTBE, pesticides, and deicers."[57] In particular, studies show that "zinc, copper and cadmium pollution [were] found in urban runoff;"[58] that "[m]icrobial pollution" such as bacteria, protozoa, and viruses "is almost always found in stormwater runoff;"[59] that "cars and other vehicles contributed 75 percent of the total copper load to the lower San Francisco Bay through runoff;"[60] and that "insecticides such as diazinon and malathion were commonly found in surface water and stormwater in urban areas ... with urban runoff being the primary transport mechanism into urban streams."[61]

New discharges will only increase the mass of these pollutants entering impaired receiving waters. In fact, the Tentative Order explicitly acknowledges that "[d]evelopment and urbanization increase pollutant loads," and that "urban development creates new pollution sources as the increased density of human population brings proportionately higher levels of vehicle emissions, vehicle maintenance wastes, municipal sewage waste, pesticides, household hazardous wastes, pet wastes, trash, and other anthropogenic pollutants." (Tentative Order finding B.16.) These conclusions are echoed by the U.S. EPA, which states that "the impacts of stormwater pollution are not static; they usually increase with more development and urbanization."[62]

There are water bodies in Ventura County identified by the Regional Board and U.S. EPA as impaired by pollutants including bacteria, nutrients, pesticides, PCBs and selenium, for which no TMDL has been adopted. Any new discharge of these pollutants to such a water body resulting from increased urbanization would violate the terms of 40 C.F.R. § 122.4(i) and the court's holding in *Friends of Pinto Creek*. Such discharges must be prohibited.

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[57] Center for Watershed Protection (March 2003) *Impacts of Impervious Cover on Aquatic Systems*, at 55.

[58] Earl Shaver et al. (2007) *Fundamentals of Urban Runoff Management: Technical and Institutional Issues*, North American Lake Management Society, at 3-48.

[59] *Id.* at 3-49.

[60] NRDC, *Stormwater Strategies: Community Responses to Runoff Pollution*, at Chapter 2, *available at* http://www.nrdc.org/water/pollution/storm/stoinx.asp.

[61] Earl Shaver et al. (2007) *Fundamentals of Urban Runoff Management: Technical and Institutional Issues*, North American Lake Management Society, at 3-54.

[62] U.S. Environmental Protection Agency (December 2007) *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices*, at v.

Even where TMDLs have been adopted and are in effect for the Ventura MS4 Permittees, following the court's holding in *Friends of Pinto Creek*, a permit allowing new dischargers or sources of pollutants could be approved and issued only in the event that the applicable TMDL explicitly establishes that (1) existing discharges into the impaired water body are "subject to *compliance schedules* designed to bring the segment into compliance with applicable water quality standards," and (2) additional allocations are available for the specified water body. (*Friends of Pinto Creek*, 504 F.3d at 1013.) As the Tentative Order identifies, eight individual TMDLs "have been or will be incorporated into the Basin Plan within the term of the Order," including TMDLs for toxicity, chlorpyrifos, and diazinon, for metals and selenium, and for organochlorine pesticides, PCBs and siltation in Calleguas Creek, its tributaries, and Mugu Lagoon; for trash in Revolon Slough and Beardsley Wash; and for bacteria in harbor beaches of Ventura County. (*See* Tentative Order ¶¶ 6.V.1 through 6.V.8) However, the Tentative Order does not establish that additional allocations for pollutants addressed by these TMDLs exist and are available. As a result, new discharges to a waterbody impaired for these pollutants, or for any other contaminant for which a TMDL has been established, are prohibited and there is no authority for the Regional Board to issue the Tentative Order. In order to be lawful, the Tentative Order must establish measures to ensure that stormwater discharges, from existing or future sources, do not cause or contribute to such impairments, and the Tentative Order has not done so.

We stress that these concerns highlight the problems created by the Regional Board's weakening of key provisions of the Tentative Order pertaining to implementation of controls on stormwater. In order to ensure compliance with WLAs established by applicable TMDLs, the Tentative Order must require LID techniques to be implemented with clear performance metrics for both new development and redevelopment, including the imposition of a 3% EIA standard. The Tentative Order must further place strict limitations on the use of waivers or alternative compliance measures for addressing stormwater control. Mandating the proper implementation of LID practices is a critical means of ensuring that runoff from new sources or dischargers will not contribute additional pollutants to an impaired waterbody, and the Tentative Order must be revised to ensure that these practices are not rendered ineffectual.

VI. The Tentative Order Fails to Include Provisions that Effectively Prohibit all Non-Stormwater Discharges, as Required by the Clean Water Act

A. The Tentative Order Is Inconsistent with the Clean Water Act and Regulations

Federal law requires that MS4 permits "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers." (33 U.S.C. § 1342(p)(3)(B)(ii).) However, the Tentative Order and Tentative Order Fact Sheet state that "the federal regulations . . . included a list of specific non-storm water discharges that 'need not be prohibited.'" (Tentative Order Fact Sheet at 15.) This exception violates

the clear language of the CWA and its implementing regulations. Section 402(p)(3)(B)(ii) of the CWA requires that permits for discharge from municipal sewers "effectively prohibit non-stormwater discharges," 33 U.S.C. § 1342(p)(3)(B)(ii), and does not create any authorization for exemption of such discharges.

The Tentative Order states that "[t]he Permittees shall, within their respective juridictions, effectively prohibit non-storm discharges into the MS4 and watercourses, except where such discharges . . . (b) Are covered by a separate individual or general NPDES permit, or conditional waiver for irrigated lands; or (c) Fall within one of the categories [identified in the Tentative Order], are not a source of pollutants that exceed water quality standards, and meet all conditions where specified by the Regional Water Board Executive Officer." (Tentative Order ¶ 1.A.1.) However, section 402(p) places a clear, mandatory duty on the Permittee to prohibit non-stormwater discharges to the MS4 system. The Permittee, or Regional Board, has no discretion to deviate from this requirement. In ascertaining the meaning of a statute, construction must begin with the text. (*Duncan v. Walker* (2001) 533 U.S. 167, 172.) "If there is no ambiguity, then we presume the lawmakers meant what they said, and the plain meaning of the language governs." (*Day v. City of Fontana* (2001) 25 Cal.4th 268, 272.) There is no ambiguity present in the CWA's requirement that a permit "effectively prohibit nonstormwater discharges," and the Tentative Order's provision of categorical exceptions stands in clear violation of its terms.

Further, the Tentative Order's attempt to allow exemptions from the prohibition against non-stormwater discharges to MS4 systems is not supported by the CWA's implementing regulations under 40 C.F.R. § 122.26(d)(2)(iv)(B)(1), as the Tentative Order Fact Sheet implies. This provision states the circumstances under which the Permittee must specifically design a program to prevent certain illicit discharges: "the following category of non-storm water discharges or flows shall be addressed where such discharges are identified by the municipality as sources of pollutants to waters of the United States." The cited regulation, providing for an enforcement program to "prevent illicit discharges," does not support the construction, seemingly implemented by the Tentative Order, that such non-stormwater discharges "need not be prohibited." (Tentative Order Fact Sheet at 15.) Even if the regulations did allow some conditional exemption, they do not provide that non-stormwater discharges are permissible when they fall into a specified category and "are not a source of pollutants *that exceed water quality standards*." (Tentative Order ¶ 1.A.1(c) (emphasis added).) The regulations explicitly state that the identified non-stormwater discharges "shall be addressed where such discharges are identified by the municipality *as sources of pollutants to waters of the United States*" in any quantity, whether or not they result in the exceedence of water quality standards. (40 C.F.R. 122.26(d)(2)(iv)(B)(1).)

Indeed, the interpretation adopted in the Tentative Order, allowing for categorical exemptions for non-stormwater discharges, is not found in the plain language of the regulation, and both the Tentative Order and staff's gloss place the regulations in direct

conflict with the overlying statute. As written, the entire scheme in the Tentative Order is inconsistent with both the regulations and the statute that they purport to implement.

B. The Tentative Order Is Also Inconsistent with Facts in the Record

Even if the Tentative Order's non-stormwater scheme were conceptually lawful, the exemptions provided are unsupportable because they contradict facts in the record evidencing the pernicious water quality impacts of some of the exempted discharges and fail to impose controls adequate to ameliorate those impacts. Of particular concern is the Tentative Order's exemption of "reclaimed and potable landscape irrigation runoff" even though pollutants from theses sources are a known, significant source of impairment to waters in the Ventura region. A finding that these discharges are "not []sources of pollutants to receiving waters," as required under 40 C.F.R. 122.26(d)(2)(iv)(B)(1), simply has not been and cannot be made here, as it would be inconsistent with facts in the record.

First, "a non-source of pollutants" finding would stand contrary to extensive research that has proved the opposite: studies have consistently shown that non-stormwater discharges from irrigation water or lawn water are a significant source of pollutants for which Ventura area waters are impaired. As the Calleguas Creek OC Pesticides & PCBs TMDL duly notes, "[u]rban runoff" is a "source[] of OC pesticides."[63] Though many of the listed pesticides have been banned, urban growth and use still remain a source of pesticide pollution and related toxicity. Further, garden use has been identified generally as one of the main sources of pesticides found in urban streams.[64] Lawns have further been identified as a "hot spot" for nutrient contamination in urban watersheds—lawns "contribute greater concentrations of Total N, Total P and dissolved phosphorus than other urban source areas ... source research suggests that nutrient concentrations in lawn runoff can be as much as four times greater than other urban sources such as streets, rooftops or driveways."[65] Thus, any claim that irrigation water is unequivocally not a source of pollutants to receiving waters cannot be sustained, and this exemption should be removed from the Tentative Order.

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[63] Calleguas Creek Pesticides TMDL, at 4.

[64] Earl Shaver et al. (2007) *Fundamentals of Urban Runoff Management: Technical and Institutional Issues*, North American Lake Management Society, at 3-54.

[65] Center for Watershed Protection (March 2003) *Impacts of Impervious Cover on Aquatic Systems* at 69; *See also*, H.S. Garn (2002) *Effects of lawn fertilizer on nutrient concentration in runoff from lakeshore lawns, Lauderdale Lakes, Wisconsin.* U.S. Geological Survey Water-Resources Investigations Report 02-4130. In an investigation of runoff from lawns in Wisconsin, runoff from fertilized lawns contained elevated concentrations of phosphorous and dissolved phosphorous.

Second, to the extent that the Tentative Order purports to allow the implementation of BMPs as a means of authorizing the conditional exemption of potentially, or in fact actually, polluted irrigation water,[66] there has been no showing that the BMPs required by the Tentative Order under Part 1.A., Table 1, are sufficient to meet the regulatory requirements of the CWA. The requirements of this section, such as the requirement that Permittees "[i]mplement conservation programs to minimize this type of discharge by using less water" (Tentative Order, ¶ 1.A., Table 1), are vague and fail to set out any measurable requirement, further underscoring that these provisions are not tantamount to actions that will result in non-stormwater irrigation flows free of pollutants as required under 40 C.F.R. § 122.26(d). Indeed, they echo proposals that have been introduced in previous permits throughout California and that have been tried—and failed—to prevent impacts to receiving waters from irrigation runoff.[67]

In total, the Tentative Order's approach does not uphold the CWA's mandate that Permittees "effectively prohibit non-stormwater discharges into the storm sewers." (33 U.S.C. § 1342(p)(3)(B)(ii).) Given the overwhelming evidence that pollution from pesticides, nutrients, and other contaminants constitutes a serious and ongoing problem in receiving waters under the jurisdiction of the Permittees, the conditional exemption of irrigation or lawn watering from prohibitions against non-stormwater discharge violates the clear requirements of the CWA and its implementing regulations. As with our comments in Section III, we underscore that these concerns emphasize the need for LID-based, onsite stormwater retention requirements, since these approaches will reduce non-stormwater runoff from new development to zero when properly implemented.

VII. The Permit Application Is Incomplete for Failure to Include an Assessment of Controls

A permit application for discharge from a large- or medium-sized MS4 must contain an assessment of controls, including "[e]stimated reductions in loadings of pollutants from discharges of municipal storm sewer constituents from municipal storm sewer systems expected as the result of the municipal storm water quality management

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[66] The Tentative Order states that it "incorporates BMPs to ensure that authorized Non-Storm Water Discharges are not a source of pollutants to the MS4." (Tentative Order finding F.18.)

