AMERICAN RIVERS
CONSERVATION LAW FOUNDATION
NATURAL RESOURCES DEFENSE COUNCIL

together with

California Coastkeeper Alliance

Petition For A Determination That Stormwater Discharges From Commercial, Industrial, And Institutional Sites Contribute To Water Quality Standards Violations And Require Clean Water Act Permits

July 10, 2013

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Dear Administrator,

As the Regional Administrator of EPA Region 9, American Rivers, California Coastkeeper Alliance, Conservation Law Foundation, and Natural Resources Defense Council hereby petition you for a determination, pursuant to 40 CFR 122.26(a)(9)(i)(D), that non-*de minimis*, currently non-NPDES permitted stormwater discharges from commercial, industrial, and institutional sites are contributing to violations of water quality standards in certain impaired waters throughout Region 9, and therefore require National Pollutant Discharge Elimination System (NPDES) permits pursuant to Section 402(p) of the Clean Water Act.[1]

I. Factual Background

Stormwater runoff from impervious areas has significant negative impacts on water quality throughout this region and nationwide. As the EPA Office of Water has found, "Stormwater runoff in urban and developing areas is one of the leading sources of water pollution in the United States."[2] The National Research Council (NRC) agrees: "Stormwater runoff has a deleterious impact on nearly all of the nation's waters"[3] – as does the Ninth Circuit Court of Appeals: "Stormwater runoff is one of the most significant sources of water pollution in the nation."[4]

In its preamble to the Phase II stormwater regulations in 1999, EPA explained the impacts of stormwater runoff in detail:

> Storm water runoff from lands modified by human activities can harm surface water resources and, in turn, cause or contribute to an exceedance of water quality standards by changing natural hydrologic patterns, accelerating stream flows, destroying aquatic habitat, and elevating pollutant concentrations and loadings. Such runoff may contain or mobilize high levels of contaminants, such as sediment, suspended solids, nutrients (phosphorous and nitrogen), heavy metals and other toxic pollutants, pathogens, toxins, oxygen-demanding substances (organic material), and floatables. … Individually and combined, these pollutants impair water quality, threatening designated beneficial uses and causing habitat alteration or destruction.[5]

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[1] *See* 33 U.S.C. §§ 1342(p)(2)(E), (p)(6); 40 C.F.R. §§ 122.26(a)(1)(v), (a)(9)(i)(D), (f)(2).

[2] U.S. Environmental Protection Agency, Office of Water, *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act*, Forward by Peter S. Silva, Assistant Administrator (Dec. 2009), *available at* http://www.epa.gov/oaintrnt/documents/epa_swm_guidance.pdf.

[3] National Research Council, Committee on Reducing Stormwater Discharge Contributions to Water Pollution, *Urban Stormwater Management in the United States* at 25 (2008), *available at* http://www.nap.edu/catalog.php?record_id=12465.

[4] *Environmental Defense Center v. EPA*, 344 F.3d 832, 840 (9th Cir. 2003).

[5] National Pollutant Discharge Elimination System—Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges, 64 Fed. Reg. 68,722, 68,724 (Dec. 8, 1999) (citation omitted).

These water quality impairments "result[] in an unhealthy environment for aquatic organisms, wildlife, and humans."[6]

EPA has recognized that stormwater runoff is a "contributor to water quality impairments across the country, particularly in developing and urbanized areas."[7] Stormwater has these effects in large part due to the harmful contaminants that it carries into receiving waters. According to the NRC, "The chemical effects of stormwater runoff are pervasive and severe throughout the nation's urban waterways, and they can extend far downstream of the urban source. … A variety of studies have shown that stormwater runoff is a vector of pathogens with potential human health implications."[8]

In particular, over 250 studies have shown that increases in impervious area associated with urban development are a "collection site for pollutants,"[9] and generate greater quantities (and additional types) of contaminants. Urban development creates new pollution sources as population density increases and brings with it "proportionately higher levels of car emissions, maintenance wastes, pet waste, litter, pesticides, and household hazardous wastes, which may be washed into receiving waters by storm water."[10] These increases in pollutant loadings can result in immediate and long-term effects on the health of the water body and the organisms that live in it.[11] The U.S. Geological Survey has found that, in areas of increased urban development, local rivers and streams exhibited increased concentrations of contaminants such as nitrogen, chloride, insecticides, and polycyclic aromatic hydrocarbons (PAHs).[12]

The increased stormwater volume and pollutant loadings caused by urbanization, especially impervious cover, are closely connected with water body impairment. Contaminants, habitat destruction, and increasing streamflow flashiness resulting from urban development have been associated with the disruption of biological communities.[13] The NRC states, "By almost any currently applied metric…the net result of human alteration of the landscape to date has resulted in a degradation of the conditions in downstream watercourses."[14]

The deleterious effects of urbanization on water quality are evident from a review of the lists of impaired waters states must compile in compliance with the Clean Water Act. Thousands of water bodies nationwide are currently listed as impaired for stormwater-source pollutants such

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[6] *Id.*
[7] U.S. Environmental Protection Agency, *TMDLs to Stormwater Permits Handbook*, Office of Water cover letter (2008), *available at* http://www.epa.gov/owow/tmdl/pdf/tmdl-sw_permits11172008.pdf.
[8] National Research Council, *supra* note 3, at 26.
[9] EPA, Office of Water, *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act*, *supra* note 2, at 5.
[10] 64 Fed. Reg. at 68,725.
[11] U.S. Geological Survey, *Effects of Urban Development on Stream Ecosystems in Nine Metropolitan Study Areas Across the United States* at 20 (2012), *available at* http://pubs.usgs.gov/circ/1373/.
[12] *Id.* at 3.
[13] *Id.* at 1.
[14] National Research Council, *supra* note 3, at 17.

as pathogens, nutrients, sediments, and metals.[15] Of those impaired water bodies, by 2000, impairments from stormwater runoff were "responsible for about 38,114 miles of impaired rivers and streams, 948,420 acres of impaired lakes, 2,742 square miles of impaired bays and estuaries, and 79,582 acres of impaired wetlands" – and the NRC considers these figures to be underestimates of actual impairments.[16] Urban stormwater is listed as the "primary" source of impairment for 13 percent of all rivers, 18 percent of all lakes, and 32 percent of all estuaries, despite the fact that urban areas cover just 3 percent of U.S. land mass.[17]

In Region 9, stormwater is a major contributor to water body impairment. In California's Water Code, the state legislature found that "In many parts of the state stormwater is a source of surface water and groundwater contamination, contributing to a loss of usable water supplies, and the pollution and impairment of rivers, lakes, streams, and coastal waters."[18] And according to a statewide water quality assessment in Hawaii, "Most of Hawaii's waterbodies have variable water quality due to storm water runoff. During dry weather, most streams and estuaries have good water quality that fully supports beneficial uses, but the quality declines when storm water runoff carries pollutants into surface waters."[19]

Since the adoption of the Phase II stormwater rule, the scientific understanding of the correlation between impervious surfaces and water quality impairments has increased significantly. EPA has recognized the now-well-understood connection between high percentages of impervious cover in watersheds and pollutant loading-driven impairments (among many other deleterious effects). EPA has now approved state-developed 303(d) lists identifying impaired waters afflicted by pollutants typically discharged from stormwater sources. Numerous peer reviewed scientific articles and publications have documented the connection between impervious cover and declines in water quality and stream health.

