Low Impact Development's Supersized Stamp on California Storm Water Regulation

By David M. Metres

Without much fanfare, low impact development ("LID") practices have become a dominant trend in federal and California storm water regulation. The California State Water Resources Control Board ("State Board") and the Regional Water Quality Control Boards ("Regional Boards") have adopted groundbreaking and influential LID requirements mandating action throughout California. In addition, the U.S. Environmental Protection Agency has reaffirmed its commitment to LID in a series of guidance documents issued in July, 2012. These actions indicate that LID practices will increasingly drive site design for real estate development as well as at industrial facilities. The rapid adoption of LID concepts into regulatory requirements demands that all stormwater dischargers become familiar with the obstacles and opportunities associated with LID.

LID approaches vary so dramatically from prior approaches to storm water management that every site discharging storm water will require guidance. Instead of using concrete channels to direct runoff to point sources, LID practices attempt to mimic a site's predevelopment hydrology. LID practices include filtering storm water with natural media, detaining storm water for infiltration into the ground, and retaining water onsite for reuse. These techniques are designed to protect water quality by controlling runoff volume, peak runoff rate, and the duration of runoff flows, while potentially offering cost savings for developers and industry. Because these requirements represent significant departures from the traditional storm water management paradigm, they will require new approaches to planning physical infrastructure for industrial facilities and large-scale construction projects.

Although the concept of integrating LID practices into storm water management has existed since at least the late 1990s,[1] there continues to be significant uncertainty regarding what LID requires in practice. To help navigate this changing landscape, this article summarizes how California's regulatory framework requires LID approaches, identifies practical examples of LID applications, and highlights legal and policy issues that should be monitored by industrial dischargers, real estate developers, construction companies, and municipalities.

I. CALIFORNIA'S FRAMEWORK OF STORM WATER REGULATION

Storm water is regulated through permits issued under the federal Clean Water Act ("CWA") by implementing state and local authorities. The CWA regulates water pollution that is discharged from a "point source"—a discrete outlet point such as a pipe or channel—into waters of the United States.[2] Such point source discharges require a permit issued under the CWA's National Pollutant Discharge Elimination System ("NPDES") permit system.[3] In California, CWA NPDES permits are implemented by the Regional Boards under the state's Porter-Cologne Water Quality Control Act.[4]

Storm water runoff in many cases does not come within the CWA's NPDES permitting system directly, because the runoff is not discharged through a point source into waters of the United States as these terms are used in the CWA. Such storm water discharges are still subject to CWA regulation indirectly, however, where they discharge into a municipal separate storm sewer system ("MS4") that is subject to NPDES permitting. The CWA requires that MS4s must impose controls that "reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods."[5] These controls include restrictions on property developments from which storm water may run off into the MS4, which the owner or operator of the MS4 must impose on property owners through ordinances, permits, contracts, or other means.[6]

Each owner or operator of an MS4 must develop a storm water management program ("SWMP") as part of the NPDES permit process to implement these requirements, which must address four categories of pollutant sources: (1) storm water runoff from commercial and residential areas; (2) storm water runoff associated with industrial facilities; (3) storm water runoff from construction sites; and (4) illicit non-storm water discharges.[7] After developing the SWMP, the MS4 must then implement it by imposing obligations directly on affected property owners—for instance, by adopting local ordinances requiring property developers to implement storm water runoff control measures—to achieve compliance with the NPDES permit. This article focuses primarily on NPDES permits issued for MS4s because LID practices have been most prominently featured in such permits, and because this is the CWA jurisdictional mechanism under which LID requirements arise for many land uses that are not directly subject to NPDES permitting requirements.

In addition, in some cases storm water discharges are directly regulated as "point source" discharges and require an NPDES permit themselves. Thus, construction projects over one acre in size that discharge storm water through a point source must obtain an NPDES permit.[8] The federal CWA regulations for construction activities do not require LID practices, but in California, the State Board has incorporated LID requirements into its general permit for storm water discharged from construction sites.[9]

Similarly, facilities that discharge storm water associated with industrial activity[10] must be covered by an NPDES permit.[11] This requirement is normally satisfied through California's Industrial General Permit ("IGP") for storm water discharges, which is a general NPDES permit issued by the State Board. If such a facility discharges to an MS4, the facility must also notify the MS4 permit holder, in addition to obtaining its own permit coverage.[12] LID practices have not yet been required by California's general storm water NPDES permit for industrial dischargers—to date, they have been required only in MS4 permits and the construction general permit in California. Although LID concepts inform the selection of Best Management Practices ("BMPs") under the most recent version of the draft IGP,[13] an earlier draft of the IGP provided significant regulatory relief to dischargers that adopt LID practices, including a conditional exclusion from the permit's Storm Water Pollution Prevention Plan ("SWPPP") and monitoring requirements.[14] The conditional exclusion was dropped from the most recent version of the draft IGP, but BMPs employing LID concepts may become a standard feature of industrial storm water permitting in California.[15]

II. CALIFORNIA NPDES PERMITS AND OTHER PERMITTING PROGRAMS REQUIRING LOW IMPACT DEVELOPMENT PRACTICES

NPDES permits issued throughout California are increasingly requiring implementation of LID practices. Many such NPDES permits are issued to county permit holders for operation of their MS4s, although as noted above the California State Board has also issued a construction general permit that applies statewide. Regulatory programs requiring LID practices also exist at the local level separate and apart from NPDES permit requirements. All of these developments are occurring with the strong support of the federal U.S. Environmental Protection Agency, which is actively promoting the adoption of LID into NPDES permitting programs.

