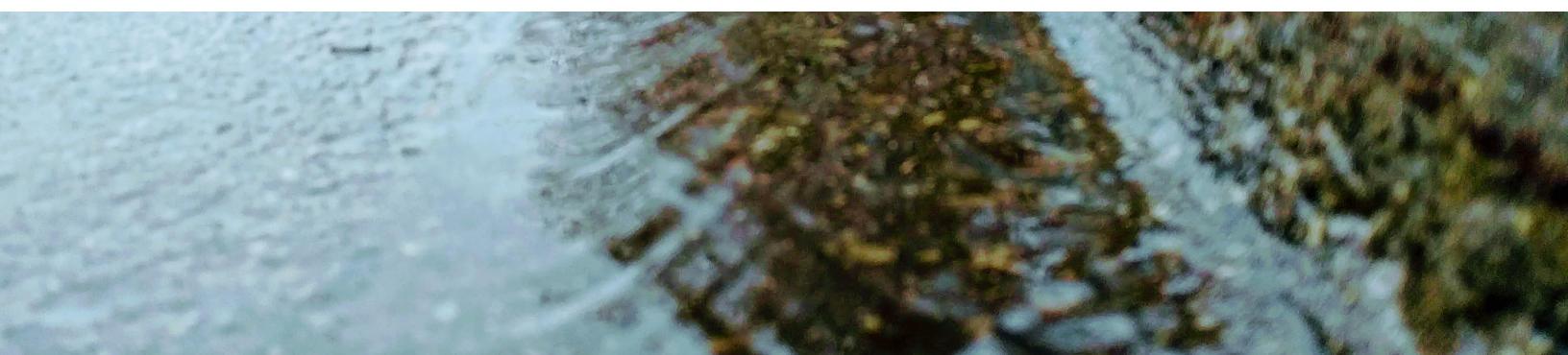




Value of Partnerships

in Reducing MS4 Compliance Cost



A project by American Rivers in cooperation with the Lower Grand River Organization of Watersheds and the City of Grand Rapids Environmental Services Department (ESD)

August 2022

Shanyn Viars

Cara Decker



CONTENTS

Table of Contents

Summary	3
Introduction	4
Regulating MS4s: Clean Water Act Requirements	5
Gaps in Funding MS4 Compliance	6
Municipal Cost of MS4 Compliance	6
Grand Rapids, Michigan: A Case Study in Reducing Municipal Stormwater Program Costs	8
Cost Comparison for Stormwater Management Programs	10
A Closer Look: The Value of Collaborative Partnerships for Grand River MS4s	13
Conclusion	20
Appendix A: Summary of LGROW's Activities to Support Member's MS4 Compliance	23
Appendix B: Estimated Cost Comparison for MS4 Compliance Across Regions	25
Appendix C: Comparison of Proportional Expenditures for Each MCM	26

Summary

Across the nation, municipal stormwater managers face financial burdens as they work to manage stormwater flows that jeopardize the health and safety of communities and the availability of clean water. Decreased federal funding for stormwater management in recent decades has resulted in local communities shouldering most of the rising costs to protect the nation's water resources. The increasing fiscal gap, coupled with an urgency to reduce the likelihood of devastating flood events, has spurred creative partnerships in stormwater management to adopt green stormwater infrastructure.

Green stormwater infrastructure incorporates a variety of pathways that improve water quality and foster climate-resilient cities for current and future generations. Green stormwater infrastructure utilizes soils and vegetation to mimic natural processes that reduce stormwater runoff, enhance overall environmental quality and provide utility services. Among these pathways are important efforts to engage new partners and forge collaborative approaches for long-term watershed planning. This report examines the **opportunities the private sector and non-traditional partners** can provide to **improve efficiency** for municipal stormwater managers in meeting regulatory obligations, **fostering watershed collaboration**, and **engaging public participation** in reducing stormwater runoff.



Introduction

Increasingly, communities across the Great Lakes are adapting their cityscapes to effectively mitigate the impacts of climate change. Current and projected changes to climate conditions are predicted to cause intensified flooding, degradation to water bodies, loss of biodiversity, and risks to human health. An increase in the frequency of severe rain events will exacerbate stormwater-related challenges in many cities already challenged by outdated infrastructure, pressure on existing capacity, and decreased fiscal budgets. The costs associated with managing stormwater runoff can place significant burdens on municipal budgets. The recent American Society of Civil Engineers Stormwater Infrastructure Report Card estimated the **3.5 million miles of storm sewers** across U.S. cities are inadequate given urbanization and rainfall trends.¹ The report card estimated it would cost Michigan \$400-\$500 million per year to replace aging water infrastructure across the state.

Surrounded by freshwater resources, cities in the Great Lakes region are pioneering sustainable solutions and collaborating across agencies and communities to reduce the costs of stormwater management. In particular, several municipalities along the Grand River in Michigan have leveraged limited fiscal budgets by partnering with a local organization that provides technical support for staff, community outreach and education, and watershed-scale resiliency planning.

Cost-saving efficiencies in stormwater management can be achieved through collaboration with local organizations and experts to overcome municipal capacity constraints. Local partners can offer several services to complement municipal stormwater programs and contribute to improvements in water quality, including technical support, public outreach, and policy or program development. With capacity support, stormwater managers are able to **redistribute limited personnel and fiscal resources** to address other watershed priorities, **coordinate across jurisdictional boundaries**, and **cultivate public engagement** in water stewardship.



1. Stormwater Infrastructure Report Cards American Society of Civil Engineers (ASCE), (2021)

Regulating MS4s: Clean Water Act Requirements

Congress began enacting regulations to control harmful pollutants from entering waterways in 1948 and expanded regulations through the Clean Water Act (1972).² In 1987, Congress aimed to strengthen the Clean Water Act (1972) by adding regulations to reduce the discharge of pollutants and improve water quality in rivers and streams. Publicly owned pipes, gutters, catch basins, ponds, roadside ditches, and other “conveyance or conveyance of systems” designed to channel stormwater are referred to as Municipal Separate Storm Sewer Systems (MS4s). Municipalities and other agencies that own and operate MS4s are required to obtain coverage under a permit for discharging stormwater into lakes, streams and rivers. These permits are part of the National Pollutant Discharge Elimination System (NPDES), a program administered by most states, including those surrounding the Great Lakes.

The 1987 amendments to the Clean Water Act established regulatory differences for MS4s based on population size in the serviced area; Phase I permits are required for “incorporated places” of at least 100,000 people, while MS4 areas with smaller populations, like small cities, towns or institutions, are regulated under Phase II permits.³ Phase I communities are typically covered under an individual permit tailored to a specific jurisdiction, whereas a general permit covers similar Phase II communities within the state. The specific conditions for both categories of MS4 permits require implementing Best Management Practices (BMPs) to reduce the discharge of pollutants to protect water quality.⁴ MS4 operators are obligated to develop a Stormwater Management Plan (SWMP) detailing the approaches they will take to meet regulatory requirements.

A stormwater management program for all MS4s includes six minimum control measures (MCMs), listed in Table 1.

Table 1: Six Minimum Control Measures⁵

Table 1: Minimum Control Measure (MCM)	Minimum Requirement
1. Public Education and Outreach	provide educational material about stormwater to various audiences
2. Public Participation and Involvement	provide an opportunity for the public to participate in the SWMP
3. Illicit Discharge Detection and Elimination	find and eliminate sources of non-stormwater from their storm sewer system
4. Construction Site Runoff Control	develop, implement, and enforce erosion and sediment control plan from construction activities
5. Post Construction Site Runoff Control	require new and redevelopment projects to retain stormwater runoff onsite
6. Pollution Prevention/Good Housekeeping	maintenance practices in municipal operations including street sweeping, and catch basin cleaning

2. EPA Summary of the Clean Water Act (33 U.S.C. §1251 et seq. (1972))

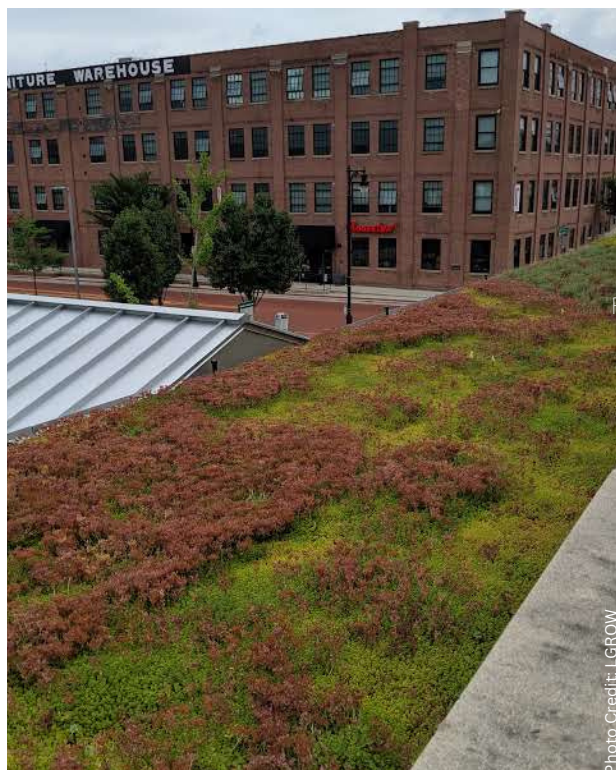
3. EPA NPDES Stormwater Program

4. MS4 Stormwater Permitting Guide, The National Association of Clean Water Agencies, (2018)

5. EPA Fact Sheet 2.0, An overview of the Small MS4 Stormwater Program

Gaps in Funding for MS4 Compliance

Despite efforts across the country at least, 166,000 miles of rivers and streams were impaired from 2010-2018, signaling gaps in achieving water quality improvements.⁶ The threat of climate change prompted improvements in local MS4 regulations and sparked innovation in management strategies to reduce stormwater impacts by implementing green infrastructure practices that improve water quality and provide other community and ecological benefits. Re-designing urban landscapes to incorporate climate-resilient infrastructure necessitates fiscal resources to invest in sustainable solutions. Sustainable BMPs recommended for MS4 communities to reduce pollutants in waterways also serve as drivers toward fostering greener, healthier communities and protecting communities from flooding.



