APPENDIX A

Advancing Regional-Scale Stormwater Management in San Mateo County: Drivers and Objectives

MAY 2021

SAN MATEO COUNTYWIDE

WATER POLLUTION PREVENTION PROGRAM

Advancing Regional-Scale Stormwater Management in San Mateo County:

Drivers and Objectives

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WATER POLLUTION PREVENTION PROGRAM

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A Program of the City/County Association of Governments of San Mateo County (C/CAG)

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1. INTRODUCTION

Geosyntec Consultants, Inc. (Geosyntec) is assisting the City/County Association of Governments of San Mateo County (C/CAG) with a project focusing on advancing regional-scale stormwater management in San Mateo County (County) through a countywide collaborative approach (the Project).

The Project involves a multi-stage process to identify:

1. **What** can be addressed and achieved through regional-scale stormwater management, by defining key drivers and objectives for the County;
2. **Why** jurisdictions across the County should collaborate to address stormwater management drivers and objectives, through development of a business case; and
3. **How** County jurisdictions can collaborate regionally, by establishing a collaboration framework.

The focus of the Project is advancing implementation of multi-benefit regional-scale stormwater management projects, though the regional collaboration framework developed is expected to include programmatic applications for smaller scale distributed green stormwater infrastructure (GSI). It is intended that C/CAG member agencies, the San Mateo County Flood and Sea Level Rise Resiliency District (FSLRRD), and other potential stakeholders would jointly collaborate to manage stormwater through the regional collaboration framework.

In parallel with this Project, C/CAG and the County of San Mateo are working with Craftwater Engineering (Craftwater) to identify and prioritize potential multi-benefit regional stormwater capture opportunity locations and concepts for projects that can achieve the drivers and objectives identified herein. With consideration of the drivers and objectives, Geosyntec will work collaboratively with Craftwater to develop the approach for the business case demonstration, and Craftwater will conduct modeling and analyses to develop quantitative output to support the business case. C/CAG is receiving additional pro-bono support from American Rivers/Corona Environmental Consultants and WaterNow Alliance to 1) evaluate the feasibility of creating a stormwater credit trading market; and 2) develop meaningful funding and financing approaches for varying scales of stormwater management that can achieve objectives identified herein. The analyses conducted through the pro-bono support will build from this Project, and the final products will be incorporated into regional collaboration framework deliverables as attachments.

This report summarizes key drivers and objectives for managing stormwater on a regional scale throughout the County, and includes the following sections:

- Section 2 defines “drivers” and “objectives” for the purposes of the Project,
- Section 3 describes the process used to identify drivers and objectives,
- Section 4 identifies drivers for regional-scale stormwater management,
- Section 5 describes objectives to meet the identified drivers, and
- Section 6 summarizes next steps for the Project.

2. DEFINITIONS

This report identifies key drivers for managing stormwater on a regional scale and identifies objectives associated with those key drivers. Regional-scale stormwater management is defined as planning and implementation of multi-benefit regional and sub-regional stormwater capture facilities that may serve one or multiple jurisdictions, as well as regional-scale implementation of smaller-scale distributed facilities countywide. For the purposes of this report, "regional" facilities serve neighborhoods or large portions of neighborhoods, while "sub-regional" facilities refer to approximately block-scale facilities. "Distributed" facilities provide parcel-scale or right-of-way segment-scale treatment.

The terms "drivers" and "objectives" are defined as follows for the purposes of the Project:

- ***Drivers:*** The fundamental issues that provide impetus for managing stormwater on a regional scale.
- ***Objectives:*** The desired outcomes from addressing the identified stormwater management drivers on a regional scale.

The following overall "vision" statement describes the envisioned path to achieve the objectives identified in this report:

- ***Vision:*** Cost-effectively implement multi-benefit stormwater infrastructure solutions that collectively minimize localized flooding; improve water quality; increase resiliency to climate change impacts; utilize stormwater as a resource; address regulatory requirements; and serve communities equitably, both locally and regionally.