[67] Order No. 00-108, NPDES Permit No. CAS004002, Ventura County MS4 Permit; *see also*, Letter from Douglas E. Eberhardt, U.S. EPA, to Dale Bowyer, San Francisco Regional Water Quality Control Board (April 3, 2009), at 6 (EPA has recently acknowledged that there are significant "uncertainties in the performance of many of the BMPs commonly used for stormwater pollution control," which make it difficult to determine that BMPs will achieve compliance with WLAs or other standards.)

program." (40 C.F.R. § 122.26(d)(2)(v).) While the Permit explicitly states that "[t]he Regional Water Board has prepared this Order so that implementation of provisions contained in this Order by Permittees will meet the requirements of the federal NPDES regulations at 40 CFR 122.26," (Tentative Order finding C.4.), neither the application, the Tentative Order, the Tentative Order Fact Sheet, nor other supporting documents include any required information or other discussion of the amount of pollution that will be reduced through its controls. The approval of the Tentative Order without this information fundamentally violates basic precepts of administrative procedure, not only because required evidence in the record is lacking, but also because the findings and related subfindings in the record are therefore devoid of necessary guideposts as to why and how provisions were included or rejected. The Tentative Order does not provide sufficient evidence to demonstrate that the management practices included in the Tentative Order are adequate to meet relevant requirements and water quality standards.

The U.S. EPA has previously released guidance purporting to "allow[] permitting authorities to develop flexible reapplication requirements that are site-specific." (61 F.R. 41698.) However, nothing in the CWA's implementing regulations permits such flexibility, and this or other guidance cannot reduce or remove the regulatory requirement that the Tentative Order include estimated reductions in pollutant loadings. It is axiomatic that where agency guidance is inconsistent with an unambiguous statutory scheme or its enabling regulations, the regulations must govern. (*See, e.g.*, *Christensen v. Harris County* (2000) 529 U.S. 576, 588 ("To defer to the agency's position would be to permit the agency, under the guise of interpreting a regulation, to create *de facto* a new regulation"); *Davis v. Florida Power & Light Co.* (11th Cir. 2000) 205 F.3d 1301, 1307 (rejecting agency policy guidance as inconsistent with its overlying statutory scheme).) In order for the Tentative Order application to meet the requirements of the CWA, the Tentative Order must include an estimate of the pollutant load reduction that it is expected to achieve.

Even if the guidance were not in direct conflict with the regulations, the guidance does not in itself specifically exempt permits from including this information. The guidance states that "as a practical matter, *most* first-time permit application requirements are unnecessary for purposes of second round MS4 permit application;" it does not state that all such information is unconditionally unnecessary. (61 F.R. 41698 (emphasis added).) The omitted pollutant reduction estimates represent a fundamentally different type of information from that required by *most* of the other provisions of 40 C.F.R. § 122.26(d)(2), such as identifying already identified "major outfalls," for which repeating the exercise "would be needlessly redundant," especially "where it has already been provided and has not changed." (61 F.R. 41698.) Instead, the required pollutant load reduction estimates are self-evidently relevant to crafting and assessing the core requirements of the new permit. Such estimates are an essential means of determining whether or not the permit will ensure that water quality standards will be met and what improvements can be expected; they are not merely an administrative detail that has no effect on the permit's functionality. Tellingly, these estimates are not found in the Report

of Waste Discharge cited to in the Tentative Order as "partially complete" in their application process "under the reapplication policy for MS4s issued by the United States Environmental Protection Agency . . . (61 Fed. Reg. 41697)." (Tentative Order findings C.3-4.)

The missing information is further indispensable when, as here, the Tentative Order and the provisions included in it represent not only a substantial change from the previously adopted permit,[68] but also a substantially weakened version in comparison to prior drafts of the current Tentative Order. Given changes from both the prior Permit and prior drafts of this Tentative Order, the necessity of basing the Tentative Order on information about its estimated efficacy should be clear. The Tentative Order and application must be revised to include the required estimates.

XIII. Conclusion

For the many aforementioned reasons, the Tentative Order fails to meet the Clean Water Act's requirements and needs revision. We urge the Regional Board to improve the Tentative Order and provide staff with clear direction on the numerous modifications that are necessary, as discussed above.

Sincerely,

David S. Beckman
Bart Lounsbury
Noah Garrison
Natural Resources Defense Council

Mark Gold
Kirsten James
Heal the Bay

[68] Order No. 00-108, NPDES Permit No. CAS004002, Ventura County MS4 Permit.

NRDC
THE EARTH'S BEST DEFENSE

NATURAL RESOURCES DEFENSE COUNCIL

February 13, 2009

Via U.S. Mail and electronic mail

Ms. Carole H. Beswick and Members of the Board
Santa Ana Regional Water Quality Control Board
3737 Main Street, Suite 500
Riverside, CA 92501-3348

Re: Draft NPDES Stormwater Permit for the County of Orange, Tentative Order No. R8-2008-0030

Dear Chair Beswick and Members of the Board:

We write on behalf of the Natural Resources Defense Council ("NRDC") and Orange County Coastkeeper ("Coastkeeper"). NRDC is a national environmental advocacy organization with over 120,000 members in California and has been involved in MS4 permit matters across the state, with a focus on the implementation of low-impact development ("LID") practices. Coastkeeper is a grassroots environmental organization with 17,000 members in the region, a decade's worth of successful projects that have improved water quality, and a record of collaboration in developing solutions to the impacts of water pollution. As a general matter, we strongly support LID because it is the most effective means of addressing the water quality and quantity problems associated with urban runoff. LID practices seek to replicate pre-development hydrology through the deployment of measures that infiltrate or capture water onsite, thereby significantly reducing the amount of water and water-borne pollutants that drain from developed areas. Since urban runoff is the single greatest contributor to water pollution in California, widespread implementation of LID is vital to the health of our state's renowned ecosystems.

We believe that LID techniques are required by the Clean Water Act's "maximum extent practicable" ("MEP") standard for pollution reduction because of their practicability, low cost, and superior performance relative to conventional BMPs. Additionally, LID practices generate significant ancillary benefits—such as cost savings, reduced need for imported water, and improved aesthetics—for developers, building owners, and city residents. For all of these reasons, we support the Santa Ana Regional Water Quality Control Board's inclusion of LID practices in the Draft MS4 Permit ("Permit") for the County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County within the Santa Ana Region (Order No. R8-2008-0030; NPDES No. CAS618030).

NRDC has investigated the practicability of including specific, numeric metrics to guide LID implementation in MS4 permits in California. Working with national

storm water expert, Dr. Richard Horner, we have verified the feasibility of using the type of clear and transparent metrics that are appropriate for permits—and supported by EPA Region IX—to guide LID implementation. We have also quantified the range of pollution and water supply benefits that would accompany the use of these metrics in permits. The results of this California-focused technical work show that LID is a robust, pollution-reducing, water-supply enhancer. It is extremely cost-effective, as well, according to recent EPA evaluations.[1]

We have divided our comments into three sections that discuss:

(1) The necessity for LID implementation through a numeric performance standard that is transparent and enforceable and represents the level of compliance required to meet the MEP standard;

(2) Areas in which the Permit needs revision to clarify its requirements; and

(3) Recent expert analyses of the feasibility of implementing LID features through the type of numeric performance standard established in the Permit.

I. LID Implementation and Numeric Performance Standards

There is an emergent consensus nationwide that LID practices are the most effective stormwater management techniques, besides providing many other benefits, such as reducing the need for imported water, increasing property values, mitigating the urban heat island effect, and creating aesthetically pleasing landscapes. In California, the Ocean Protection Council, for instance, strongly endorsed LID last year by "resolv[ing] to promote the policy that new developments and redevelopments should be designed consistent with LID principles" because "LID is a practicable and superior approach ... to minimize and mitigate increases in runoff and runoff pollutants and the resulting impacts on downstream uses, coastal resources and communities."[2] EPA has also called upon Regional Boards across California to prioritize the implementation of LID, even "recommend[ing] that the [South Orange County draft] permit be revised to put more emphasis on LID [and to] require[] that LID be woven into the design of specified new development and redevelopment projects."[3] In other MS4 permit contexts, EPA has also specifically endorsed the use of metrics, particularly the EIA approach in the Permit.

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[1] Environmental Protection Agency, *Reducing Stormwater Costs Through Low Impact Development (LID) Strategies and Practices* (Dec. 2007) (hereinafter "EPA LID Study").

[2] California Ocean Protection Council, *Resolution of the California Ocean Protection Council Regarding Low Impact Development* (May 15, 2008). We have enclosed a CD that includes all of the documents referenced in our letter, as well as additional information regarding the benefits and implementation of LID.

[3] Environmental Protection Agency, Comments re Draft MS4 Permit for Southern Orange County (email from Eugene Bromley) (Jan. 24, 2008) (hereinafter "EPA South OC Comments").

It is becoming clear that without requiring the implementation of LID practices designed to satisfy feasible and clear metrics, stormwater permits cannot meet the Clean Water Act's "maximum extent practicable" ("MEP") standard for pollution reduction. Critically, the prioritization of LID practices is insufficient by itself to meet the MEP standard and must be paired with a measurable requirement for the implementation of LID. Since its inception, the MS4 permitting program has been seriously hampered by a pervasive absence of numeric performance standards for the implementation of best management practices ("BMPs") such as LID. For this reason, in December 2007, the State Water Resources Control Board commissioned a report which found that "[t]he important concept across all of [the] approaches [described in the report] is that the regulations established a performance requirement to limit the volume of stormwater discharges."[4] The report also noted that "[m]unicipal permits have the standard of Maximum Extent Practicable (MEP) which lends itself more naturally to specifying and enforcing a level of compliance for low impact development."[5] EPA has highlighted similar but more specific concerns, remarking that subjective and imprecise language (such as requiring "a portion" of a site to address LID) is "vague" and that EPA recommends "more precise requirements."[6]

Various jurisdictions nationwide have begun adopting numeric performance standards for stormwater management, frequently pairing these with requirements to implement LID practices:

- **Pennsylvania:** Capture at least the first two inches of rainfall from all impervious surfaces and retain onsite (through reuse, evaporation, transpiration, and/or infiltration) at least the first one inch of runoff;[7]

- **Anacostia, Washington, D.C.:** Retain onsite the first one inch of rainfall and provide water quality treatment for rainfall up to the two-year storm volume;[8]

- **West Virginia:** Retain onsite the first one inch of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation;[9]

- **Georgia:** Treat the runoff from 85% of the storms that occur in an average year (*i.e.*, provide treatment for the runoff that results from a rainfall depth of 1.2 inches);[10]

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[4] State Water Resources Control Board, *A Review of Low Impact Development Policies: Removing Institutional Barriers to Adoption* at 23 (Dec. 2007) (emphasis added) (hereinafter "SWRCB LID Report").

[5] *Id.* at 4.

[6] EPA South OC Comments.

[7] Pennsylvania Stormwater Best Management Practices Manual, Chapter 3 at 7 (Dec. 30, 2006).

[8] *See* SWRCB LID Report at 20-21.

[9] State of West Virginia, NPDES Permit No. WV0116025 at 13-14.

- **Central Coast, California (RWQCB, Phase II):** Limit effective impervious area ("EIA") at development projects to no more than 5% of total project area (interim criteria); establish an EIA limitation between 3% and 10% in local stormwater management plans (permanent criteria);[11]

- **All Federal Buildings over 5,000 square feet** (under EPA's draft guidance for implementation of the Energy Independence and Security Act of 2007): Manage onsite (*i.e.*, prevent the offsite discharge of) the 95th percentile storm through infiltration, harvesting, and/or evapotranspiration.

For these reasons, it is imperative that the Orange County Permit require new development and redevelopment projects to implement LID practices designed in accordance with a clear performance requirement. As detailed below, we support the Permit's use of an EIA limitation as this overall performance measure, teamed with a requirement to fulfill this obligation through appropriately sized LID features. These are critical elements of the Permit as a whole and assure that it is consistent with MEP and related requirements, as well as the mainstream of stormwater control across the country. However, as discussed below, some elements of the New Development section need revision. We also support the Permit's emphasis on LID and specifically agree with the findings on pages 19-20 of the Permit, which underscore the superiority of LID practices and the usefulness of establishing an EIA limitation.

II. Suggested Revisions to the Permit's New Development Requirements

A. EIA Should Be Defined to Require Full Onsite Retention of the Design Storm, and the Volumetric Requirement to Implement the EIA Limitation Should Be Defined as the Entirety of the Design Storm Volume.