Yet, over recent decades, federal capital spending on water infrastructure has dramatically declined, leaving states and local governments to bear most fiscal responsibility associated with MS4 activities. In many municipalities, stormwater management is often underfunded in annual budgets and left with inadequate resources to protect critical waterways and communities.

Municipal Cost of MS4 Compliance

Addressing the urgent threat of climate change, improving water quality, and avoiding costly flood damage will require a shift toward managing stormwater with sustainable approaches. Since its inception in the 1990s, the MS4 program has evolved in response to emerging urban water management challenges. Although necessary, these evolutions have increased compliance costs for municipal stormwater programs. For example, in 2018, stormwater experts in EPA Region 9 reported inadequate funding and capacity constraints hindered the ability of municipalities to implement and sustain stormwater programs.⁷

Metropolitan areas with high impervious coverage will face steeper increases in costs, often without a corresponding increase in local budgets to address stormwater and other urban resiliency goals. The Water Environment Federation (WEF) surveyed 147 MS4s in 2018 that identified aging infrastructure, funding, or availability of capital, and increasing and expanding regulations as the top three stormwater program challenges.⁸

The cost to manage stormwater and meet updated stormwater requirements is significantly higher than reported in previous years. Nationwide, municipalities are estimated to collectively spend up to \$24 billion for stormwater infrastructure annually, a 10% increase from 2018.⁹

6. Stormwater Infrastructure Report Cards American Society of Civil Engineers (ASCE), (2021)

7. Evolution of Stormwater Permitting and Program Implementation Approaches, Workshop Report and Recommendations for Program Improvement EPA Region 9 (2018)

8. National Municipal Storm Sewer System (MS4) Needs Assessment Survey Results, Water Environment Federation (WEF) Stormwater Institute, (2021)

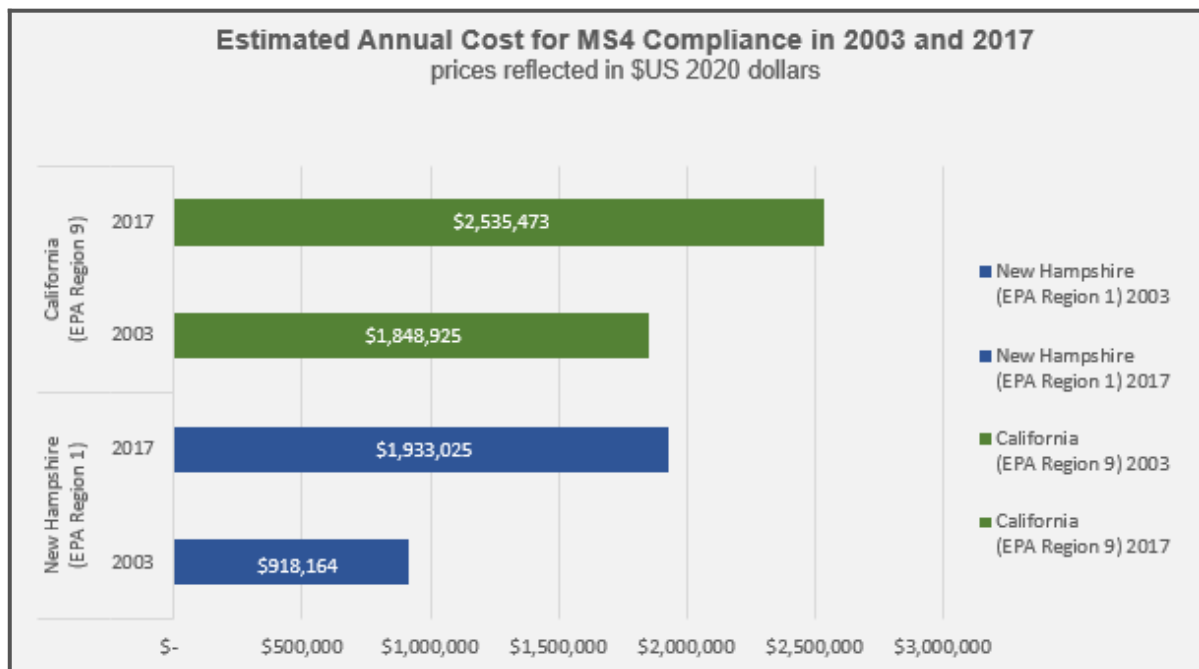
9. National Municipal Storm Sewer System (MS4) Needs Assessment Survey Results, Water Environment Federation (WEF) Stormwater Institute, (2021)

The graph (Figure 1) illustrates the regional cost difference for municipalities to meet compliance and the increase in expenditures associated with updated permit requirements. Municipal expenditures associated with meeting MS4 permit requirements more than doubled in the last 15 years. The cost of effectively managing stormwater in urban areas will continue to rise as cities grow and weather patterns become more unpredictable in the wake of climate change.¹⁰

Cost differences among municipalities will vary depending on the type of MS4 permit required and the management strategies in local SWMPs. Additional factors can also be attributed to cost variations including the size of land area, amount of impervious coverage, frequency of maintenance activities, condition and age of existing infrastructure, climate patterns, staff capacity, and budget limitations.

Fifty-eight percent of MS4 permittees surveyed across the U.S. and Puerto Rico reported an annual gap in stormwater funding that exceeds \$8 billion.¹¹ With limited fiscal support, some local municipalities enact stormwater utility fees to collect revenue to support regulatory obligations, develop programs that advance green infrastructure implementations, and fund proactive solutions for long-term watershed management. Currently, legal constraints limit the ability of Michigan municipalities to adopt stormwater fees.

Figure 1: Comparison of Estimated Annual Cost for MS4 Compliance in California (EPA Region 9) and New Hampshire (EPA Region 1).¹²



*The estimated annual cost reflects annual expenditures reported by MS4s in California (EPA Region 9), and annual expenditures reported by MS4s in New Hampshire, (EPA Region 1).

10. In 2020, the Environmental Finance Center (EFC) in EPA Region 9 and the Office of Water Programs at Sacramento State created a [free toolkit](#) to assist California municipalities in asset management and planning for stormwater management programs. The toolkit contains guidance for stormwater practitioners on identifying and estimating costs related to managing stormwater for fiscal budgeting. A report in the toolkit surveyed 146 MS4s in California and found cities spent an average of \$3.1 million in total expenditures for stormwater management.

11. 2020 National Municipal Separate Storm System (MS4) Needs Assessment Survey, WEF Stormwater Institute, Water Environment Federation, (2021)

12. Estimates reflect inflation-adjusted prices in 2020 USD. Inflation rate determined by the CPI Index for Urban Consumers, U.S. Bureau Labor of Statistics. Estimates obtained from New Hampshire, (EPA Region 1) Phase II MS4s and California, (EPA Region 9) Phase I & Phase II MS4s in the following reports: https://www.owp.csus.edu/research/papers/papers/NPDES_Stormwater_costsurvey.pdf, <https://www3.epa.gov/region1/npdes/stormwater/nh-nh-stormwater-program-cost-evaluation.pdf>, <https://www.efc.csus.edu/stormwater-funding-and-financing/>



A survey of municipalities in 2021, reported in the *Journal of Environmental Policy and Planning*, found less than 30% of municipalities receive revenue from stormwater utility fees.¹³

The same year, 80% of stormwater managers and utilities surveyed in North Carolina reported lacking sufficient revenue from stormwater fees to meet existing needs and plan for future capital projects.¹⁴ Stormwater requirements improve the water quality in rivers and drinking water sources, and reduce flood risks and threats to ecological habitats but local communities with insufficient financial resources risk neglecting improvements that could jeopardize human and environmental health. Locally, a lack of adequate financial resources dedicated to meeting MS4 requirements could lead to impaired waterbodies and sources of drinking water, increased flood risk, deteriorating ecological habitats, and jeopardizing human health. Municipalities with access to financial resources may be eligible for low-cost loans, debt financing, and other capital investment approaches to fund stormwater infrastructure improvements.