3. PROCESS TO IDENTIFY DRIVERS AND OBJECTIVES

Geosyntec reviewed existing plans produced by County of San Mateo, C/CAG member agencies, and other County-based and regional entities that are relevant to stormwater management planning, implementation, and/or resultant benefits. Several foundational factors related to or benefitted by regional-scale stormwater management were identified through review of the plans and were used to develop preliminary drivers and objectives for consideration. These factors include: the presence of water quality regulations, stormwater infrastructure deficiencies, existing and future flooding issues, climate change impacts, water supply needs, community benefits and engagement, and equity considerations. The preliminary drivers identified in these plans are compiled in Attachment A.

A preliminary list of drivers and associated objectives were presented to the Project Technical Advisory Committee (TAC) for consideration at the first of three TAC meetings on January 22, 2021. The Project TAC provided input on how to revise the preliminary drivers to the key drivers that are most compelling for managing stormwater on a regional scale. The Project TAC also considered the associated objectives of the revised drivers, the prioritization of the drivers and objectives, and the overall Project vision. Input from the Project TAC was used refine the drivers, which are summarized in Section 4 of this report. Objectives relating to the drivers are provided in Section 5 of this report.

4. REGIONAL-SCALE STORMWATER MANAGEMENT DRIVERS

Based on input from the Project TAC, the key drivers for managing stormwater on a regional scale in the County are:

1. Limited Resources
2. Existing Stormwater Infrastructure Deficiencies
3. Water Quality Regulations and Protection
4. Climate Resiliency
5. Beneficial Use of Stormwater
6. Equity and Community Engagement

These drivers are described as follows.

4.1 Driver 1: Limited Resources

There are currently limited resources available to address many of the fundamental stormwater needs in the County. This limitation primarily arises from stormwater fees that are lower than what is needed (and limited general fund monies to supplement) to maintain permittee stormwater infrastructure, and meet compliance requirements of the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (MRP; Order R2-2015-0049), especially with respect to achieving stormwater treatment and GSI requirements (SFBRWQCB, 2015). In 2020, C/CAG projected San Mateo County municipalities may collectively need to invest between $760 million and $1.14 billion in capital improvement funds over the course of several decades to comply with mandated GSI requirements and additional publicly funded GSI needed to achieved mercury and polychlorinated biphenyls (PCBs) load reductions established in the Total Maximum Daily Loads (TMDLs) for these pollutants in the San Francisco Bay (San Mateo Countywide Water Pollution Prevention Program [SMCWPPP], 2020a). Further, it is typical for the cost to comply to increase during each permit term, putting an increased strain on limited resources every five years (also see Section 4.3). There are additionally limitations with the funding structure of the FSLRRD, which is currently dependent on municipal entities (i.e., cities and towns and the County of San Mateo) contributing funding and is additionally challenged by entities that face difficulties funding projects with limited or no benefits within their jurisdictional boundaries. These funding constraints are coincident with a need for increased investment in infrastructure to provide resiliency and adaptation as the County is confronted with the current and future impacts of a changing climate.

As an example of existing stormwater funding challenges, the City of San Mateo is conducting a Stormwater Funding Analysis to evaluate the current and future funding need to operate the City's stormwater program. Using the City's current basic operations costs, estimates for additional operational and compliance needs, and future capital costs based on the Capital Improvement Program funded and unfunded projects budgets and a 2018 Marina Lagoon Dredging Analysis, the draft report estimates that the City's overall stormwater funding need ranges from $68 to $139 million amortized over 30 years to meet basic operations, regulatory compliance and capital improvements. (City of San Mateo, 2021b). To achieve this funding goal,

the City would need to propose a significant new stormwater utility fee or propose an alternative means to a long-term revenue stream. City of San Bruno provides another example, with 2014 stormwater fees ranging from $2 to $4 per 1,000 square feet for parcels, depending on land use, resulting in an average of about $500,000 to $600,000 collected by the City's Stormwater Fund each year. Collections support operational work and occasional small improvement projects, with an annual surplus of typically less than $100,000. The SDMP states that the City would need to revise its storm drainage fee structure or find other funding sources to fund the proposed SDMP Capital Improvement Program (CIP) of over $20 million for Priority 1 and 2 projects (City of San Bruno, 2014). San Bruno initiated a Proposition 218 property-related fee balloting process in early 2021 to increase stormwater fees from $46 for a single-family residence to $154; results of the balloting were not available at the time this report was finalized.

