# Structural Planning and Design for Optimizing Operations and Maintenance for Stormwater Control Measures


*Jennifer Drake*

*Andrew Erickson*

*Lee Sherman*

*Stephanie Gaines*

*Holly Piza*

*Sarah Waickowski*

*Ryan Winston*

*Rachel Biller*

*Frank Cheng*

*Melissa Turcotte*

*Joseph Venzon*

*Elizabeth Fassman-Beck*

*Kenneth Schiff*



SOUTHERN CALIFORNIA COASTAL WATER RESEARCH PROJECT

Technical Report 1474

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Jennifer Drake[1], Andrew Erickson[2], Lee Sherman[3], Stephanie Gaines[4], Holly Piza[5], Sarah Waickowski[6], Ryan Winston[7], Rachel Biller[8], Frank Cheng[8], Melissa Turcotte[8], Joseph Venzon[8], Elizabeth Fassman-Beck[9], Kenneth Schiff[9]

*[1]Carleton University, Ottawa, ON, Canada*

*[2]University of Minnesota, Minneapolis, MN*

*[3]City of Austin, Austin, TX*

*[4]County of San Diego, San Diego CA*

*[5]Mile High Flood District, Denver, CO*

*[6]Clemson University, Clemson, SC*

*[7]Ohio State University, Columbus, OH*

*[8]Los Angeles County Department of Public Works, Alhambra, CA*

*[9]Southern California Coastal Water Research Project, Costa Mesa, CA*

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Workshop participants from left to right: Ken Schiff (SCCWRP, Facilitator), Stephanie Gaines (County of San Diego), Melissa Turcotte (Los Angeles County Dept of Public Works), Lee Sherman (City of Austin), Rachel Biller (Los Angeles County Dept of Public Works), Elizabeth Fassman-Beck (SCCWRP, Facilitator), Sarah Waickowski (Clemson University), Ryan Winston (Ohio State University), Andy Erickson (University of Minnesota), Holly Piza (Mile High Flood District), Jennifer Drake (Carleton University), Frank Cheng (Los Angeles County Dept of Public Works), Joe Venzon (Los Angeles County Dept of Public Works).

# WORKSHOP SUMMARY

Stormwater control measures (SCMs) – also known as structural Best Management Practices (BMPs) – are one of the key tools for controlling stormwater runoff quality and quantity. Los Angeles County is spending hundreds of millions of dollars each year - either directly or through grants - to design and build SCMs. To ensure these capital investments function optimally and last as long as possible, each SCM has operations and maintenance (O&M) requirements. However, O&M requirements are often not rigorously considered during the planning and design phases of SCM implementation, hampering the ability of O&M crews to efficiently do their jobs, driving up O&M costs, and shortening the lifespan of the constructed SCMs.

To address O&M considerations in design, planning, and post-construction for Los Angeles County, seven stormwater SCM thought leaders from across North America were invited to southern California for a two-day SCM O&M Workshop in January 2026. The charge given to the Workshop experts was to *identify and prioritize recommendations for improving the effectiveness and efficiency of SCM designs for post-construction operations and maintenance*. This report documents the Workshop experts' consensus recommendations.

After brainstorming more than 60 different ideas, Workshop experts distilled, refined, and prioritized their list to 13 recommendations (Figure A), grouped into five categories:

1. **Communication and Training:** Focus is on building knowledge, shared understanding, and coordination among staff.
2. **Design Aspects and Features:** Emphasis on how SCMs should be planned and designed to support long-term maintenance.
3. **Monitoring and New Technology:** Describes how data and tools can improve maintenance timing and decision-making.
4. **Contracting and Funding:** Emphasis on project delivery, accountability, and securing sustainable financial resources.
5. **Safety:** Highlight that SCMs can/should be designed as accessible and safe for both workers and the public.

Some recommendations are ready for implementation within a relatively short amount of time (i.e., 1-2 years), while other recommendations may take longer to develop, perhaps utilizing pilot implementation prior to widespread utilization.

Importantly, not all recommendations are independent, and many are inter-dependent (Figure A). For example, communication and training support all four of the other categories of recommendations. Only a handful of recommendations are so inter-dependent that they should be implemented sequentially.

Regardless of category and timing, all the recommendations are worthwhile endeavors to improve O&M effectiveness and efficiency, likely substantially reducing costs and helping SCMs perform years to decades longer. Finally, Workshop experts recommend a repeat of this Workshop in 3-5 years to help assess if initial implementation can be refined and upgraded for maximum benefit to Los Angeles County.

**Figure A. List of workshop recommendations. Filled cells with an X indicate where two recommendations are related.**

| Project | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | #9 | #10 | #11 | #12 | #13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| #1: Comprehensive training and workforce development | | X | X | X | X | X | X | X | | | | X | X |
| #2: Communication materials to develop common expectations | | | X | X | X | X | | X | | X | X | X | X |
| #3: Break down silos to improve SCM designs | | | | X | X | X | | X | X | X | | X | X |
| #4: Keep it simple for SCM design and O&M | | | | | X | X | X | X | X | X | X | X | |
| #5: Make it successful by focusing on intent | | | | | | X | X | X | X | X | X | X | X |
| #6: Make it easy by reducing O&M burden | | | | | | | X | X | X | | | X | X |
| #7: Use remote sensors to trigger O&M | | | | | | | | X | | X | X | | |
| #8: Create a robust metric to predict O&M effort | | | | | | | | | | | X | X | X |
| #9: Explore alternative delivery approaches | | | | | | | | | | X | X | | |
| #10: Create a structured handoff process | | | | | | | | | | | X | | |
| #11: Contractor pay for performance | | | | | | | | | | | | X | X |
| #12: Create project access standards | | | | | | | | | | | | | X |
| #13: Incorporate O&M safety protocols into design | | | | | | | | | | | | | |

# List of Acronyms

AI: Artificial intelligence

BMP: Best management practice

CIP: Capital improvement plan

CMAR: Construction Manager At-Risk

LACDPW: Los Angeles County Department of Public Works

O&M: Operations and Maintenance

PDB: Progressive Design-Build

SCCWRP: Southern California Coastal Water Research Project

SCM: Stormwater Control Measure

# TABLE OF CONTENTS

# INTRODUCTION

Stormwater control measures (SCMs) – sometimes referred to as structural best management practices (BMPs) – are a critical management option for protecting the region's receiving waters. Every watershed in Los Angeles County has a Water Quality Improvement Plan approved by the State of California for capturing and/or treating stormwater, and all these plans include SCMs. This link between SCMs and receiving waters is a fundamental path towards restoring the region's beneficial uses (e.g., body contact recreation, aquatic life use, etc.) that are adversely affected by urban stormwater.

SCMs are a significant investment for municipalities. Los Angeles County spends several hundred million dollars on SCM planning, design, and construction every year, either through its own initiatives or as part of the Safe Clean Water Grant Program. The total cost for planning, designing, and constructing SCMs to restore beneficial uses across Los Angeles County was estimated to be $20 billion over 20 years in 2015[1].