For many small and mid-sized cities, a lack of a dedicated source for repayment or the inability to extend current debt obligations prevents large-scale investments that are needed to address the significant decline in existing infrastructure.

In the face of these trends, innovative strategies and partnerships between municipal agencies and the private and non-profit sectors can support compliance-related activities to reduce budgetary pressures and achieve broader climate resiliency goals for communities. Cities in the Great Lakes region are innovating market-based approaches to reduce compliance costs and developing collaborative programs to implement green infrastructure solutions and meet regulatory requirements. Watershed approaches that encourage regional coordination and comprehensive education campaigns are recommended actions by the American Society of Engineers to improve our nation's stormwater infrastructure.¹⁵

Grand Rapids, Michigan: A Case Study in Reducing Municipal Stormwater Program Costs

Located 35 miles from the shores of Lake Michigan (and within EPA Region 5), and sprawling across 46 square miles of land, the City of Grand Rapids, Michigan is home to nearly 200,000 people.¹⁶ In the heart of downtown, the Grand River is channelized through the city before eventually flowing into Lake Michigan. Known for its local breweries and "green" initiatives, the Grand Rapids community is transforming its relationship with the Grand River. The City of Grand Rapids has made exceptional progress at improving water quality in the river and advancing green stormwater infrastructure solutions through creative strategies that result from watershed collaboration.

In the Lower Grand River watershed, coordination across municipal boundaries and agencies improves the program's effectiveness, and non-traditional partners provide additional capacity to sustain planning initiatives. A project of the regional planning authority, Grand Valley Metro Council, the Lower Grand River Organization of Watersheds (**LGROW**) strengthens the abilities of 23 municipalities in the region to develop and implement long-term stormwater management plans.

13. Cousins J.J. and D.T. Hill. "Green infrastructure, stormwater, and the financialization of municipal environmental governance." *Journal of Environmental Policy and Planning* 2021

14. Results of the 2021 North Carolina Local Government Stormwater Management Survey, Environmental Finance Center-UNC, 2021

15. Stormwater Infrastructure Report Cards American Society of Civil Engineers (ASCE), (2021)

16. Grand Rapids, Michigan, Quick Facts, US Census Bureau, V2019



LGROW provides the structure for communities to develop cross-cutting strategies that integrate plans, prioritize actions, and increase public stewardship to advance the clean water goals in the region. In cooperation with state agencies, LGROW also assists members with developing and implementing the following required MS4 obligations:

- Stormwater Management Plan (SWMP)
- Public Education Plan (PEP)
- Illicit Discharge Elimination Plan (IDEP)
- Total Maximum Daily Load (TMDL) Implementation Plan
- Good Housekeeping and Pollution
- Prevention Best Management Practices
- Keeping an updated Stormwater Infrastructure Inventory
- Assistance for reporting, audits, monitoring, and enforcement

Through a shared commitment to climate resiliency strategies, member communities engage collaboratively in self-selected committees for peer-to-peer learning and developing initiatives to further water quality improvements.

The table in [Appendix A](#) details the compliance standards LGROW provides to communities in the watershed. A further examination of associated activities and staff capacity dedicated to achieving the compliance measures illustrates the economic benefits of partnering with community organizations. The Stormwater Management Plan (SWMP), obligated in the MS4 includes required activities and recommended actions for meeting the compliance measures. The level of activity and/or amount of time to perform activities associated with each MCM will vary by community. For example, MS4s with more outfalls and discharge points to freshwater resources will have to spend more time completing required dry weather screening than those communities with fewer outfalls.

Cost Comparison for Stormwater Management Programs

The toolkit developed by the Environmental Finance Center (EFC) at Sacramento State demonstrates methods for MS4s to estimate expenditures related to compliance utilizing stormwater management expenditures from the City of Grand Rapids. In 2018, EFC estimated stormwater management in Grand Rapids to cost \$1.05 million annually.¹⁷ The actual stormwater management expenditures in 2018 reported by the City of Grand Rapids exceeded \$2 million.¹⁸ The EFC's lower estimations for expenditures could be attributed to the budget implications of vacancies in stormwater staff positions in previous years. Although the actual cost for Grand Rapids stormwater management was significantly higher than the EFC estimate, the cost categorization outlined in the EFC tool could be useful to assess actual expenditures for meeting MCMs and identifying areas to improve efficiency.

This analysis applies the cost categorization identified in the EFC toolkit to explore the stormwater management fiscal savings and capacity support created through non-traditional partnerships. Evaluating total expenditures for stormwater management and the path for meeting compliance varies by municipality, climate, and activities performed. In addition, some activities conducted to meet requirements may overlap multiple MCMs, increasing the difficulty in estimating the cost for meeting for each compliance measure. Due to the variation in cost to meet MS4 compliance, the following proportional cost estimations for implementing MCMs should only be used as guidance in comparing to actual stormwater management expenditures and adopting efficiency gains.

In 2018, the EPA provided a cost breakdown to illustrate the proportion of total program funding dedicated for meeting compliance obligations for Phase II MS4s in New Hampshire (EPA Region 1).

Table 2: Cost Breakdown for MS4 Compliance in New Hampshire (EPA Region 1)¹⁹

Table 2: Cost Breakdown for MS4 Compliance in New Hampshire (EPA Region 1) 2018	
% Of Total Program Funding	Compliance Obligation
50%	Systems Operations & Maintenance (street sweeping, catch basin cleaning, etc.)
30%	Track and remove illicit connections to the storm sewer
20%	Planning, public education, and administrative requirements

The EPA estimated Phase II MS4s in New Hampshire will spend a generous portion (20%) of total program funding to implement public education and participation requirements. In 2019, the Sacramento State EFC estimated stormwater program expenditures by compliance measure (MCM) for MS4s in California (EPA Region 9). The EFC reported municipalities in California, on average dedicate 12% of total expenditures on activities related to implementing MCMs in public education and participation. Comparing the program expenditures identified by MS4s in New Hampshire and California to annual expenditures in stormwater management program for the City of Grand Rapids can help to identify cost savings in stormwater management that could be realized through partnering with non-traditional organizations.

17. A Toolkit for Stormwater Asset Management and Funding, Environmental Finance Center at Sacramento State, (2019); <https://www.efc.csus.edu/stormwater-funding-and-financing/>

18. FY2020 Annual Report Stormwater Oversight Commission, City of Grand Rapids Environmental Services Department

19. Stormwater in New Hampshire, US EPA Municipal Separate Storm Sewer System (MS4) Permit, Spring 2018

In accordance with the requirement of its Phase I stormwater permit, the City of Grand Rapids is obligated to develop and implement a Stormwater Management Plan (SWMP) that is guided by the six MCMs. The cost of meeting compliance obligations includes staff time in implementing the SWMP, maintenance of existing stormwater systems, developing control measures for Best Management Practices (BMPs), reducing polluted runoff from roadways, permitting industrial facilities and construction activities, water quality monitoring, and public education and outreach. Maintenance and repairs to the existing stormwater infrastructure in Grand Rapids MS4 is performed by city staff with city-owned vehicles and equipment.

The cost comparison in Table 3 demonstrates the proportion of expenditures dedicated for each MCM category and highlights the variation in activities performed across regions to meet MS4 compliance.

Minimum controls for MS4s in New Hampshire (Phase II) do not include costs for water quality monitoring or industrial and commercial management, although water quality monitoring for impaired waters is a required measure for Phase II MS4 communities. Following EFC's toolkit, proportional expenses for Public Education and Outreach (MCM #1) and Public Participation and Involvement (MCM #2) are combined in one category in Table 3. The range of the expenditures for each MCM by region suggests diversity in climate and regional priorities steer planning objectives and how requirements will be met. The cost of stormwater management programs can be attributed to differences in approach to compliance, size of population and watershed area, amount of impervious area, land-use activities, climate patterns and the local emphasis on long-term watershed planning.

MS4s in urban areas with higher rainfall averages are likely to spend more on stormwater management programs to maintain existing infrastructure and will require additional funding to implement sustainable infrastructure for a climate-resilient future. In regions with higher rainfall averages, a larger portion of expenditures is required for pollution preventive measures (MCM #5) and water quality monitoring compared to a region that receives less precipitation. Cities in the Midwest and New England states receive an annual average rainfall of 37" and 43" (respectively), whereas municipalities in California typically experience wet season/dry season precipitation patterns as well as recent droughts and departure from historic annual rainfall averages.²⁰ A future of more heavy rainfall and severe storms in Midwest and New England cities will require frequent maintenance and extensive housekeeping efforts to maintain the function of stormwater management assets and reduce polluted discharges.