Many of C/CAG's member agencies have developed storm drain master plans. The following table summarizes the costs identified in those plans for necessary infrastructure improvements, broken down by high, medium, and low priority projects, where available, along with dedicated stormwater fee revenue, if any. It is important to note that many of these master plans were completed five or more years ago, and listed costs are not escalated to current dollars. In addition, many member agencies do not have storm drain master plans, or they were not available for review for the purposes of this report.

Table 1: Summary of Storm Drain Master Plan Costs and Dedicated Revenue

	Date of Study	Storm Drain Master Plan Cost (total)	High Priority Projects	Med Priority Projects	Low Priority Projects	Dedicated Annual Revenue
Atherton	2015	$45	$18	$24	$3	$0.000
Belmont	2009	$57	$13	$13	$31	$0.300
Brisbane	2003	$20	$15	$3	$2	$0.055
East Palo Alto	2014	$39	$31	$5	$3	$0.125
Hillsborough	2015	$58	$26	$14	$18	$0.030
Menlo Park	2003	$39	$23	$16		$0.335
Millbrae	2018	$42	$3	$30	$9	$0.240
Pacifica	2012	$11	$9	$2		$0.178
San Bruno	2014	$26	$19		$7	$0.575
San Carlos	2017	$56	$43	$13		$0.435
San Mateo (City)	2004	$57	$33	$16	$8	$0.000
South San Francisco	2016	$54	$23	$27	$4	$0.425
Total		**$504**	**$256**	**$163**	**$85**	**$3**

Note: All values in $ millions

A significant impediment to increasing municipal stormwater fees is Proposition 218, a state constitutional amendment that restricts local government's ability to impose property-related fees without voter approval. Proposition 218 exempts "sewer" fees and taxes from its provisions, but court decisions have interpreted the meaning of "sewer" to preclude stormwater within its definition. As a result, it has been difficult for counties and local municipalities to gain voters or property owners support for tax proposals to fund stormwater infrastructure improvements or

stormwater capture, urban runoff treatment programs and projects to comply with municipal separate stormwater system (MS4) requirements. Contra Costa County tried to get property owner approval for an increased stormwater fee and failed in 2012,[1] though some cities in southern California have been successful. The City of San Bruno initiated a Proposition 218 property-related fee process to increase their stormwater fee from $46 to approximately $154 annually for a typical single-family home (City of San Bruno, 2021b). Faced with similar funding challenges, the City of San Mateo has commissioned a study to investigate the potential to create a stormwater utility and needed next steps (City of San Mateo, 2021b).

C/CAG initiated a similar effort to pursue a property owner-balloted countywide stormwater fee in 2014, including opinion research and evaluation of funding needs, but ultimately did not go forward with the initiative. The needs analysis indicated an annual shortfall to comply with the MRP of approximately $25 million. This takes into account approximately $10 million in dedicated stormwater revenue throughout the County, both for C/CAG's stormwater program (approximately $2.2 million) and roughly half of the 21 agencies that have pre-Proposition 218 fees in place, as well as the local share of vehicle registration revenue that can be used for water pollution prevention efforts (see below). It is important to note that the needs analysis was performed during the first five-year term of the MRP, which is now moving toward its third term with increased cost implications associated with GSI implementation and additional pollutant load reduction requirements. Costs to maintain and repair stormwater systems and for compliance with MRP requirements have risen significantly since that analysis was completed.

Senate Bill (SB) 231, signed into law in 2017, is intended to provide guidance to the courts in their interpretation of "sewer" in the context of Proposition 218 (State of California, 2017). SB 231 clarifies the definition of sewer includes storm sewers and therefore stormwater property related fees would be subject to the same voter approval exemptions as sanitary sewer fees. Taxpayer advocacy groups disagree with this clarification and are likely to challenge in court any agency that attempts to impose a new or increased stormwater property-related fee without a balloting process; hence, no jurisdiction to date has attempted this approach to increasing stormwater revenues.

4.2 Driver 2: Existing Stormwater Infrastructure Deficiencies

There are existing deficiencies in many C/CAG member agency storm drainage systems as a result of age and limited resources to address these issues. Deficiencies are identified in SDMPs produced by many of the member agencies. In many SDMPs, deficiencies are ranked in terms of severity, with some deficiencies classified as, for example: indicative of "imminent failure" that could "affect a dwelling structure, damage… property…, cause roadway failure or traffic disruption" (Town of Hillsborough, 2015); areas that "continually flood and cause damage and/or pose a threat to safety" (City of South San Francisco, 2016); or "hav[ing] a large area of flooding where the 10-year maximum flood depth is greater than 12-inches" (City of Half Moon Bay, 2016).