Operations and maintenance (O&M) of SCMs post-construction is an essential component to ensure the reasonable effectiveness and longevity of SCMs. Unfortunately, a unified O&M program does not exist across the many municipal-owned SCMs throughout Los Angeles County. The status of O&M for private SCMs is even less understood. Poor performing SCMs due to lack of O&M have been shown to dramatically decrease treated volume due to bypass, reduced infiltration rates due to clogging, and diminished treatment effectiveness due to old biofiltration media[2]. This can reduce the effective life of an SCM that is typically anticipated to last 20-30 years or more.

One method to ensure O&M yields the strongest possible return on investment is to incorporate considerations for O&M during the SCM planning and design stages. All to often, seemingly straightforward O&M issues such as access, safety, training, frequency, and funding become needlessly challenging because post-construction O&M needs were not fully considered during the SCM planning process.

[1] Authorization To Submit Enhanced Watershed Management Programs On Behalf Of The Los Angeles County Flood Control District, Letter to the California State Regional Water Quality Control Board, Dated May 26, 2015.

[2] Winston, R. J., Dorsey, J. D., Smolek, A. P., & Hunt, W. F. (2018). Hydrologic performance of four permeable pavement systems constructed over low-permeability soils in Northeast Ohio. Journal of Hydrologic Engineering, 23(4), 04018007

# Objective

The objective of this document is to provide recommendations on how best to incorporate O&M into SCM planning and design to make O&M more cost-effective, easier, and efficient. These recommendations were developed by a group of seven SCM thought leaders from across North America that came together during the two-day SCM O&M Workshop at the Southern California Coastal Water Research Project (SCCWRP). The recommendations are meant to provide Los Angeles County with a path forward to implement an improved and streamlined SCM design process and O&M program.

# Methods

To develop SCM O&M planning and design recommendations, Los Angeles County brought together seven national thought leaders on SCMs from across North America (Table 1). These expert panelists have deep knowledge on a variety of SCMs, a range of geographies and climates, widely varying O&M approaches, and an array of O&M successes and failures. Altogether, the seven experts cumulatively have more than 160 years of stormwater and SCM experience, spanning topics including planning, design, construction oversight, research, and O&M.

Also included in the Workshop were five Los Angeles County Department of Public Works (LACDPW) staff in Watershed Compliance, Design, and O&M.

The two-day Workshop was held at the Southern California Coastal Water Research Project (SCCWRP) on January 12-13, 2026. The Agenda can be found in Appendix A.

**Table 1. Participants in Los Angeles County's SCM O&M Workshop, held in person January 12-13, 2026.**

| Name | Affiliation | Location |
|---|---|---|
| Workshop Panelists | | |
| Andrew Erickson | University of Minnesota | Minneapolis, Minnesota |
| Sarah Waickowski | Clemson University | Georgetown, South Carolina |
| Ryan Winston | Ohio State University | Columbus, Ohio |
| Jennifer Drake | Carleton University | Ottawa, Ontario |
| Holly Piza | Mile High Flood District | Denver, Colorado |
| Stephanie Gaines | San Diego County | San Diego, California |
| Lee Sherman | City of Austin | Austin, Texas |
| LACDPW Staff | | |
| Joe Venzon | Los Angeles County DPW | Alhambra, California |
| Frank Cheng | Los Angeles County DPW | Alhambra, California |
| Rachel Biller | Los Angeles County DPW | Alhambra, California |
| Melissa Turcotte | Los Angeles County DPW | Alhambra, California |
| Valerie Esparza | Los Angeles County DPW | Alhambra, California |
| Facilitators | | |
| Ken Schiff | SCCWRP | Costa Mesa, California |
| Elizabeth Fassman-Beck | SCCWRP | Costa Mesa, California |

The Workshop participants were given two charge questions to guide their deliberations:

- **Identify and prioritize recommendations for improving the effectiveness and efficiency of SCM designs for post-construction O&M.**
- **Document these recommendations in a Workshop recommendations report.**

The Workshop used a five-step sequence to address the charge questions:

1. Each expert presented a short case study on their successful (or unsuccessful) experiences with SCM O&M.
2. The experts brainstormed as many recommendations for improving O&M planning and design as possible.
3. The experts categorized and refined their long list of brainstormed recommendations.
4. Small breakout groups were assembled to further flesh out each of the recommendation categories, followed by a full group discussion.
5. The small breakout groups drafted write-ups for each of their recommendations.

The written recommendations were reviewed and approved by all Workshop attendees. Thus, this Workshop report, drafted based on the written recommendations, reflects the consensus of all Workshop attendees.

# O&M Planning and Design Recommendations

Workshop participants initially brainstormed 64 different SCM O&M planning and design needs, then whittled them down to 13 priority O&M planning and design recommendations codified in this Workshop report. The 13 recommendations are organized around five themes:

- Communication and training
- Design aspects and features
- Monitoring and new technology
- Contracting
- Safety

For each of the 13 recommendations, a problem statement is highlighted, followed by specific recommendation(s) to address the issue, and a conceptual scope of work for how to implement the recommendation.

Note that the 13 recommendations and the five themes are not presented in any particular priority order.

# Communication and Training

Communication and training are foundational building blocks for improving SCM planning and design. Enhancing communication and training among designers, plan reviewers, land development engineers, project managers, field crews, and decision-makers will help ensure robust, critical interactions are taking place at key junctures to maximize the long-term effectiveness and efficiency of SCM O&M.

**Recommendation #1: Invest in comprehensive SCM O&M training and workforce development for designers, project managers, field crews, and decision makers**

*Problem Statement*

SCM professionals do not interact and coordinate enough with one another to ensure SCMs are consistently well-constructed, high-performing, and long-lasting. Because successful SCM O&M requires specialized techniques and technologies, specialized training (either in-person or through online modules) is needed for end users to understand the fundamental maintenance needs across the large range of SCMs being implemented, and how O&M relates to initial engineering design. Not only are trainings needed for a wide range of SCM types, but trainings also need to be adapted and customized to meet the needs of a wide variety of audiences, including design engineers, plan reviewers, land development engineers, project managers, decision makers/funders, and O&M field crews. These trainings will help close communication gaps and ensure a high level of competency and coordination among all SCM professionals regarding O&M issues.