Another notable comparison indicates a significant variation in expenditures for MCM #1 that is less likely to be determined by differences in climate or regulatory obligations. In Grand Rapids, the portion of total spending on activities related to Public Education, Outreach, Involvement, and Participation (MCM #1 & MCM #2) and Illicit Discharge Detection and Elimination (MCM #3) is significantly lower than compared to the other regions despite differing climates and type of permit program. The cost savings to perform these activities are directly correlated to the support LGROW provides the City's in administering the SWMP. The analysis estimated expenditure for implementing the SWMP in Grand Rapids is less than \$12.00/ per person, whereas municipalities in California reportedly spend up to \$54.00/ per person.²¹

20. Average annual rainfall amounts retrieved from [US Climate Data, 2021](#)

21. Based on the population in Grand Rapids reported in the 2020 U.S. Census. California (EPA Region 9) estimates retrieved from [Estimating Benefits and Costs of Stormwater Management, Part II: Evaluating Municipal Spending in California, EFC \(2020\)](#)

Table 3: Comparison of Proportional Expenditures Dedicated to MS4 Compliance Measures

MCM	Activities	Grand Rapids MS4* (EPA Region 5)	California MS4s* (EPA Region 9)	New Hampshire MS4s* (EPA Region 1)
1 & 2	Public Education, Outreach, Involvement, and Participation	1%	12%	3%
3	Illicit Discharge Detection and Elimination	3%	9%	22%
4	Construction Site Stormwater Runoff Control	3%	10%	1%
5	Post Construction Stormwater Management for New/Re-Development	1%	5%	2%
6	Pollution Prevention/Good Housekeeping for Municipal Operations	56%	30%	69%
	Water Quality Monitoring	15%	7%	
	Industrial and Commercial Management***	4%	5%	
	Overall Stormwater Program Management	3%	11%	1%
	Long-Term Planning (e.g., Trash Amendment, TMDL Compliance, Watershed Management Coordination)	14%	11%	2%
Total Program Expenditures		100%	100%	100%
<p>* Grand Rapids and California MS4s include reported costs for Phase 1 MS4 permits. Estimates for both regions were calculated from data reported by EFC at Sacramento State Stormwater Funding and Financing (2020) https://www.efc.csus.edu/stormwater-funding-and-financing/</p> <p>**New Hampshire MS4s reflects estimated municipal expenditures for small Phase II MS4 permits complying with the Six Minimum Control Measures only. Estimates were calculated from data retrieved from EPA Region 1 Program Cost Evaluation Information https://www.epa.gov/npdes-permits/stormwater-tools-new-england</p> <p>***Industrial and Commercial Management is a requirement for Phase I MS4 communities.</p>				



Photo Credits: I-GROW

A Closer Look: The Value of Collaborative Partnerships for Grand River MS4s

The City of Grand Rapids and adjacent municipalities turned to non-traditional partners to assist in developing their SWMPs and in complying with MS4 permit standards. Cities in Michigan also face legal constraints on their ability to implement stormwater utility fees, restricting their ability to raise the funding needed to implement broad-scale resiliency measures. A regional collaboration between the area's MS4 permittees and LGROW created the opportunity to develop watershed-based planning to meet regulatory obligations and encourage regional cooperation to achieve broader climate resiliency initiatives. Subcontracted by municipalities in the watershed, LGROW provides a structured opportunity for stormwater professionals to plan collaboratively, explore new sustainable initiatives and receive ongoing training. LGROW plays a key role in connecting MS4 communities, sub-watershed groups, community organizations, and local stakeholders to address stormwater challenges collaboratively.

Increased coordination between agencies and local organizations cultivated initiatives to pursue resilient solutions through watershed-scale planning and program initiatives. As a watershed partner, LGROW is uniquely qualified to provide administrative and technical support to municipalities in implementing the MCMs as part of regulatory obligations.

LGROW prioritizes and implements watershed-scale initiatives, supports basin-wide efforts, and provides oversight for communities with MS4 permits. Since its inception, member municipalities credit LGROW's support as providing significant cost savings in meeting regulatory compliance measures. As one example, the City of Walker (MI) reported saving approximately \$86,000 after the first year of contracted support from LGROW.²²

Small but effective, LGROW consists of 4-5 full-time staff that provide a wide range of assistance to 23 municipalities, including the following required activities:

- Implementing new post-construction stormwater control requirements and coordinating Post-Construction Control efforts in the region
- Developing the Stormwater Standards Manual and Design Spreadsheet
- Revising and Finalizing Permit Applications
- Deploying the LGROW Data Repository for water quality sample collections
- Creating the LGROW's Natural Connections Map for visualizing green infrastructure practices in the watershed
- Providing training materials and videos for permittees
- Assisting in meeting new TMDL requirements and compliance

Staff and partners from member communities voluntarily participate in LGROW committees to provide relevant expertise and resources in stormwater management. Each committee plays a role in contributing toward the development of watershed-based planning and meeting individual MS4 compliance. The committees meet about six times a year to discuss topics related to technical resources, public engagement, sustainability, sub-watersheds, and stormwater ordinances. The collaboration increases knowledge and resource sharing and reduces redundancy to distribute water quality benefits across the watershed.

In 2020, LGROW dedicated more than 3,500 hours assisting MS4s with required activities in their SWMPs. Member municipalities compensate LGROW through annual fees for services that largely support advancing watershed stewardship through public education, participation, and outreach as well as assistance in meeting additional compliance measures.

Member communities also benefit from LGROW's wide reach of community and environmental partners that collaborate to implement green stormwater infrastructure projects, riverbank restorations, daylighting, invasive species removal, and more. Project implementations and community-led initiatives are funded through grants and local foundation support, alleviating fiscal burdens on municipalities while contributing to overall water quality improvements in the watershed. The coordination between MS4s delivers synchronized messaging to encourage community-wide stewardship and reduces the cost and capacity for each individual permittee to achieve compliance.

In addition to supporting MS4 communities, LGROW provides hands-on learning experiences for students, scientific research, and community support in green infrastructure project planning and implementation. In fact, less than one-third of LGROW's total organizational expenditures are committed to directly supporting member communities in meeting MS4 requirements while additional programs and activities advance broader watershed climate-resiliency goals.

Watershed organizations like LGROW exist in many regions of the country and can provide support through a variety of mechanisms to assist MS4s in achieving regulatory goals, advancing stormwater education and advocacy in the community, and fostering climate-resilient cities. The collaboration between municipalities and LGROW establish a joint commitment to ongoing education and training, data sharing, standardized procedures and policy that improve program effectiveness and reduce overall stormwater management costs for each MS4 community.

The following sections examine the MCM categories where LGROW's supported activities contributed to proportional cost savings in the Grand Rapids MS4 program illustrated in Table 3. Interestingly, more than one-third of MS4s nationwide reported an urgent need for more resources to meet compliance in public education, outreach and participation (MCM #1 & MCM #2), illicit discharge detection, and elimination (MCM #4), and post-construction site runoff control (MCM #5).²³

Public Education, Outreach, and Participation

Engaging the public as active participants in managing stormwater runoff is necessary to foster community support and gain greater compliance. The EPA acknowledges “an informed and knowledgeable community is crucial in the success of a stormwater management program”.²⁴ However even though public participation is listed first among the compliance measures, these are often the last measures considered in stormwater management. The requirement is satisfied with the implementation of a public education program to distribute educational materials, conduct outreach activities, and develop a plan for appropriate BMP approaches. The activities include forming partnerships, providing educational materials that reach diverse audiences, and developing measurable goals to achieve environmentally positive behavior changes.

Activities related to public education and participation activities will vary by region, population size, and climate patterns. Compliance with public education measures for Phase II MS4s in New Hampshire (EPA Region 1) requires delivery of two separate messages to four separate audiences to the community on relevant watershed topics. The EPA provides a page of resources to assist MS4 in messaging although no guidance on the messaging format or delivery methods are provided. In addition, MS4s in New Hampshire must implement public involvement programming that is estimated to require up to 740 staff hours or an average cost of \$60,000 per MS4 community.²⁵

Municipalities in California develop a community-specific public education and outreach program with reportable outcomes and training for municipal staff. Stormwater staff are estimated to spend approximately \$300,000 annually for activities related to implementing public education, outreach, and participation.²⁶ As a Phase I MS4, Grand Rapids is required to implement similar measures as MS4s in California but spend less than \$24,000 annually to meet its regulatory obligations for MCM #1.