As the overarching numeric performance standard for BMP implementation, the Permit imposes a mandatory 5% EIA limitation, based on the difference between the pre-development and post-development runoff ("delta volume") for the two-year design storm. Field-based studies have demonstrated that at 3 to 5% impervious area, watersheds begin to experience deleterious impacts from development, as noted in the attached reports by national stormwater expert Dr. Richard Horner.[12] For this reason, in other permitting contexts, we have

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[10] Georgia Stormwater Management Manual, Unified Stormwater Sizing Criteria at 1.3-1.

[11] Central Coast Regional Water Quality Control Board, Letter from Roger Briggs re Notification to Traditional, Small MS4s on Process for Enrolling under the State's General NPDES Permit for Storm Water Discharges (Feb. 15, 2008) (hereinafter "Central Coast Phase II Letter").

[12] Richard Horner, *Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices ("LID") for Ventura County*; Richard Horner, *Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices ("LID") for the San Diego Region*; Richard Horner, *Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices ("LID") for the San Francisco Bay Area*; Richard Horner, *Supplementary Investigation of the*

recommended the establishment of a 3% EIA requirement for new development and redevelopment projects, and we recommend the same for Orange County. Dr. Horner's studies have shown the attainment of this standard onsite to be feasible in southern California.

The critical factor in determining whether an EIA limitation will be effective at reducing stormwater pollution is how the Permit defines the concept of "disconnecting" impervious surfaces such that they are rendered "ineffective" and thus do not count toward the 5% EIA requirement. This involves two different elements: (1) the volume of water that must be accommodated through stormwater BMPs and (2) the processes through which impervious surfaces can be considered "disconnected" from the storm sewer system.

On the first issue, in the Permit, as mentioned above, the volume of water for which developers must design stormwater BMPs to meet the EIA limitation is the delta volume for the two-year design storm. (Permit at p.52, fn.49.) For several reasons—most notably, the potential for calculations of pre-development volume that inflate the quantity of runoff which exists under natural conditions—NRDC does not support the use of the "delta volume" calculation and instead supports the use of the entire design storm as the volumetric requirement. (Our reasons are detailed in the attached critique by Dr. Horner,[13] which analyzes the study by Geosyntec et al., discussed below.) Thus, we suggest that the volumetric requirement for meeting the EIA limitation be revised to the full volume of the two-year design storm and that, for the sake of clarity, this crucial volumetric requirement be moved out of the footnote section and into the main text of the Permit.[14]

On the second issue, the Permit requires that BMPs have the capacity to "percolate" the design volume in order for impervious surfaces to be considered "disconnected" and effectively pervious. (Permit at p.52-53.) "Percolate," however, is not defined in the permit, and its meaning is not readily apparent. For this reason, we recommend revising the Permit such that BMPs are required to have the capacity to "infiltrate, harvest for reuse, or evapotranspire" the design storm volume. This onsite retention requirement will eliminate any ambiguity and allow for greater flexibility, as well as clarity, in meeting the EIA limitation. This change will also bring the Permit into line with other stormwater regulations around the country, which require onsite retention and thereby eliminate the potential for <u>any</u> polluted runoff from the design storm since there is no discharge.[15]

Feasibility and Benefits of Low-Impact Site Design Practices ("LID") for the San Francisco Bay Area.

[13] Richard Horner, *Critique of Certain Elements of "Low Impact Development Metrics in Stormwater Permitting"* (Feb. 2009).

[14] We also recommend that footnote 43 on page 48 include a cross-reference to the relevant full definition of EIA later in the Permit so that footnote 43 is not misinterpreted as the controlling definition of EIA.

[15] *See, e.g.*, requirements listed in section I, above, for Anacostia, the Energy Independence and Security Act of 2007, Pennsylvania, and West Virginia.

We would not support a definition of EIA that allows for onsite treatment and discharge to the storm sewer system, as this does not guarantee that pollutants will be removed from Orange County's receiving waters. Indeed, as further discussed below, the value of retention and reuse or infiltration is substantial, when measured both in terms of the ability to meet water quality standards and when measured in terms of other water resources imperatives, such as addressing drought and long-term reduction in water supply. Our analyses, presented as part of our submittal with this letter, document the extraordinary ability of LID to "create" new water supply, but this feature is operative only when water is retained and not discharged to surface waters.[16]

B. The Permit's Waiver Provision Must Require Offsite Compliance for Any Project that Cannot Meet the EIA Limitation Onsite and Must Set a Floor that All Developments Are Required to Meet.

The Permit, as currently written, would allow unfettered waivers for projects that can make an amorphous demonstration of disproportionate costs relative to the water quality benefits achieved. (Permit at p.55.) This loophole threatens to undermine the value of the EIA limitation and the entire New Development section. NRDC can support including flexibility in the permit's LID provisions to address true instances of technical infeasibility (and we detail below an appropriate scheme based on approaches taken in other jurisdictions). But the existing provision is overbroad, not supported by the facts, and is rife with the potential for abuse.

First, at a general level, this waiver provision is irreconcilable with the general findings of EPA and others that LID in most circumstances is *less* costly—often considerably so—than alternative building or stormwater management approaches. The provision, therefore, appears to be arbitrary and fundamentally counter-factual.

More specifically, the provision has a number of other fatal flaws as drafted. First, the LID requirements in the permit are based on addressing a *practicable* design storm, as discussed further in Dr. Horner's analysis, and this storm is well within the range of sizing requirements in place across the nation. Hence, the basic permit requirement already addresses and answers the question loosely posed by the waiver provision: the benefits and feasibility of the LID requirements are well-established generally and in reference to water quality improvements specifically. LID implemented across a watershed is far more capable of ensuring the attainment of water quality standards than traditional BMPs, and since ensuring compliance with standards is a fundamental requirement of the permit, LID is similarly a necessary element in new development and redevelopment.

Second, even if a waiver provision in general were appropriate, this one is not: the Permit does not define how these costs and benefits would be weighed against each other, and

[16] *See, e.g.*, Letter from David Beckman and Noah Garrison, NRDC, to Mary Nichols, Chair, California Air Resources Board, re AB 32 Draft Scoping Plan and Appendices (Aug. 11, 2008).

while the installation of BMPs can be easily priced, the human and ecosystem benefits of reduced water pollution are much more difficult to monetize and likely to receive short shrift in any such comparison. Even using a cost-benefit approach where (as is the case in much of the Permit area) waters are impaired may have the effect of allowing new sources of pollution to contribute to existing impairments, which is not allowable legally.

Third, the waiver provision includes no limiting factors, such as a requirement that projects implement all feasible LID (or even conventional) BMPs. Fourth, the Permit does not mandate offsite mitigation for any stormwater volume that a project is unable to retain onsite. This is the most appropriate "waiver" provision, allowing offsite compliance when onsite compliance is truly technically infeasible.

To close the waiver provision's loopholes, we would recommend first that the cost-benefit calculation be changed to a requirement that project applicants demonstrate the technical infeasibility of complying with the EIA limitation. The Permit should then define technical infeasibility, which could include circumstances such as severe space constraints, underground pollutant plumes, and non-infiltrative soils. Additionally, the Permit should specify that the project applicant must implement all technically feasible BMPs to the maximum extent practicable—if infiltration is infeasible, then harvesting and evapotranspiration should be maximized. The Permit should also set a floor for compliance with the EIA limitation onsite (*i.e.*, X% of the design volume must be infiltrated, harvested, or evapotranspired at the project site) so that project applicants do not utilize the alternative compliance option for the entirety of the design volume. This is a typical requirement of similar regulations in other parts of the country and ensures better results because of the limitations of offsite mitigation.[17] Any onsite discharge up to the design storm volume should be treated for water quality purposes.

The project applicant should then be required to perform offsite mitigation for the difference in volume between what is achieved onsite and the otherwise applicable EIA requirement. This could be accomplished by rewriting the waiver provision such that it *requires* permittees to establish an "urban runoff fund" (or project applicants to construct their own offsite projects) within the same hydrologic unit. For the sake of water quality and overall programmatic equivalence, the monetary contributions required should be based not on the avoided cost for developers, but rather on the volume of stormwater that is not retained on a given site. This system should also be paired with an obligation to mitigate stormwater volume offsite at a higher ratio than 1:1, such as 1:1.5, given the generally weaker performance of offsite mitigation projects. Several jurisdictions, including West Virginia and Washington, D.C. (Anacostia), have instituted such ratios.

Finally, we note that the Permit imposes no time limitation on the expenditure of funds for offsite mitigation. We recommend that offsite mitigation projects, whether public or private, should be constructed within three years of final discretionary approval (of the original

[17] *See, e.g.*, the requirements for West Virginia and Pennsylvania.

project) by the permittee. Additionally, the Permit should require project applicants to provide the necessary funds within one month to the permittee (for public mitigation projects) or to an escrow account (for private mitigation projects).

C. The Permit Must Impose Limits on "Water Quality Credit Systems" to Ensure that Equivalent Results Are Achieved on a Watershed Basis.

The Permit allows permittees to establish a "water quality credit system" that would waive LID, hydromodification, and infiltration requirements. (Permit at p.56.) While we agree that certain projects generate environmental benefits by the very nature of their circumstances, we also believe that waivers from otherwise applicable criteria should not be granted unless they are necessary and some nexus with water quality can be demonstrated. The fundamental requirements of the Clean Water Act include attainment of water quality standards. Without further specification, the approach taken in the permit effectively (and unlawfully) would delegate to those responsible for meeting the standards the ability to waive attainment through unilateral reductions in basic technological treatment requirements. This is unwarranted, poor policy, and in all eventualities, inconsistent with the text of the Act. For this reason, we suggest that the Permit impose certain restrictions on the water quality credit system.

First, the Permit should require that the permittees justify—scientifically and quantitatively—the stormwater volume and pollutant load reductions that accrue from a particular type of development granted "credit" under the system. These reductions should correlate with the amount of credit available for the project in question. Second, the Permit should set a maximum allowable credit amount for which a single project would be eligible. Other jurisdictions with such credit systems cap the allowable credit at half of the volumetric requirement or less, for instance, whereas the Permit currently includes no cap at all.[18] Without these changes, the water quality credit system could undermine the EIA numeric performance standard altogether by allowing projects blanket waivers without any specific demonstration of technical infeasibility or equivalent stormwater volume and pollutant load reduction—this would not meet the MEP standard. Moreover, it would not reduce pollution so as to reduce water quality impairment and, particularly in circumstances such as those in Orange County where many projects discharge to impaired waters, it is flatly inconsistent with the basic legal requirements that apply to protection and restoration of waters listed as impaired pursuant to 33 U.S.C. Section 1313(d) (including TMDL waste load allocations and requirements that pertain to additional sources of pollution discharged to waters listed as impaired).

D. Additional Concerns and Comments.

Below, we have listed some additional concerns and comments regarding specific provisions within the New Development section of the Permit.

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[18] *See, e.g.*, the requirements for West Virginia.

- **Prioritization of LID:** In the LID section of the Permit, the language does not clearly state a hierarchy of stormwater management BMPs. (Permit at p.52.) It merely states that onsite implementation of LID principles is the "preferred approach." Because proprietary BMPs and conventional stormwater management techniques have proven less effective than LID, this section of the Permit should clearly establish a hierarchy such that project applicants must prove the technical infeasibility of implementing LID BMPs before they resort to proprietary or conventional technologies.

- **Treatment Control BMPs:** The Permit allows project applicants to substitute "treatment control BMPs" for LID measures if certain conditions are met. (Permit at p.53.) These conditions include limiting EIA to 5% or less. However, this is antithetical to the Permit's inchoate conception of EIA as onsite retention with no discharge, as we support. By definition, treatment control BMPs that discharge treated stormwater cannot render impervious areas "ineffective" for the purposes of meeting the 5% EIA limitation. For this reason, we recommend that any projects exercising this compliance option be required to retain the volume of their discharge (multiplied by our suggested 1:1.5 offsite mitigation ratio) elsewhere in the hydrologic unit.

- **Hydrologic Conditions of Concern:** We do not support the Permit's waiver of hydromodification criteria for any project that discharges to engineered, hardened, and regularly maintained conveyance channels. (Permit at p.54.) The Clean Water Act is a restorative statute with a restorative purpose—by not subjecting a whole group of projects to hydromodification criteria, the Permit will heavily burden future restoration efforts. With stream daylighting and habitat restoration a reality nowadays, the Permit should not condemn all hardened conveyances to their present, unnatural state. Instead, it should effectuate the goal of the Clean Water Act and begin to restore natural conditions to even those streams that are most burdened by human engineering. It is also noteworthy that one outcome of hydrological controls is reduced flooding. With projections that the impacts of climate change in California will include more intense storms, it would be unwise in the extreme to allow a waiver of hydromodification requirements.