A. The Ventura County MS4 Permit

Although many permits integrate LID concepts, the Ventura County MS4 NPDES permit stands out as a watershed example of the move to embrace LID. The Los Angeles Regional Board finalized this groundbreaking permit in 2010.[16] The permit arose out of a stakeholder negotiation with Heal the Bay, the Natural Resources Defense Council, the Regional Board, and 12 municipal stakeholders.

This MS4 permit requires the adoption of LID Best Management Practices ("BMPs").[17] As discussed below in Section III.A., LID BMPs are stormwater management practices that control the movement of pollutants, prevent degradation of soil and water resources, and are compatible with the desired land use. The permit provides landowners the flexibility to select their own BMPs, which allows them to choose solutions for managing water quality that comport with the desired use of their facility. The adoption of BMPs is designed to replace hard and fast numeric limits on effluent pollution.

Perhaps even more importantly, for all new and redevelopment projects, the Ventura County permit also limits the effective impervious area ("EIA")—the area covered by a hard surface that is impervious to storm water infiltration—to 5 percent of the site's total area.[18] Where the EIA exceeds 5 percent, off-site mitigation or payment in lieu will be required and must be equivalent to the amount of storm water not managed on site.[19] Impervious surfaces may be rendered "ineffective," and thus not count toward the 5 percent EIA limitation, if the storm water runoff from those surfaces is fully retained on-site for the design storm event.[20] This EIA standard will cause all new and redevelopment projects to squarely confront the challenges and opportunities presented by LID.

By requiring LID BMPs, setting specific quantified limits for storm water retention, and mandating offsite mitigation for any inadequacies, the Ventura County MS4 permit diverges radically from traditional storm water regulation in favor of onsite features replicating natural hydrology. This permit demonstrates the State and Regional Boards' focus on and implementation of LID practices and policies, and represents a harbinger of future LID requirements.

B. Other California Regional Board Permits Featuring LID

Several other Regional Board permits have included rigorous LID requirements. For example, the San Diego County MS4 permit, which mandates LID BMPs (where feasible) and requires limits on "hydromodification"—changes to the land that increase runoff flow—that will increase erosion and related impacts.[21] The San Diego County permit also requires certain categories of development projects with a potentially significant threat to water quality to meet heightened LID requirements.[22] Another example is the recently issued MS4 Permit applicable to nearly all of Los Angeles County, an area of more than 3,000 square miles. The Los Angeles County MS4 permit requires new and redevelopment projects to retain either a 0.75-inch, 24-hour rain event, or the 85th percentile 24-hour rain event onsite via infiltration, evapotranspiration,[23] and rainwater harvest and reuse.[24] This permit also incorporates other LID features, such as requirements for hydromodification controls and LID BMPs.[25]

Orange County has two MS4 permits—one issued by the Santa Ana Regional Board and the other issued by the San Diego Regional Board. These MS4 permits require LID BMPs, on-site retention of the 85th percentile storm event, and hydromodification restrictions.[26] Riverside County and San Bernardino County also have MS4 permits that require LID practices.[27] These examples are illustrative of the many California NPDES permits requiring the use of LID practices.

C. The State Board's Construction General Permit

The State Board has adopted limited LID provisions into the statewide construction NPDES general permit. This permit requires permittees to replicate pre-project hydrology up to the 85th percentile storm event after construction is complete.[28] Permittees can obtain credits for implementing LID practices that will enable them to more easily meet this "Post-Construction Water Balance Performance Standard."[29] Although not yet a program with robust LID features, the construction general permit may eventually develop more rigorous LID requirements.

D. Local Governments' Innovative Initiatives To Promote Low Impact Development Practices

Local governments have adopted innovative LID requirements into storm water ordinances and programs. In part, such initiatives have been required under the legal obligations in these jurisdictions' NPDES permits for their MS4s. But in many cases they have also gone beyond the minimum permit requirements in promoting LID. For example, San Francisco has adopted Stormwater Design Guidelines that apply to projects that disturb 5,000 square feet or more of ground surface. These Guidelines require preparation of a Stormwater Control Plan that incorporates LID BMPs and integrates numerous other LID concepts.[30] The Guidelines apply to projects discharging to San Francisco's MS4, but they also apply to projects that do not discharge to the MS4. By applying LID requirements to all projects in San Francisco—whether or not required to do so by an MS4 NPDES permit—San Francisco has developed a city-wide effort to reduce discharges of pollutants.