Illustrated in Figure 2, approximately one percent of total expenditures by the City of Grand Rapids for stormwater management is spent on meeting public education, outreach, and participation measures. With the ability to reach diverse audiences on a range of stormwater topics, LGROW develops and implements the public education plan (PEP) and provides quality watershed education materials and programming. Member MS4s receive access to public education content to eleven public education categories and achievable implementation strategies. LGROW creates social media posts, printed and electronic materials, newsletters, signage, and staff host public events and activities that help MS4 member communities meet the educational requirements.²⁷



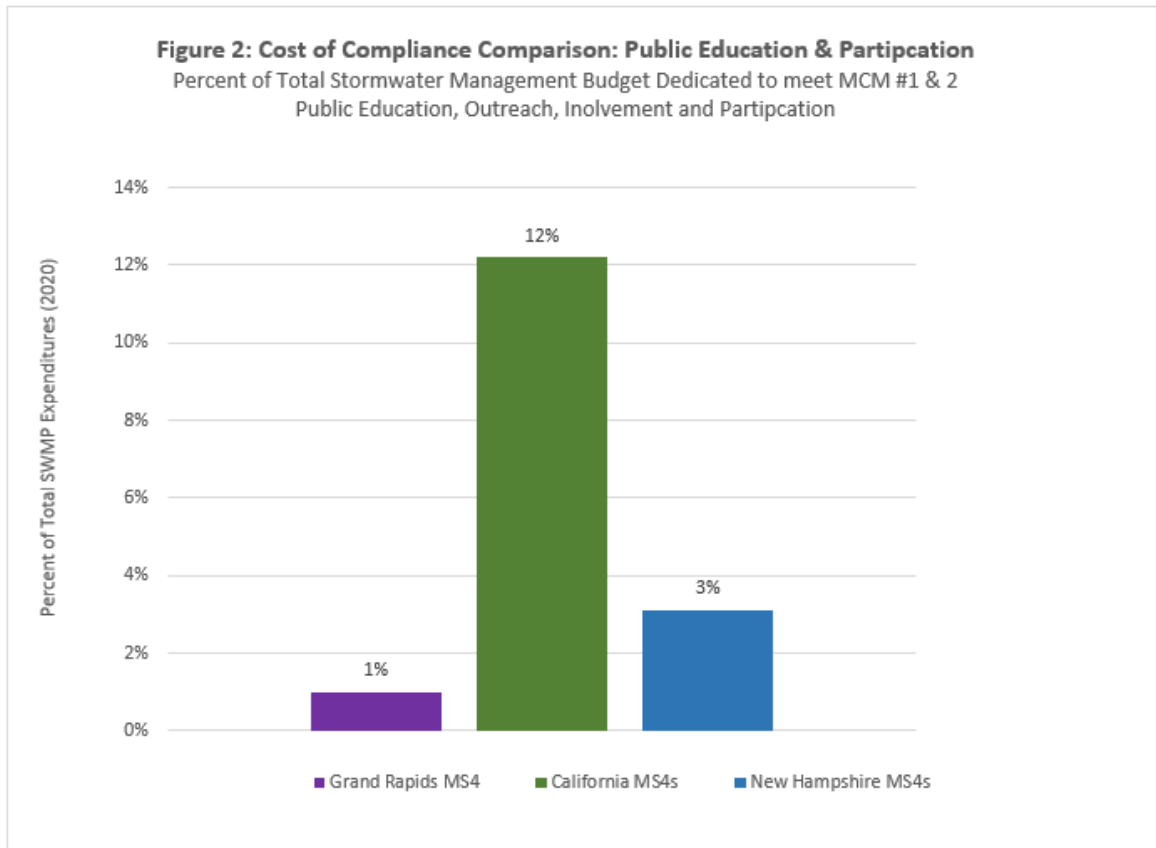
24. Public Education and Outreach Minimum Control Measure, Stormwater Phase II Final Rule, EPA, (2005)

25. Estimates reflect inflation-adjusted prices in 2020 USD. Stormwater in New Hampshire, US EPA Municipal Separate Storm Sewer System (MS4) Permit, Spring 2018

26. Estimating Benefits and Costs of Stormwater Management Part II: Evaluating Municipal Spending in California. EFC at Sacramento State, May 2020

27. City of Grand Rapids MS4 Progress Report, 2019-2020 prepared by Grand Valley Metro Council/LGROW

Figure 2: Comparing Cost of Compliance for Public Education and Participation



Grand Rapids’ municipal expenses are reduced relative to other MS4s because they rely on the City’s partnership with LGROW for the bulk of the MS4 permit’s public participation provisions. On average, each member municipality receives 3.5 weeks of annual assistance from LGROW that allows stormwater staff to reduce time spent on meeting MCM #1 and re-allocate resource capacity toward completing other stormwater management activities. An added benefit of sharing public outreach materials is ensuring community members across the watershed are receiving the same messages across MS4 jurisdictions.

In fact, all of LGROW’s member communities utilize the same PEP and related materials for consistent messaging across the watershed and encourage action to address priority concerns. LGROW also creates scheduled content for municipal leaders to easily share messages on social media platforms and public meetings to foster public engagement. LGROW’s ability to provide quality watershed education materials and programming surpass what most municipalities can achieve given limited resources and capacity.

Throughout the year, LGROW provides watershed education opportunities to K-12 schools, hosts watershed education events for the community, and promotes community-based science and service programs. The creativity in messaging and methods of engagement LGROW provides to reach community support for improving water quality exceeds the limited capacity for many municipalities and reaches a broader audience.

For example, one LGROW public outreach campaign mailed postcards to 2,500 riparian landowners in the MS4 areas to encourage riparian buffers and provided a free package of purple coneflower seeds for planting. In addition, watershed-scale programs such as [Adopt-A-Drain](#) and [Rainscaping](#) foster watershed stewardship through individual actions driven by community members.

LGROW's regional approach allows member communities to share responsibilities, communicate to broader and diverse audiences, and deliver in-person resources through the watershed. For example, despite a COVID pandemic in 2020, LGROW's public education plan work included:

- [Planted 300 trees at 2 schools](#)
- [39 Watershed Activity Videos](#)
- [50 green infrastructure site assessments](#)
- [300 attendees in Virtual workshops](#)
- [Reached more than 1,100 students](#)

Additionally, 15 communities are participating in the [Adopt-A-Drain](#) program to encourage community members to keep storm drains clear of debris resulting in more than 1,191 adopted drains in the watershed.

Illicit Discharge Detection and Elimination

The MS4 permit program requires stormsewer operators to implement an Illicit Discharge Detection and Elimination Program (IDEP, MCM #3). Activities required under the IDEP include developing, implementing, and enforcing a program to detect illicit discharges and map existing stormwater systems. MS4s in EPA Region 1, EPA Region 9, and the Grand River watershed are obligated to implement the same requirements for MCM #3. Grand Rapids spends substantially less than MS4 operators in California and New Hampshire on meeting this requirement, as shown in Figure 3.

LGROW leverages grant funding opportunities to expand watershed activities that result in water quality and quantity improvements and implement long-term strategies for communities with limited resources. Approximately 30% of LGROW's organizational expenditures are dedicated to implementing the MS4 program, which would be a substantial burden on a municipal stormwater budget. Through the collaboration, the administrative burden of managing a SWMP is spread across all the watershed, reducing LGROW's cost to provide support to approximately \$11,000 per MS4 community.

A significant portion of LGROW's support is dedicated to public education. Assuming MS4s in California allocate the same portion of expenditures for administrating the SWMP, the administrative burden for implementing MCM #1 and MCM #2 could cost more than \$25,000 per community annually, without the support from partners. LGROW's program supports MS4s in meeting specific compliance measures but the collaborative effort helps permittees achieve gains in water quality improvements that would be costly to achieve individually.

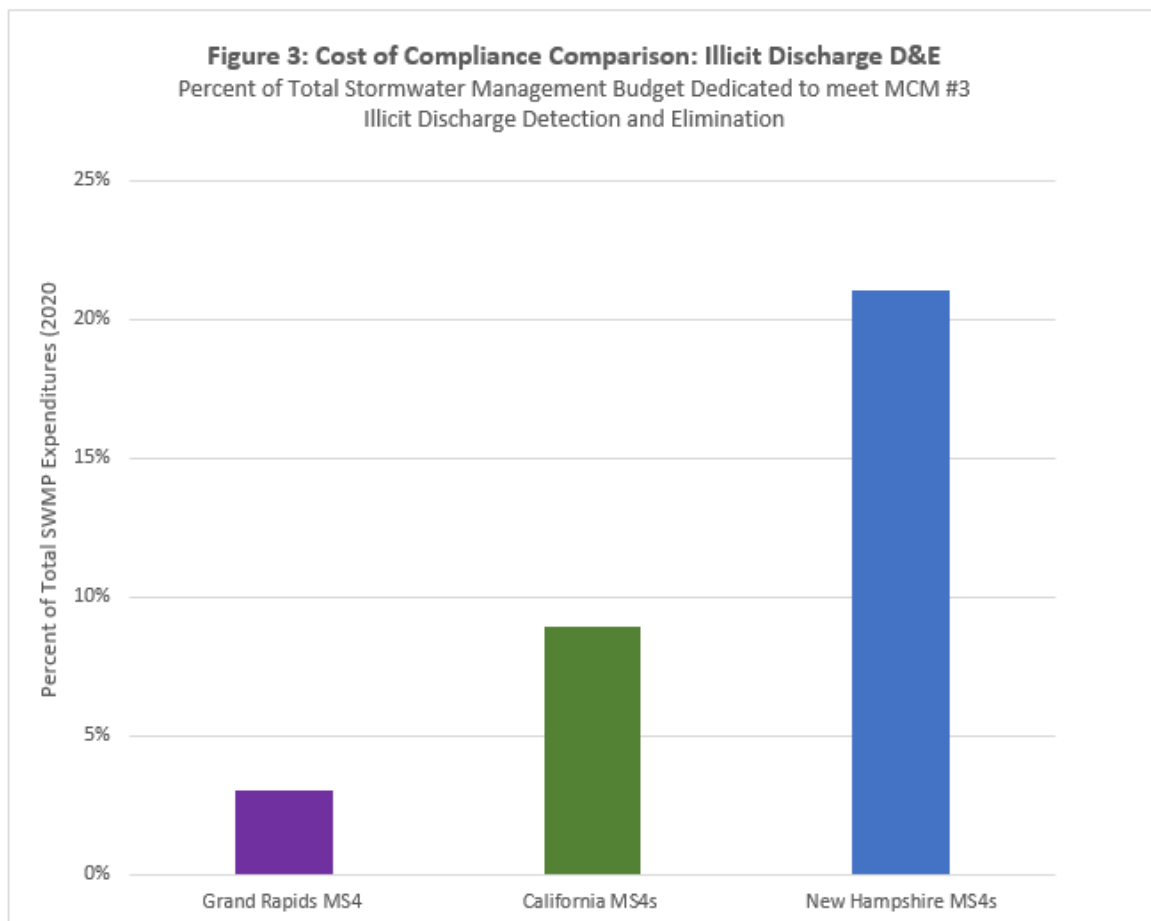


Compliance for MCM #3 includes inspecting reported potential illicit discharge and issuing enforcement actions. The EPA estimated stormwater staff in New Hampshire would dedicate more than 3500 staff hours and up to \$400,000 on average to meeting MCM #3.²⁸ Phase 1 permittees in California spend more than \$225,000 a year on expenses for developing and implementing the IDEP. Grand Rapids receives assistance from LGROW which reduces the capacity required on city staff and saves the city at least \$150,000 annually compared to MS4s in California.