- **Applicability:** We support the applicability section's establishment of a 5,000 square foot threshold for most projects (Permit at p.46-47), but the language in XII.B.2(a) for significant redevelopment projects needs to specify in the third and fourth sentences that the relevant question is how much impervious surface was added or replaced (not increased), consistent with the first sentence.

- **Depth to Groundwater:** The Permit states that infiltration BMPs must be at least 10 vertical feet above seasonal high groundwater. (Permit at 49.) However, recent studies and state and national standards demonstrate that five feet (or even less) is a

safe threshold, and the Permit's infiltration infeasibility criteria should be changed accordingly.[19]

III. Case Studies and the Feasibility of LID Implementation

We have submitted, as attachments to this letter, several reports by Dr. Horner. These reports take into account local rainfall patterns and building typologies and demonstrate that a 3-5% EIA limitation can be feasibly implemented by various types of development projects in southern California. Dr. Horner's reports show that considerable reductions in pollutant loadings occur through the implementation of an EIA limitation with LID techniques. They also highlight that onsite retention of stormwater can result in significant water savings, as well, through infiltration and harvesting for in-building uses or landscape irrigation. Such water savings are an important ancillary benefit of LID implementation and can decrease our reliance on expensive, increasingly unreliable sources of imported water. These water savings also result in considerable greenhouse gas emission reductions because water importation machinery is the single largest user of electricity in California.[20] For these various reasons, as mentioned above, we strongly support the Permit's establishment of an EIA limitation that requires the implementation of LID practices because they are the most effective means of improving water quality while also generating other benefits.

Recently, another study (entitled "Low Impact Development Metrics in Stormwater Permitting," hereinafter "the report") of three specific existing or proposed development sites was completed by Geosyntec Consultants and Larry Walker Associates for the Counties of Orange and Ventura.[21] Despite several flaws in assumptions and methodology, as documented in the attached critique by Dr. Horner, the study in many regards bolsters the argument that implementing LID through a numerical performance standard, such as proposed in the Permit, is feasible. Regarding the 60 California project, for instance, the study remarks that "it was not exceedingly difficult to achieve less than 5% EIA." (Geosyntec et al. at p.55.) However, various supposed problems identified by the report deserve attention in this context because we feel that the EIA concept and LID practices have been mischaracterized and that the report unjustifiably condemns, or at least puts an inappropriately negative spin on, worthwhile aspects of the Orange County Draft Permit.

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[19] The Los Angeles Regional Water Quality Control Board, for instance, typically allows 5 feet of separation between onsite system leachfields and groundwater. *See, e.g.*, Draft Waste Discharge Requirements for the Malibu Lumber Facility (requiring a 5-foot separation from groundwater). The AB 885 draft regulations (California's septic tank law) would allow dispersal systems of all conventional OWTS to have only 3 feet of separation. *See* 27 CCR § 30014 (draft).

[20] *See, e.g.*, NRDC, *Energy Down the Drain* at v (Aug. 2004).

[21] Geosyntec Consultants et al., *Low Impact Development Metrics in Stormwater Permitting* (Jan. 2009).

A. The Report Relies on a Flawed Definition of EIA to Draw its Negative Conclusions about the EIA Concept Overall.

The authors base their definition of EIA on the flawed language of the current Ventura draft permit. (Geosyntec et al. at p.3.) NRDC and Heal the Bay have repeatedly commented on the lack of hydraulic sizing criteria that should apply to the EIA limitation in that permit, and we agree with the authors of the report that this loophole allows for manipulation of the EIA concept. (Geosyntec et al. at p.5.) However, by basing their analysis of EIA limitations, writ large, on a single flawed definition of the concept, the authors have compromised the applicability and usefulness of their study. They are, therefore, unable to address the true benefits of an EIA standard from a water quality perspective, benefits recognized by a wide range of agencies and experts, including Dr. Horner (in his California studies), Tetra-Tech (in a study for the Ocean Protection Council),[22] EPA (in its own comments on the South Orange County Permit and in other permit proceedings around the state),[23] and the Central Coast Regional Water Quality Control Board (which adopted a default 5% EIA standard for Phase I and Phase II communities).[24] In this sense, it is not an overstatement to suggest that by adopting something of a "straw man" and then knocking it over, the report does not credibly refute the effectiveness or practicability of EIA properly implemented. The Orange County Draft Permit does not contain the same loophole as the Ventura draft permit, and although we recommend certain changes to the Permit's definition of EIA, it can easily be insulated from the type of abuse envisioned by the authors of the report.

B. The Permit Does Incentivize Infill, Redevelopment, and Smart Growth.

The authors mistakenly claim that the Permit creates significant disincentives for infill, redevelopment, and smart growth. (Geosyntec et al. at p.5.) In truth, the permit accommodates these development typologies by enabling developers to comply with the Permit's EIA limitation through four different options at varying scales and by allowing the permittees to establish both alternative compliance measures (*i.e.*, in-lieu fees for offsite mitigation) and a water quality credit system that would lessen the requirements for the exact sites about which the authors are worried. (Permit at pp.51-53, 55-56.) The Permit has gone further than several other states in encouraging infill, redevelopment, and smart growth, and we stand behind the Regional Board's efforts to accommodate these concerns in a manner that is consistent with water quality protection.

The environmental community's willingness to accept permit requirements that can be satisfied in part offsite should not be taken for granted, as it constitutes an attempt to address other stakeholders' stated concerns and, in any case, fully addresses any reasonable concern about infill and redevelopment. We are willing to accept offsite mitigation notwithstanding the

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[22] Oceans Protection Council of California, *State and Local Policies Encouraging or Requiring Low Impact Development in California* at 27 (Jan. 2008).
[23] EPA South OC Comments.
[24] Central Coast Phase II Letter.

lack of a clear need for this flexibility when the matter is analyzed objectively. For example, some of the most aggressive LID requirements have been imposed in ultra-urban environments, like Philadelphia, PA, and Anacostia, Washington, D.C., demonstrating that the supposed conflict between LID and infill and redevelopment appears to be largely rhetorical. Moreover, as noted in Dr. Horner's critique of the report (and further below), even those sites chosen to represent the most challenging circumstances for LID implementation can feasibly (and in some cases easily) implement LID as envisioned by the Permit. And of course, the record also contains Dr. Horner's analysis of the feasibility of LID implementation across a range of building typologies, showing that LID can be accommodated in virtually any building situation with robust numeric metrics.

C. With Our Recommended Revisions, the Permit Will Not Lead to Unnatural Levels of Infiltration.

The report states that the Permit's infiltration requirements could destabilize the water balance in certain locations. (Geosyntec et al. at p.5.) This might be true in some situations if the Permit required infiltration of the entire design volume; very large numbers of sites were affected; and the water balance in the affected area were otherwise undisturbed compared to natural conditions. However, none of these three factors is present and, in particular, those who would contend that the LID provisions regulating new development and redevelopment could significantly affect water balance have failed to recognize that, in most of urbanized Orange County, the natural rate of infiltration has been dramatically reduced by a century of development focused on impervious surface. While we believe that this issue is yet another poorly justified criticism of LID, we note that the permit in any case does not require infiltration, per se, but rather any of three techniques that retain water. To make this even clearer, we have recommended the inclusion of language to clarify that three techniques are allowed: infiltration, harvesting, and evapotranspiration. If infiltration is ill-advised and thus infeasible, then project applicants will simply use the other allowable techniques for retaining water onsite.

Moreover, the Technical Advisory Committee (mentioned on page 46 of the Permit) should develop criteria—for potential insertion into the DAMPs and/or guidance manuals—to determine when infiltration would be counter-productive. These criteria will guide developers in deciding whether to utilize infiltration, harvesting, or evapotranspiration, or some combination of the three, to meet the EIA limitation. Additionally, developers have the option under the Permit of paying in-lieu fees when it is infeasible to attain the Permit's otherwise applicable requirements, including the infiltration requirement. Thus, there is no reason to assume that the level of infiltration encouraged by the Permit will lead to hydrologic imbalances, and there is every reason to assume that this potential problem will be easily avoided.

D. The EIA Limitation in the Permit Is Not Intended to Function As a Hydromodification Standard, Nor Should It.

The authors of the report posit that the EIA metric does not reflect the current understanding of stream hydrology and geomorphology. (Geosyntec et al. at p.6.) It does not reflect these issues because it is not intended to, and any interpretation of the EIA limitation that transmutes it into a hydromodification standard is misguided. Limiting the effective impervious area of a site is a means of addressing water quality—not water quantity—concerns. The purpose of retaining water onsite and infiltrating, harvesting, or evapotranspiring it is to prevent all pollutant loads contained within the design storm volume from entering aquatic ecosystems. While such retention may aid projects in meeting hydromodification criteria, and does have the salutary effect of making new water supplies available, the EIA metric stands as a water quality-focused, technology-based performance standard required by the Clean Water Act. This is why the Permit also contains a section that establishes requirements for "hydrologic conditions of concern." (Permit at p.54.) Any arguments about hydromodification should properly be addressed to this section. It also bears mention that even the report's recommended performance standard suffers from the same exact "problem" as the EIA limitation, and the authors thus included a separate hydromodification control standard in their recommendation. The Permit is structured in exactly the same fashion.

E. The Report's Case Studies Fail to Demonstrate that It Is Technically or Economically Infeasible to Implement a 5% EIA Standard.

The authors purport to prove through three case studies that the EIA concept is both difficult to implement and less protective of water quality than a volumetric reduction requirement. (Geosyntec et al. at p.16.) The principle failure of this analysis is, again, that the authors used a flawed definition of EIA (with no sizing requirement) as the basis for their analysis. They effectively seek to compare the function of two techniques, one of which they define nonsensically and one of which they define reasonably. This yields skewed analyses that, accordingly, run the risk of appearing to be results-oriented to support a predetermined perspective on the Permit. Moreover, the authors' assertion that a volumetric reduction approach would be "more constructive than a % EIA standard" highlights the degree to which the inadequate language of the Ventura draft permit has biased various entities' understanding of how an EIA limitation should operate. Ultimately, EIA limitations should be volumetric reduction approaches, as the authors of the report advocate. When EIA is properly defined as a requirement for onsite retention of a certain percentage of the design storm volume, it is literally a volumetric reduction requirement, and thus all of the report's negative conclusions about EIA have no real bearing on the worth of a properly designed EIA standard. Indeed, if it is a volumetric reduction approach that the authors favor, they should support a properly designed EIA standard. With this in mind, we offer the following thoughts on the specific case studies.

1. Walnut Village

As noted by Dr. Horner in the attached letter, this case study suffers from several analytical flaws. Without repeating those flaws here, we will simply draw attention to the fact that the authors found it almost feasible (and had they used appropriate infiltration rates, it would have been entirely feasible) to meet even the most stringent of the standards they analyzed, characterizing options as merely "less feasible" and "more feasible" based on problematic assumptions described by Dr. Horner. (Geosyntec et al. at pp.8-11.) This most stringent standard—delta volume for the two-year design storm—is by definition only 5% different from the EIA standard in the Permit because the Permit bases its definition of EIA on the delta volume for the two-year design storm. Thus, the authors' third proposed standard—although nowhere described as EIA—is just 5% away from the EIA metric in the Permit. This case study, therefore, demonstrates in general terms the practicability of the Permit's approach even on a very challenging building site and even when technically unsupported limitations are assumed that make accomplishing Permit requirements more difficult than necessary.

2. 60 California

The same flaws apply to this case study analysis; however, here, the authors openly admit that the site could feasibly achieve any of the three standards they used. (Geosyntec et al. at pp.13-14.) Their sole bases for questioning the utility of apparently any LID requirement are that green roofs and cisterns are relatively new concepts and that green roofs (anecdotally) might not be climate-appropriate, hardly reasons for dismissing them out-of-hand.