Recently, EPA has created the Causal Analysis/Diagnosis Decision Information System, or "CADDIS" Urbanization Module, which "is a website developed to help scientists and engineers in the Regions, States, and Tribes conduct causal assessments in aquatic systems."[20] Through this module EPA provides a comprehensive overview of the connection between impervious surfaces (and other facets of urbanization) and declines in water quality for use in causal assessment for specific stressors including pollutant categories. In the CADDIS Module, EPA has reiterated that "Urbanization has been associated with numerous impairments of water and sediment quality," including, but not limited to, increased suspended solids or turbidity,

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[15] EPA, *TMDLs to Stormwater Permits Handbook*, *supra* note 7, at Cover Letter.
[16] National Research Council, *supra* note 3, at 25.
[17] *Id.*
[18] Cal. Water Code § 10561(a).
[19] U.S. EPA, *National Water Quality Inventory: 2000 Report* at 100 (2000), *available at* http://water.epa.gov/lawsregs/guidance/cwa/305b/upload/2002_09_10_305b_2000report_alhi-2.pdf.
[20] U.S. EPA, "CADDIS: The Causal Analysis/Diagnostic Decision Information System," http://www.epa.gov/caddis/index.html.

increased nitrogen and phosphorus, decreased dissolved oxygen, and increased metals (such as copper, lead, and zinc).[21]

Perhaps the greatest development in available data since adoption of the Phase II rule is the compilation of the National Stormwater Quality Database, now in its third version.[22] This database has allowed for publication of numerous analyses corroborating prior understandings and providing new and very reliable characterizations of pollutant loading and concentrations from specific land use categories. Shaver et al. have underscored the significance of the NSQD:

> In the decades between the NURP data being collected and now [2007], much has been accomplished with regard to urban runoff source control, the treatment of stormwater runoff, and improvements in receiving water quality. The most comprehensive analysis of stormwater runoff quality is currently underway. In 2001, the University of Alabama and the Center for Watershed Protection (CWP) were awarded an EPA Office of Water grant to collect and evaluate stormwater data from a representative number of NPDES (National Pollutant Discharge Elimination System) MS4 (municipal separate storm sewer system) stormwater permit holders. The initial version of this database, the National Stormwater Quality Database (NSQD, 2004) is currently available from the CWP.
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> In the NSQD project, stormwater quality data and site descriptions are being collected and reviewed to describe the characteristics of national stormwater quality, to provide guidance for future sampling needs, and to enhance local stormwater management activities in areas having limited data. Over 10 years of monitoring data collected from more than 200 municipalities throughout the country have a great potential in characterizing the quality of stormwater runoff and comparing it against historical benchmarks. This project is creating a national database of stormwater monitoring data collected as part of the existing stormwater permit program, providing a scientific analysis of the data as well as recommendations for improving the quality and management value of future NPDES monitoring efforts (Pitt et al., 2004).[23]

The authors of the first report on the NSQD concluded that the national dataset represented in the database is so robust that "general characterization" monitoring is no longer needed and can no longer be justified.[24] Specifically, the authors stated:

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[21] U.S. EPA, "CADDIS Volume 2: Sources, Stressors & Responses," http://www.epa.gov/caddis/ssr_urb_wsq1.html.

[22] National Stormwater Quality Database, http://rpitt.eng.ua.edu/Research/ms4/mainms4.shtml. According to Pitt et al., to create the NSQD, "The University of Alabama and the Center for Watershed Protection were awarded an EPA Office of Water 104(b)3 grant in 2001 to collect and evaluate stormwater data from a representative number of NPDES (National Pollutant Discharge Elimination System) MS4 (municipal separate storm sewer system) stormwater permit holders." Robert Pitt et al., *The National Stormwater Quality Database (NSQD, Version 1.1)* 2 (2004), *available at* http://rpitt.eng.ua.edu/Research/ms4/Paper/MS4%20Feb%2016%202004%20paper.pdf.

[23] Earl Shaver et al., *Fundamentals of Urban Runoff Management: Technical and Institutional Issues* 3-59 (2007).

[24] Pitt et al., *The National Stormwater Quality Database (NSQD, Version 1.1)*, *supra* note 22, at 33.

> The excellent U.S. national coverage, along with the broad representation of land uses, seasons, and other factors, makes this information highly valuable for numerous basic stormwater management needs. Monitoring with no specific objective, except for general characterization in an area, is not likely to provide any additional value beyond the data and information contained in NSQD. After a sufficient amount of data has been collected by a Phase 1 community for representative land uses and other conditions, outfall characterization monitoring resources should be re-directed to other specific data collection and evaluation needs. Burton and Pitt (2001) provide much additional information on determining an adequate outfall monitoring program. Similarly, communities that have not initiated a stormwater monitoring program (such as the Phase II NPDES small communities) may not require general characterization monitoring (monitoring is not specifically required as part of the Phase II regulations), if they can identify a regional Phase I community that has compiled extensive monitoring data as part of their required NPDES stormwater permit. Obviously, there will be some situations that are not well represented in NSQD and additional characterization monitoring may be warranted. These situations will be identified in the final data analyses.[25]

More recently, Version 3.1 of the NSQD has been compiled and improved through integration of various databases into one highly reliable dataset. [26] NSQD 3.1 provides a basis for assessing runoff sources nationally and includes detailed analysis of the expanded datasets within EPA designated "Rain Zones," which reflect the differences in precipitation in various defined regions of the nation. Robert Pitt's statistical analysis of the NSQD 3.1 provides the "coefficient of variation" for pollutant-specific concentrations by land use, in order to give the reader a sense of the variability in stormwater discharge data.[27] Furthermore, the author provides "yellow high-lighted cells [to] indicate rain zone-land use combinations having at least 40 events represented, a value expected to result in more reliable concentration estimates than for conditions having very few data."[28]

Since the adoption of the Phase II rule, there has been a dramatic improvement in data describing the pollutant concentration and loading characteristics of specific land use categories. The NSQD now provides such a strong basis for understanding the stormwater pollutant characteristics of specific land uses that the EPA-funded researchers responsible for compiling and maintaining the database see no further benefit in monitoring for the purposes of characterizing these pollutant discharges generally. In addition, the understanding of the connection between large areas of impervious cover and water quality impairments has improved

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[25] *Id.*
[26] Robert Pitt, *The National Stormwater Quality Database, Version 3.1* (Mar. 8, 2011), available at http://rpitt.eng.ua.edu/Publications/4_Stormwater_Characteristics_Pollutant_Sources_and_Land_Development_Characteristics/Stormwater_characteristics_and_the_NSQD/NSQD%203.1%20summary%20for%20EPA%20Cadmus.pdf.
[27] *Id.* at 2-3.
[28] *Id.* at 1.

by leaps and bounds over the past decade. As stated by EPA, it is now understood that "There is a direct relationship between the amount of impervious cover and the biological and physical condition of downstream receiving waters."[29] It can no longer be reasonably refuted that commercial, industrial and institutional facilities with large areas of impervious cover contribute a broad spectrum of pollutants to receiving waters. EPA must acknowledge these now well-understood facts and, at long last, assist municipalities in addressing these pollutant sources by exercising its residual designation authority under the Clean Water Act to require those facilities to address their contribution to water quality violations.

II. Regulatory Framework

In order to achieve the Clean Water Act's (CWA or the Act) fundamental goal of "restor[ing] and maintain[ing] the chemical, physical, and biological integrity of the Nation's waters,"[30] EPA and States delegated authority to administer the Act must establish minimum water quality standards.[31] These standards define "the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses."[32] Region 9 jurisdictions Arizona,[33] California,[34] Hawaii,[35] and Nevada[36] have established, and EPA has approved, water quality standards pursuant to this requirement.