LGROW's dedicated staff reduces constraints on member communities in identifying sources of illicit discharge, reducing establishing an accessible method for reporting, and educating the broader community on the hazards of dumping fluids and other items into storm sewers. The regional collaboration establishes guidance for the watershed while alleviating capacity constraints for each MS4 while offering some adaptability to fiscal demands.

During years that dry-weather screening has to be performed, LGROW staff complete the work across the watershed with minimal assistance from MS4 managers. Meeting this compliance measure in New Hampshire is estimated to consume 22% of total spending and every year.²⁹ With LGROW's support, Grand Rapids expenditures related to MCM #3 are only 3% of total program expenditures. In California's drier climate, 9% of total stormwater management expenditures are needed to implement required measures for MCM #3.

Figure 3: Comparing Cost of Compliance: Illicit Discharge Detection and Elimination



28. Stormwater in New Hampshire, EPA Fact Sheet, (2018)

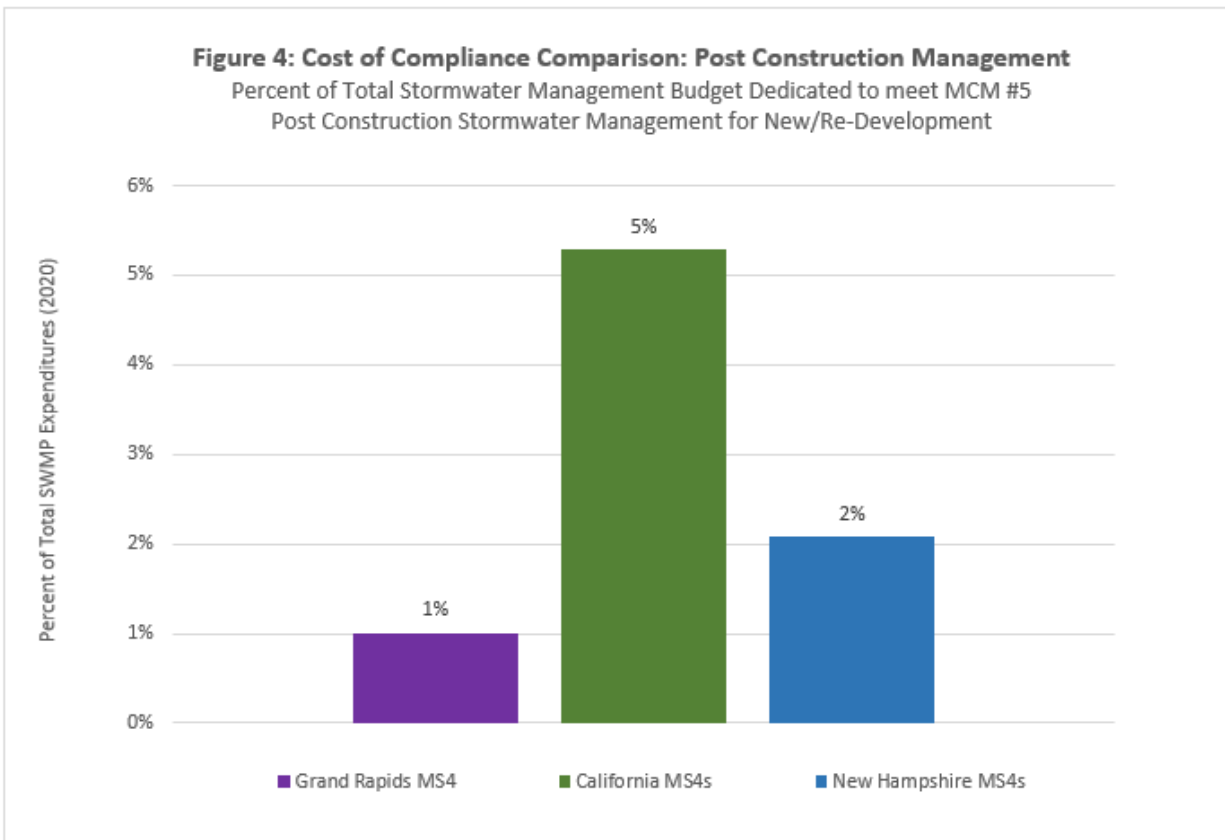
29. Stormwater in New Hampshire, EPA Fact Sheet, (2018)

Post Construction Stormwater Management for New/Re-Development

The conversion of undeveloped (or partially developed) urban properties through the real estate development process typically increases impervious cover. New and redevelopment projects that add impervious surfaces to the watershed increase the quantity of stormwater that flows into rivers and streams.³⁰ These projects also increase the type and quantity of pollutants carried in stormwater runoff. Developing, implementing, and enforcing a program that aims to reduce post-construction runoff is the “most cost-effective approach” to stormwater quality management, according to the EPA.³¹ Yet, more than 40% of MS4s surveyed by WEF are requesting more information and technical resources to assist them with meeting MCM #5, Post-Construction Stormwater Controls.³²

The estimated portion of total expenses dedicated to implementing MCM #5 is relatively small compared to the cost of meeting other compliance measures. However, on average, municipalities in New Hampshire and California are spending a larger portion of total expenditures on developing water quality treatment standards for new and redevelopment projects than Grand Rapids (Figure 4).

Figure 4: Comparing Cost of Compliance: Post Construction Stormwater Management for New/Redevelopment



30. Addressing America’s Largest Growing Source of Water Pollution: Stormwater Runoff, McMahon, M. Northwestern Institute for Energy and sustainability (2016)

31. Stormwater Phase II: Post-Construction Runoff Control Minimum Control Measure, EPA, (2005)

32. 2020 National Municipal Separate Storm System (MS4) Needs Assessment Survey, WEF Stormwater Institute, Water Environment Federation, (2021)

New and Redevelopment

The estimated cost for municipalities to implement compliance measures aimed at reducing post-construction runoff in California can range from \$130,000 to over \$500,000 annually.³³ Phase II permittees in New Hampshire are expected to spend more than 2% of the total stormwater program budget on MCM #5 requirements.

In Grand Rapids, the standards to meet water quality and quantity requirements for post-construction projects were developed through LGROW in cooperation with a technical committee of stormwater managers and engineers. LGROW also developed a model stormwater ordinance for the MS4 member communities to easily implement updated requirements into municipal codes and are working toward developing a system for tracking long-term maintenance and inspections. Compared to MS4s in California, Grand Rapids saves more than \$100,000 a year on the post-construction runoff control program.

The support to meet MCM #5 provided by LGROW improves efficiency in project permitting by streamlining the process for plan review. The training provided to both municipal agencies and the private developer community help overcome the hesitancy in green infrastructure adoption and ongoing maintenance. LGROW also helps track project implementation in the MS4 for annual reporting.

To advance green infrastructure implementations on new and redevelopment projects, LGROW created a Design Spreadsheet to ease design decisions for developers as they determine how to meet requirements. The Design Spreadsheet also streamlines the permit process for the private sector reducing the project timeline and saving money by reducing project revisions.