The 60 California case study can in fact assist us in partially understanding the cost implications of the various performance standards analyzed by the report, although the authors themselves have performed no such economic analysis. The authors concluded that for the largest storm event analyzed (the two-year design storm, which is nearly four times the volume of the 85th percentile storm), a combination of green roof and cistern would meet the standard. This green roof would require 4,300 square feet of space (Geosyntec et al. at p.13) and need to retain at least two inches of water. Assuming that this would require an intensive green roof, which can typically hold 80-150 pounds per square foot and accommodate soil depths up to 24 inches, the roof itself would cost (at the high end) approximately $25 per square foot, or almost $108,000.[25] The accompanying cistern that would need to hold an additional 4,170 gallons would likely cost less than $10,000, plus any plumbing necessary to carry stormwater from the roof to the cistern.[26] In all, the total cost of stormwater infrastructure would likely be less than

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[25] *See, e.g.*, Great Lakes Water Institute, Green Roof Installation, at http://www.glwi.uwm.edu/research/genomics/ecoli/greenroof/roofinstall.php; Steven Peck and Monica Kuhn, *Design Guidelines for Green Roofs*, available at http://egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/design_guidelines_for_green_roofs.pdf.

[26] *See, e.g.*, Low Impact Development Center, Rain Barrels and Cisterns, at http://www.lid-stormwater.net/raincist_cost.htm.

$125,000. Of course, this does not take into account the costs of avoided conventional stormwater infrastructure, which would reduce the added cost of the LID infrastructure by some unknown but potentially substantial amount. Indeed, EPA found that at 11 out of 12 case study sites, LID infrastructure actually cost less than conventional stormwater management practices.[27]

The total development cost for this project was around $4 million. Hence, even if conventional stormwater infrastructure cost nothing and the green roof fell in the upper range of expected costs, the ~$125,000 stormwater compliance price-tag would be only 3% of total project cost. And this is supposedly one of the most constrained sites the authors could find where compliance would be the most technically and financially difficult. Hence, the best interpretation of the authors' analysis is that the upper limit of the cost to comply with the LID requirement—even assuming the most unfavorable conditions and without any credit for offsetting infrastructure cost savings that are clearly present—is only 3%. This is well within the accepted cost for compliance with existing MS4 requirements, such as the SUSMP provisions; the State Water Resources Control Board (in the *Bellflower* decision) already has determined in precedential orders that such provisions are reasonable and appropriate.

3. Kmart

The Kmart case study analysis is the most flawed of all from a methodological standpoint. Regardless of the LID techniques proposed, the report misconstrues the requirements of the Permit such that the conclusions vis-à-vis percentage of total project cost are entirely indefensible.

As a threshold matter, the authors misunderstood that an interior remodel that does not replace or add impervious surface would not trigger the Permit's requirements. Thus, the basis for their low-end estimate of redevelopment cost is a number far below any true redevelopment cost that would be associated with actually adding or replacing roof or other impervious surfaces. The applicability section of the Permit on page 46 specifies that redevelopments must comply with the Permit *only* when they result in the addition or replacement of impervious surface. An interior "remodel" would not add or replace impervious surface; only a demolition and reconstruction would do so. Consequently, the $50 per square foot low-end estimate should be revised to a more reasonable reconstruction—not remodel—cost figure, so as to allow an accurate calculation of the relative cost of the LID features compared to total construction cost.

Typical commercial construction costs range from $160 per square foot to $350 or more per square foot.[28] The authors' high-end estimate of $250 per square foot is, hence, an average cost figure for redevelopment. Using this more appropriate range, the total project cost (for the

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[27] EPA LID Study at 12.

[28] *See, e.g.*, Saylor Publications, Inc., Square Foot Building Costs, at http://www.saylor.com/lacosts.

130,000 square foot building) is $21 million to $46 million. Just with this initial change in cost estimates, the "% of total redevelopment cost" figures given in the study changes from 4-22% to 3-6% for the "high volume interpretation" and from 1-3% to 0.5-1% for the "low volume interpretation."

Digging further into the report's assumptions, the authors once again misconstrued the applicability section of the permit. If the building alone were being redeveloped and the parking lot were left in its existing condition, the project would not obligated to comply across the entire site because it would result in an alteration of less than 50% of the impervious surface, thus requiring that only the altered portion comply with the permit. As the building footprint is slightly less than 25% of the site (approximately three out of 12.4 acres), the stormwater infrastructure costs would thus drop to about $300,000 or $50,000, depending on the high vs. low volume interpretation; the "% of total redevelopment cost" figures given in the study, consequently, would drop to 0.7-1.5% or 0.1-0.2%, respectively.

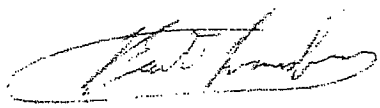
If the project altered more than three acres of the parking lot, as well as the entire building footprint, then the entire site would be required to comply with the Permit. However, in this situation, to find a meaningful value for the percentage of total redevelopment cost, one would have to calculate the costs of the stormwater infrastructure and landscaping that would otherwise be required by law or desired by the developer (for instance, the developer would surely include landscaping in the parking lot for aesthetic reasons, regardless of its stormwater functionality), and those costs would have to be deducted from the 3-6% or 0.5-1% of total redevelopment cost figures calculated above. It is thus impossible to draw any real conclusions from the study because of the lack of complete cost data. Without such data, even using correct redevelopment cost assumptions, the study actually tells us nothing that we want to know in terms of the marginal costs of complying with the permit vs. complying with requirements that would exist anyway in the absence of the permit.

IV. Conclusion

We commend the Regional Board staff's efforts to prioritize LID stormwater management practices and to establish an EIA limitation as the performance standard for BMP implementation in the Permit. Studies have demonstrated that attainment of this standard is feasible, and even so, the Permit contains sufficient alternative compliance criteria that (once properly revised) should allow equivalent results while granting developers more flexibility. Nonetheless, we believe that the effectiveness of the Permit's provisions could be compromised by various defects, especially the overbroad waiver language, the delta volume sizing criterion, and the Permit's failure to specify clearly that onsite retention (and not simply capture and discharge) is required. We have recommended various ways to remedy these and other problems, and we strongly urge the Regional Board to adopt these revisions.

We look forward to working further with Regional Board staff on the Permit and encourage you to contact us with any questions regarding our suggestions or the documents we have provided.

Sincerely,



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April 10, 2009

Chair Lutz and Board Members
Los Angeles Regional Water Quality Control Board
320 4th Street, Suite 200
Los Angeles, CA 90013

Dear Chair Lutz and Members of the Board:

I have previously submitted a study to the Los Angeles Regional Water Quality Control Board that reports on my findings regarding the feasibility and water quality benefits of Low Impact Development ("LID") implementation in Ventura County. LID is an extremely effective way of addressing a root cause of stormwater pollution: the unnaturally high degree of impervious surface in urban areas which not only conveys significant pollutant loadings to receiving waters, but also has related and deleterious water resources impacts. Because it addresses a root cause of stormwater pollution, LID is not merely one of many theoretically co-equal best management practices, but rather one that is central to stormwater pollution control today. For this reason, the technical adequacy of the Ventura County MS4 Permit's ("Ventura County Permit" or "Permit") new development and redevelopment provisions, and the degree to which they integrate clear LID requirements tied to numeric performance metrics, is essential to the function and success of the Permit.

Summary

By way of summary, my study, "Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices ("LID") for Ventura County," provided to you when the Draft Permit was first issued in 2007, examined the practicability of retaining storm water onsite through LID BMPs based on a performance standard ("effective impervious area") that drafts of the Permit contained. My analysis took into account local soil and rainfall conditions and examined a range of development types. The analysis showed that by retaining water from the site to meet a 3% EIA standard, LID practices result in drastically less polluted runoff compared to conventional BMPs (reducing site runoff volume and pollutant loading to zero in many typical rainfall scenarios). Even treating stormwater with the best-performing conventional BMPs is much less effective than using LID practices to retain water with a strong numeric requirement like 3% EIA. Pollutant loads would also be significantly diminished through the use of these LID techniques, especially in comparison to conventional BMPs. Based on my analysis, LID implementation, anchored to an EIA or volume-based design storm, is both feasible and

far preferable to the use of conventional BMPs from a water quality and quantity perspective.

The Permit Omits Practicable Control Requirements and Would Impose Standards Weaker than Other Jurisdictions

Overall, the Permit's requirements are notable in that they do not adopt a 3% EIA standard, notwithstanding local technical verification of this approach, and also do not adopt another equivalent storm water retention requirement for all regulated development and redevelopment projects. This makes the permit's critical development and redevelopment provisions out-of-step with common approaches to LID implementation nationally and with recent studies in the field, in which I have participated. Many other stormwater management documents around the country have adopted onsite retention standards with larger design storm volumes than the Ventura County Permit. These precedents can be compared to conditions in Ventura County, which generally has rainfall patterns that make retention-based LID approaches even more practicable than many other regions. I have enclosed as Attachment A my analysis ("Assessment of Evaporation Potential with Low-Impact Development Practices") of how these other examples from around the country support similar or stronger requirement in Southern California.

The Exemption from EIA for All Redevelopment is Unjustified Technically

Of particular significance, in reviewing the new draft of the Ventura County Permit, I note that its provisions appear to allow the use of conventional BMPs on any redevelopment site. As I demonstrated in my studies, LID implementation focused on onsite retention is feasible in a wide range of development typologies, and the pollution-reducing and volume-reducing benefits of LID practices far exceed conventional BMPs. In cases where retention of the design storm is not possible, standard practice in the field today offers a development applicant the opportunity to achieve the same performance in part offsite, which permits flexibility but returns predictable, superior water quality performance in the watershed or subwatershed. The Permit, however, dispenses with prior requirements to meet an EIA standard in redevelopment contexts, unless doing so can be shown by rigorous analysis to be technically infeasible.

There is no technical justification in the Permit for this exemption for redevelopment from meeting the EIA requirements. This exemption is, at minimum, substantially overbroad as now formulated. My research has shown that there is, in fact, no need for such blanket exemptions at all. Thus, from a technical standpoint, in this way also the Permit would require a level of performance considerably inferior to that which my Ventura County analysis demonstrated is feasible.[1]

[1] The authors of "Low Impact Development Metrics in Stormwater Permitting" ("the report") drew certain negative (and not always well-founded, as explained in Attachment

This conclusion based on specific Ventura County analysis is bolstered also by my work and that of my colleagues, including the Regional Board's Xavier Swamikannu, who participated in the preparation of an expert report for the National Academy of Sciences. We found that LID techniques must be a top priority for implementation at new development *and* redevelopment projects covered by stormwater permits, unless their use can be formally and convincingly demonstrated to be infeasible. In keeping with the NAS report and my research, the Ventura County Permit should recognize the critical importance of using LID not only in "green field" applications, but also during redevelopment, so as to address urbanized landscapes that are today the chief source of storm water pollution and associated hydromodification of local streams. Based both on local work, work elsewhere in the field, and my investigations as part of the NAS team, I believe the exemption for redevelopment from a technical standpoint simply cannot be squared with technical practicability or what the best science tells us is necessary to address both polluted runoff and broad-scale changes to hydrogeology as a result of the current level of urban development.

Hydromodification

The Permit now waives interim hydromodification requirements for all projects under 50 acres, thereby excluding a great majority of the development and redevelopment activity in Ventura County. As a technical matter, this risks degradation to Ventura County watersheds because hydromodification is not just caused by a few large projects, but typically (more typically) by many smaller ones. Moreover, most LID BMPs are not sufficient to attenuate the peak storms that cause a great deal of hydromodification. Thus, the Permit's reliance on LID provisions is not a technically adequate solution to the hydromodification problem and appears to be based on a misunderstanding of the role and function of LID BMPs sized and designed to reduce pollution generated through smaller storms, on the one hand, and the approaches necessary to address watershed scale hydromodification, on the other hand. I note also that since the LID approach in the Permit does not actually require LID BMPs for redevelopment projects, let alone those

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B) conclusions about a maximum 3-5 percent effective impervious area ("EIA") site design criterion. However, notably the results of the report's analysis overall contribute to the growing consensus that implementing LID according to a numeric metric is technically feasible in both new development and redevelopment contexts. The results thus buttress my findings in analyses performed earlier for San Diego and Ventura Counties and for the San Francisco Bay Area and support the feasibility of meeting a 3-5% EIA standard in southern California. However, the report's suggestion that a "delta volume" standard be adopted would depart from standard and well-accepted practice in the United States, resulting in significantly greater volumes of stormwater with concomitant, significant increases in the mass volume of a range of pollutants in stormwater.

sized to address the water quality design storm, the approach of relying on LID BMPs to address hydromodification is further unjustified (and, in this instance, illusory).