*Recommendation*

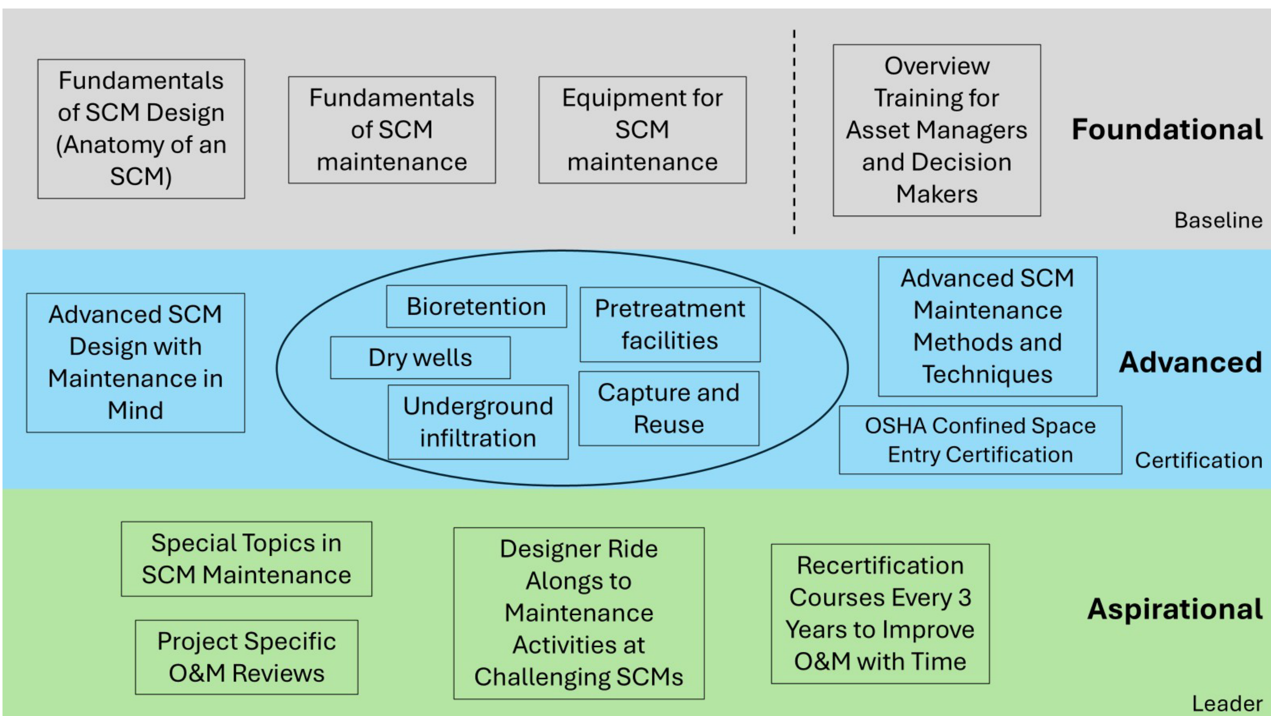
A menu of modular trainings with three different tracks should be developed to meet the needs of SCM O&M audiences. The first track (fundamentals) should include foundational training that covers: (1) fundamentals of SCM design (i.e., anatomy of an SCM), (2) fundamentals of SCM maintenance (i.e., what maintenance tasks are needed for different SCMs?), and (3) equipment used for SCM maintenance. This common foundation will ensure that all parties can communicate effectively across their different SCM O&M roles. Professionals should have the option to take these trainings at their own pace to ensure they do not result in reduced daily productivity; the trainings also should be combined so that a longer, full-day short course can be offered.

The second track (certification) and third track (creating O&M leaders) should consist of advanced training, including advanced SCM design with maintenance in mind (for designers), and advanced maintenance techniques (Figure 1). This training should include best practices for routine and non-routine maintenance and frequency of maintenance to ensure proper SCM function. Re-certification workshops should also be developed for specific SCMs on a periodic (e.g., three year) cycle to ensure designers and maintainers continue their communication on the latest advances in O&M practices.

*Conceptual Scope*

Training should be developed in phases, building curriculum that starts with capturing basic information, and then expanded over time to encompass more complex information, including local case studies. Champions should be identified to lead each training and develop content in collaboration with colleagues skilled in SCM O&M. Track 1 fundamentals training should be developed and implemented within 6 months. Advanced training (Tracks 2 and 3) is expected to take at least 12 months to develop. A large challenge is the "certification" track, identifying who and how the certification will be documented.

**Figure 1. Example SCM O&M training program, with three levels of training and multiple modules per level.**



**Recommendation #2: Develop visual companions, fact sheets, and communication materials to provide accessible, standardized best practices for SCM O&M**

*Problem Statement*

In the absence of standardized, relevant, and accessible SCM O&M guidance, designers and O&M staff have developed and utilized their own reference materials. Sometimes designers even base their designs on O&M guidance that is incompatible with what their O&M colleagues are doing in the field. This can lead to inconsistent and/or incomplete maintenance.

*Recommendation*

Standardized, relevant, accessible reference guides and/or fact sheets should be developed that contain basic information about SCM systems, and distributed to all personnel involved in SCM O&M. One version of these written guides should be specific to each individual SCM and should be limited to one page, front and back. The front side should provide quick reference information regarding SCM design/components and their primary function, and the back side should include maintenance tasks, such as access, plants, three-dimensional renderings, and other critical information.

Additionally, for bioretention and constructed wetland systems specifically (and any other vegetated SCM), additional guides should be developed that specify planting plans, including a menu of plant options. These guides should highlight lists of appropriate new or replacement plants, the need to limit the number of plant species utilized to simplify maintenance, identify common weeds and invasive species, and explain how to prune and perform other landscape maintenance related to plants.

For complex underground assets, digital twin models in three-dimensional augmented reality should be developed. Digital twins, which are already a common practice for wastewater treatment systems, can be used to inform maintenance staff of potential hazards prior to entering a confined space, prepare for specific maintenance activities, and identify potential maintenance challenges.

*Conceptual Scope*

Reference guides covering each SCM type should be developed over the short term (i.e., 6 months), and then a new fact sheet specific to individual SCMs should be developed as the construction of each SCM is completed. These fact sheets should be revised over time as maintenance staff use them in the field. Digital twin development, which should be done only for complex underground projects, is expected to take longer, with a 3-dimensional model of the system created during the design process on an as-needed basis. The digital twin model should be updated post-construction with any field calls or changes made during construction using as-built data.

**Recommendation #3: Foster internal collaboration, create feedback loops, and break down silos to improve SCM design with O&M in mind**

*Problem Statement*

SCMs are often designed without consideration of how to conduct long-term maintenance. Existing work structures around SCM O&M are focused on specific tasks and are typically highly siloed within most municipal agencies. Design engineers may spend a year on design without interacting with maintenance personnel, and/or may not fully understand maintenance equipment or techniques. Furthermore, staff who are focused on life-cycle costs may not understand best maintenance practices and how design choices affect long-term O&M costs. The lack of interaction and cross-training among various professionals involved in SCM design, construction, and O&M creates inefficiencies, increases overall cost, and reduces the ability to evolve the most effective and efficient O&M techniques and technologies. These inefficiencies are consequential, as O&M may cost more than design and construction over the lifetime of an SCM.

*Recommendation*

The trainings and materials developed in Recommendations #1 and #2 above should be used to break down siloes and foster collaboration between the many professionals working towards a similar goal. Furthermore, a workflow should be developed for every project at the 0%, 30%, 60%, and 90% marks that include having specific conversations related to O&M between the maintenance crew lead and design engineers to inform design with maintenance in mind. The goal of these conversations should be to identify and effectively incorporate design features and opportunities that facilitate cost-efficient O&M. These design phase conversations should be matched with a post-construction briefing between design engineers and maintenance crews to assess how well a SCM is performing.