In order to ensure that such water quality standards will be achieved, no person may discharge any pollutant into waters of the United States from a point source without a National Pollutant Discharge Elimination System (NPDES) permit.[37] NPDES permits must impose water quality-based effluent limitations, in addition to any applicable technology-based effluent limitations, when necessary to meet water quality standards.[38]

The Act defines "point source" as "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit…from which a pollutant is or may be discharged."[39] EPA's Clean Water Act regulations further specify that "discharge of a pollutant" includes "additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man."[40] Consequently, although stormwater discharges are

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[29] EPA, *Managing Stormwater with Low Impact Development Practices: Addressing Barriers to LID* 1 (Apr. 2009), *available at* http://www.epa.gov/region1/npdes/stormwater/assets/pdfs/AddressingBarrier2LID.pdf.
[30] 33 U.S.C. § 1251(a).
[31] 33 U.S.C. § 1313; 40 C.F.R. § 131.2.
[32] 40 C.F.R. § 131.2.
[33] Ariz. Admin. Code §§ 18-11-101–18-11-123.
[34] *See* U.S. EPA, "Repository of Documents: California" (linking to all California state documents relating to water quality standards), http://water.epa.gov/scitech/swguidance/standards/wqslibrary/ca_index.cfm.
[35] Haw. Code R. §§ 11-54-1–11-54-12.
[36] Nev. Admin. Code §§ 445A.11704—445A.2234.
[37] 33 U.S.C. §§ 1311(a), 1362(12)(A).
[38] 33 U.S.C. § 1311(b).
[39] 33 U.S.C. § 1362(14).
[40] 40 C.F.R. § 122.2.

often characterized as "non-point" in nature, it is legally well settled that "[s]torm sewers are established point sources subject to NPDES permitting requirements."[41] As EPA has stated, "For the purpose of [water quality] assessments, urban runoff was considered to be a diffuse source or nonpoint source pollution. From a legal standpoint, however, most urban runoff is discharged through conveyances such as separate storm sewers or other conveyances which are point sources under the CWA."[42]

Despite the fact that stormwater runoff channeled through a conveyance is a point source subject to the Act's permitting requirements, EPA did not actually regulate stormwater through the NPDES program until Congress amended the statute in 1987 to explicitly require it[43] and EPA promulgated its Phase I and II regulations in 1990 and 1999, respectively.[44] As a result, the Clean Water Act now requires NPDES permits for discharges of industrial and municipal stormwater.[45] While these are the only categories of stormwater discharges called out for regulation in the text of the statute, Congress also created a catch-all provision directing EPA to require NPDES permits for any stormwater discharge that the Administrator or the State director determines "contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States."[46]

This catch-all authority—known as EPA's "residual designation authority"—is a critical tool to ensure that problematic discharges of stormwater do not go unregulated. In the preamble to its Phase II stormwater regulations, EPA described the need for this authority: "EPA believes…that individual instances of storm water discharge might warrant special regulatory attention, but do not fall neatly into a discrete, predetermined category. Today's rule preserves the regulatory authority to subsequently address a source (or category of sources) of storm water

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[41] *Environmental Defense Center v. EPA*, 344 F.3d at 841 (citing *Natural Resources Defense Council v. Costle*, 568 F.2d 1369, 1379 (D.C. Cir. 1977)).
[42] National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges, 55 Fed. Reg. 47,990, 47,991 (Nov. 16, 1990).
[43] *See* 33 U.S.C. § 1342(p). Congressional insistence that stormwater be regulated through the NPDES program is evident in the legislative history of the 1987 amendment, such as the following statement from Senator Durenberger during the floor debates:

> The Federal Water Pollution Control Act of 1972 required all point sources, including storm water discharges, to apply for NPDES permits within 180 days of enactment. Despite this clear directive, E.P.A. has failed to require most storm water point sources to apply for permits which would control the pollutants in their discharge. The conference bill therefore includes provisions which address industrial, municipal, and other storm water point sources. I participated in the development of this provision because I believe it is critical for the Environmental Protection Agency to begin addressing this serious environmental problem.

133 Cong. Reg. S752 (daily ed. Jan. 14, 1987).
[44] National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges, 55 Fed. Reg. 47,990 (Nov. 16, 1990); National Pollutant Discharge Elimination System—Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges, 64 Fed. Reg. 68,722 (Dec. 8, 1999).
[45] 33 U.S.C. § 1342(p)(2).
[46] 33 U.S.C. § 1342(p)(2)(E); 40 C.F.R. § 122.26(a)(1)(v).

discharges of concern on a localized or regional basis."[47] Citizens may petition EPA for designation of stormwater sources for regulation under this authority.[48] In recent years, often acting in response to such petitions, EPA and delegated States have exercised this residual designation authority on multiple occasions.[49]

Categories of sources designated under EPA's residual designation authority may be geographically broad. The agency has stated that "the designation authority can be applied within different geographic areas to any single discharge (i.e., a specific facility), or category of discharges…The added term 'within a geographic area' allows 'State-wide' or 'watershed-wide' designation within the meaning of the terms."[50] The Ninth Circuit Court of Appeals and Supreme Court of Vermont have both found that the designation of broad regional categories of sources is a reasonable exercise of statutory authority.[51]

Once EPA has made a finding or determination that a category of discharges meets the statutory criterion of "contribut[ing] to a violation of a water quality standard," it must designate that category for regulation, and those "operators *shall* be required to obtain a NPDES permit."[52] In other words, "the Agency's residual designation authority is not optional."[53] As EPA has explained, "designation is appropriate as soon as the adverse impacts from storm water are recognized."[54]

EPA has not defined a threshold level of contribution to water quality standards violations that would suffice to make such a determination. However, the agency has advised delegated States that "it would be reasonable to require permits for discharges that contribute more than *de minimis* amounts of pollutants identified as the cause of impairment to a water

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[47] National Pollutant Discharge Elimination System—Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges, 64 Fed. Reg. at 68,781.
[48] 40 C.F.R. § 122.26(f)(2).
[49] U.S. EPA Region IX, *Request for Designation of MS4 Discharges on the Island of Guam for NPDES Permit Coverage* (Feb. 2011), *available at* http://www.epa.gov/region9/water/npdes/pdf/guam/Guam-ms4-residual-designation-memo.pdf; Vermont Agency of Natural Resources, Department of Environmental Conservation, *Final Designation Pursuant to the Clean Water Act for Designated Discharges to Bartlett, Centennial, Englesby, Morehouse and Potash Brooks* (Nov. 2009), *available at* http://www.vtwaterquality.org/stormwater/docs/swimpairedwatersheds/sw_rda_final_determination.pdf; U.S. EPA Region I, *Final Determination Under Section 402(p) of the Clean Water Act—Long Creek* (Oct. 2009), *available at* http://www.epa.gov/region1/npdes/stormwater/assets/pdfs/LongCreekFinalResidualDesignation.pdf; U.S. EPA Region I, *Residual Designation Pursuant to Clean Water Act—Charles River* (Nov. 2008), *available at* http://www.epa.gov/region1/charles/pdfs/RODfinalNov12.pdf.
[50] National Pollutant Discharge Elimination System—Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges, 64 Fed. Reg. at 68,781.
[51] *Environmental Defense Center*, 344 F.3d at 875-76; *In re Stormwater NPDES Petition*, 910 A.2d 824, 829-32 (Vt. 2006).
[52] 40 C.F.R. § 122.26(a)(9)(i)(D) (emphasis added).
[53] *In re Stormwater NPDES Petition*, 910 A.2d at 835-36.
[54] Letter from G. Tracy Mehan III, EPA Assistant Administrator, to Elizabeth McLain, Secretary, Vermont Agency of Natural Resources 2 (Sept. 16, 2003).

body."[55] The Supreme Court of Vermont has recognized this analysis as a valid interpretation of the RDA threshold.[56]

Once the Regional Administrator receives an RDA petition requesting that it exercise this authority, EPA must make a final decision on the petition within 90 days.[57]

III. Analysis

Non-*de minimis* discharges from impervious surfaces associated with industrial, institutional, and commercial sites[58] (including rooftops and parking lots) are contributing to violations of water quality standards throughout Region 9 ("the Region"). This petition asks EPA to exercise its mandatory RDA to designate non-NPDES permitted stormwater discharges from sites in these categories for regulation under the NPDES program.[59]

A. Hundreds of water bodies in Region 9 are impaired by lead, copper, zinc, sediment, COD/BOD, phosphorus, and/or nitrogen, and the contributing watershed areas to those water bodies are readily identifiable as geographic areas over which RDA can be exercised.