The City of Santa Monica has promulgated a set of very stringent LID requirements in its Urban Runoff Pollution Ordinance.[31] The Urban Runoff Pollution Ordinance requires that new development and redevelopment projects infiltrate, store for non-potable use, or evapotranspire the first ¾ inch of a storm, or pay an Urban Runoff Reduction fee that the City of Santa Monica then uses for storm water control projects.[32]

California's counties have also gotten into the mix. In Contra Costa County, for example, the County's MS4 permits require municipalities and the County to incorporate LID practices into policies, processes, and permitting.[33] As part of its implementation of these requirements, the County offers private property owners rebates of up to 80% of the construction costs to install LID features through its Low Impact Development Rebate Program.[34] Such programs demonstrate that cities and counties are increasingly integrating LID concepts into local planning efforts—sometimes even without the hook of a required NPDES permit.

E. U.S. Environmental Protection Agency Efforts to Promote LID

Not only have the California Water Boards and local governments embraced LID, the U.S. Environmental Protection Agency ("EPA") has adopted formal positions promoting LID. In April 2011, EPA officials issued a memorandum to Regional Administrators strongly recommending integrating green infrastructure approaches into NPDES permitting processes.[35] In July 2012, EPA released a series of six factsheets and four supplements designed to provide guidance to EPA and state permitting and enforcement officials on how to integrate green development into NPDES permits.[36] This focus has resulted in several consent decrees with EPA that have included requirements for deploying green infrastructure or LID practices as part of settling enforcement actions. Cities with these consent decrees include Cincinnati and Cleveland, Ohio; Kansas City, Missouri; and Louisville, Kentucky.[37]

III. LOW IMPACT DEVELOPMENT PRACTICES ATTEMPT TO MIMIC A SITE'S PRE-DEVELOPMENT HYDROLOGY

LID practices vary significantly from conventional approaches to storm water management, which generally are designed to channel storm water runoff to discrete points of discharge. Directing storm water discharges to point sources enables accurate, comprehensive sampling and facilitates filtering storm water prior to discharge. But it has also caused unintended and significant consequences for watersheds, estuaries, and oceans. The concentration of storm water and the construction of impermeable surfaces creates paved pathways for polluted storm water to be discharged directly into creeks, rivers, and the ocean. This surface runoff can pick up many contaminants, including particulate matter, heavy metals, oil and grease, bacteria, pesticides, and other pollutants, which can be discharged without proper filtration. Furthermore, the concentrated flows of storm water discharged from impervious surfaces can erode stream banks, causing downstream sedimentation, scouring, and channel widening. Finally, the concentration of storm water flows into combined sewers can result in sewer system overflows. All of these effects degrade water quality and can harm aquatic ecosystems and human health.

LID approaches aim to redress these shortcomings by filtering storm water with natural media, detaining storm water for infiltration, and retaining water onsite for reuse. To achieve these goals, LID approaches call for a variety of implementing strategies. Most permits with LID features emphasize the adoption of BMPs. In addition, some permits with LID practices also require other features, including hydromodification management requirements, quantified performance standards, and offset and retrofit programs. This section summarizes the various practices employed to achieve LID.

A. Low Impact Development Best Management Practices

BMPs are the most common LID requirement in storm water regulation. As noted previously, LID BMPs are storm water management practices that control the movement of pollutants, prevent degradation of soil and water resources, and are compatible with the desired land use. BMPs include conservation designs, low impact landscaping, and practices promoting improved infiltration, runoff storage, runoff conveyance, and filtration. The following discussion outlines the various types of LID BMPs that have been used for storm water control, following the six categories that EPA uses to describe them (although certain BMPs can straddle multiple categories).[38]

1. *Conservation Designs*

Conservation designs preserving open space can help reduce runoff from the outset of the planning process. Open space tends to consist of natural features that encourage infiltration, filtration, and reduced runoff flows, while providing wildlife habitat. By integrating LID concepts at the design (or re-design) stage, project planners can maximize project and landscape integration to achieve water quality objectives.

2. *Low Impact Landscaping*

Low impact landscaping requires preparing soils and selecting plant species that are adapted to the specific features of each particular site. Careful attention to these considerations can facilitate plant establishment and growth. With well-rooted and flourishing vegetative landscaping, soils can be stabilized, thereby preventing sedimentation and scouring. Furthermore, thriving plant communities can enable biological uptake of pollutants, further reducing the likelihood of water quality impacts.[39] Such low impact landscaping can even occur on rooftops, where green roofs can facilitate evapotranspiration. By adopting these low impact landscaping practices, site managers can reduce onsite erosion, promote infiltration, and prevent increased runoff.