[1] See article titled, "Water fee defeat starts email rant" from The Mercury News, 2012. Notably, the article claims, "Nowhere in the [ballot initiative's] voluminous backup reports did analysts answer a homeowner's most basic question: How much money will my city receive from this fee, and how will it spend it?"

All the SDMPs reviewed by Geosyntec identified major improvement projects to maintain and improve existing infrastructure to address minor to severe flooding issues resulting from undersized, aging, or otherwise deficient storm drain infrastructure. The multi-year schedule and hundreds of millions of dollars needed to mitigate just the severe/high priority issues (e.g., more than 14 years and $26 Million for the Town of Hillsborough high priority improvements; over $23 Million to address Priority 1 deficiencies for South San Francisco; and $56 Million to address identified CIP projects and Tier 2 projects for the City of San Carlos) are indicative of the funding challenges for stormwater management overall (see Table 1 and Driver 1).

4.3 Driver 3: Water Quality

The Clean Water Act (CWA) requires MS4 discharges to be permitted under the NPDES permit program. In addition, the CWA requires the States to adopt water quality standards for receiving water bodies. Water quality standards consist of designated beneficial uses for a receiving water body (e.g., wildlife habitat, agricultural supply, fishing, etc.), along with water quality criteria necessary to support those uses. All San Mateo County MS4s discharge into regulated receiving water bodies.

4.3.1 Impaired Water Bodies and Total Maximum Daily Loads

When designated beneficial uses of a receiving water body are being compromised by water quality, Section 303(d) of the CWA requires identifying and listing that water body as "impaired". Once a water body has been deemed impaired, a total maximum daily load (TMDL) must be developed for the impairing pollutant(s). A TMDL is an estimate of the total load of pollutants from point, non-point, and natural sources that a water body may receive without exceeding applicable water quality standards (with a "factor of safety" included). Once established, the TMDL allocates the loads among current and future pollutant sources to the water body. Table 2 lists the water quality impairments for water bodies in San Mateo County as reported in the Final 2014/2016 California Integrated Report (CWA Section 303(d) List/ 305(b) Report) (State Water Resources Control Board [SWRCB], 2021a).

The SFBRWQCB oversees protection of water quality in the San Francisco Bay Area. The San Francisco Bay Basin Plan (SFBRWQCB, 2017), the water quality control planning document for the San Francisco Bay Region, identifies beneficial uses for waterbodies in the region. The Basin Plan classifies water quality attainment strategies, including specific TMDLs and enhancement plans that help to maintain water quality standards.

Table 2: Summary of 303(d) Listings for San Mateo County

Waterbody	Impaired Pollutants
River and Stream	
Butano Creek	Sedimentation/Siltation
Colma Creek	Trash
Pescadero Creek	Sedimentation/Siltation
Pomponio Creek	Indicator Bacteria
San Francisquito Creek	Diazinon
	Sedimentation/Siltation
	Trash
San Gregorio Creek	Indicator Bacteria

Table 2: Summary of 303(d) Listings for San Mateo County

Waterbody	Impaired Pollutants
	Sedimentation/Siltation
San Mateo Creek	Diazinon
	Trash
San Mateo Creek, Lower	Toxicity
San Pedro Creek	Indicator Bacteria
San Vicente Creek	Indicator Bacteria
Coastal and Bay Shoreline	
Aquatic Park (Marina Lagoon, San Mateo County)	Indicator Bacteria
Lakeshore Park Beach (Marina Lagoon, San Mateo County)	Indicator Bacteria
Kiteboard Beach (San Francisco Bay, Lower)	Indicator Bacteria
Oyster Point Marina (San Francisco Bay, Lower)	Indicator Bacteria
Pacific Ocean at Pacifica State/Linda Mar Beach	Indicator Bacteria
Pacific Ocean at Pillar Point	Mercury
Pacific Ocean at Pillar Point Beach	Indicator Bacteria
Pacific Ocean at Venice Beach	Indicator Bacteria
Lake and Reservoir	
Lower Crystal Springs Reservoir	Mercury
Pilarcitos Lake	Mercury
Bay and Harbor	
San Francisco Bay, Lower	Chlordane
	Dichlorodiphenyltrichloroethane (DDT)
	Dieldrin
	Dioxin compounds, including (2,3,7,8-TCDD)
	Furan Compounds
	Invasive Species
	Mercury
	Polychlorinated biphenyls (PCBs)
	Polychlorinated biphenyls (PCBs) dioxin-like
	Trash
San Francisco Bay, South	Chlordane
	Dichlorodiphenyltrichloroethane (DDT)
	Dieldrin
	Dioxin compounds, including (2,3,7,8-TCDD)
	Furan Compounds
	Invasive Species
	Mercury
	Polychlorinated biphenyls (PCBs)
	Polychlorinated biphenyls (PCBs) dioxin-like
	Selenium