EPA has approved 305(b) water quality reports for each of the States within the Region. Each of the States has identified waters that are impaired as a result of lead, copper, zinc, sediment, COD/BOD, phosphorus, and nitrogen. EPA has compiled this impairment data into a national database, and each of the States has created GIS layers that readily depict these impaired waters.[60]

Thousands of miles of rivers and streams and thousands of acres of lakes throughout the Region fail to meet water quality standards due to discharges of lead, copper, zinc, sediment,

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[55] *Id.* at 3.
[56] *In re Stormwater NPDES Petition*, 910 A.2d at 836 n.6.
[57] 40 C.F.R. § 122.26(f)(5).
[58] "Commercial sites" means any site where the primary land use is commercial activity (the sale of goods and services), as opposed to residential or industrial use. Commercial sites may include malls, shopping centers, strip commercial areas, neighborhood stores, office buildings, hotels, gas stations, restaurants, parking lots and garages, and other businesses, including their associated yards and parking areas. Mixed use developments that include commercial uses are considered commercial sites for this purpose. "Industrial sites" means any site where the primary land use is light or heavy industry, including buildings, equipment, and parking areas. "Institutional sites" means any site where an institution is located, including schools, colleges, hospitals, museums, prisons, town halls or court houses, police and fire stations, including parking lots, dormitories, and university housing.
[59] For purposes of this petition, "non-NPDES permitted stormwater discharges" includes any stormwater discharge from a property, or from a portion of a property, that is not subject to post-construction stormwater pollution control requirements under a NPDES permit. For example, where an industrial stormwater permit requires pollution controls only for stormwater discharges from the portions of an industrial site on which "industrial activity" takes place, stormwater discharges from the remaining portion of that industrial site are included in the term "non-NPDES permitted stormwater discharges." The term "non-NPDES permitted stormwater discharges" does include stormwater discharges from properties (or portions thereof) that are within the geographic boundaries of a regulated MS4.
[60] *See* EPA, "MyWATERS Mapper," http://www.epa.gov/waters/enviromapper/index.html.

COD, BOD, phosphorus, and/or nitrogen. Throughout Region 9, 116 water body segments are impaired by copper, 50 segments by lead, and 99 by zinc. 485 water body segments have sediment-related impairments (including impairments by siltation, turbidity, and suspended solids). 182 water body segments have impairments related to oxygen depletion (including impairments by COD, BOD, low dissolved oxygen, and organic enrichment). 212 water body segments are impaired by phosphorus, and 216 segments are impaired by nitrogen, in addition to 88 segments impaired by eutrophication or "nutrients" generally. These regional impairments are a subset of the 1,052 waters nationwide impaired by copper, 1,043 impaired by lead, 628 impaired by zinc, 10,525 impaired by sediment (and/or turbidity), 8,498 impaired by oxygen depletion, 3,797 impaired by phosphorus, and 1,790 impaired by nitrogen (with another 4,440 impaired by "nutrients" or eutrophication).[61]

The watershed areas draining to these impaired waters are geographic areas within which sources that contribute the pollutants of concern must be regulated and controlled subject to NPDES permits. These geographic areas are readily identifiable consistent with the approach adopted by EPA in the Phase II rule.[62]

Attachment A to this Petition lists the waters in Region 9 impaired by lead, copper, zinc, sediments, turbidity, oxygen depletion, phosphorus, and/or nitrogen.

B. Stormwater discharges from impervious surfaces on commercial, industrial, and institutional sites consistently contain elevated levels of these pollutants.

Research demonstrates, and EPA has recognized, that commercial, industrial, and institutional land uses consistently discharge certain pollutants at expected, elevated concentrations (both generally as well as for specific runoff events) and have large annual per - acre pollutant loads. In fact, EPA has recommended use of pollutant loading and assessment models based on well-established pollutant loading levels associated with these land uses.

Recently, an EPA-sponsored stormwater practice performance analysis relied on "pollutant loading export rates . . . obtained from the *Fundamentals of Urban Runoff Management: Technical and Institutional Issues* (Shaver et al. 2007)…because they have been reported in several sources of stormwater management literature."[63] This analysis identified "typical pollutant loading export rates" for total suspended solids, total phosphorus, total

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[61] All regional and national impairment data were downloaded from EPA's AskWATERS database (compiling data from current approved state 305(b) lists), *available at* http://iaspub.epa.gov/pls/waters/f?p=ASKWATERS:EXPERT:0.

[62] "[T]he designation authority can be applied within different geographic areas to any single discharge (i.e., a specific facility), or a category of discharges that are contributing to a violation of a water quality standard. . . . The added term 'within a geographic area' allows 'State-wide' or 'watershed-wide' designation within the meaning of the terms." 64 Fed. Reg. at 68,781.

[63] Tetra Tech, Inc., *Stormwater Best Management Practices (BMP) Performance Analysis* 18 (Dec. 2008, revised Mar. 2010), prepared for EPA Region 1, *available at* http://www.epa.gov/region1/npdes/stormwater/assets/pdfs/BMP-Performance-Analysis-Report.pdf.

nitrogen, and zinc from different land uses. The analysis recognized that commercial and industrial land uses consistently had very significant pollutant loading for TSS (total suspended solids, a measure of sediment) (1000 and 670 lbs/ac-yr.), total phosphorus (1.5 and 1.3 lbs/ac-yr), total nitrogen (9.8 and 4.7 lbs/ac-yr), and zinc (2.1 and 0.4 lbs/ac-yr).[64]

In turn, the Shaver et al. study referenced in that EPA-sponsored guidance cites EPA's own "Handbook for Developing Watershed Plans to Restore and Protect Our Waters," stating: "Many models utilize literature-based values for water-quality concentrations to estimate pollutant loads (US-EPA 2005)."[65] In the 2008 version of that Handbook, EPA provides a specific recommendation with regard to "where to get export coefficients" for different land uses, including a reference to a 2004 data review by Jeff P. Lin, which "summarizes and reviews published export coefficient and event mean concentration (EMC) data for use in estimating pollutant loading into watersheds."[66] Lin in turn confirms that numerous studies have been completed that document consistently high pollutant concentrations from commercial and industrial sources both on a per year and per acre basis.[67] Burton and Pitt's "Stormwater Effects Handbook," cited in Shaver et al., further documents that commercial, parking lot, and industrial land uses had consistently high COD, lead, and copper levels in addition to the TSS, phosphorus, nitrogen, and zinc levels cited in the EPA analysis.[68] These long-accepted estimates of total annual loading underscore that commercial, industrial, and institutional land uses are large per-acre contributors of pollutants.[69]

Analyses of the extensive dataset in the NSQD confirm that stormwater discharges from commercial, industrial, and institutional land uses consistently contain high loading levels of these impairment-causing pollutants. The NSQD, extensively referenced in Shaver et al. 2007, is

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[64] *Id.*

[65] Shaver et al., *Fundamentals of Urban Runoff Management*, *supra* note 23, at 3-63.

[66] EPA, *Handbook for Developing Watershed Plans to Restore and Protect Our Waters* 8-7 (2008), available at http://water.epa.gov/polwaste/nps/upload/2008_04_18_NPS_watershed_handbook_handbook.pdf.

[67] Jeff P. Lin, U.S. Army Corps of Engineers, Wetlands Regulatory Assistance Program, *Review of Published Export Coefficient and Event Mean Concentration (EMC) Data* (2004), available at http://el.erdc.usace.army.mil/elpubs/pdf/tnwrap04-3.pdf.

[68] G.A. Burton & R.E. Pitt, *Stormwater Effects Handbook* (2002); *see also* Pitt et al., *The National Stormwater Quality Database (NSQD, Version 1.1)*, *supra* note 22, at 25 ("Figure 11 shows significant differences by land uses. The open space COD concentrations are the lowest, and the freeway COD concentrations are the largest for most all of the data range. The residential, commercial, and industrial areas are very similar for the lower half of the distribution, while the residential areas are lower than the commercial and industrial areas in the upper portion of the distribution."); *id.* at 33 ("The example investigation of first-flush conditions indicated that a first flush effect was not present in all the land uses and certainly not for all the constituents. Commercial and residential areas were more likely to show the phenomenon, especially if the peak rainfall occurred near the beginning of the event. It is expected that the effect will be more likely in watersheds with larger amounts of imperviousness. However, the industrial category had large amounts of imperviousness, but indicated first-flushes less than 50% of the time. All the metals evaluated show a higher concentration at the beginning of the event in the commercial land use category.").