Conclusion

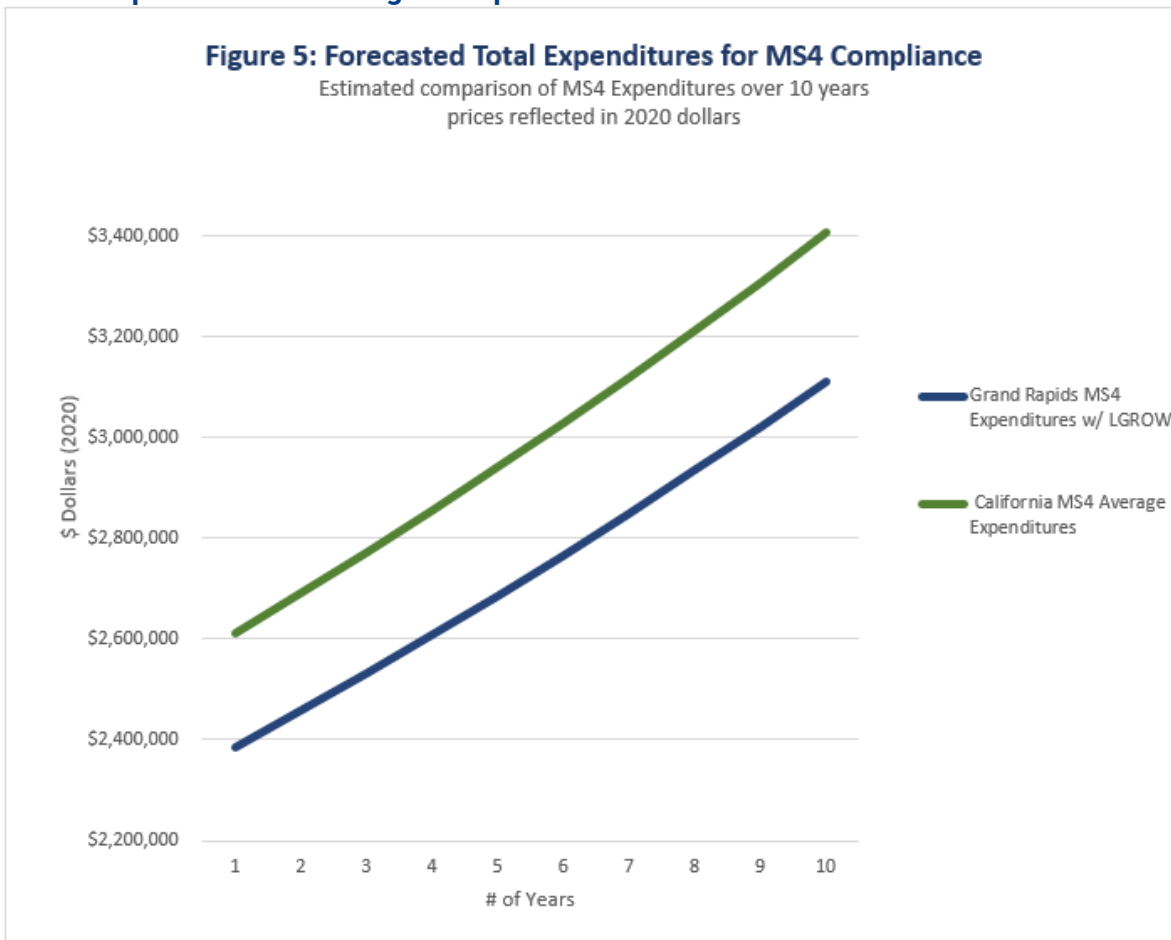
MS4 operators frequently must manage stormwater systems with insufficient budgets and staff capacity. Partnerships with local NGOs and other entities can provide opportunities for improved efficiency in stormwater management to expand the abilities of local stormwater agencies and reduce water quality and flooding impacts. Non-traditional partners assist MS4 compliance in developing and implementing stormwater management plans, creating and deploying public education, outreach and participation activities, prioritizing actions to advance compliance goals and coordinating multiple agencies on long-term climate resiliency planning for the watershed.

Through collective action, MS4s across 23 municipalities in the Lower Grand River watershed have reduced capacity strains and eased the fiscal burdens associated with meeting their MS4 regulatory obligations. LGROW's impressive outreach activities assist MS4 member communities in implementing long-term strategies to achieve water quality improvements through improved stormwater management

33. Estimating Benefits and Costs of Stormwater Management Part II: Evaluating Municipal Spending in California. EFC at Sacramento State, May 2020

Due to this regional partnership created by LGROW, overall stormwater management costs are slightly lower in Grand Rapids compared to MS4s in California (Figure 5). With the support of LGROW, the City of Grand Rapids can devote a larger portion of its stormwater management budget toward water quality monitoring, long-term planning, and other priorities. If funding allocated for stormwater management program budgets remains the same over the next ten years, our analysis suggests that the estimated cumulative savings for Grand Rapids stormwater management program cost is over \$2.5 million as a result of LGROW’s continued support.

Figure 5: Comparison of MS4 Program Expenditures Over 10 Years³⁴



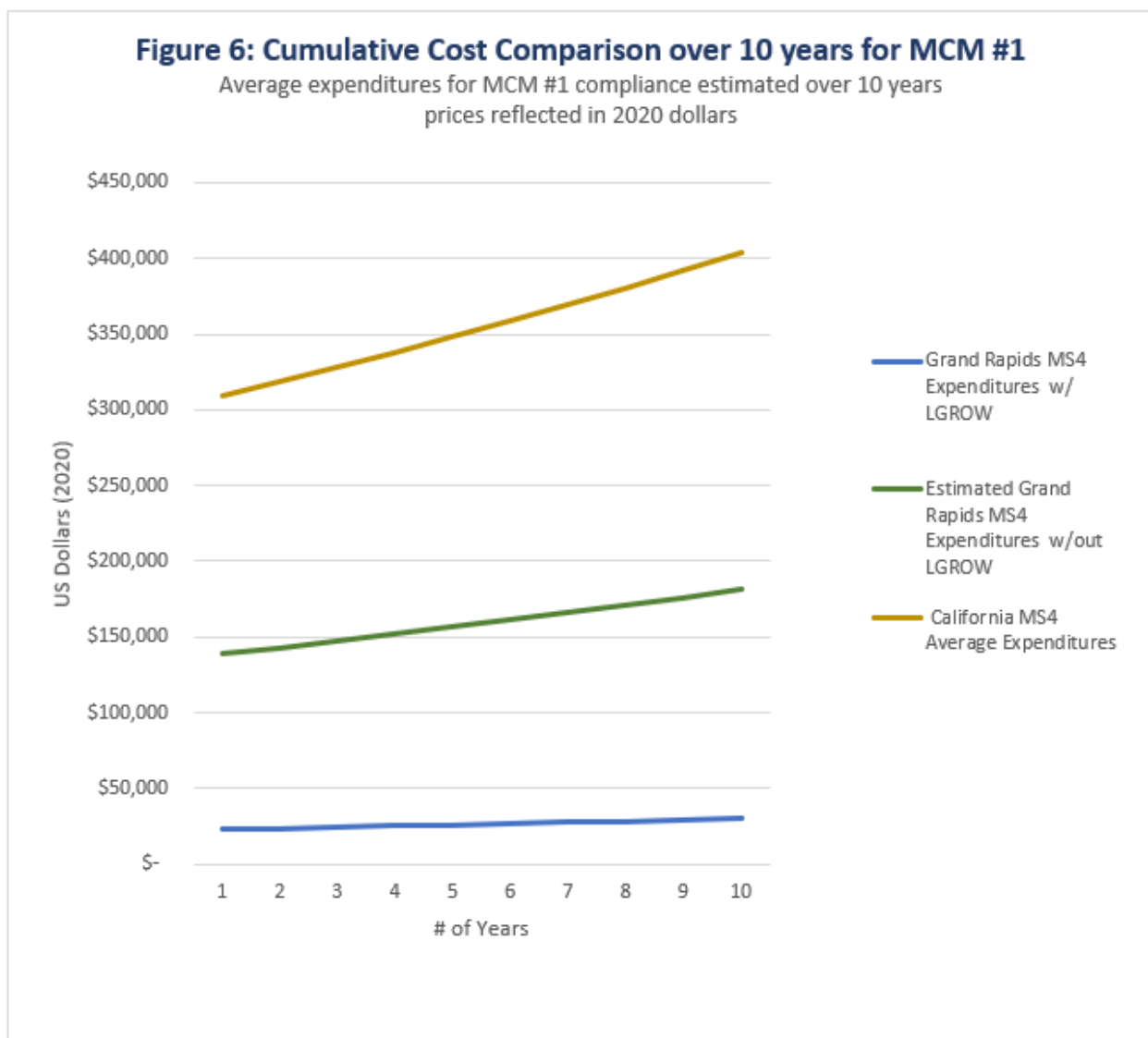
Specifically, LGROW’s support for meeting regulatory obligations for MCM #1 results in sustainable savings over time. Figure 6 illustrates the average annual expenditures for MS4s to comply with MCM #1 over ten years, provided allocations for stormwater expenditures remain the same. Through the LGROW partnership, the City of Grand Rapids saves more than \$320,000 in annual expenses to meet requirements for MCM #1 compared to MS4s in California, and nearly \$40,000 less than the smaller Phase II MS4s spend in New Hampshire. Figure 6 also illustrates Grand Rapids’ estimated annual expenditures to meet MCM #1 without the support of LGROW.

Municipalities across the country are turning toward non-profits and community organizations in a partnership to address stormwater discharge through education outreach and green infrastructure implementation projects. Yet, the financial gap hinders many MS4s from implementing sustainable solutions to address the impacts of climate change and protect communities. Through partnerships with the private sector, MS4s can reduce budgetary constraints and increase efficiency to achieve stormwater management goals.