Conclusion

In summary, based on my Ventura County-specific study, my work in the field, and my knowledge of the state of practice in California and nationally, I conclude that the Permit's current scheme will not result in effective, feasible mitigation of the various problems caused by stormwater runoff, and it will certainly allow a significant amount of pollution, which could feasibly be reduced through LID techniques, to be discharged to receiving waters.

Sincerely,

Richard R. Horner

Dr. Richard Horner

ASSESSMENT OF EVAPORATION POTENTIAL WITH LOW-IMPACT DEVELOPMENT PRACTICES

RICHARD R. HORNER

BACKGROUND

Low-impact development ("LID") stormwater management practices are designed to capture and retain (i.e., not discharge) stormwater runoff through infiltrating water into the soil, vaporizing it to the atmosphere via transpiration from vegetation and evaporation, and harvesting to put rainwater to a beneficial use like irrigation or gray water supply. Jurisdictions in various locations around the United States have adopted stormwater management regulations requiring elimination of surface runoff discharge in storms up to specified sizes, and hence in effect requiring application of LID methods. An issue raised in California regarding such requirements is the potential of the evapotranspiration component of runoff attenuation, in the event infiltration is limited by soil, high groundwater, or subsurface contamination and insufficient demand exists for harvested water. The opinion has been advanced that evapotranspiration potential must be low, because most California rainfall occurs in the months with least evaporation. To explore this issue the author compared rainfall and evaporation at five California locations and four sites elsewhere in the nation where limitations on urban stormwater discharge are in effect.

METHODS OF ANALYSIS

Examples of surface discharge limitations are found, or are being considered by regulatory authorities, in the states of Georgia, Tennessee, West Virginia, Pennsylvania, and New Jersey and the cities of Philadelphia and Washington, DC (Anacostia River watershed). Data from long-term evaporation pan measuring devices are available for Georgia, Tennessee, and Pennsylvania (including Philadelphia), as well as for California. In the analysis Georgia was represented by Atlanta, Tennessee by Nashville, and Pennsylvania by State College in central PA (Centre County), as well as Philadelphia. Evaporation data were not found for New Jersey, Washington, DC, and West Virginia. However, Philadelphia is adjacent or very close to New Jersey and Washington and represents those locations well. Fayette County in southwestern Pennsylvania has such data and is very close to Morgantown, WV; this location represented a West Virginia case. Precipitation data were readily available for all of the locales offering evaporation data. Table 1 presents data sources.

Table 1. Sources of Precipitation and Evaporation Data

Location	Data[a]	Source
Atlanta	Evaporation	http://climate.engr.uga.edu/evaporation.html
Nashville	Evaporation	http://www.nashville.gov/stormwater/docs/pdfs/stw/vol2/swmanual12_vol2_chapter8.pdf
Philadelphia, Central PA, Fayette County (for Morgantown, WV)	Precipitation, evaporation	http://www.pa.nrcs.usda.gov/technical/Engineering/PaRainEvapRunoff.pdf
California cities except Ventura	Evaporation	http://www.caiclim.dri.edu/ccda/comparative/avgpan.htm
Ventura	Precipitation, evaporation	http://portal.countyofventura.org/portal/page?_pageid=876,1686932&_dad=portal&_schema=PORTAL (El Rio – UWCD Spreading Grounds [Revolon Slough])

[a] Precipitation data are from http://www.mei.utah.edu/ihorel/html/wx/climate/normrain.html except as noted.

Rainfall and evaporation were tabulated for the three highest and six highest months of precipitation at each location. The excess or deficit of evaporation for these periods was then calculated as the difference between evaporation and precipitation.

RESULTS

Table 2 shows the three highest and six highest months of precipitation for each location assessed. The southern cities experience their highest precipitation in the earlier months of the year, the northeastern locations in the warmest months, and the California cities during the winter and just before and after it. Snow is not a factor in any location, in that the California cities receive no snow, and snow in the southern cities comes rarely and in small quantities in the months of high precipitation.

Table 2. Months with the Highest Precipitation Totals

Location	Three Highest Months of Precipitation	Six Highest Months of Precipitation
Atlanta	January-March	February-July
Nashville	March-May	December-May
Philadelphia	May-July	April-September
Central PA	May-July	April-September
Morgantown, WV	May-July	March-August
Los Angeles	December-February	November-April
Long Beach	December-February	November-April
San Diego	December-February	November-April
Ventura	January-March	November-April
San Francisco	November-January	November-April

Figures 1 and 2 exhibit the rainfall and evaporation totals, respectively, in the three and six highest rainfall months. The southern cities receive the most rain in these periods, the northeastern locations slightly less, and the California cities roughly half of the southern totals. Evaporation does not differ much among the sites in the three highest rainfall months, excepting San Francisco's somewhat lower amount. Philadelphia and environs and southern California are very similar in evaporation in their respective six highest months of precipitation. During this period, evaporation at San Francisco and Nashville is somewhat lower than in southern California and Philadelphia, and Atlanta has the highest quantity.

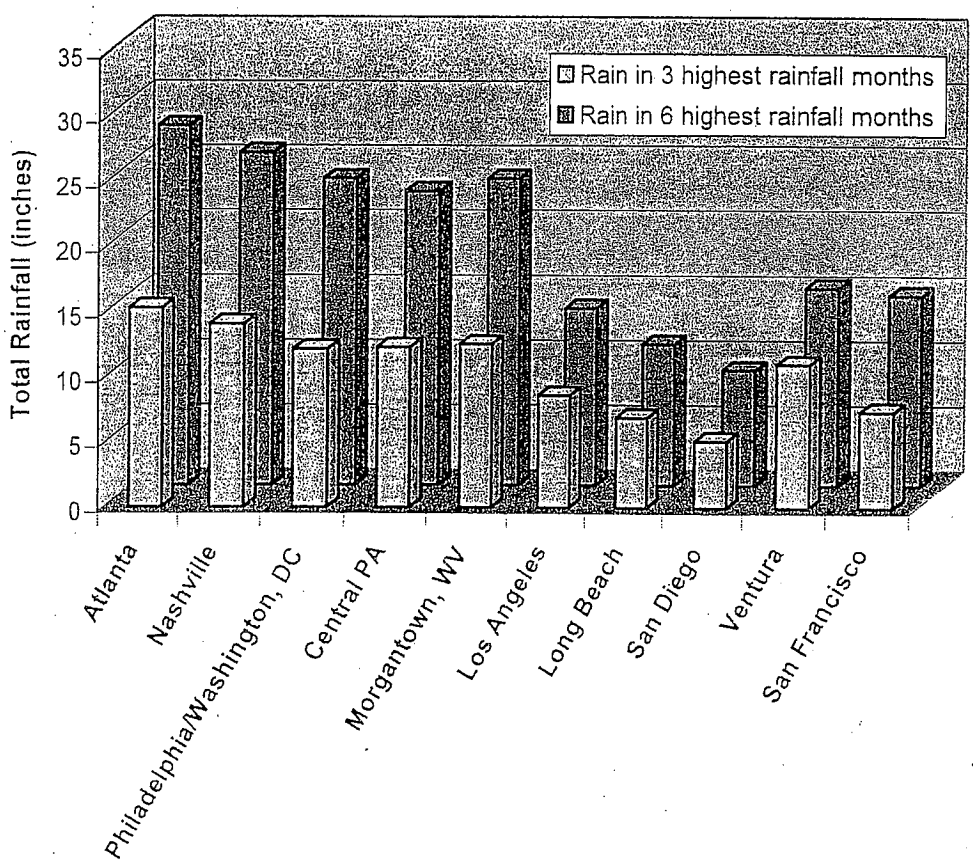

Figure 1. Rain in Highest Rainfall Months

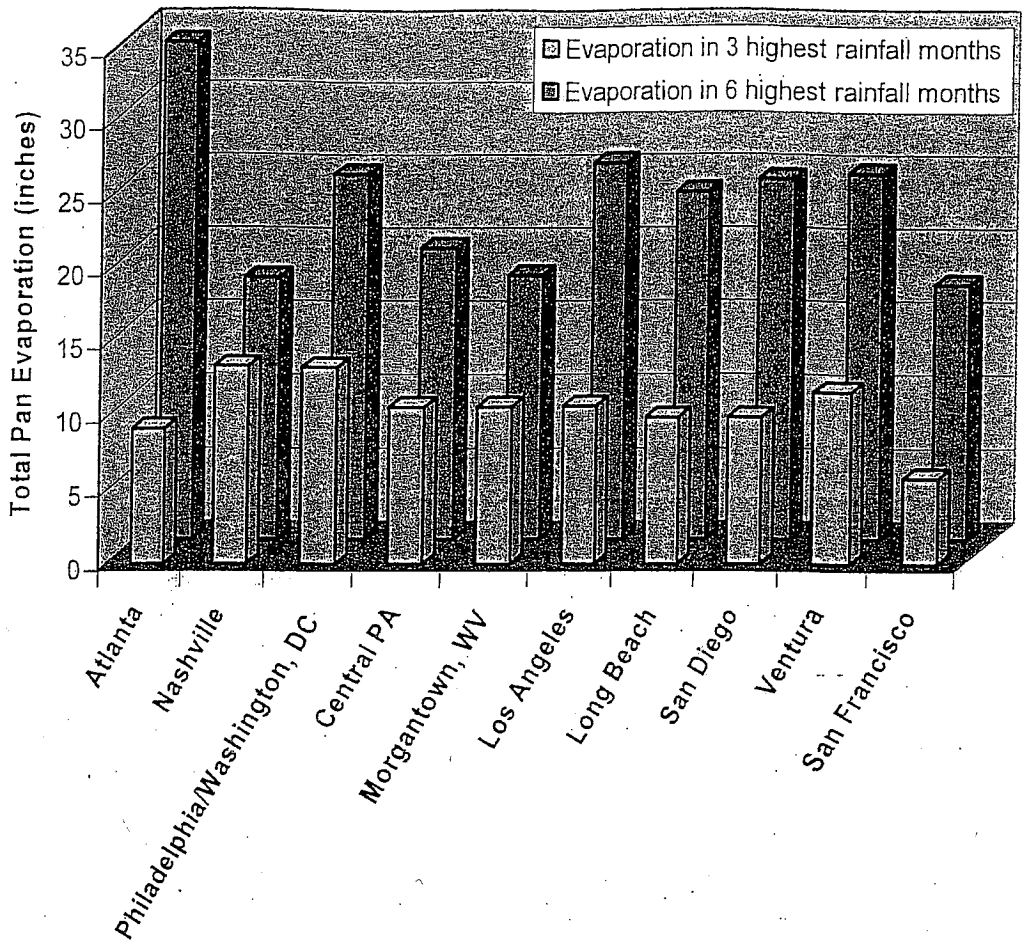

Figure 2. Evaporation in Highest Rainfall Months

Figure 3 offers the most telling portrait of the potential of evaporation to cut surface runoff discharge using LID techniques in California. Southern California locations exhibit a substantial excess of evaporation over precipitation in the six highest months of precipitation. Only Philadelphia has any excess in the three highest rainfall months, and the southern California cities' excess is about two to four times as large as Philadelphia's in these months. Therefore, even though southern California's wet season coincides with its period of lowest evaporation, its generally warm, sunny winters give it an advantage over other locations in the nation that have adopted runoff retentive LID measures. San Francisco has an evaporation excess in its six rainiest months, although a small deficit in its three wettest ones. Atlanta has a much larger deficit in this period. Inland areas in the San Francisco Bay region are generally warmer than the city itself and likely have somewhat higher evaporation. However, data were not available to verify this hypothesis. Ventura is represented by the place closest to the main urban concentration in the county offering evaporation data, the El Rio – UWCD Spreading Grounds.
As one illustration of the potential offered by LID, Berghage et al. (2007) performed green roof research at Pennsylvania State University, located in State College, PA. They found over 50 percent of annual stormwater volume to be retained and not discharged, even with as little as 20 mm (under 1 inch) of storage capacity, and peak discharge rate attenuation to no more than the pre-development level for the 2-, 25-, and 100-year frequency events. Figure 3 shows that all of the California cities assessed are in a more favorable position than State College in implementing green roofs, and hence would be expected to increase runoff retention to well over 50 percent with this LID technique.