[69] *See* National Research Council, *supra* note 3, at 180.

very valuable because it builds on and corroborates prior datasets.[70] This dataset is also important because analysis and comparison of both median and mean pollutant concentrations in the data across numerous pollutant parameters clearly demonstrates that commercial, industrial, and institutional land uses discharge elevated *concentrations* of copper, lead, zinc, sediment, BOD/COD, phosphorus, and nitrogen (among other pollutants).[71] These elevated concentrations are responsible in part for the high pollutant loadings from these land uses; the increased impervious cover on these types of sites generates greater runoff volumes, and loadings are the product of volume and pollutant concentration. Based on the Center for Watershed Protection's "Simple Method" for calculating pollutant loads, for unit-area loadings to a water body, essentially any medium- to high-intensity land use (like the uses subject to this petition) is likely to impose 10- to 20-fold increases in pollutant loadings.[72] Higher average pollutant concentrations at commercial, industrial, and institutional sites increase pollutant load contributions even further.

1. Lead, Copper, and Zinc

Runoff from commercial, industrial, and institutional sites consistently contains elevated levels of harmful heavy metals, particularly lead, copper, and zinc. The National Research Council, in summarizing the comparative importance of urban land-use types in generating pollutants of concern on a per-unit-area basis (ranked on a scale from "low" to "very high"), characterizes the contribution of heavy metals from commercial sites as "moderate" and that from freeways as "high."[73] Metals like lead, zinc, and copper get into runoff from impervious areas that are trafficked by vehicles, such as driveways and parking lots, from vehicle wear, tire wear, motor oil, grease, and rust.[74]

EPA's National Urban Runoff Program study found that "Heavy metals (especially copper, lead and zinc) are by far the most prevalent priority pollutant constituents found in urban runoff."[75] These metals "have the potential to impact water suppl[ies] and cause acute or chronic toxic impacts for aquatic life."[76]

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[70] Shaver et al., *Fundamentals of Urban Runoff Management*, *supra* note 23, at 3-59; Pitt, *The National Stormwater Quality Database, Version 3.1*, *supra* note 26, at 1 ("Recently, version 3 of the NSQD was completed, and besides expanding to include additional stormwater NPDES MS4 permit holders, most of the older NURP data, and some of the International BMP database information was also added, along with data from some USGS research projects.").
[71] Pitt et al., *The National Stormwater Quality Database (NSQD, Version 1.1)*, *supra* note 22; Pitt, *The National Stormwater Quality Database, Version 3.1*, *supra* note 26.
[72] *See* Center for Watershed Protection, *Impacts of Impervious Cover on Aquatic Systems* (2003) at Section 4.3.
[73] National Research Council, *supra* note 3, at 180.
[74] U.S. Department of Transportation, Federal Highway Administration, *Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring* Chapter 2, Table 1, *available at* http://environment.fhwa.dot.gov/ecosystems/ultraurb/uubmp2.asp.
[75] U.S. Environmental Protection Agency, *Results of the Nationwide Urban Runoff Program – Executive Summary* 4 (Dec. 1983), *available at* http://www.epa.gov/npdes/pubs/sw_nurp_exec_summary.pdf.
[76] U.S. Environmental Protection Agency, *Preliminary Data Summary of Urban Storm Water Best Management Practices* 4-16 (Aug. 1999), *available at* http://water.epa.gov/scitech/wastetech/guide/stormwater/.

These general characterizations are supported by numerous scientific studies finding elevated loads of lead, copper, and zinc in runoff from commercial, industrial, and institutional sites. Initial analysis of the National Stormwater Quality Database found median zinc concentrations to be 110 µg/L from commercial sites, compared to 57 µg/L from undeveloped open space. Median copper concentrations were found to be 17.9 µg/L from commercial sites, compared to 9 µg/L from undeveloped open space.[77] Recent analysis of Version 3 of the NSQD demonstrate elevated mean concentrations for these pollutants as well.[78] For commercial sites the mean zinc concentration was 197 µg/L, for industrial sites 382 µg/L, and for institutional sites 210 µg/L. For commercial sites the mean copper concentration was 37 µg/L, for industrial sites 36 µg/L, and for institutional sites 21 µg/L. Whether comparing mean or median values, analysis of this extensive database indicates that the subject land uses discharge elevated concentrations of these metals.

EPA's National Urban Runoff Program study found similar results: it found median lead concentrations at commercial sites to be 104 µg/L; median copper concentrations at commercial sites were 29 µg/L; and median zinc concentrations at commercial sites were 226 µg/L.[79]

These results are also consistent with a USGS study that found mean concentrations of these metals at commercial rooftops and commercial parking lots to be the following:[80]

Metal	Commercial Rooftops	Commercial Parking Lots
Lead	52 µg/L	40 µg/L
Copper	23 µg/L	25 µg/L
Zinc	348 µg/L	178 µg/L

Consistent with elevated concentrations in pollutant discharges, the land uses subject to the petition also have been shown to have large annual pollutant loadings. Shaver et al. provide an overview of typical pollutant loadings in pounds per acre per year (lbs/acre-yr) from different land uses.[81] Commercial areas discharge 2.1 lbs/acre-yr. of zinc, 0.4 lbs/acre-yr. of copper, and 2.7 lbs/acre-yr. of lead. Parking lots discharge 0.8 lbs/acre-yr. of zinc, 0.06 lbs/acre-yr. of copper, and 0.8 lbs/acre-yr. of lead. Industrial areas discharge 0.4 lbs/acre-yr. of zinc, 0.10 lbs/acre-yr. of copper, and 0.2 lbs/acre-yr. of lead. Shopping center uses discharge 0.6 lbs/acre-yr. of zinc, 0.09 lbs/acre-yr. of copper, and 1.1 lbs/acre-yr. of lead.

A report summarizing data from multiple studies of relative pollutant loadings found that the median loads of zinc from roads was 0.31 kg/ha per year and from commercial sites was 3.30

[77] National Research Council, *supra* note 3, at 184-85, Table 3-4.
[78] Pitt, *The National Stormwater Quality Database, Version 3.1*, *supra* note 26, at 6.
[79] Burton & Pitt, *Stormwater Effects Handbook*, *supra* note 68, at Table 2.4 (citing EPA, *Results of the Nationwide Urban Runoff Program*, *supra* note 75).
[80] Jeffrey Steuer et al., U.S. Geological Survey, *Sources of Contamination in an Urban Basin in Marquette, Michigan and an Analysis of Concentrations, Loads, and Data Quality* 20 (1997), *available at* http://pubs.usgs.gov/wri/1997/4242/report.pdf.
[81] Shaver et al., *Fundamentals of Urban Runoff Management* (2007), *supra* note 23, at 3-63.

kg/ha per year, compared to 0.02 kg/ha per year from undeveloped forest land. The same report found that the median loadings of copper from roads was 0.06 kg/ha per year and from commercial sites was 2.10 kg/ha per year, compared to 0.03 kg/ha per year from undeveloped forest land.[82] Another study found that aggregate loadings of these metals from parking lots in a particular county were much greater than loadings from the same land before it was developed. Loadings of lead rose from 1.31 lbs (pre-development) to 67 lbs (with parking lots); loadings of copper rose from 1.648 lbs (pre-development) to 74 lbs (with parking lots); and loadings of zinc rose from 6.794 lbs (pre-development) to 930 lbs (with parking lots).[83]

2. Sediments (Total Suspended Solids/TSS)

Runoff from commercial, industrial, and institutional sites consistently contains elevated levels of sediment (TSS). Sediment provides a medium for the accumulation, transport, and storage of other pollutants, including nutrients and metals.[84] It can harm fish and macroinvertebrate communities by decreasing available light in streams and smothering fish eggs.[85] EPA has listed driveways and roads as some of the sources of sediment in runoff.[86]

Runoff from the subject land uses contain high concentrations of sediments. Initial analysis of the NSQD found median TSS concentrations of 55 mg/L at commercial areas, compared to 10.5 mg/L at open spaces.[87] Recent analysis of Version 3 of the NSQD demonstrates elevated mean concentrations of TSS as well.[88] For commercial sites the mean TSS concentration was 133 mg/L, for industrial sites 160 mg/L, and for institutional sites 83 mg/L. Whether comparing mean or median values, analysis of this extensive database indicates that the subject land uses discharge elevated concentrations of sediments. The USGS has found even higher mean concentrations of TSS in runoff from commercial parking lots (138 mg/L).[89]

Consistent with elevated concentrations in pollutant discharges, the land uses subject to the petition also have been shown to have large annual pollutant loadings as well. Shaver et al. provide an overview of typical pollutant loadings from different land uses.[90] Commercial areas discharge 1000 lbs/acre-yr. of TSS, parking lots discharge 400 lbs/acre-yr., industrial areas discharge 670 lbs/acre-yr., and shopping center uses discharge 440 lbs/acre-yr.