"O&M ride-alongs" should be developed where design reviewers and asset managers go to field sites to observe O&M activities firsthand. The goal of these ride-alongs is to help break down siloes by increasing design reviewers' understanding of maintenance burdens, which can lead to better cost estimates, additional design insights, and more valuable interactions with consultants and contractors to implement best designs for maintenance.

*Conceptual Scope*

O&M ride-alongs should be accomplished on an ad-hoc basis, especially for projects that have critical maintenance needs. The feedback should be rapidly incorporated into SCM design, with reviews at critical junctures cumulatively requiring just a few person-hours of extra effort. The post-construction briefings, once implemented, should last less than a half-hour. This recommendation, which is relatively low-hanging fruit, should become easier as Recommendations #1 and #2 are implemented.

# Design Aspects and Features

Given the variety of SCM types in Los Angeles County and the wide range of landscape-specific design attributes, it is not practical to generate a comprehensive list of specific, detailed design recommendations to optimize O&M-related activities – nor would such recommendations be useful to practitioners. Thus, the Workshop experts agreed that recommendations regarding design aspects and features should focus on conceptual guidance and provide an overall philosophy for O&M intended to influence future SCM designs. Practically speaking, this conceptual guidance could be catalogued into case-studies or retrospectives, perhaps for the training modules in Recommendation #1.

The following three recommendations follow a straightforward logical path towards conceptual guidance. First, keep design and maintenance activities simple. Second, focus on the intent of individual components within the SCM and how they contribute to making the SCM design for O&M successful. And third, reduce the maintenance burden by using designs that make O&M easy.

**Recommendation #4: Keep designs and associated maintenance activities (including equipment requirements) simple to reduce the overall maintenance and compliance burden**

*Problem Statement*

The maintenance burden for SCMs often outweighs available resources, with SCM professionals requiring substantial funds, personnel, equipment, and expertise to maintain the plethora of SCMs within their jurisdictions. Moreover, complicated designs and multiple variations of designs for the same type of SCM create even more challenging, site-specific maintenance regimes. To reduce the burden and increase efficient use of available resources, stormwater managers need simplified designs and efficient maintenance activities, including an approach to design and maintenance that is consistent, streamlined, and easy to transfer to new personnel.

*Recommendation*

To help SCM practitioners get more done with the resources at hand, the following recommendations should be implemented: 1) standard designs with associated maintenance plans should be developed; 2) design variations should be limited to a relative few, pre-approved designs for each SCM; 3) project placement should consider maintenance access and ease of maintenance; and 4) SCMs that require simpler equipment and training requirements for O&M activities should be given preference during the design phase for the desired level of performance.

Developing standard designs with associated maintenance plans and activities will substantially reduce variability, increase efficiency, and reduce the overall maintenance burden for responsible parties. Limiting design variations will also speed up the approval process if a pre-approval list and process are implemented. For example, curb inlet designs vary substantially, but a few standard designs that work for most typical street designs would reduce variability, inconsistency, and improve long-term success. To allow for designer and contractor innovation, site-specific designs should be allowed and approved on a case-by-case basis, but once approved, an associated and specific maintenance plan must be developed and approved in conjunction with the design. Approved variations should be documented and added to a standard design resource library.

In addition, the scale and placement of SCMs within the watershed should be optimized to increase maintenance efficiency and reduce the overall burden. For example, large regional SCMs with dedicated maintenance plans and access may require more effort per visit, but will require less overall maintenance effort compared to numerous, small, dispersed SCMs spread throughout the watershed. Optimizing the placement of SCMs for the purpose of increasing maintenance efficiency and access will simplify maintenance and reduce the overall maintenance burden of the responsible party.

Finally, some maintenance requires specialized equipment (tracked vehicles, loaders, dump trucks, excavators, vac trucks, etc.) and/or specialized training (e.g., confined space entry) or access. Conducting maintenance with large equipment may also require road closures and traffic diversions, causing substantial disruption to the public and requiring more resources (i.e., time and personnel) than the maintenance activities themselves. Designing SCMs to minimize the need for specialized equipment, road closures, and/or training will increase efficiency and reduce the overall maintenance burden.

*Conceptual Scope*

Standard designs and associated maintenance plans are available from multiple sources throughout North America. A literature review of existing guidance would produce multiple examples, with CAD drawings and maintenance plans, that could be synthesized into a small number of locally relevant design templates. Designs could be compiled into an online resource library. This effort should take approximately 3-6 months.

Additionally, optimizing the placement of SCMs within a watershed to increase maintenance efficiency requires personnel training to be implemented effectively. Because every watershed is different, guiding principles must be developed rather than specific rules and steps. As such, a working group is likely needed to develop these guiding principles with several case studies (hypothetical, if needed) so that other personnel have resources and examples to follow when considering watershed-scale SCM placement optimization. This effort could take 6-12 months.

Finally, to develop guidance for how to prioritize simple equipment and minimize training, an inventory of current and recently completed projects should be collated to identify instances where specialized equipment, specific training, and/or traffic impacts were required to complete the maintenance. These projects should be critically analyzed to identify opportunities for design alternatives that reduce the need for specialized equipment, training, or traffic impacts. From this, a rubric of best design practices should be developed to inform future designs. This effort could take 3-6 months, and then repeated at periodic intervals to update the inventory, especially if new types of SCM applications are used.

**Recommendation #5: Develop guidance for maintenance crews that link SCM features to functional intent**

*Problem Statement*

SCMs do not perform as designed for a number of reasons: (1) They experience excessive flow bypass and hydrologic short-circuiting, (2) Pretreatment may not be effective, or (3) SCM owners may lack the space and equipment necessary to perform maintenance. To overcome these challenges, designers, contractors, and maintenance personnel need to develop collective understanding of SCM systems. Specifically, they must be able to identify the intent of each SCM component, assess if it will meet or is meeting the intent, and produce designs that can be maintained with available equipment. Too often, there is a disconnect between the O&M crew's goals and what the SCM needs simply because O&M crews are unaware of how or why the SCM operates.

*Recommendation*

To deepen the collective understanding of intent and build a common language that guides SCM O&M, the following recommendations should be implemented: First, standard design guidance for inlets and pretreatment concepts should be developed. This guidance should focus on ensuring runoff gets into the SCM, and the pretreatment area is effective in removing trash, sediment, and oil and grease as appropriate for the characteristics of the tributary area. This guidance should include a discussion on the importance of flow paths into, within, and out of the SCM, with a particular focus on entry and pretreatment. It should also include information about the space required for certain maintenance operations, with special attention paid to the potential conflicts with nearby utilities. Ideally, the bulk of maintenance work should occur near the inlet and within an area designated for pretreatment.

Second, pretreatment O&M guidance should be developed to be consistent with design guidance. Maintenance personnel should have a clear understanding of the intent and expectations for these components if they are to maintain them properly.

Third, a list of available and preferred maintenance equipment should be developed. Knowing about available equipment will help design engineers decide what types of O&M are feasible in their jurisdiction, thereby limiting design options to those that are logistically feasible. Meanwhile, knowing about preferred maintenance equipment will help design engineers ensure proper access and maneuverability for the preferred equipment. Alternatively, if design engineers mandate the use of specific equipment to maintain their design, making this information accessible will put maintenance supervisors on notice about the O&M burden associated with the particular SCM design.