34. Forecasted program expenditures are adjusted for average annual inflation per CPI Index (3%)

Further analysis examining MS4s costs that are closely similar in regulatory obligations, population, and climate would provide further details to determine efficiency gains. For this study, the simple comparison suggests partnering with the private sector has the potential to improve capacity in stormwater management and expand public stewardship toward achieving long-term climate resiliency goals. Although partnerships may alleviate some fiscal strains associated with implementing a stormwater management plan, communities lack significant funding to achieve water quality improvements and flood protections necessary to address the urgent threats of climate change. For municipalities in Michigan where stormwater utilities are not currently feasible, the fiscal flexibility and added capacity from partnerships can ease programmatic constraints and advance water quality improvements across the watershed.

Figure 6: Forecasted Expenditures for MCM #1 Compliance³⁵




35. Forecasted program expenditures based on current costs and adjusted for average annual inflation per CPI Index 2020 (3%)

Appendix A: Summary of LGROW's Activities to Support Member's MS4 Compliance.

LGROW Activity	Description	Applicable MCM
Stormwater Management Plan (SWMP)	<ul style="list-style-type: none"> Facilitate the process for implementing SWMPs 	Overall Permit Compliance
Public Education Plan (PEP) & Public Participation	<ul style="list-style-type: none"> Promote, publicize, and facilitate watershed education and foster stewardship Provide public outreach, workshops, events, and training Track and report progress on public participation activities 	MCM #1 + MCM #2
Illicit Discharge Elimination Plan (IDEP)	<ul style="list-style-type: none"> Develop, implement and enforce a program to detect and eliminate illicit connections and discharges to MS4s Model IDEP including dry weather screening Encourage partnerships to reduce sampling points 	MCM #3
Municipal Separate Storm Sewer System (MS4) Training	<ul style="list-style-type: none"> Training on a variety of topics specifications in the SWMP 	MCM #4 + MCM #6
Model Ordinances and Strategies	<ul style="list-style-type: none"> Provide model stormwater ordinance needed for permit compliance. 	Overall Permit Compliance

Appendix A cont: Summary of LGROW's Additional Assistance to MS4 Members

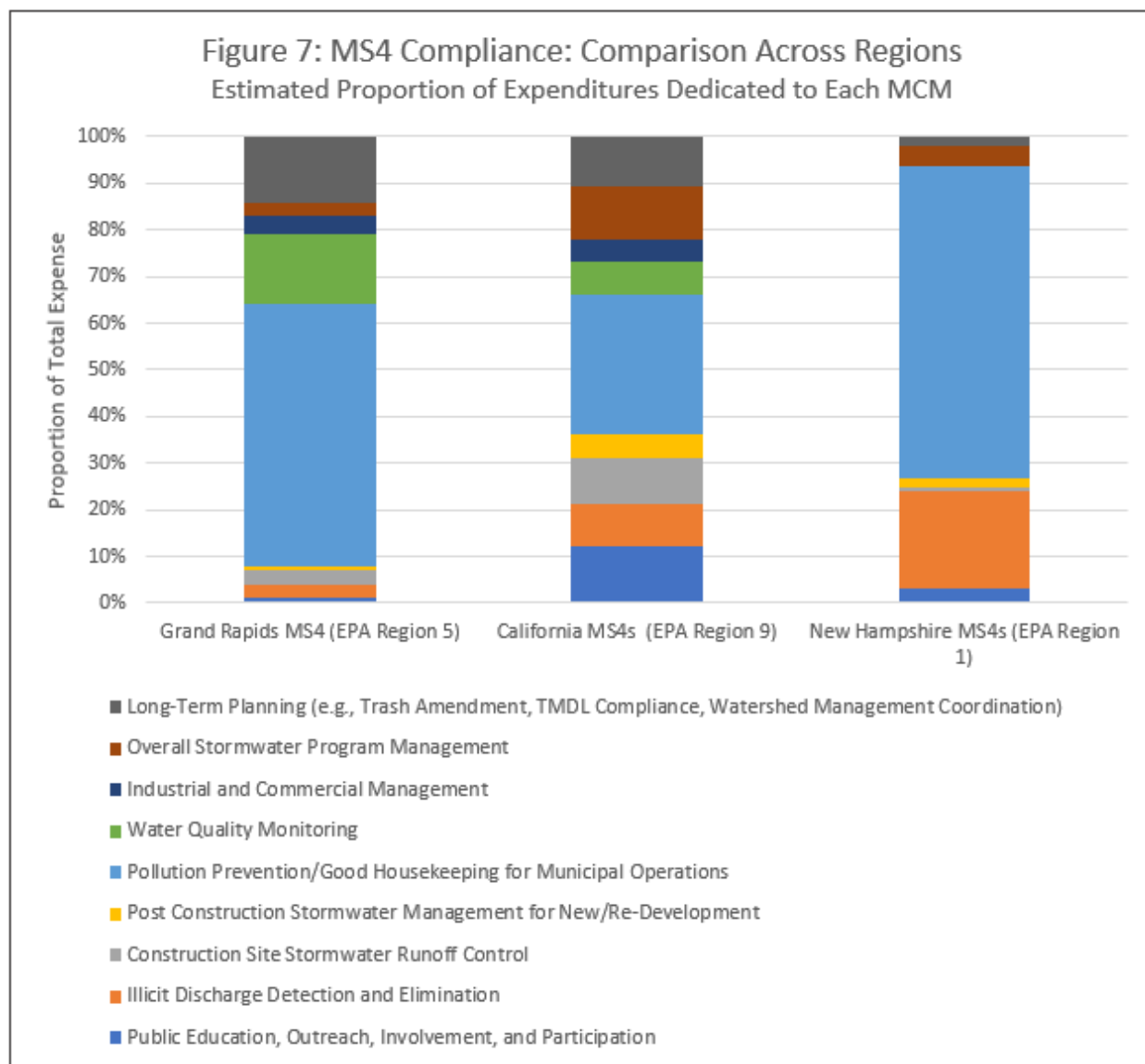
LGROW 's Additional Assitance	Description	Applicable MCM
Progress Reports	<ul style="list-style-type: none"> • Collect available water monitoring data • Prepare and submit progress reports 	Overall Permit Compliance
Audits	<ul style="list-style-type: none"> • Provide aid in case of of an audit 	Overall Permit Compliance
Public Participation	<ul style="list-style-type: none"> • Public outreach through workshops, events, and training • Track and report progress on public participation activities 	MCM #2
Permit Applications and Individual Permit Issuance	<ul style="list-style-type: none"> • Assist in transition to revised or new permits 	Overall Permit Compliance
Enforcement Response Procedure	<ul style="list-style-type: none"> • Develop approvable procedures for enforcement • Create system to track, record, and respond to violations 	Overall Permit Compliance
Stormwater Development and Redevelopment Standards	<ul style="list-style-type: none"> • Develop standards to reduce stormwater runoff related to post-construction activities • Develop a tracking system for long-term maintenance and inspections 	MCM #5
Total Maximum Daily Load (TMDL) Implementation	<ul style="list-style-type: none"> • Coordinate activities to collectively address water quality impairments 	Overall Permit Compliance
LGROW Network	<ul style="list-style-type: none"> • Connect to a wide network of technical advisors, environmental and community leaders 	 BONUS

Appendix B: Estimated Cost Comparison for MS4 Compliance Across Regions.

Appendix B: Estimated Cost Comparison for MS4 Compliance in Grand Rapids, New Hampshire, and California			
MCM #	Description of Minimum Control Measure	Range of Average Annual Cost (2020)	
		Low	High
1 & 2	Public Education, Outreach, Involvement, and Participation	\$ 23,000	\$ 310,000
3	Illicit Discharge Detection and Elimination	\$ 69,000	\$ 418,500
4	Construction Site Stormwater Runoff Control	\$ 14,000	\$ 247,500
5	Post Construction Stormwater Management for New/Re-Development	\$ 24,000	\$ 134,000
6	Pollution Prevention/Good Housekeeping for Municipal Operations	\$ 763,000	\$ 1,333,000
	Water Quality Monitoring	\$ 175,500	\$ 348,000
	Industrial and Commercial Management	\$ 92,000	\$ 124,000
	Overall Stormwater Program Management	\$ 69,000	\$ 289,000
	Long-Term Planning (e.g., Trash Amendment, TMDL Compliance, Watershed Management Coordination)	\$ 42,000	\$ 325,000
TOTAL COST		\$ 1,271,500	\$ 3,529,000

**Average estimated costs were retrieved from data sources that normalized cost based on population. Estimates are adjusted for inflation to reflect prices in 2020 USD. Sources for estimated expenditures for stormwater program cost were retrieved from MS4 expenditures reported by MSAs in New Hampshire (EPA in Region 1), California (EPA in Region 9), and the City of Grand Rapids Stormwater Annual Report (2021) (EPA Region 5) were used in the analysis and described in Section 2.*

Appendix C: Comparison of Proportional Expenditures for Each MCM across Regions.



Shanyn Viars
American Rivers
www.americanrivers.org

Cara Decker
Lower Grand River Organization of Watersheds
www.lgrow.org