3. *Infiltration Practices*

Infiltration practices consist of engineered structures or landscape features that capture and infiltrate runoff.[40] These practices restore the natural recharge of groundwater, while limiting or eliminating runoff. Infiltration practices include physical features such as retention ponds, vegetated swales, and infiltration trenches or basins. Pervious concrete, asphalt and pavers provide durable surfaces while still allowing infiltration. Finally, processes to amend soil with sand and organic materials and the grading of sites to retain water can also increase infiltration.

4. *Runoff Storage Practices*

LID practices also include capturing runoff from impervious surfaces and storing it for reuse or gradual infiltration. Runoff storage practices harvest storm water by relying on catchment basins, cisterns, or underground storage tanks. These practices reduce flooding, while providing local water storage for later use onsite. Re-used water can be applied to irrigation, flushing, washing, evaporative cooling, dust control, or industrial processes.

5. *Runoff Conveyance Practices*

When large storm events prevent retaining all storm water onsite, improved conveyance systems can slow flow velocities, lengthen the time over which runoff occurs, and delay and reduce peak flows. For example, bioswales are vegetated channels that slow storm water runoff and promote infiltration, trap sediment, and help filter pollutants. Bioswales are often planted on a slope so that runoff flows along the length of the swale, with the vegetation slowing and filtering the water as it infiltrates into the soil. Studies have shown that bioswales successfully remove oil and grease, total suspended solids, and heavy metals through filtration and infiltration.[41]

6. *Filtration Practices*

LID calls for treating runoff by filtering it through natural media to reduce the water quality impacts of any runoff leaving the site. Such filtration can capture and prevent the discharge of pollutants through the physical filtration of solid particles as well as cation exchange of dissolved pollutants.[42] For example, bioretention treats storm water by pooling water on the surface and allowing filtering and settling of suspended solids and sediment at a mulch layer, prior to entering a plant/soil/microbe medium for infiltration and pollutant removal.

B. Hydromodification Management Requirements

In addition to BMPs, LID approaches are increasingly requiring property developers to address hydromodification. Hydromodification refers to “the change in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow, and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and sediment transport.”[43] Hydromodification can be caused by construction of impervious surfaces, compaction of soils, deforestation, and topographic modifications.[44] All of these actions alter the distribution and flow of water across a site, which can result in increases in erosion of creek beds and banks, silt pollutant loading, and other adverse impacts.[45]

Accordingly, as part of the movement to embrace LID, several Regional Boards have imposed hydromodification management requirements in MS4 permits. For example, the San Francisco Bay Regional Board has issued a permit covering multiple municipalities in the region that requires all projects creating or replacing one acre or more of impervious surface to demonstrate that they will not increase the erosion potential in receiving streams.[46] The Ventura County MS4 permit imposes similar hydromodification control requirements designed to prevent any increase over pre-project runoff flow rates and durations.[47] The San Diego County permit takes a similar approach, although the requirements apply only to defined "Priority Development Projects."[48]

C. Quantified Performance Standards

Several NPDES permits require meeting quantified performance standards to ensure the effectiveness of BMPs. Such standards typically require that BMPs be designed so that they are sufficient to retain a target volume of storm water (known as the "design storm") through on-site through storage, infiltration, re-use, and/or evapotranspiration. For example, the MS4 permit for Orange County requires that BMPs must be designed to infiltrate, filter or treat the 85th percentile storm event.[49] Another example is the District of Columbia's MS4 NPDES permit, which requires storm water controls to be designed and constructed to retain a 1.2-inch rainfall event on-site for all new development and redevelopment disturbing 5,000 square feet of land or more.[50]

Other NPDES permits provide a menu of alternative performance standards for developers to choose from. The Ventura County MS4 permit uses such an approach in allowing impervious surfaces to be rendered "ineffective" for purposes of the 5 percent limit on "effective impervious area" ("EIA") discussed above in Section II.A. Impervious surfaces are not counted towards this 5 percent EIA limit if LID features are implemented that will infiltrate, store for reuse, or evapotranspire the amount of water associated with the 85th percentile storm event, a 0.75-inch storm event, or third volumetric option based on treatment capacity.[51] Developers can choose which metric to use in demonstrating that any impervious surfaces are "ineffective."

D. Offset Programs

Where LID BMPs cannot meet quantified performance standards due to physical site conditions, some permits with LID features—such as the Ventura County MS4 permit—rely on offset programs that incorporate off-site mitigation and/or a fee-in-lieu requirement.[52] These offsets redress shortcomings in site-specific storm water retention capabilities. Offsets are usually required to be located in the same watershed as the project being developed.