*Conceptual Scope*

This work should start with a review of standard designs and associated maintenance guidance available from multiple sources throughout North America, with a goal to identify what works best for Los Angeles County. Champions should be identified within each area of design, construction, and maintenance at the County, and these champions should be empowered to provide input and refine County-specific guidance. Consider a structure for the guidance that covers components common to most SCMs such as inlet features (including pretreatment concepts and energy dissipation), vegetation, irrigation, and outlet features (including orifice plates, weirs, and spillways), supplemented with SCM-specific fact sheets as noted in Recommendation #3.

**Recommendation #6: Use design principles to reduce the maintenance burden and make it easier for more people to complete maintenance with reduced training**

*Problem Statement*

Complicated SCM designs and inaccessible inlet and outlet structures increase the amount of time, level of effort, and overall maintenance burden. Meanwhile, limited funds, personnel, and training necessitate designing systems that are easier, faster, and more efficient to maintain. By using design principles that focus on reducing the maintenance burden, it is possible to increase efficiency, reduce costs, and improve overall success.

*Recommendation*

A guidance document and training program should be developed to demonstrate a design process that directly incorporates best maintenance practices. The goal of these practices is to simplify maintenance, make maintenance more effective, and widen the pool of talent that can complete the maintenance. SCM design practices that make maintenance more difficult than necessary should be avoided. For example, inspecting SCM underdrains or connections between dry wells may require “snake” camera systems and light sources as a result of these systems having only a single access and inspection port. Meanwhile, cleaning out underdrains may be impractical or impossible because there is no means to remove accumulated clogging material. Thus, incorporating several inspection and cleanout ports would allow for pressure washing or the addition of water in one location while simultaneously allowing vacuum-based withdrawal from another port. This simple, low-cost design change that focuses on increasing maintenance efficiency will save time, money, and increase success.

Other specific examples of design best practices that focus on increasing maintenance efficiency include (but are not limited to): designing to make dewatering clogged systems easy, fast, and safe; developing standard plant lists to simplify design choices and reduce plant identification training required for maintenance personnel; creating more resilient outlets that are easier to maintain; and including forebays with hardened bottoms to allow for quick and accurate sediment removal.

*Conceptual Scope*

A guidance document and training program should be developed to disseminate lessons learned and best practices. First, maintenance staff should be surveyed to identify maintenance challenges, barriers, and frustrations that could be alleviated by design improvements by making them less complicated or more useful. Then, design improvements should be coalesced into design guidance, and a training program should be developed that illustrates these best principles with several examples and case studies. This effort could be linked to Recommendation #1 and should take 6-12 months.

# Monitoring and New Technology

Monitoring to trigger O&M is not routinely conducted. Instead, most O&M follows preset schedules, which are often based on manufacturer recommendations. This may be a reasonable starting point but lacks knowledge about the sometimes large deviations in maintenance burden due to variations in catchment sources and characteristics. This section provides opportunities to improve O&M planning and triggers by applying new technology and advanced approaches.

**Recommendation #7: Use remote sensors to trigger O&M when it is actually needed**

*Problem Statement*

Currently, many O&M activities take place on a preset schedule, regardless of actual SCM condition or maintenance burden. The schedule may be set in accordance with manufacturer recommendations based on average conditions, even though Los Angeles County SCMs may need maintenance more or less frequently (e.g., due to the highly seasonal nature of rainfall in LA County). Moreover, O&M sometimes does not occur even when it is necessary, simply because existing monitoring efforts fail to detect warning signs; this is especially true for underground systems. SCM monitoring needs to be re-thought to ensure it can consistently alert O&M teams when O&M is actually needed (and when it isn't). Improved monitoring can help ensure efficient field deployments and effective maintenance, while reducing overall labor costs.

*Recommendation*

Monitoring should begin transitioning to *in-situ,* remotely connected sensors that can trigger maintenance. *In-situ* sensors are a newly mature technology that can enable near-real time assessment of SCM performance. A variety of sensors are available to accurately assess water level, flow, and basic water quality (temperature, conductivity, turbidity, etc.), with cameras for visual images. With this data, O&M teams can assess if infiltration rates are declining, if flow is getting into the SCM, if flow entering the SCM is being bypassed, if excess turbidity loading might clog engineered media, if groundwater intrusion is significant, and if trash is accumulating within the SCM. Importantly, these sensors can transmit the data to a computer or smart phone – a breakthrough given that cost, power, connectivity, sensitivity, and robustness have historically been limitations to using sensors for O&M purposes. Today, lower power requirements for these sensors allow them to remain deployed in the field for weeks to months; they also are physically robust enough to withstand the rigors of storm drain environments, and costs are a fraction of what they were even just a few years ago. Sensors can now be implemented widely, especially at complex and problematic sites and/or sites near sensitive water bodies.

Remotely connected sensors should be paired with data processing automation, which is another rapidly evolving field. Given that continuous, near-real time sensors can produce terabytes of data in a relatively short time, data processing automation, including cloud-based technology, machine learning, and artificial intelligence (AI) can play an invaluable role compiling all of the sensor data, analyzing results, and autonomously assessing if a SCM may be in need of maintenance. The sensors, when combined with advanced data automation, can alert O&M teams when field crews need to be deployed to prevent SCM failures or suboptimal performance.

*Conceptual Scope*

Sensor technology is ready to be immediately deployed, as sensors are already available and cost-effective. For example, a dry well can be fully instrumented for under $1,000, and different dry wells can be customized with varying sensor arrays for specific applications. All the data transmissions can occur over cellular or satellite communication systems. Pilot test programs are already in progress around southern California.

The greatest challenge to implementing this new technology is data automation, which needs to address QA/QC, as well as when deviations in performance occur, including using AI for image analysis from cameras. Some of this data automation programming is already underway and should be available within the next two years. Another challenge involves training O&M crews on sensor installation and instrument maintenance. Recurring costs for third party maintenance of monitoring equipment, dashboards, software, and algorithms require planning and budgeting but the economies of scale can reduce the cost per asset.

Demonstration studies or pilot tests should be conducted during at least one wet season to ensure a smooth rollout, and engineers should start immediately incorporating sensor installation into future SCM designs.

**Recommendation #8: Create a robust metric that communicates level of O&M effort required for different types of SCMs**

*Problem Statement*

O&M effort for SCMs is commonly underestimated, leading to inadequate allocation of O&M resources over a SCM's lifespan. In some cases, there may be insufficient information in the manufacturer's recommendations. In other cases, there are unique, site-specific issues and pollutant sources, or the designers or watershed managers who design O&M plans are not fully involved in O&M field work. All parties would benefit from a simple-to-understand mechanism that communicates the level of O&M effort required to optimize SCM performance effectiveness over time.