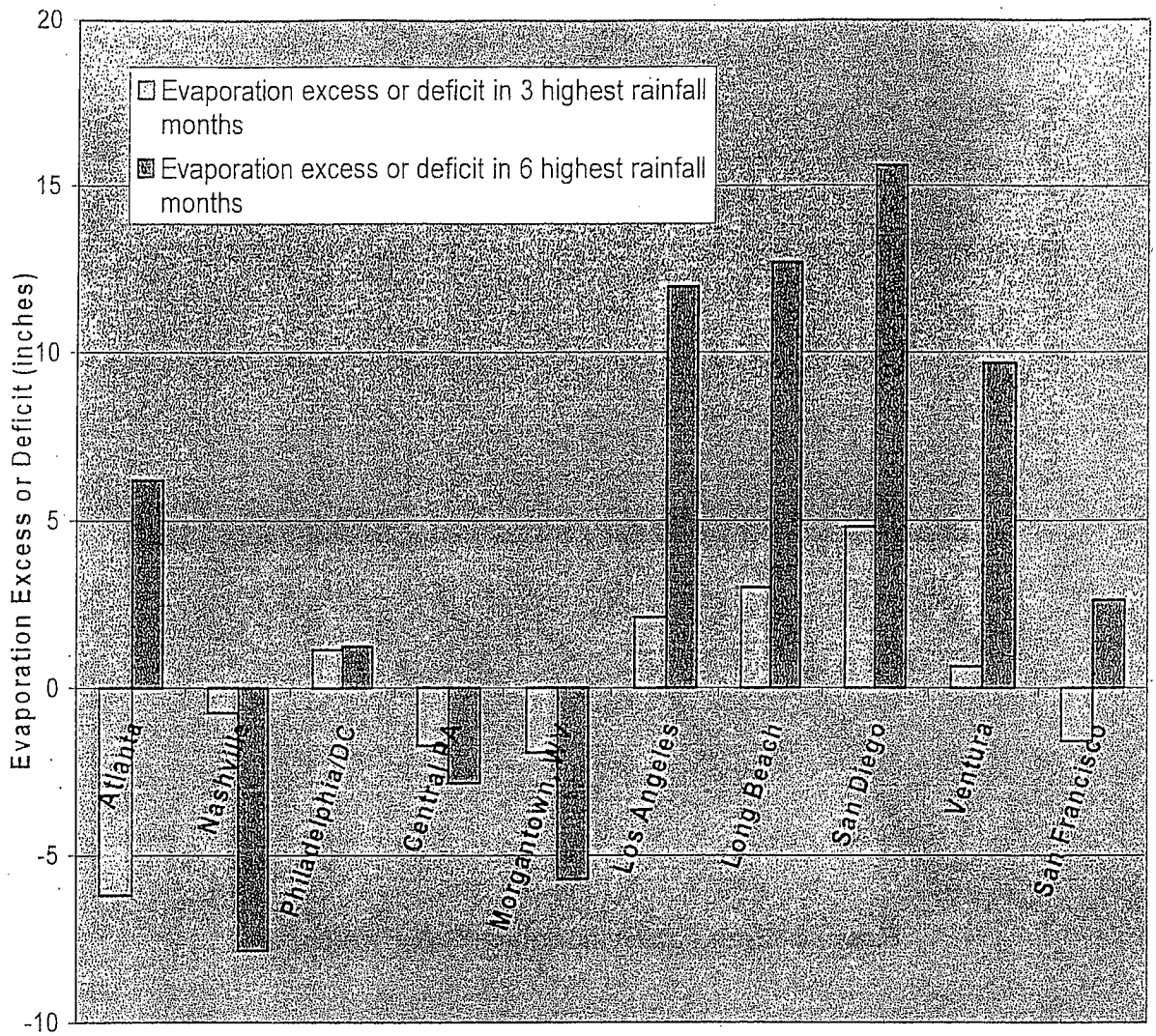

Figure 3. Evaporation Excess or Deficit in Highest Rainfall Months

CONCLUSIONS AND RECOMMENDATIONS

Southern California has considerably greater potential to reduce the discharge of contaminated urban runoff through evaporation in LID stormwater management practices than other locations in the United States that have already adopted and mandated those practices or are considering regulatory proposals to do so. The San Francisco Bay Area's potential to utilize evaporation in LID stormwater management is equal to or higher than those other locations in the U.S. Furthermore, most locations can infiltrate much or even all runoff produced by typical water quality design storms and need not rely on evaporation. In addition, harvesting rainwater for beneficial uses can further subtract from surface discharge. California is unique among the locations considered in this analysis in having some reclaimed water distribution systems in place. These systems could be expanded to take harvested rainwater, and many unexplored opportunities exist to put runoff to good purposes to help solve the state's water supply problems. Recognizing all these points, the fact that California experiences most of its nominal annual rainfall during winter months is not a factor that technically justifies imposing relatively weaker runoff retention requirements than other jurisdictions nationally, such as West Virginia or Anacostia, Washington, D.C. Instead, in a number of California cities, evaporation potential, all things being equal, actually feasibly enables stronger requirements. For all of these reasons, California Regional Water Quality Control Boards feasibly can require capture and full retention of stormwater runoff produced by design events in new developments and redevelopments through LID methods. Boards should set thorough, objective

criteria that a development project proponent must use to demonstrate inability to satisfy these requirements on-site. For those cases where such a demonstration can be convincingly made, the Boards should require and provide for installing compensating, equivalent LID works off-site, so as to ensure that practicable storm water pollution reduction is achieved on a watershed or sub-watershed basis in those circumstances when it cannot be achieved fully on-site.

REFERENCE

Berghage, R., A. Jarrett, D. Beattie, K. Kelley, S. Husain, F. Rezai, B. Long, A. Negassi, and R. Cameron. 2007. Quantifying Evaporation and Transpirational Water Losses from Green Roofs and Green Roof Media Capacity for Neutralizing Acid Rain. Pennsylvania State University, University Park, PA.

Critique of Certain Elements of "Low Impact Development Metrics in Stormwater Permitting"

By Richard Horner

GENERAL CONCLUSION

While the authors drew certain negative (and not always well-founded, as explained below) conclusions about a maximum 3-5 percent effective impervious area ("EIA") site design criterion, the results of the report's analysis overall contribute to the growing consensus that implementing LID according to a numeric metric is technically feasible in both new development and redevelopment contexts. The results thus buttress my findings in analyses performed earlier for San Diego and Ventura Counties and for the San Francisco Bay Area (Horner 2006; 2007a, b) and support the feasibility of meeting a 5% EIA standard in southern California. However, the report's suggestion that a "delta volume" standard be adopted would depart from standard and well-accepted practice in the United States, resulting in significantly greater volumes of stormwater with concomitant, significant increases in the mass volume of a range of pollutants in stormwater.

CRITIQUE OF WATER QUALITY TREATMENT DESIGN BASIS

The authors of Low Impact Development Metrics in Stormwater Permitting ("the report") propose and employ in their case studies a quantity they term "excess stormwater runoff," which forms the basis for their sizing and designing of low impact development ("LID") facilities to treat stormwater runoff. In footnote 21 on page 31, the authors have defined "excess stormwater runoff" as the volume of post-development runoff minus pre-development runoff for the 85th percentile storm event (or for an equivalent water quality design event). However, using the differential volume ("delta volume") between pre- and post-development conditions breaks the long-standing national and state precedent of using the full volume of stormwater discharged from the developed site as the basis for stormwater best management practices ("BMPs") that store runoff for longer than a few minutes.

The virtually universal adoption (see examples below) of the full water quality volume instead of the delta volume occurred for good reasons. The total runoff volume from the 85th percentile event—the prevailing design standard in southern California—was determined through objective analysis to represent the point above which substantially diminishing returns in water quality improvement would accompany considerable size enlargement and, therefore, cost (Guo and Urbonas 1996). The analysis identified the *full* volume generated by the 85th percentile event—not some lesser quantity like the delta volume—as the appropriate threshold at which the decrease in benefits accelerates.

The use of a differential hydrologic measure that compares pre- and post-development states is common in the management of storm runoff quantity (i.e., hydromodification). The pre- vs. post-development measure is appropriate in that situation because successfully matching pre-

and post-development hydrologic characteristics causes no modification in the hydrologic status of the receiving water and, hence, no negative physical effects. When managing water quality, in contrast, any untreated volume (in the delta volume scenario, this would be the amount that originally flowed from the undeveloped land) would deliver to the receiving water the many pollutants characteristic of urban runoff. There, these pollutants would create negative physical, chemical, and biological effects. On the other hand, if the appropriate water quality volume is used (i.e., no less than the full volume of the 85th percentile event), the LID-based stormwater management BMPs should deliver no pollutants to the receiving water, since the retention and reuse or infiltration of that volume is practicable and achievable, as I have demonstrated separately by analyzing a range of development scenarios in southern California.

The loss in treatment capacity from using the delta volume measure, and hence the loss in water quality protection, would vary depending on climatology and the characteristics of the undeveloped parcel and the developed site (type of pervious and impervious land cover, soil, slope, etc.). In the Walnut Village and 60 California case studies presented in the report, the difference ranged from 15 to 20 percent and could be higher in different scenarios. This difference is not small, considering that the National Stormwater Quality Database (Pitt, Maestre, and Morquecho 2004) shows that pollutants like solids, metals, nutrients, and bacteria are typically present in urban runoff at concentrations two to five times as high as in storm flow from undeveloped land. Discharging the pre-development volume, contaminated by urban pollutants without any water quality treatment, would subject human users and aquatic life to substantial runoff quantities with pollutant mass loadings and potentially acutely toxic pollutant concentrations. These loadings and concentrations would be increased by factors of approximately two to five, compared to the pre-development state, thus compromising the beneficial uses of the water body that existed before development. It is essential for resource protection that the full post-development volume be retained onsite through infiltration, evapotranspiration, and/or harvesting for reuse.

As pointed out above, adopting a volumetric basis for stormwater treatment design and then subjecting that full volume to onsite retention or treatment has been the rule in the United States. Jurisdictions take differing approaches to defining that volume, but, once it is set, they utilize the entire quantity as the basis for BMP design. Common approaches include the storm percentile method: a storm event of selected frequency and duration is chosen, which correlates to a certain depth of precipitation spread over a watershed area. In addition to southern California, Georgia provides an example of the first approach (http://www.georgiastormwater.com/vol2/1-3.pdf at 1.3-1):

> Treat the runoff from 85% of the storms that occur in an average year. For Georgia, this equates to providing water quality treatment for the runoff resulting from a rainfall depth of 1.2 inches.

The state of Washington employs a second approach, actually in relation to a storm percentile analysis (http://www.ecy.wa.gov/pubs/0510029.pdf at 2-28):

> Water Quality Design Storm Volume: The volume of runoff predicted from a 24-hour storm with a 6-month return frequency (a.k.a., 6-month, 24-hour storm). Wetpool

> facilities are sized based upon the volume of runoff predicted through use of the Natural Resource Conservation Service curve number equations in Chapter 2 of Volume III, for the 6-month, 24-hour storm. Alternatively, the 91st percentile, 24-hour runoff volume indicated by an approved continuous runoff model may be used.

Numerous jurisdictions, such as Maine, use the precipitation depth approach (http://www.maine.gov/dep/blwq/docstand/stormwater/stormwaterbmps/vol3/chapter2.pdf at 2-12):

> Stormwater management facilities must be designed to treat the first 1 inch of runoff ...

Maryland (http://www.mde.state.md.us/assets/document/chapter2.pdf at 2.1):

> P= rainfall depth in inches and is equal to 1.0" in the Eastern Rainfall Zone and 0.9" in the Western Rainfall Zone ...

Pennsylvania (http://www.depweb.state.pa.us/watershedmgmt/cwp/view.asp?a=1437&q=529063&watershedmgmtNav=| at 3.3.4):

- Stormwater facilities shall be sized to capture at least the first two inches (2") of runoff from all contributing impervious surfaces.
- At least the first one inch (1.0") of runoff from new impervious surfaces shall be permanently removed from the runoff flow – i.e., it shall not be released into the surface Waters of this Commonwealth. Removal options include reuse, evaporation, transpiration, and infiltration.

and North Carolina (http://h2o.enr.state.nc.us/su/documents/BMPManual_WholeDocument_CoverRevisedDec2007.pdf at 2-2):

> Non-coastal counties: Control and treat the first 1.0" of rain. (Note: a more complex basis applies to coastal counties.)

In none of these cases does the stormwater treatment design basis involve a delta volume computation such as advocated by the authors of the report.