IV. CHALLENGES AND OPPORTUNITIES PRESENTED BY THE MOVEMENT TO LOW IMPACT DEVELOPMENT

The growing trend to require LID features for NPDES permit holders presents both challenges and opportunities. LID represents a new and uncertain frontier for site design and storm water management. Administrative burdens, jurisdictional conflicts, physical limitations, legal uncertainty, and new cost calculations will all present hurdles for municipalities, businesses, and developers. Yet, despite these difficulties, opportunities may abound for cost savings in the form of decreased infrastructure and filtration needs while also achieving reduced impacts to our rivers, lakes, and oceans. Nevertheless, permittees must understand the challenges in order to capitalize on the opportunities created by the shift to LID.

A. Administrative Hurdles

Evaluating and verifying the use of LID BMPs and their effects on storm water runoff will present significant administrative hurdles for the California Regional Boards and other entities requiring these practices. For example, Jeff Pratt with Ventura County Public Works, the agency charged with implementing and enforcing Ventura County's new LID rules, has opined that "[a]dministratively, this is going to be a nightmare."[53] Previous gray infrastructure approaches have been in place for nearly 100 years, and are well understood. By contrast, evaluating changes in hydrography requires a nuanced before-and-after technical evaluation of the timing and intensity of storm water runoff. Such evaluations are still relatively new, and may need further technical refinement to improve their accuracy. Against this challenging technical background, already cash-strapped local governments will be hard-pressed to provide the resources to monitor and verify LID BMPs and hydrograph effects.

B. Limitations on Regulatory Jurisdiction

The administrative problem of verifying technical adherence to requirements is compounded because waste water authorities do not regulate land use or zoning. As a result, these authorities cannot directly control siting and zoning requirements that facilitate or complicate adoption of LID practices. For example, waste water authorities cannot alter street widths required by development codes for new construction, or alter local weed ordinances that could deem native plantings to be weeds. LID's land use-focused approach to managing storm water thus runs up directly against jurisdictional limitations. To overcome these barriers, local governments must coordinate land use and zoning programs to enable adoption of LID practices and policies.

An additional consequence of these jurisdictional conflicts is that developers may encounter conflicting mandates that could add confusion and delays to the entitlement process. Such conflicts must be resolved in order to facilitate widespread adoption of LID.

C. Infiltration and Groundwater Contamination

LID BMPs place a heavy emphasis on infiltration practices. However, infiltration can threaten groundwater quality if soil or groundwater contamination is present. Mobilization of soil contaminants or plumes of groundwater contamination through downward migration of water can subject an owner or operator to liability under federal and California law. This concern is especially heightened if mobilized contaminants enter groundwater supplying drinking water. Accordingly, where BMPs require the use of infiltration practices that may mobilize contaminants, permit applicants must work with regulators to obtain protections or otherwise avoid specific infiltration requirements that may result in liability.

D. Physical Limitations

Many permittees will find their LID options constrained by geography or existing site design. For example, sites with heavy clay soils or locations near wetlands or watercourses may have high water tables that prevent adequate infiltration. Additionally, LID designs tend to require more land area than existing gray infrastructure approaches. LID approaches can even have the unintended effect of increasing sprawl because some LID goals—such as infiltration and retention of storm water—can require significant amounts of land area.

In addition to such geographical limitations, a site's existing physical infrastructure can also constrain adoption of LID. Some permits with LID requirements force even fully constructed sites that are redeveloping to adopt significant and costly site redesigns. Depending on the particular site's features, these costs can become so onerous that developers will decide to scrap the proposed redevelopment entirely. Storm water permits have only inconsistently confronted these realities and will need to develop more sophisticated approaches to dealing with physical limitations.

One example of a permit that has grappled with these issues is Ventura County's MS4 permit, which provides several mechanisms for projects to address physical limitations at particular sites. The permit provides an exemption from the hydromodification control requirements for some redevelopment projects, although only if they are located in the urban core and the project does not increase the effective impervious area or decrease the infiltration capacity of pervious areas.[54] The permit also allows municipalities to implement their post-construction storm water mitigation programs on an area-wide basis—instead of site-by-site or project-by-project—where there are "exceptional site constraints" that inhibit site-specific implementation. But this exception is limited to specified Redevelopment Project Areas such as city center areas and infill development areas.[55] Finally, and most importantly, the permit allows projects to exceed the 5 percent EIA limitation if limiting impervious areas to 5 percent of the project site is not technically feasible (and as long as appropriate off-site mitigation is provided).[56]

Technical infeasibility may result from a variety of conditions including high groundwater, dense infill or redevelopment that would complicate on-site retention capabilities, and other constraints identified in Ventura County's Technical Guidance Manual. Collectively, these provisions represent a sensitive approach to physical limitations. But to take advantage of these mechanisms, projects sited in physically challenging locations will have to demonstrate that the site fulfills the applicable criteria. Compared to making a straightforward demonstration that, for example, the site meets the 5% EIA limitation, these feasibility showings are subject to additional agency discretion and may result in additional uncertainty for physically challenging sites.