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[82] Horner et al., *Fundamentals of Urban Runoff Management* Table 2.6 (1994).
[83] Amélie Y. Davis et al., "The Environmental and Economic Costs of Sprawling Parking Lots in the United States," *Land Use Policy* 27 (2010) at 255-261, *available at* http://iesp.uic.edu/Publications/Faculty%20Publications/Davis/Davis_TheEnvironmentalAndEconomicCostsSprawling.pdf.
[84] EPA, *Preliminary Data Summary of Urban Storm Water Best Management Practices*, *supra* note 76, at 4-12.
[85] National Research Council, *supra* note 3, at 21.
[86] EPA, *Preliminary Data Summary of Urban Storm Water Best Management Practices, supra* note 76, at 4-9.
[87] National Research Council, *supra* note 3, at 184-85, Table 3-4.
[88] Pitt, *The National Stormwater Quality Database, Version 3.1*, *supra* note 26, at 4.
[89] Steuer et al., *Sources of Contamination in an Urban Basin in Marquette, Michigan*, *supra* note 80, at 19.
[90] Shaver et al., *Fundamentals of Urban Runoff Management* (2007), *supra* note 23, at 3-63.

Numerous scientific studies have found elevated loads of sediments in runoff from commercial sites. One study compiled data showing that typical TSS loadings from commercial land use were 1,000 lb/acre per year, compared with only 3 lb/acre per year from undeveloped park land.[91] Another report summarizing the results of multiple studies found that median TSS loadings were 805 kg/ha per year from commercial sites, compared to 86 kg/ha per year from undeveloped forests.[92] A study of aggregate runoff from parking lots in a particular county found that TSS loadings from these parking lots were 287,030 lbs, compared to loadings of 46,383 lbs from the land before it became parking lots.[93]

3. Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD)

Runoff from commercial, industrial, and institutional sites consistently contains high levels of chemical oxygen demand (COD) and biological oxygen demand (BOD), which are oxygen-demanding organic compounds. Maintaining appropriate levels of dissolved oxygen in receiving waters is one of the most important considerations for the protection of fish and aquatic life.[94]

Scientific studies show elevated concentrations and loadings of chemical and biological oxygen demand in runoff from the subject land uses. The National Stormwater Quality Database found median COD concentrations of 60 mg/L at commercial areas, 60 mg/L at industrial sites, and 50 mg/L at institutional sites.[95] For BOD, the NSQD documented that commercial sites have a median concentration of 11 mg/L, industrial sites 9 mg/L, and institutional sites 8.5 mg/L.[96]

EPA's National Urban Runoff Program study found similar results: it found median COD concentrations at commercial sites to be 57 mg/L.[97] The USGS has found mean total BOD concentrations of 17.5 mg/L at commercial rooftops and 10.5 mg/L at commercial parking lots, as well as mean total COD concentrations of 104 mg/L at commercial rooftops and 93 mg/L at commercial parking lots.[98]

Consistent with elevated concentrations in pollutant discharges, the land uses subject to the petition also have been shown to have large annual pollutant loadings as well. Shaver et al. found that commercial areas discharge 420 lbs/acre-yr. of COD, and parking lots discharge 270

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[91] Burton and Pitt, *Stormwater Effects Handbook*, *supra* note 68, at Table 2.5. This report compiles data from multiple studies, some of which report values as lbs/acre/year and some of which report values as kg/ha/year; because the difference between these two units is less than 15%, the report makes no effort to convert between them.
[92] Horner et al., *Fundamentals of Urban Runoff Management* (1994), *supra* note 82, at Table 2.6.
[93] Davis et al., "The Environmental and Economic Costs of Sprawling Parking Lots in the United States," *supra* note 83, at 259.
[94] EPA, *Preliminary Data Summary of Urban Storm Water Best Management Practices*, *supra* note 76, at 4-12.
[95] Pitt et al., *The National Stormwater Quality Database (NSQD, Version 1.1)*, *supra* note 22, at 7-13; National Research Council, *supra* note 3, at 184-88, Table 3-4.
[96] Pitt et al., *The National Stormwater Quality Database (NSQD, Version 1.1)*, *supra* note 22, at 7-8.
[97] Burton and Pitt, *Stormwater Effects Handbook*, *supra* note 68, at Table 2.4.
[98] Steuer et al., *Sources of Contamination in an Urban Basin in Marquette, Michigan*, *supra* note 80, at 20-21.

lbs/acre-yr. Similarly, commercial areas discharge 62 lbs/acre-yr. of BOD, while parking lots discharge 47 lbs/acre-yr.[99]

A study of aggregate runoff from parking lots in a particular county found that BOD loadings from these parking lots were 119,949 lbs, compared to loadings of 1,794 lbs from the land before it became parking lots. Similarly, COD loadings from these parking lots were 599,919 lbs, compared to loadings of 0 lbs from the land before it became parking lots.[100]

4. Phosphorus

Runoff from commercial, industrial, and institutional sites consistently contains high levels of phosphorus. Nutrient over-enrichment from phosphorus in runoff can lead to major impacts relating to the excessive growth of algae, which leads to nuisance algal blooms and eutrophic conditions.[101] Phosphorus often gets into runoff via atmospheric deposition and fertilizer application;[102] EPA also lists automobile exhaust as one source of phosphorus in urban runoff.[103]

Runoff from commercial, industrial, and institutional sites contains high concentrations of phosphorus. The National Stormwater Quality Database found median total phosphorus concentrations of 0.22 mg/L at commercial areas, 0.26 mg/L at industrial sites, and 0.18 mg/L at institutional areas.[104] Recent analysis of Version 3.1 of the NSQD demonstrates elevated mean concentrations for total phosphorus as well.[105] For commercial sites the mean total phosphorus concentration was 0.37 mg/L, for industrial sites 0.39 mg/L, and for institutional sites 0.23 mg/L. Whether comparing mean or median values, analysis of this extensive database indicates that the subject land uses discharge elevated concentrations of total phosphorus.