TMDLs have been developed for watersheds throughout San Mateo County. Completed TMDLs include:

- Sediment for Pescadero Creek and Butano Creek;
- Diazinon and pesticide-related toxicity for San Francisco Bay area urban creeks, including Laurel Creek, San Francisquito Creek, and San Mateo Creek in San Mateo County;
- Bacteria for San Pedro Creek, Pacifica State Beach, and Marina Lagoon (Aquatic Park and Lakeshore Park Beach); and
- Mercury and PCBs for San Francisco Bay.

TMDLs under development in San Mateo County include:

- Sediment for San Francisquito Creek and San Gregorio Creek;
- Bacteria for Pillar Point Harbor and Venice Beach on the Pacific Ocean; and
- Bacteria for Kiteboard Beach and Oyster Point Beach on San Francisco Bay.

A Water Quality Improvement Plan has also been developed for San Vincente Creek and was adopted by the SFBRWQCB in 2016 (SFBRWQCB, 2016). For municipal stormwater discharges in the Bay area, TMDLs are implemented through requirements in the Municipal Regional Permit (MRP).

4.3.2 Municipal Regional Permit

C/CAG member agencies are subject to the requirements of the MRP, which was issued first issued in 2009, reissued in 2015, and is currently being revised for its third five-year term, with the expected effective date of July 1, 2022 (herein called "MRP 3.0"). The MRP applies to 79 large, medium, and small municipalities (cities, towns, and counties) and flood control agencies (collectively referred to as Permittees) throughout the San Francisco Bay Area, including all C/CAG member agencies.

The MRP regulates discharges to receiving waters in various ways including Provision C.3., which details specific requirements for new development and significant redevelopment projects, including selection, sizing, and design criteria for low impact development (LID), treatment control, and hydromodification control BMPs. Provision C.3 also requires the development of long-term Green Stormwater Infrastructure (GSI) Plans to address pollutants in stormwater discharges. The MRP states:

> *"Over the long term, the Plan is intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff."*

In addition to Provision C.3, trash controls (Provision C.10) and mercury (Provision C.11) and PCBs (Provision C.12) controls are included in the MRP. The SFBRWQCB has indicated that MRP 3.0 will require implementation of the Permittees' GSI Plans, including a GSI retrofit target to be achieved during the next permit term (2022 – 2027), potentially requiring over 100

acres to be retrofit countywide. In addition, specific provisions to address approved TMDLs that are not included in the current MRP will be incorporated into MRP 3.0. These new provisions will require specific controls for bacteria and sediment in the drainage areas of water bodies impaired for these pollutants (Table 2). While the Quality Improvement Plan for San Vincente Creek Water and a section of the Pacific Ocean at James V. Fitzgerald Marine Reserve was approved under the current MRP, an additional new provision is expected in MRP 3.0 to address discharges to the County's Area of Special Biological Significance (ASBS) within Fitzgerald Marine Reserve. In addition to those described, there are other provisions within the MRP that address other sources of stormwater pollution.