E. Cost Considerations for New Developments

While some charge that LID practices will require costly site design modifications and construction of never-before-required features, EPA believes that adopting LID approaches can result in significant savings. EPA conducted a study of 17 cases in 2007, which found that "in the vast majority of cases, significant savings were realized due to reduced costs for site grading and preparation, storm water infrastructure, site paving, and landscaping."[57] Total capital cost savings ranged from 15 to 80 percent when LID methods were used, with a few exceptions in which LID project costs were higher than conventional storm water management costs.[58]

Any cost benefits that may be associated with LID can best be realized for new projects, however, because many LID approaches need to be incorporated at the site design stage. Many redevelopment projects will effectively have to start from scratch to incorporate LID features, which will drive up costs and offset potential cost savings. Furthermore, there is significant uncertainty regarding the durability of LID features. Unlike existing approaches that rely primarily on concrete and steel, LID requires using natural (or pseudo-natural) features that may not have the same longevity or durability as hard infrastructure. Accordingly, even where the use of LID practices may project some cost benefits, it is uncertain whether these benefits will actually result in long-term savings.

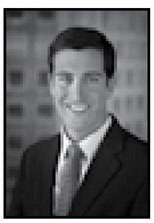
Cost considerations will be especially important because some permits requiring LID provide exemptions based on prohibitive costs.[59] These programs may require a LID feasibility analysis based on technical and economic feasibility. Quantification of the costs involved in implementing LID approaches—and any cost savings that could be derived from them—will be crucial in determining the outcome of any such analysis.

F. Environmental Review under NEPA and CEQA

Finally, LID practices and concepts can be used to support the environmental process under NEPA and CEQA. For example, an Environmental Impact Statement or Environmental Impact Report can use hydrographs and hydromodification analyses to describe a project's existing setting and its effect on water resources.[60] Furthermore, LID practices can be deployed as mitigation measures for water quality impacts.[61] Thus, it is likely that LID concepts will increasingly permeate into other environmental law and planning contexts.

V. CONCLUSION

By emphasizing onsite storm water retention, natural filtration, and infiltration practices, LID practices attempt to mimic the preexisting natural hydrography. With more and more jurisdictions embracing LID as required design features, particularly in California, permittees must increasingly adopt LID practices. Although there is still much uncertainty, LID may offer significant cost savings in the form of reduced physical infrastructure and decreased likelihood of exceedances of water quality standards. Accordingly, while adapting to the new normal of LID practices may require significant investment to deploy LID solutions, the long-term result may be decreased storm water management costs with improved environmental outcomes. LID practices, then, may prove to be a win-win solution to storm water management for businesses and the environment. But until there is a more developed track record demonstrating LID's efficacy, the ultimate result remains in question.



David M. Metres is an attorney with Barg Coffin Lewis & Trapp LLP in San Francisco. *Mr. Metres would like thank Sandy Crockett for his impressive editing and wordsmithing, Kevin Poloncarz of Paul Hastings LLP for his editorial guidance, and Tracy Egoscue of Egoscue Law Group for inspiring this article.*

ENDNOTES

1 *See* Low Impact Development Hydrologic Analysis, Prince George's County Dep't of Envtl. Res. (1999) at 11. Prince George's County, Maryland, and Alexandria, Virginia, pioneered LID strategies in the early 1990s.

2 *See* CWA § 301(a), 33 U.S.C. § 1311(a) (prohibiting "the discharge of any pollutant" without a permit); CWA § 502(12), 33 U.S.C. § 1362(12) (defining "discharge of a pollutant" to mean the addition of a pollutant to navigable waters from any "point source"); CWA § 502(7), 33 U.S.C. § 1362(7) (defining "navigable waters" to mean waters of the United States); *see also* CWA § 502(14), 33 U.S.C. § 1362(14) (further defining "point source"). "Waters of the United States" has been interpreted broadly to include tributaries of and wetlands adjacent to lakes, rivers and streams, although the Supreme Court has issued several decisions in recent years rejecting the most expansive interpretations of this term. *See* Rapanos v. United States, 547 U.S. 715, 126 S.Ct. 2208 (2006); Solid Waste Agency *etc*. v. United States Army Corps of Eng'rs, 531 U.S. 159, 121 S.Ct. 675 (2001).

3 33 U.S.C. § 1342(p); 40 C.F.R. § 122.26.

4 Cal. Wat. Code §§ 13000 *et seq*.

5 33 U.S.C. § 1342(p)(3)(B).

6 *See* 40 C.F.R. § 122.26(d)(2). Each MS4 permit applicant must specifically demonstrate that it has adequate legal authority to impose such controls as part of its NPDES permit application. *See id.* § 122.26(d)(2)(i).

7 40 C.F.R. § 122.26(d)(2)(i) and (iv).

8 40 C.F.R. § 122.26(c); *see also* 40 C.F.R. § 122.26(b)(14)(x) (defining construction activity resulting in disturbance of more than five acres as an industrial activity, thereby requiring such construction activity to obtain a permit for discharges associated with industrial activity) and § 122.26(b)(15) (defining construction activity resulting in disturbance of more than one acre but less than five acres as a small construction activity).