EPA's National Urban Runoff Program study found similar results: it found median phosphorus concentrations at commercial sites to be 0.201 mg/L.[106] The USGS has found mean total phosphorus concentrations of 0.09 mg/L at commercial rooftops and 0.21 mg/L at commercial parking lots.[107]

Consistent with elevated concentrations in pollutant discharges, these land uses have been shown to generate large annual phosphorus loadings as well. Shaver et al. found that

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[99] Shaver et al., *Fundamentals of Urban Runoff Management*, *supra* note 23, at 3-63; Burton and Pitt, *Stormwater Effects Handbook*, *supra* note 68, at Table 2.5.
[100] Davis et al., "The Environmental and Economic Costs of Sprawling Parking Lots in the United States," *supra* note 83, at 259.
[101] EPA, *Preliminary Data Summary of Urban Storm Water Best Management Practices*, *supra* note 76, at 4-13.
[102] DOT, FHWA, *Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring*, *supra* note 74, at Chapter 2, Table 1.
[103] EPA, *Preliminary Data Summary of Urban Storm Water Best Management Practices*, *supra* note 76, at 4-9.
[104] National Research Council, *supra* note 3, at 184-85, Table 3-4.
[105] Pitt, *The National Stormwater Quality Database, Version 3.1*, *supra* note 26, at 4.
[106] Burton and Pitt, *Stormwater Effects Handbook*, *supra* note 68, at Table 2.4.
[107] Steuer et al., *Sources of Contamination in an Urban Basin in Marquette, Michigan*, *supra* note 80, at 19.

commercial areas discharge 1.5 lbs/acre-yr. of total phosphorus, parking lots discharge 0.7 lbs/acre-yr., industrial areas discharge 1.3 lbs/acre-yr., and shopping centers discharge 0.5 lbs/acre-yr.[108]

One study found average loadings of phosphorus to be 1.5 lb/acre per year from commercial land, compared to 0.03 lb/acre per year from undeveloped park land.[109] A report summarizing the results of multiple studies found median phosphorus loadings of 0.80 kg/ha per year from commercial sites and 1.10 kg/ha per year from roads, compared to 0.11 kg/ha per year from undeveloped forests.[110] Another found annual loadings of 2 lb/acre per year from parking lots compared to 0.5 lb/acre per year from undeveloped meadows.[111] EPA Region 1 has used an annual phosphorus loading rate from commercial sites of 1.15-2.29 lb/acre per year for purposes of designating impervious areas for regulation (compared to a 0.10-0.13 lb/acre per year loading rate for forest and open space).[112] A study of aggregate runoff from parking lots in a particular county found that phosphorus loadings from these parking lots were 1,654 lbs, compared to loadings of 562 lbs from the land before it became parking lots.[113]

5. Nitrogen

Runoff from commercial, industrial, and institutional sites consistently contains high levels of nitrogen in various forms. Whether analyzing levels of Total Kjeldahl Nitrogen (TKN), which includes ammonia and organic forms of nitrogen,[114] or measuring only nitrate, nitrite, ammonia, or a sum of these values, studies consistently find elevated nitrogen levels in runoff from these sites. Like phosphorus, nutrient over-enrichment from nitrogen in runoff can lead to major impacts relating to the excessive growth of algae, which leads to nuisance algal blooms, lower dissolved oxygen levels, and eutrophic conditions.[115] Nitrogen often gets into runoff via atmospheric deposition and fertilizer application;[116] EPA also lists automobile exhaust as one source of nitrogen in urban runoff.[117]

Runoff from commercial, industrial, and institutional sites contains high concentrations of nitrogen. The National Stormwater Quality Database found median TKN concentrations of 1.6 mg/L at commercial areas, 1.4 mg/L at industrial areas, and 1.35 mg/L at institutional

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[108] Shaver et al., *Fundamentals of Urban Runoff Management* (2007), *supra* note 23, at 3-63; Burton and Pitt, *Stormwater Effects Handbook*, *supra* note 68, at Table 2.5.
[109] Burton and Pitt, *Stormwater Effects Handbook*, *supra* note 68, at Table 2.5.
[110] Horner et al., *Fundamentals of Urban Runoff Management* (1994), *supra* note 82, at Table 2.6.
[111] Tom Schueler, "The Importance of Imperviousness," Center for Watershed Protection, Table 1 (2000), *available at* http://www.cwp.org/online-watershed-library/doc_download/308-the-importance-of-imperviousness.
[112] U.S. EPA Region I, *Residual Designation Pursuant to Clean Water Act—Charles River*, *supra* note 49, at 5.
[113] Davis et al., "The Environmental and Economic Costs of Sprawling Parking Lots in the United States," *supra* note 83, at 259.
[114] EPA, *Preliminary Data Summary of Urban Storm Water Best Management Practices*, *supra* note 76, at 4-13.
[115] *Id.*
[116] DOT, FHWA, *Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring*, *supra* note 74, at Chapter 2, Table 1.
[117] EPA, *Preliminary Data Summary of Urban Storm Water Best Management Practices*, *supra* note 76, at 4-9.

areas.[118] Recent analysis of Version 3.1 of the NSQD demonstrates elevated mean concentrations for TKN as well.[119] For commercial sites the mean TKN concentration was 1.9 mg/L, for industrial sites 1.9 mg/L, and for institutional sites 1.5 mg/L. Whether comparing mean or median values, analysis of this extensive database indicates that the subject land uses discharge elevated concentrations of nitrogen. EPA's National Urban Runoff Program study found similar results: it found median TKN concentrations at commercial sites to be 1.179 mg/L.[120] The USGS has found mean TKN concentrations of 1.7 mg/L at commercial rooftops and 1.5 mg/L at commercial parking lots.[121]

One study found an average TKN concentration of 5.07 mg/L in surface runoff from industrial sites.[122] Another study found average nitrate concentrations of 1.1 mg/L in runoff from parking lots on commercial sites, and 1.0 mg/L in runoff from parking lots on light industrial sites.[123] A regional study found that TKN event mean concentrations for asphalt parking lots on commercial sites averaged in range from 0.38 to 1.37 mg/L.[124]

Consistent with elevated concentrations in pollutant discharges, the land uses subject to the petition also have been shown to have large annual nitrogen loadings as well. One study compiled data showing that commercial areas discharge 6.7 lbs/acre-yr. of TKN, parking lots discharge 5.1 lbs/acre-yr., industrial areas discharge 3.4 lbs/acre-yr., and shopping centers discharge 3.1 lbs/acre-yr.[125] A report summarizing the results of multiple studies found median total nitrogen (TN) loadings of 5.2 kg/ha per year from commercial sites and 2.4 kg/ha per year from roads.[126] Another found annual nitrogen loadings of 15.4 lb/acre per year from parking lots compared to 2.0 lb/acre per year from undeveloped meadows.[127] A study of aggregate runoff from parking lots in a particular county found that nitrogen loadings from these parking lots were 6,930 lbs, compared to loadings of 1,993 lbs from the land before it became parking lots.[128]

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[118] Pitt et al., *The National Stormwater Quality Database (NSQD, Version 1.1)*, *supra* note 22, at 9-10.
[119] Pitt, *The National Stormwater Quality Database, Version 3.1*, *supra* note 26, at 5.
[120] Burton and Pitt, *Stormwater Effects Handbook*, *supra* note 68, at Table 2.4.
[121] Steuer et al., *Sources of Contamination in an Urban Basin in Marquette, Michigan*, *supra* note 80, at 19.
[122] J.S. Choe et al., "Characterization of Surface Runoff of Urban Areas," *Water Sci. Tech.* 45(9) (2002), 249-54, at Table 3.
[123] Hope et al., "Nutrients on Asphalt Parking Surfaces in Urban Environments," *Water, Air and Soil Pollution: Focus* Vol. 4, Issue 2-3, 371-90, at Table 2.
[124] E. Passeport & W. Hunt, "Asphalt Parking Lot Runoff Nutrient Characterization for Eight Sites in North Carolina, USA," *Journal of Hydrologic Engineering* Vol. 14, Special Issue: Impervious Surfaces in Hydrologic Modeling and Monitoring (2009), 352-62, at Table 4.
[125] Shaver et al., *Fundamentals of Urban Runoff Management* (2007), *supra* note 23, at 3-63; Burton and Pitt, *Stormwater Effects Handbook*, *supra* note 68, at Table 2.5.
[126] Horner et al., *Fundamentals of Urban Runoff Management* (1994), *supra* note 82, at Table 2.6.
[127] Schueler, "The Importance of Imperviousness," *supra* note 111, at Table 1.
[128] Davis et al., "The Environmental and Economic Costs of Sprawling Parking Lots in the United States," *supra* note 83, at 259.

C. Therefore, to address impairments caused or worsened by these contributing discharges, EPA must designate, as a class, all non-*de minimis*, currently non-NPDES permitted stormwater discharges from commercial, industrial, and institutional sites within the impaired watersheds listed in Attachment A.