MRP Provisions C.11 and C.12 requires Permittees to develop a Reasonable Assurance Analysis (RAA) that quantitatively demonstrates that proposed GSI control measures will result in sufficient load reductions of PCBs and mercury to meet the municipal stormwater wasteload allocations (WLAs) for the San Francisco Bay PCBs and mercury TMDLs. C/CAG's SMCWPPP developed an RAA study that quantifies baseline hydrology and loadings of PCBs and mercury loads to San Francisco Bay, and evaluates the benefits of proposed GSI projects to reduce these loads through the capture, infiltration, and/or treatment of stormwater. The RAA was also used to predict the most cost-effective GSI implementation plan for each municipal jurisdiction and sub-watershed throughout the County and set implementation goals for the amount of stormwater volumes to be managed and impervious area to be retrofitted to serve as metrics for implementation tracking (SMCWPPP, 2020b). The new MRP requirements in the permit to be reissued in 2022 are expected to result in increased costs for implementation and long-term operations and maintenance, above and beyond what was anticipated in the 2014 C/CAG funding needs analysis (i.e., increased costs above $25M per year).

4.4 Driver 4: Climate Resiliency

The climate crisis is projected to cause impacts to all facets of water and stormwater systems in the 21st century (and beyond), including stormwater management, flood management, water quality, water supply, and drainage systems. California's Fourth Climate Change Assessment (2018) identified dozens of current and future impacts caused by climate change, including an already observed increase in annual maximum temperature of 1.7°F in the San Francisco Bay Area , more intense large winter storms, decreased snowpack in the Sierra Nevada and moisture deficits throughout the state, and a median sea level rise of at least 2.4 feet and potentially as much as 10 feet by 2100 (Ackerly et al., 2018). The County of San Mateo has identified specific flooding impacts to the County in the Sea Level Rise Vulnerability Assessment for coastal flooding (San Mateo County Office of Sustainability, 2018) and in the Sustainable Streets Master Plan for watershed flooding impacts (C/CAG, 2020). As a result of the current and projected impacts resulting from climate change, the San Mateo County Board of Supervisors declared a Climate Emergency in the County (San Mateo County Board of Supervisors, 2019). The Emergency Declaration demands accelerated actions on the climate crisis, calls on local and regional partners to collaborate to address climate change, and emphasizes the importance of protecting vulnerable communities by focusing on equitable climate solutions.

Key precipitation related effects of climate change that will likely impact existing stormwater drainage systems include projected increases in less frequent, larger storm events, which countywide downscaled climate modeling has shown could cause up to a 20% increase in the 10-year, 6-hour storm size and up to a 40% increase in the 100-year, 6-hour storm size per the

climate analysis conducted in the Sustainable Streets Master Plan (C/CAG, 2020). Storm drains in residential neighborhoods are typically designed for the 10-year, 24-hour event, with larger storm drains sized for a range of storm sizes from the 25-year, 24-hour event to the 100-year, 24-hour event. The projected increases expected for design events under climate change indicate that already deficient storm drain infrastructure is likely to become increasingly strained with larger and/or more frequent large events in the future, with potential for increased flooding and associated damage.

Per AB 825, the San Mateo County FSLRRD powers include controlling floodwater and stormwater, as well as addressing and protecting against the impacts of sea level rise and coastal erosion (State of California, 2019). The purpose of the act establishing the district includes allowing for more comprehensive management of the floodwater and stormwater; conserving waters for beneficial purposes when practical; and protecting infrastructure, life, and property from floodwater and stormwater.

In addition to flooding concerns, increased water stress is projected for much of the state with changes to climate, largely relating to expected declines in snowpack. Additionally, future increases in temperature, regardless of changes (increases or decreases) in total precipitation, are likely to cause longer and deeper California droughts (Ackerly et al., 2018). Many water supply agencies and districts in the County are members of the Bay Area Water Supply and Conservation Agency (BAWSCA) (16 member agencies within the County) and rely upon the San Francisco Regional Water System for supply. Eighty-five percent of the regional system water comes from Sierra Nevada snowmelt (BAWSCA, 2021). Changes to snowmelt could cause reliability impacts to current water supplies. There are areas of the County that also rely on groundwater as all or part of their water supply source. In the meantime, population is projected to continue to grow in the County, resulting in additional water demand (BAWSCA, 2015). The total population of the BAWSCA member agency service areas is projected to grow from 1.8 million in 2015 to 2.2 million by 2040, reflecting a 25% increase (BAWSCA, 2015). The San Francisco Public Utilities Commission (SFPUC) is in the process of developing a Long Term Vulnerability Assessment and Adaptation Plan for their Water Enterprise through the Water Research Foundation to explore the impact of climate change on water supply for the agencies reliant on the Regional Water System, with the plan due in 2021 (SFPUC, 2021). The importance of using stormwater as a potential source for augmenting water supplies is included under Driver 5 in the next section.