9 National Pollution Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order No. 2009-0009-DWQ as amended by 2010-0014-DWQ (Sept. 2, 2009, as modified Nov. 16, 2010), NPDES No. CAS000002. A general permit is a permit issued for an entire category of discharging activities, rather than to an individual discharger. Any person engaging in the activities addressed by the general permit is covered by the permit, as long as the general permit requirements are complied with.

10 Under CWA regulations, "[s]torm water discharge associated with industrial activity means the discharge from any conveyance that is used for collecting and conveying storm water and that is directly related to manufacturing, processing or raw materials storage areas at an industrial plant." 40 C.F.R. § 122.26(b)(14).

11 CWA §§ 301(a) & 402(p)(3)(A), 33 U.S.C. §§ 1311(a) & 1342(p)(3)(A); 40 C.F.R. § 122.26(c).

12 40 C.F.R. § 122.26(a)(4).

13 Draft NPDES General Permit for Storm Water Discharges Associated with Industrial Activities, Order No. 2013-XXXX-DWQ (July 19, 2013) at § X.H.6, pp. 34-35 (treatment control BMPs).

14 *See* Draft NPDES General Permit for Storm Water Discharges Associated with Industrial Activities, § XXIII, p. 48-49 (Jan. 28, 2011). These practices were called "Green Storm Water Impact Reduction Technology" or "G-SIRT".

15 *See* Draft NPDES General Permit for Storm Water Discharges Associated with Industrial Activities, Order No. 2013-XXXX-DWQ (July 19, 2013).

16 Final Ventura County Municipal Separate Storm Sewer (MS4) Permit, Los Angeles Regional Board, Order No. R4-2010-0108 (July 8, 2010), NPDES No. CAS004002.

17 *Id*. at § 4.E.I.1.d-f, p. 54; § 4.E.III.4., pp. 62-63.

18 *Id*. § 4.E.III.1.a, p. 56.

19 *Id*. § 4.E.III.2.c, pp. 57-59. Where the EIA cannot be

reduced to less than 30% of the total project area, the mitigation or in lieu payment must be 1.5 times the amount of water not managed on site. *Id.*

20 *Id*. § 4.E.III.1.b-c, pp. 56-57. In order for such a site to "fully retain" the design storm event, these features must infiltrate, store for reuse, or evapotranspire 1.5 times the volume of storm water that results from: (1) the 85th percentile storm event, (2) the volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in the Ventura County Technical Guidance Manual for Storm Water Quality Control Measures, or (3) the volume of runoff produced from a 0.75 inch storm event. *Id*. § 4.E.III.1.c, pp. 56-57.

21 San Diego County MS4 Permit, San Diego Regional Board, Order No. R9-2007-01 (Jan. 24, 2007) § D.1, pp. 25-26, 64. Hydromodification management initiatives are designed to manage increases in runoff discharge rates and durations to prevent increased erosion of channel beds and banks, sediment generation, and other impacts. Hydromodification restrictions must be implemented so that post-project runoff discharge rates and durations do not exceed pre-project discharge rates and durations where the increased discharge can cause erosion or other significant adverse impacts. *Id*. at 25-26. Hydromodification management requirements are discussed in more detail later in this article in connection with LID development practices.

22 *See id*. § D.1.d, pp. 17-24.

23 "Evapotranspiration" is the movement of water into the atmosphere from direct evaporation and from transpiration, which is the movement of water into a plant and then subsequently into the atmosphere through its leaves. Evapotranspiration is the sum of evaporation and transpiration.

24 Los Angeles County MS4 Permit, Los Angeles Regional Board, Order No. R4-2012-0175 (Dec. 8, 2012) § IV.D.7.c.i.2., p. 98.

25 *See e.g., id*. § IV.D.7.c.iv., pp. 105-08.

26 Orange County has two separate NPDES permits, which are administered by the Santa Ana and San Diego Regional Boards. The Santa Ana Region permit was renewed in 2009. Santa Ana Regional Board, Order No. R8-2009-0030. The San Diego Region permit was also renewed in 2009. San Diego Regional Board, Order No. R9-2009-002. While the San Diego Region requires retaining the 85th percentile storm event onsite, the Santa Ana Region allows storage of the 85th percentile storm to take place either onsite or offsite. The permits also diverge on specifics for hydromodification requirements.

27 *See* Riverside County MS4 Permit, Santa Ana Regional Board, Order No. R8-2010-0033; San Bernardino County MS4 Permit, Santa Ana Regional Board, Order No. R8-2010-0036.

28 Order No. 2009-0009-DWQ as amended by 2010-0014-DWQ (Sept. 2, 2009 as modified on Nov. 16, 2010) and by Order No. 2012-006-DWQ (July 17, 2012) at § XIII, pp. 35-36.

29 *Id*. at Appx. 2, 2.1, and 4.1.