Impervious surfaces on commercial sites, industrial facilities, and large institutions are discharging stormwater runoff containing lead, copper, zinc, sediments, BOD/COD, phosphorus, and nitrogen into these impaired waters and are thereby contributing to violations of water quality standards. Therefore, EPA must determine that these sources require NPDES permits.

EPA has often expressly recognized this connection for waters where TMDLs have been completed. For example, California's TMDL for metals (including copper, lead, and zinc) in the Los Angeles River finds that "developed areas where the contribution of metals is highest" includes highways.[129] Nevada and California's joint TMDL for sediment and phosphorus in Lake Tahoe concludes that urban stormwater runoff is the largest source of the sediment impairment, and recommends that "areas of concentrated impervious coverage, such as commercial land uses with extensive streets, parking areas, and rooftops, may require intensive application of advanced pollutant control measures" because of their contribution to the problem.[130] Hawaii's TMDL for Ala Wai Canal finds that commercial land uses contribute 32% of phosphorus loadings to the canal despite taking up only 11% of the land area in the watershed.[131]

EPA has also recognized the connection between pollutant discharges from particular land uses and water body impairments in its previous exercises of residual designation authority. For example, in Maine, EPA designated stormwater discharges from properties with one or more acres of impervious surface—including roads, rooftops, and parking lots—because it found that those properties were contributing to violations of water quality standards for dissolved oxygen, suspended solids, and heavy metals (zinc, lead, and copper).[132] In Massachusetts, EPA designated stormwater discharges from properties with two or more acres of impervious surface—again, including roadways, parking lots, and rooftops—because it found that those properties were contributing to violations of water quality standards for phosphorus.[133]

As a result, non-*de minimis*, currently non-NPDES permitted stormwater discharges from these types of sites located within impaired watersheds must be designated for permitting, and all

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[129] California Regional Water Quality Control Board, Los Angeles Region, *Total Maximum Daily Loads for Metals: Los Angeles River and Tributaries* 64 (2005), *available at* http://www.epa.gov/waters/tmdldocs/35717_lametals2008.pdf.

[130] Nevada Division of Environmental Protection, *Final Lake Tahoe Total Maximum Daily Load* 9-2 (2011), *available at* http://www.epa.gov/waters/tmdldocs/LTTMDL_NDEP_Final%20submittal.pdf.

[131] EPA Region 9 & Hawaii Department of Health, *Revisions to Total Maximum Daily Loads for the Ala Wai Canal – Island of Oahu, Hawaii* 16 (2002), *available at* http://www.epa.gov/waters/tmdldocs/11760_alawaitmdlfinal.pdf.

[132] U.S. EPA Region I, *Final Determination Under Section 402(p) of the Clean Water Act—Long Creek*, *supra* note 49, at 4.

[133] U.S. EPA Region I, *Residual Designation Pursuant to Clean Water Act—Charles River*, *supra* note 49, at 5.

entities responsible for the discharges must be notified of their obligation to obtain NPDES permits. EPA regulations provide for residual designation of a category of discharges within a geographic area, such as a watershed, when it determines that discharges from that category contribute to a violation of a water quality standard.[134] Here, ample scientific evidence proves that stormwater discharges from commercial, industrial, and institutional sites, as a class, are contributing to the non-attainment of water quality standards in watersheds that are impaired because of heavy metals, sediment, COD/BOD, and/or phosphorus. As a result, EPA must designate all non-*de minimis* point source stormwater discharges from commercial, industrial, and institutional sites, which are not currently subject to Clean Water Act permitting requirements and are within the Region's watersheds that are impaired by those pollutants (listed in Attachment A).

Requiring NPDES permits for these discharges will allow for the establishment of necessary and effective requirements to reduce existing stormwater pollution loadings. The National Research Council has found that "roads and parking lots can be the most significant type of land cover with respect to stormwater,"[135] and has recommended remedial actions such as conservation of natural areas, reducing hard surface cover (including parking lots), and retrofitting urban areas with features that hold and treat stormwater.[136] EPA has agreed, "Retrofits to stormwater infrastructure will be necessary to reduce runoff and pollution."[137] So have Region 9 jurisdictions; Hawaii has found that managing stormwater runoff from existing development is necessary to maintain water quality in areas where urbanization is occurring,[138] and the California Department of Transportation has found that using retrofit projects to infiltrate runoff is effective at reducing water quality impacts from highways.[139]

In addition to fulfilling the Clean Water Act's statutory and regulatory mandate for immediate permitting of stormwater discharges that contribute to non-attainment of water quality standards, residual designation of the entire class of discharges from commercial, industrial, and institutional sites will also further EPA's goal of "facilitat[ing] watershed planning" in non-attainment waters.[140] General permits implementing residual designations "promot[e] the watershed approach to program administration" because they "can cover a category of

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[134] 40 C.F.R. § 122.26(a)(9)(i)(D).
[135] National Research Council, *supra* note 3, at 6.
[136] Stakeholder Input; Stormwater Management Including Discharges From New Development and Redevelopment, 74 Fed. Reg. 68,617, 68,620 (Dec. 28, 2009) (citing National Research Council, *supra* note 3).
[137] U.S. EPA, Managing Wet Weather with Green Infrastructure - Municipal Handbook - Green Infrastructure Retrofit Policies 3 (Dec. 2008), *available at* http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_retrofits.pdf.
[138] Hawaii Coastal Zone Management Program, *Hawaii's Coastal Nonpoint Pollution Control Program: Management Plan, Volume 1* III-128—III-129 (1996), *available at* http://hawaii.gov/dbedt/czm/initiative/nonpoint_mgmt_plan.php.
[139] California Department of Transportation, *BMP Retrofit Pilot Program: Final Report* (2004), *available at* http://www.dot.ca.gov/hq/oppd/stormwtr/Studies/BMP-Retro-fit-Report.pdf.
[140] *See* 64 Fed. Reg. at 68,736.

dischargers within a defined geographic area. Areas can be defined very broadly to include political boundaries (e.g., county), watershed boundaries, or State or Tribal land."[141]

Moreover, absent such residual designation, an inordinate regulatory burden for attainment of water quality standards falls upon the subset of stormwater dischargers (including MS4s, regulated industrial activities, and construction projects) that currently are subject to NPDES permitting requirements.[142] Discharges from commercial, industrial, and institutional sites are burdening municipal storm drainage systems and preventing attainment of water quality standards even where municipally owned infrastructure is properly controlled. Unfortunately, EPA has determined that the "maximum extent practicable" standard applicable to the NPDES MS4 stormwater program does not require that MS4 permits regulate these sources of pollutants.[143] This situation is both unfair and is also less likely to result in attainment of water quality standards. Regulation of discharges from commercial, industrial, and institutional sites is therefore not only legally required, but also an equitable and efficient means of increasing the chances that local water bodies will attain their designated uses.

In conclusion, residual designation of these sources is necessary not only due to the substantial data and information documenting pollutant discharges to impaired waters, but also to assist municipalities that are struggling to bear the clean water burden without the regulatory participation of the largest impervious source categories. Since adoption of the Phase II rule in 1999, there has been a dramatic improvement in the understanding of the connection between impervious areas and degraded water quality conditions, and in the data on the large relative contribution of commercial, industrial, and institutional land uses.

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[141] *Id.* at 68,739.
[142] *See, e.g.*, 33 U.S.C. § 1342(p)(3)(A) (permits for stormwater discharges associated with industrial activity, including construction activities, must meet the § 301(b)(1)(C) mandate to include any more stringent limitation necessary to meet water quality standards).
[143] 64 Fed. Reg. at 68,782 ("EPA received comments and evaluated the proposal under which operators of regulated small, medium, and large MS4s would be responsible for controlling discharges from industrial and other facilities into their systems in lieu of requiring NPDES permit coverage for such facilities. EPA did not adopt this framework due to concerns with administrative and technical burden on the MS4 operators, as well as concerns about such an intergovernmental mandate.").

Respectfully submitted,

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