*Recommendation*

A simple, knowledge-based metric should be developed to facilitate communication amongst funding agencies, SCM owners, design engineers, and O&M crews about the level of effort necessary for lifecycle O&M requirements. This unified metric will help ensure sufficient O&M

resources are set aside to maintain optimal performance. Or, they could be used to select amongst multiple SCMs that might be used for a particular project. The metric could include various factors, such as personnel hours, equipment hours, equipment type, asset type, catchment area, wet or dry season, land use and density, climate, prioritization, accessibility, permitting, traffic control, materials cost, frequency of non-routine events, amongst others. It is feasible to move forward with developing this metric in the short term: unified, multi-factorial metrics already have been created for other applications. Moreover, there have been a sufficient number of SCMs already constructed around Los Angeles County and elsewhere that provide sufficient insights into how much O&M effort is necessary to maintain SCM performance.

*Conceptual Scope*

Focus groups or multi-sector working groups are an effective method for developing a balanced metric. There is limited need for more research to get started; developing an O&M metric is mostly a function of open and interactive communication among the different parties that will utilize the metric. The metric could be created in 1-2 years, with another year for test deployment and refinement. Some collation of existing data will be required to begin exploring/developing a metric algorithm with different end users.

# Contracting and Funding

Municipalities rely extensively on external contractors to design, build, and maintain SCMs. Although these partners provide essential services, this heavy reliance on contractors can lead to communication breakdowns, misaligned priorities and misunderstandings, loss of institutional knowledge, inadequate and suboptimal SCMs, or SCM designs which are complex to maintain. Additionally, some of the greatest O&M issues are a result of inadequate construction. This section addresses both construction and design inadequacy to enhance O&M.

**Recommendation #9: Explore alternative delivery approaches for SCM contractors**

*Problem Statement*

Contracting SCM projects is not as straightforward as traditional projects such as streets and roadways, with the traditional design-bid-build project delivery method posing significant challenges for O&M planning. One key challenge is that selecting a contractor solely based on the “lowest bid” often overlooks the contractor’s industry-specific experience in operating and maintaining the systems being constructed. This omission eliminates a valuable layer of quality assurance regarding aligning the system with project goals and intent. Additionally, the compartmentalized nature of this method – where designers, contractors, and maintenance personnel are separated by project stage – limits opportunities to involve project-specific O&M contractors early in the process. This lack of early integration reduces the ability to incorporate O&M considerations into design and construction decisions.

*Recommendation*

Given the challenges associated with the traditional design-bid-build project delivery method, municipalities, including Los Angeles County, should commit to more frequently utilizing alternative delivery approaches that on-board contractors before a project advances into significant project design. Two key alternatives to consider are the Progressive Design-Build (PDB) methodology and Construction Manager At-Risk (CMAR) delivery:

- PDB enables the project owner and a single integrated design-and-construction team to collaborate under one contract. Together, they progressively develop the design and establish a guaranteed maximum price. This approach promotes early involvement, flexibility, and faster delivery, all of which are advantages that are particularly beneficial from an O&M perspective.
- CMAR offers similar benefits by engaging the construction team early in the design process to provide input. Unlike PDB, CMAR maintains the design team as a separate project entity from the Contractor.

Utilizing one of these alternative delivery models will empower owners to prioritize O&M experience during contractor selection, and leverage their expertise to influence design and project direction from the earliest stages. The end result will be smoother transitions between construction and O&M, and enhanced shared responsibility across all project stages. Finally, alternate delivery models have already been successfully used for non-stormwater related projects in Los Angeles County.

*Conceptual Scope*

When evaluating alternative project delivery models, owners should first assess their project goals, objectives, and available resources, then select the model that best advances these areas. Key considerations when selecting a delivery model may include regulatory deadlines, O&M resources available, and complexity of the project scope. Owners should also engage legal and contracting experts in discussions with project planning teams to ensure informed decisions when selecting an alternative delivery model. Once the project delivery method is established, the project team should develop a project charter together. This will ensure that all parties are aligned with the goals and objectives of each project and have a common vision for what success looks like. Finally, owners should pilot projects at varying scales using different delivery models to identify the methodology that best meets their long-term needs as an organization. These pilot projects can be implemented immediately, as there are no known administrative hurdles in Los Angeles County that would need to be overcome.

**Recommendation #10: Create a structured contractor-to-municipality handoff process**

*Problem Statement*

Differences between design assumptions and as-built performance are common with SCMs. Differences may arise from poor design or build quality, or from uncertainty in hydrologic conditions, pollutant sources, and/or site conditions. The latter issues are especially prevalent for SCM retrofit projects. In any case, municipalities need a structured handoff process from their contractors to build a comprehensive understanding of an SCM's true performance and maintenance needs. These unknowns increase the likelihood of unanticipated maintenance burdens, reduced project effectiveness, and diminished accountability for construction contractors once the handoff from contractor to municipality is complete. Thus, although SCMs are long-term assets that municipalities become responsible for upon acceptance, contractors have no requirement to verify performance or even understand performance and maintenance needs.

*Recommendation*

A formal transition and acceptance period should be established that includes clearly defined performance metrics, documentation, and deliverables that must be provided prior to handoff. This structured handoff will provide the municipality with critical knowledge about how each asset actually functions, what its near- and long-term O&M requirements are, and the performance implications where design intention may differ from as-built conditions. This approach will strengthen construction quality and accountability, reduce future operational and financial risk, and allow issues related to construction or design limitations to be identified early, when they are less costly to address. By acknowledging inherent uncertainties while simultaneously requiring verification and documentation, the municipality adopts a proactive and defensible strategy for managing stormwater assets over their full life-cycle.

*Conceptual Scope*

To implement a formalized handoff process, SCM owners should first identify critical construction and performance elements that must be verified prior to asset acceptance. These elements may include structural components, media specifications, hydraulic connectivity, infiltration capacity, and overflow functionality, depending on SCM type. Clear (in some cases quantifiable) criteria should be established to define what constitutes acceptable performance and compliance with design intent.

SCM owners also should develop standardized, County-specific guidance that clearly outlines monitoring, testing, and documentation requirements during the transition period. This guidance should specify the parameters to be monitored, acceptable methods, and minimum monitoring durations – for example, requiring flow monitoring over at least one complete storm season to capture a representative range of operating conditions. Documentation requirements should include as-built drawings, performance summaries, and maintenance expectations.

Finally, a defined pathway should be established for addressing deficiencies identified during the transition period. This pathway should outline responsibilities, timelines, and corrective actions, including modifications to construction, design refinements, or updates to the O&M plan as needed. Incorporating this feedback loop ensures that assets are accepted with a clear understanding of their performance and are supported by realistic, site-specific maintenance plans. Projects being developed could use this pathway within 1- to 2-years.

**Recommendation #11: Secure a dedicated funding source for O&M expenditures**

*Problem Statement*

Project development for SCMs rarely recognizes the full life-cycle cost of SCMs. Construction estimates and associated funding for capital projects typically are insufficient to cover long-term routine maintenance, as well as to cover emergency repairs and restoration. When SCM infrastructure is poorly or undermaintained, it introduces the risk of failure, ranging from inadequately treating water quality and falling out of compliance with permits, to catastrophic failure from physical infrastructure malfunction or collapse. Furthermore, SCM failure risks the loss of public support for SCMs – a particularly concerning scenario given that Los Angeles County's Measure W (and now the ongoing Safe, Clean Water Program) were only possible as a result of strong public support.