30 *See* San Francisco Stormwater Design Guidelines, San Francisco Public Utilities Division (Jan. 12, 2012), *available at* www.sfwater.org/index.aspx?page=446.

31 *See* Santa Monica Mun. Code § 7.10 (Urban Runoff Pollution).

32 *Id*. § 7.10.050(b).

33 *See* East Contra Costa County Municipal NPDES Permit, Central Valley Regional Board, Order No. R5-2010-0102 (Sept. 23, 2010); Municipal Regional Stormwater NPDES Permit, San Francisco Bay Regional Board, Order No. R2-2009-0074 (Oct. 14, 2009).

34 *See* Contra Costa County Low Impact Development Rebate Program, Bay Area Integrated Regional Water Management Program, *available at* http://bairwmp.org/projects/the-western-contra-costa-county-low-impact-development-rebate-program.

35 *Protecting Water Quality with Green Infrastructure in EPA Water Permitting and Enforcement Programs*, Nancy Stoner, Acting Assistant Administrator Office of Water, and Cynthia Giles, Acting Administrator Office of Enforcement and Compliance Assurance ("EPA Green Infrastructure Memo") (April 20, 2011), *available at* http://www.epa.gov/npdes/pubs/gi_memo_protectingwaterquality.pdf.

36 Green Infrastructure Permitting and Enforcement Series, EPA (July 2012), *available at* http://water.epa.gov/infrastructure/greeninfrastructure/gi_regulatory.cfm.

37 EPA Green Infrastructure Memo at 3-4; *see also* Green Infrastructure Permitting and Enforcement Series: Supplement 1 – Consent Decrees that Include Green Infrastructure Provisions, EPA (July 2012).

38 *See Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices*, EPA, 841-F-07-006 (Dec. 2007) at 3-5.

39 *Id.* at 5.

40 *Id.* at 3.

41 *See Biofilters (Bioswales, Vegetative Buffers, & Constructed Wetlands) for Storm Water Discharge Pollution Removal*, Oregon Department of Environmental Quality (Jan. 2003) at 15-17, *available at* http://www.deq.state.or.us/wq/stormwater/docs/nwr/biofilters.pdf.

42 Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices at 5.

43 San Diego Regional Board, Order No. R9-2007-01, Att. C at C-4.

44 Greg Gearheart, *A Review of Low Impact Development Policies: Removing Institutional Barriers to Adoption*, Low Impact Development Center (Dec. 2007) at 5, *available at* http://www.waterboards.ca.gov/water_issues/programs/low_

impact_development/docs/ca_lid_policy_review.pdf.

45 *Id*.

46 Municipal Regional Stormwater NPDES Permit, San Francisco Bay Regional Board, Order R2-2009-0074 (Oct. 14, 2009) § C.3.g., pp. 35-38. This permit covers MS4s operated by a large number of municipalities in the San Francisco Bay Area in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties.

47 Ventura County MS4 Permit, Los Angeles Regional Board, Order No. R4-2010-0108, § III.3, at pp. 59-62.

48 San Diego County MS4 Permit, Order R9-2007-0001, § D.1.g, pp. 25-28. Priority development projects include nearly new commercial developments and redevelopment projects. *Id.* § D.1.d.1. & 2., pp. 17-19.

49 Orange County MS4 Permit, Santa Ana Regional Board, Order No. R8-2009-0030, § XII.B.4, at p. 51-52.

50 District of Columbia MS4 Permit at § 4.1.1, p. 10.

51 Ventura County MS4 Permit, Order No. R4-2009-0057 at § III.1.c, p. 56. The Ventura permit also uses a similar approach, with multiple alternative quantitative standards, for its post-construction BMP requirements. *See id.* at § II.4.a., pp. 62-63.

52 *See e.g.* Ventura County MS4 Permit, Los Angeles Regional Board, Order No. R4-2010-0108, § III.1.(c)(3) at 58.

53 Molly Peterson, *Green infrastructure could cut stormwater pollution in Ventura County*, KPCC (Sept. 2, 2010), *available at* http://www.scpr.org/news/2010/09/02/18877/ventura-stormwater/.

54 Order No. R4-2010-0108 at § 4.E.III.3.a.2, p. 60.

55 *Id*. at § 4.E.IV.3, pp. 65-66.

56 *Id*. at § 4.E.III.2, pp. 57-59.

57 *See Reducing Stormwater Costs*, *supra* note 37, at iv.

58 *Id.*

59 For example, the Central Coast Phase II MS4 permit allows permittees to use conventional BMPs, if permittees can show that they are equally effective or that the cost of LID would be prohibitive because the "cost would exceed any benefit to be derived." Order No. WQ 2000-11.

60 Technical Advisory – CEQA and Low Impact Development Stormwater Design, Governor's Office of Planning and Research, State of California (Aug. 5, 2009), at 4-5.

61 *Id*. at 6-7.