Additional impacts of climate change that could impact urban areas include changing temperature and weather patterns. Such changes are projected to result in additional heat stress and may create challenges for maintaining certain vegetation.

4.5 Driver 5: Beneficial Use of Stormwater

In addition to needs relating to future water stress and drought year supply shortfalls, there is also a desire to use stormwater as a beneficial resource throughout the County. The primary beneficial use under consideration is water supply, including smaller scale capture and use of non-potable water to augment potable use, recharge to groundwater basins, or divert stormwater to supplement recycled water production. Use of stormwater for water supply is supported by California Water Conservation Legislation (AB 1668 and SB 606) signed into law in 2018 (State of California, 2018), which provides a road map for actions to be taken by the California Department of Water Resources (DWR) and the SWRCB to: (1) use water more wisely; (2)

eliminate water waste; (3) strengthen local drought resilience; and (4) improve agricultural water use efficiency and drought planning (DWR and SWRCB, 2018).

BAWSCA identified in their 2015 Long-Term Reliable Water Strategy (Strategy) a forecasted supply shortfall of up to 43 million gallons per day (mgd) in future drought years (year 2040, of a total estimated demand of 284 mgd). To address the drought year shortfalls, BAWSCA has identified a number of actions, including supporting local water supply projects. Local water supply projects identified in the Strategy include recycled water, groundwater recharge, and desalination projects, along with local stormwater capture and reuse projects. Notably, while the Strategy estimated a potential yield from rainwater harvesting (i.e., rain barrels) of 210 acre-feet per year (AFY) to 680 AFY, the Strategy stated that "reliable information on the potential yield of BAWSCA service area wide implementation of stormwater capture projects is not currently available due to the lack of projects in the region." As a result, larger stormwater capture projects are not included in the portfolio of projects summarized by the Strategy to make up for the drought year shortfall and rainwater capture makes up only 0.5 mgd of the projects identified to cover the shortfall (BAWSCA, 2015).

There are currently initiatives at the state level to increase use of recycled water, including the Recycled Water Policy. The Recycled Water Policy (SWRCB Resolution No. 2018-0057) encourages the safe use of recycled water from wastewater sources (SWRCB, 2018). Four of the 10 publicly operated treatment works (POTWs) in the County utilize recycled water or have plans to. These POTWs include City of Pacifica Wastewater Treatment Plant (WWTP), North San Mateo County Sanitation District, Palo Alto Regional Water Quality Control Plan, and Silicon Valley Clean Water. Based on initial research, two of the four POTWs have current recycled water programs and/or plans to expand services. The other two POTWs do not appear to have advanced treatment, which is needed for recycled water systems. A list of POTW status relating to recycled water capabilities is provided as Attachment B. In addition to potentially supplementing recycled water operations, stormwater management upstream may provide other benefits to POTWs, including reductions in peak flows during wet weather.

There are community-based reasons for potentially advancing beneficial use of stormwater as well. Per AB-825, the FLSSRD has powers that include planning and implementing facilities for public recreation incidental to projects that provide flood control drainage and water conservation. Projects that provide community amenities are potentially more likely to have community support and interest (see Driver 6) and may have additional opportunities for grant funding (see Driver 1).

4.6 Driver 6: Equity and Community Engagement

In California, disadvantaged and vulnerable communities have been disproportionately burdened by pollution, socioeconomic and health impacts, flooding, and potential climate change impacts. The San Francisco Bay Conservation and Development Commission (BCDC) includes in their community vulnerability mapping tool a description of these disproportionate effects on communities of color (BCDC, 2021):

> *"Discriminatory policies implemented across all levels of government intentionally and unintentionally caused generations of communities of color to face persistent poverty; poor public health; inadequate public services; disproportionate exposure to polluted air, water, and soil; and under-representation in policy-making."*

With respect to the increased vulnerability to climate change impacts based on existing social conditions, several demographic factors, including age, race/ethnicity, language, education, income, housing vulnerability and access to vehicles, have been identified as potentially influencing how well communities are able prepare for, respond to and recover from climatic events such as sea level rise in San Mateo County (San Mateo County Office of Sustainability, 2018).