*Recommendation*

To minimize the risk of SCM failures and subsequent loss of public support for SCMs, a dedicated funding source should be developed for SCM operating expenditures. Potential sources to pursue include (but are not limited to):

- Dedicated percent of CIP (capital improvement plan) budgets for O&M
- Development of an O&M credit trading program that encourages O&M resource sharing and helps achieve O&M economies of scale. Examples range from specialized equipment that is shared across communities/co-permittees, to consultant contracts that are leveraged to forge partnerships across municipalities.
- Contractor pay for performance

As part of developing dedicated funding for SCM asset managers, concerted efforts should be made to build public support for SCMs, as well as develop O&M cost estimates that are defensible and data-driven. The goal should be to elevate the public perception of SCM infrastructure to a level that asset managers and the public will support and recognize the value of investing in ongoing O&M to properly maintain. To build support internally, educational materials and activities should be developed that cater to the vocabulary and priorities of asset managers. To build external support, public education campaigns should be expanded that communicate how SCMs have recently become an integral part of public infrastructure, and how they require maintenance just like roads and telecommunications – except in the case of SCMs, the goal is to keep beaches and waterways clean.

*Conceptual Scope*

Because the development of a sufficient funding source is predicated on accurate estimation of actual costs, the first priority is to collect regional data on O&M costs. Given that a wide range of SCM types and technologies have been implemented across southern California, there are numerous opportunities to collaborate with municipal partners (i.e., co-permittees within Los Angeles County and other stormwater agencies across the region) to quickly develop reliable cost estimates. One way to rapidly gather, evaluate, and understand existing cost data is via an anonymous survey that solicits this information. Ideally, the survey should address issues relevant to O&M teams as well as asset managers, solicit specific information about what types of SCMs (as opposed to flood control structures) and what types of O&M activities (including preparation and coordination work) are being used. To facilitate streamlined data analysis, the survey should be designed with a standardized data reporting structure.

# Safety

Project accessibility is an integral part of effective O&M. Pretreatment units, monitoring locations, diversion structures, drywells, and other project components must be safe to access for both equipment and personnel, so that maintenance activities can be effectively conducted. Safety concerns commonly stand in the way of O&M crews being able to access and complete routine maintenance on SCMs. To reduce access and safety risks associated with SCM O&M activities, additional safeguards and controls are needed.

**Recommendation #12: Create project access standards for personnel and equipment to support safe and efficient implementation of O&M activities**

*Problem Statement*

SCM projects without defined maintenance routes and access to personnel and equipment cannot effectively be maintained and will not operate to design standards. However, it is common for SCM projects to be constructed without adequate access points for personnel and equipment to perform maintenance. As a result, the only viable option for performing maintenance may be to pursue costly project refurbishment using specialized equipment.

*Recommendation*

Standardized access designs should be integrated into every SCM design plan. Prior to project construction, design teams and the designated O&M teams for the project should collaboratively review project plans and integrate access routes for personnel and equipment as needed. In addition, project access points should be required to be incorporated into pre-approved SCM design standards, and these standards should become applicable to all future projects. Standardized access designs will prevent accidental access design omissions from project design plans and optimize maintenance activities. Standardized access plans should culminate in a checklist format that O&M teams can reference while reviewing design plans to verify all necessary access points are accounted for. Any project that includes specifications that fall outside of standardized access designs should be automatically flagged for review by O&M teams. Sample checklist items could include:

- Optimizing the location of maintenance access points, include keeping access points out of major roadways, parkin spaces, heavily trafficked areas for pedestrians or vehicles, etc., to prevent the need for traffic control teams and for maintenance only during specific hours
- Building walkdown and drive-down structures as needed (e.g., infiltration galleries) to ensure accessibility is provided for trucks or large maintenance crews under safer conditions than is what is possible with traditional confined-space protocols
- Standardizing access designs for all common equipment used to maintain and monitor projects
- Providing adequate lighting to perform routine and emergency maintenance activities within and outside of SCM structures

- Establishing well-defined access points and workspaces within SCM structures that include ample ergonomic and/or comfortable space to perform maintenance and to safely and easily enter and leave the structure
- Providing proper airflow in accordance with existing (or newly developed) standards for safe working conditions, including ensuring adequate HVAC and ventilation (e.g. good air flow, no gases, toxins, etc.) and safe temperatures
-

*Conceptual Scope*

Design engineers, plan reviewers, and O&M teams should convene into focus groups to create standardized access design plans and checklists for O&M equipment and personnel. This process should take approximately 2 years. In the first year, focus groups should conduct a literature review of other municipalities' project access plans to help generate a comprehensive checklist. In the second year, a focus group should test drive the checklist during project designs to ensure it results in sufficient access for personnel and equipment. Training of plan reviewers also should occur during the second year.

**Recommendation #13: Incorporate safety protocols into SCM designs to ensure minimum standards are met for personnel and the public**

*Problem Statement*

Regulatory compliance for SCM projects commonly focuses on optimizing SCM designs for treatment effectiveness, with a comparatively lower priority placed on safety and ergonomics for maintenance staff and maintenance activities, as well as the public who may interact with the project. Thus, the project design process needs to be rebalanced to prioritize safety and access in support of efficient, reliable O&M over the life of a capital asset, as well as the ability to conduct O&M activities easily, safely, and cost-effectively.

*Recommendation*

The initial SCM design process should balance safe, ergonomic access and maintenance with SCM treatment effectiveness and water-quality goals. The design process also should balance community interactions with the project, including walking, biking, and other forms of passive recreation. Safety protocols should cover the following: adequate lighting to perform routine and emergency maintenance activities within and outside of the structure, well-defined access points and workspaces within the structure, ample ergonomic and/or comfortable space to perform work and to safely and easily enter and leave the structure, and proper airflow and clean air. To incorporate safety protocols into SCM design processes, focus groups should be assembled with key internal and/or external stakeholders. These focus groups should develop safety protocols within the context of existing goals/priorities for water quality projects, internal standards, internal processes, and so forth. Additionally, a literature review should be conducted to identify how other agencies and organizations integrate safety into their design standards and processes. The safety protocols that are developed should be memorialized in SCM designs.

*Conceptual Scope*

The first step is to convene focus groups to agree on safe, ergonomic designs that support SCM maintenance and protect the public who may interact with SCMs. The focus groups also should identify paths forward for reducing or eliminating conflicts between safety and competing priorities.