CRITIQUE OF CASE STUDIES

Even though the report forthrightly demonstrates technical feasibility, it nonetheless takes a somewhat negative stance by overemphasizing difficulties and high costs, both of which are poorly justified. The report, moreover, is devoid of estimates of the benefits that accrue from reducing the discharge of pollutants to receiving waters, recharging groundwater through infiltration, conserving water through harvesting and reuse, and decreasing hydromodification of

receiving waters. I made such estimates in my previous reports, and these benefits are very significant. For example, I concluded that (Horner 2007a):

> Draining impervious surfaces onto the loam soils typical of Ventura County, in connection with limiting directly connected impervious area to three percent of the site total area, should eliminate storm runoff from some development types and greatly reduce it from more highly impervious types. Adding roof runoff elimination to the LID approach (by harvesting or directing it to downspout infiltration trenches) should eliminate runoff from all but mostly impervious developments. Even in the development scenario involving the highest relative proportion of impervious surface, losses of rainfall capture for beneficial uses could be reduced from more than 85 to less than 40 percent, and pollutant mass loadings would fall by 83-95 percent from the untreated scenario when draining to pervious areas was supplemented with water harvesting.

Failure to include a discussion of such important benefits inappropriately biases the report against feasible LID numeric performance standards such as an EIA limitation. There is a somewhat grudging admission that LID based on an EIA limitation can be implemented, but this is countered with assertions that doing so will take some extra work and cost too much. Both of these negative claims should not be given much weight for the reasons stated below. Furthermore, neglecting the aforementioned very real and important benefits of robust LID implementation omits the counterbalancing consideration that the aquatic environment will be better protected with an improved site design paradigm.

Additionally, the report fails to take into account two aspects of LID that are at least relatively cost-neutral or, in many configurations, even cost-saving. First, landscaping is a normal part of developed and redeveloped sites and can serve stormwater management purposes, as well as aesthetic purposes, with little or no extra cost. Second, most LID practices primarily utilize soft infrastructure instead of more expensive hard infrastructure like extensive piping and concrete. While the cost analyses presented in the report were poorly detailed in the first place, as discussed in greater depth below, it appears that these financially mitigating factors were not even considered.

Walnut Village

The report's presentation of the multi-family residential Walnut Village redevelopment project reflects the general criticisms noted above. It demonstrates the technical feasibility of implementing LID practices according to an EIA limitation (in fact, the authors achieved an EIA of zero), stating, "this result ... illustrates that LID benefits can be achieved by both extensive implementation (i.e., routing of runoff to vegetated systems) and more intensive design of active landscaping (i.e., greater retention depth) where opportunities exist."

Nevertheless, the authors put a negative spin—unjustified, in my opinion—on this success. In one negative passage the report declares, "the 14-17 inches of retention required to capture the delta 2-year volume is much less feasible, as it would require a combination of fairly deep amended soils and significant surface storage." I contend that providing 14-17 inches of storage in surface ponding and soil pores is entirely feasible. For instance, 18 inches of amended soils

with 33 percent porosity would provide 6 inches of storage, which could be supplemented by 8-11 inches of above-grounded temporarily ponded volume, a thoroughly feasible design. Elsewhere, the report characterizes decreasing EIA from 18 to 0 percent as "difficult," although this decrease merely involves converting non-essential hardscape to landscaping. The reader is left to wonder why any developer would choose to buy and install *non-essential* asphalt or concrete (almost certainly more expensive than LID landscaping) rather than constructing vegetated BMPs that would be an asset in more ways than one. In my opinion, it is more "difficult" from fiscal and marketing perspectives to justify the use of pavement for no reason. In any case, whatever impression one has of this issue, from a technical, objective perspective, the report does not contain a reasonably complete and even-handed assessment of costs, significantly undercutting its claims of infeasibility. Likewise, subjective and undefined assertions regarding the "difficulty" of meeting even relatively high volumes (such as the two-year storm) are presented without supporting analysis or justification which, once again, limits the utility of the report.

Further, with regard to landscaping, the final sentence in the case study states, "landscape plans typically include features that restrict usage of landscaping for runoff control (e.g., tree choice can limit inundation depths and duration), therefore, it is unreasonable to assume that all landscaping may be available." There is no reason why landscaping plans should be incompatible with vegetative LID practices, however. Bioretention cells and similar LID features routinely include trees, which serve several important hydrologic roles (rainfall interception, advancing infiltration by opening conveyance pathways through soil, water storage in tissues, and transpiration). It is no challenge for landscape designers to select trees that are not limited by moisture conditions in such BMPs.

The Walnut Village site has hydrologic group B soils, to which the authors assigned an infiltration rate of 0.2 inch/hour, assuming that the soils would be "compacted". They thereby ignore a fundamental LID practice: guarding against the removal and compaction of soils outside the active building area during construction (Hinman 2005). While infiltration rates vary depending on the specific soil type within a hydrologic soil group, B soils overall have rates much above the authors' assumption; i.e., 0.5-1 inch/hour (http://www.vcstormwater.org/documents/workproducts/landuseguidelines/appC.pdf). The National Resource Conservation Service (2007) observes that, "Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer or water table are in Group B if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 4.0 micrometers per second (0.57 inches per hour) but is less than 10.0 micrometers per second (1.42 inches per hour)." It would be irresponsible building practice anywhere, and certainly in a development that is implementing LID practices, to permit such indiscriminant soil disturbance that across the landscape the infiltration rate is decreased to as little as 15 percent of its natural magnitude.

The infiltration rate assumption has consequences for the analysis and the authors' interpretation of their results. While the report shows that adequate volume attenuation could be accomplished to meet the case study's stated objectives, with the 0.2 inch/hour infiltration rate, active landscaping drain times could exceed the recommended 72-hour maximum and approach 83 hours. If the infiltration rate were just slightly higher at 0.3 inch/hour, though, drawdown would

occur 50 percent faster and easily lower the drain time beneath the maximum. Avoiding the drastic diminution in hydraulic conductivity that the authors have assumed is eminently achievable on the site's B soils and would produce an even more optimistic picture than the already successful Walnut Village hypothetical design.

The authors observe that imposing a fixed EIA standard alone promotes the routing of runoff to vegetated systems but does not boost the companion strategy of pursuing more intensive design of active landscaping. In so doing, the authors provide a valuable service in pointing out that a design basis must accompany the EIA limitation for real effectiveness. An example of such a comprehensive standard is:

> Limit effective impervious area to 3 percent. Impervious surfaces can qualify as "ineffective" only when the entire volume of runoff (based on the design storm) from those areas is captured onsite through infiltration, evapotranspiration, and/or harvesting for beneficial use. In the rare circumstance in which onsite compliance is infeasible according to established criteria, the permittee or developer shall identify opportunities for off-site mitigation in the same sub-watershed that will achieve the overall goal of reducing effective impervious area to no more than the 3 percent design standard.

60 California

Like the Walnut Village case study, the authors' presentation of the 60 California multi-use commercial/retail redevelopment project also tends in an overall manner to support my own analyses and conclusions regarding the practicability of meeting the 5% EIA standard. This case study, too, demonstrates the technical feasibility of meeting a maximum 5 percent EIA standard, in this case by employing a green roof and water harvesting on a highly constrained site. Once again, though, the authors put forth some negative interpretations that are, in my opinion, unjustified.

One such claim is that green roofs and cisterns are generally beyond the level of BMP implementation in common practice in the United States nowadays. In fact, both practices are no longer at all unusual. Without attempting any comprehensive literature review of applications, I would note that Chicago has numerous green roofs in place, most prominently on its city hall (http://www.artic.edu/webspaces/greeninitiatives/greenroofs/main_map.htm). In Seattle, green roofs top a growing number of public and private buildings (http://www.seattle.gov/DPD/GreenBuilding/OurProgram/Resources/TechnicalBriefs/DPDS_009485.asp#case). Seattle's city hall also harvests rain for graywater supply and irrigation, as does the county administration building and a neighborhood environmental education center (http://www.harvesth2o.com/seattle.shtml). The Texas Water Development Board (2005) prepared an excellent, practical manual on water harvesting at all scales, complete with examples in place and design calculations. The manual covers the entire state of Texas, whose western areas have rainfall conditions very much like southern California's. Hence, little adaptation is needed to use the manual's recommendations here.

The report also claims that the suitability of green roofs for southern California is not well understood and that, "during the rainiest times of the year in southern California, the potential

evapotranspiration is the lowest, meaning that the ability to regenerate storage capacity between storms is low." It is true that the potential is lowest during the wettest season, but, given the frequent sun and relative warmth during dry intervals in the southern California winter, the regenerative ability is still not "low." Berghage et al. (2007) performed green roof research at Pennsylvania State University (PSU). They found that over 50 percent of annual stormwater volume was retained and not discharged, even with as little as 20 mm (under 1 inch) of storage capacity, and the site reduced peak discharge rates to no more than the pre-development level for the 2-, 25-, and 100-year frequency events. PSU is located in Centre County, PA, where precipitation is not highly seasonal but tends to be slightly greater in the summer, compared to other months. Pan evaporation rates there range from 3.3 to 4.2 inches/month during June-September (http://www.pa.nrcs.usda.gov/technical/Engineering/PaRainEvapRunoff.pdf). The November-February Los Angeles pan evaporation range is 3.5 to 4.0 inches (http://www.calclim.dri.edu/ccda/comparative/avgpan.html). Therefore, Los Angeles has as much evaporation potential in the months when it most needs that potential as locations with successful green roofs elsewhere. Similar research should be performed in California, but enough encouraging evidence exists to begin establishing full-scale projects, which can be monitored to confirm performance and refine design guidance for the region.

A final negative point made by the report is that green roofs and water harvesting may conflict with existing building and health codes. Codes should not be regarded as an unbending constraint on moving to new, more environmentally beneficial technologies. As experience in the growing number of applications of both practices shows, building safety and health are not being compromised. If constraints do exist in a jurisdiction's codes, they should be examined to assess their justification and revised if no overriding reasons exist to maintain them. Indeed, it is my understanding that municipal separate storm sewer permits often if not always require that local codes be amended to support implementation of programs and approaches to reduce stormwater pollution.

Redevelopment of Kmart Site

The Kmart site redevelopment case study was based on the use of vegetated filter strips and infiltration trenches. Its primary purpose was to estimate costs for these practices by apparently taking a challenging site with relatively poor soils. As an initial manner, the decision to evaluate only one site to reach a conclusion about costs of LID practices is suspect. This is particularly the case when, as here, the report's conclusions tend to contradict mainstream evaluations of the cost of implementing LID. Such studies, including an analysis of several projects by the U.S. Environmental Protection Agency, report significant cost savings compared to traditional water quality approaches across the vast majority of building sites.

More specifically, there are several flaws in the foundation of this case study. The authors developed estimates of runoff volume in pre-development and post-development conditions by using the Natural Resources Conservation Service's Curve Number Method, which is well-known to overestimate the pre-development hydrologic characteristics and thus set the wrong targets for post-construction designs. The site has hydrologic group C soils. The authors performed calculations assuming an infiltration rate of 0.5 inch/hour, higher than the rate used for B soils in the Walnut Village case study (an unexplained discrepancy). There appears to

have been no consideration of organically amending soils to increase water storage and improve infiltration. Soil amendment for these purposes is a very common LID practice, especially in group C soils. The authors appear to have given some thought to other LID practices (tree boxes, bioretention, pervious pavement, green roofs, and water harvesting) but rejected all of them for unexplained reasons. Failure to use a broader pallet of alternatives and soil amendment indicates that the case study may not have been based on the most technically effective and/or cost-effective choices.

This case study fails to convincingly meet its objective of demonstrating what the LID designs would cost, in large part because the authors give no detail whatsoever regarding how the cost figures were derived. The per-acre and percentage-of-redevelopment costs are simply not credible unless their derivation can be traced and confirmed. The cost analysis also suffers from the general criticisms stated above regarding costs: it implicitly assigns all landscaping costs to the filter strips, although these areas would be landscaped anyway at roughly the same cost; the analysis further fails to recognize that stormwater runoff must be conveyed and managed in some way, and those obligations carry costs, which are probably higher if performed conventionally through the use of large quantities of piping and concrete. With these shortcomings in analysis, it is assuredly not justified to say, as the case study conclusions do, that, "[i]t is clear from the Kmart case study cost estimates that the proposed draft permit requirements would significantly increase the drainage costs of urban redevelopment projects." And although more difficult to monetize, environmental benefits—and their economic value to society—are entirely neglected in this case study, as in the others.

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