- Within 1-3 months: Identify key players within the County spanning Planning/Development Services, Capital Engineering, Environmental, Road/Maintenance Crews, etc.
- Within 3-6 months: Initiate meetings and identify problem statements, current processes, and potential process improvements, as well as feasibility of integrating safety protocols over both the short and longer term
- Within 6-12 months: Implement a subset of identified process improvements during a pilot phase, before implementing across the enterprise

# INTEGRATION AND SYNTHESIS

This Workshop Report highlights 13 critical recommendations for improving the effectiveness and efficiency of SCM planning and design for post-construction O&M. After reflecting on the Workshop dialogue and resulting recommendations, the seven SCM experts identified three overarching themes, or throughlines:

- Throughline 1: Although the Workshop experts identified 13 recommendations, the recommendations are interdependent (Figure 2), with many projects playing off of and benefitting from one another. For example, the recommendations for enhanced communication and training will benefit almost every other recommendation, including design, contracting, new technology, and safety. In fact, of the 78 possible individual areas of overlap among project recommendations, the Workshop experts agreed that more than three-fourths will support one or more other recommendations (59 of 78 recommendations).
- Throughline 2: Despite the linkages among so many of the recommendations, most are not wholly dependent on one another, meaning that most can be pursued in parallel. In

most cases, it is not necessary to delay starting one recommendation before starting another. For example, the recommendations regarding design features are all logically linked, but do not have to be implemented in order. Similarly, the design features and contracting thematic areas are clearly related, but the design feature recommendations do not have to be completed before starting on the contracting recommendations.

- Throughline 3: While many of the recommendations can be started and completed quickly, others will require multiple years of effort to complete. For example, almost all communication recommendations can be started right away and completed in less than 1-2 years. By contrast, the technology-based recommendations will still require two or more years to complete (even though precedent-setting work has already begun) because they have several phases or tasks to complete before full implementation, including potentially focus groups, pilot studies, and training.

- **Figure 2. Interdependence of workshop recommendations. Filled cells with an X indicate where two recommendations are related.**

| **Project** | **#1** | **#2** | **#3** | **#4** | **#5** | **#6** | **#7** | **#8** | **#9** | **#10** | **#11** | **#12** | **#13** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| #1: Comprehensive training and workforce development | | X | X | X | X | X | X | X | | | | X | X |
| #2: Communication materials to develop common expectations | | | X | X | X | X | | X | | X | X | X | X |
| #3: Break down silos to improve SCM designs | | | | X | X | X | | X | X | X | | X | X |
| #4: Keep it simple for SCM design and O&M | | | | | X | X | X | X | X | X | X | X | |
| #5: Make it successful by focusing on intent | | | | | | X | X | X | X | X | X | X | X |
| #6: Make it easy by reducing O&M burden | | | | | | | X | X | X | | | X | X |
| #7: Use remote sensors to trigger O&M | | | | | | | | X | | X | X | | |
| #8: Create a robust metric to predict O&M effort | | | | | | | | | | | X | X | X |
| #9: Explore alternative delivery approaches | | | | | | | | | | X | X | | |
| #10: Create a structured handoff process | | | | | | | | | | | X | | |
| #11: Contractor pay for performance | | | | | | | | | | | | X | X |
| #12: Create project access standards | | | | | | | | | | | | | X |
| #13: Incorporate O&M safety protocols into design | | | | | | | | | | | | | |

# What This Workshop Report Does Not Address

There were two primary issues that did not get addressed by the Workshop experts: prioritization among the 13 recommendations (i.e., which recommendations Los Angeles

County should tackle first) and how much each recommendation might cost. The workshop experts stopped short of addressing these issues because they did not have sufficient time during the Workshop, not because these issues were insurmountable.

# Emerging Issues

There were several recommendations that Workshop experts discussed that did not make it into this report. Most of these recommendations focus on emerging issues where recommendations would be uncertain or too early for proper scoping.

The first emerging issue that Workshop experts did not explicitly capture in their recommendations is utilizing AI for improving SCM designs for O&M. While the Workshop developed a stretch recommendation (Recommendation 2) for using digital twins and virtual reality to improve O&M effectiveness and safety – especially in complex, confined-space SCMs like large exfiltration galleries - this technology is reasonably advanced in other industrial applications (i.e., wastewater treatment facilities). In contrast, Workshop experts agreed that using AI for new, untested applications like machine learning for optimizing SCM design, or linking plant pallets to forecasted climate change, is beyond AI's current capabilities. Thus, Workshop experts agreed that specific scoping details and success of anticipated outcomes was too uncertain to include in this report.

The second emerging issue was the impact of wildfires on SCMs. Wildfires, especially urban conflagrations such as those in Los Angeles County during 2025, are unpredictably tragic events that can destroy infrastructure, including SCMs. SCM O&M may be able to play a role in urban wildfire prevention, minimization, or recovery. However, Workshop experts stopped short of developing recommendations for SCM planning and design that considers urban wildfires not because this issue is unimportant, but because Workshop experts agreed that the recommendations in this report had a higher priority.

# Final Thoughts

The two-day SCM O&M Workshop produced a series of prescriptive, interrelated recommendations for dramatically improving O&M in Los Angeles County. Even if a fraction of these recommendations were to be implemented, the cost of O&M would be expected to decrease, while SCM effectiveness – in terms of volume capture, water quality treatment, and infrastructure longevity – would be expected to increase. Los Angeles County is a test bed of SCM technology, outpacing much of the arid Southwest and in many ways leading other climatic regions of the United States. Thus, Workshop experts agreed that revisiting these recommendations at periodic intervals – ideally every 3-5 years – will ensure Los Angeles

County can continue to optimize SCM planning and design for O&M, and ultimately realize the full value of the County's multi-billion-dollar SCM investments over the coming decades.

# APPENDIX A

## O&M Workshop Agenda

**January 12-13, 2026**

*To be held at:*

**Southern California Coastal Water Research Project**
**3535 Harbor Blvd, Suite 110**
**Costa Mesa, CA 92626**

| ***Timing*** | ***Agenda*** |
|---|---|
| 2-3 weeks pre-workshop | The project team will send a briefing package to prepare the participants. |
| Day 1 - Jan 12 | |
| 8:30–9:00 | Breakfast |
| 9:00-9:30 | Welcome, Introductions |
| | Presentation by LACDPW – Why this Workshop? |
| | Panel Charge, Set goal for the day |
| 9:30-11:00 | A presentation of case studies by participants (5-10 min each) |
| 11:00-12:00 | The participants will participate in a brainstorming session of design and O&M needs to create the universe of potential O&M design options for LACDPW |
| 12:00-1:00 | Lunch (catered) |
| 1:00-1:30 | The brainstorming session ideas will be grouped and prioritized. |
| 1:30-3:00 | The participants will be sent into breakout groups, each of which will focus on a different subset of the prioritized BMP design and O&M needs. The aim of the breakout groups is to create the BMP design and O&M recommendations for that group's O&M options. |
| 3:00-3:15 | Break |
| 3:15-4:30 | The entire group will reconvene and review each breakout group's recommendations. The aim will be to refine and upgrade each recommendation. |
| | Group Dinner (local restaurant) |
| Day 2 – Jan 13 | |
| 8:30-8:45 | Breakfast |
| 8:45-9:00 | Recap from Day 1, Set goal for the day |
| 9:00-10:30 | Small breakout groups to begin writing outlines for each O&M design need |
| 10:30-12:00 | The entire group will reconvene and review each breakout group's outline(s). The aim will be to refine and upgrade each outline so that staff can write the future document. |
| 12:00 | Workshop end |
| Two months post workshop | A Workshop document will be prepared by the facilitators, utilizing the outlined recommendations. |
| Three months post workshop | The Workshop participants will review and approve the document. |