Multiple metrics have been used to identify vulnerable communities in the County (Exhibit 1). Some of these indicators include:

- CalEnviroScreen was developed to identify California's most pollution-burdened and vulnerable communities using a quantitative method. Census tracts identified as in the top 25% of most pollutant-burdened in the state per CalEnviroScreen are defined as disadvantaged under Senate Bill 535 (State of California, 2012; CalEPA, 2017).
- The San Francisco Bay Restoration Authority identifies an "economically disadvantaged community" (EDC) as a community with a median household income less than 80% of the area median income (San Francisco Bay Restoration Authority, 2019).
- The Metropolitan Transportation Commission's (MTC) communities of concern include tracts with four of more disadvantage factors as defined in the Plan Bay Area methodology (MTC and Association of Bay Area Governments, 2017).
- The San Mateo County Community Vulnerability Index, which "combines standardized values of seven separate indicators collected from the United States Census Bureau's American Community Survey to illustrate combined indicators of poverty" (San Mateo County, 2021). This was derived from the County's Climate Adaptation Planning work under Climate Ready SMC (https://climatereadysmc.org/), which addresses multiple climate hazards (flooding, sea level rise, extreme heat, fire).

Several of these key vulnerable community indicators were compiled as part of C/CAG's Sustainable Streets Master Plan. Exhibit 1 of this report displays the map of vulnerable communities created for the Sustainable Streets Master Plan (C/CAG, 2020). As defined in the Sustainable Streets Master Plan, "vulnerable and disadvantaged communities are those that are considered the most burdened by health, economic, and environmental factors." The Sustainable Streets Master Plan compiled datasets include the: (1) Median Household Income (MHI) based Disadvantaged Communities (DACs) dataset from the U.S. Census American Community Survey data; (2) Cal EnviroScreen DAC dataset; (3) economically disadvantaged communities dataset from the San Francisco Bay Restoration Authority; (4) MTC's Communities of Concern dataset; and (5) top tier of the San Mateo County Community Vulnerability Index.

The California Governor's Office of Planning and Research (OPR) includes a definition of social equity in the 2017 General Plan Guidelines from the National Academy of Public Administration (OPR, 2017):

> *"The fair, just, and equitable management of all institutions serving the public directly or by contract; the fair, just and equitable distribution of public services and*

> *implementation of public policy; and the commitment to promote fairness, justice, and equity in the formation of public policy."*

Chapter 4 of the California State General Plan Guidelines was updated in 2020 to expand considerations of environmental justice, an important component of equity, and to describe in further detail SB 1000, which requires that environmental justice be considered in land use planning. The 2020 General Plan Guidelines Chapter 4 update includes a focus on ensuring equitable access and connections to public services and community amenities, such as community centers, libraries, public transit, parks and recreation facilities, and safe drinking water and wastewater services, as well as active transportation infrastructure, flood control and water drainage, and facilities and programs to improve disaster preparedness and recovery capacity (OPR, 2020).

Following feedback from public outreach efforts, BCDC approved an amendment to the Bay Plan[2] to include environmental justice and social equity policies, acknowledging that impacts of pollution, flooding, and climate change are impacting and will affect disadvantaged communities differently (BCDC, 2021). This focus on equity considerations is consistent with other initiatives in the state and the County.

The County of San Mateo's Board of Supervisors has recently increased the focus on equity in County decision making. The Board adopted a resolution authorizing an "Agreement with Social Progress Imperative for Research, Data Analysis, and Consulting Services in Connection with the Integration of Equity Factors into the County's Decision-Making Processes" in March 2020 (Resolution 20-089; County of San Mateo Board of Supervisors, 2020a), in addition to resolutions condemning racism (Resolution 20-584; County of San Mateo Board of Supervisors, 2020b) and supporting the Black Lives Matter movement (Resolution 20-394; County of San Mateo Board of Supervisors, 2020c).

In developing C/CAG's Sustainable Street Master Plan, the need for addressing equity and the disproportionate impacts of climate change on historically underserved communities in the County was recognized early on as an important criterion for project opportunity evaluation and builds on other recent climate adaptation planning efforts, including the San Mateo County Sea Level Rise Vulnerability Assessment and Climate Ready San Mateo County Initiative and associated community-based climate resiliency projects. To this end, the opportunity prioritization methodology included metrics for prioritizing project opportunities based on a composite of community vulnerability indices, drawing on existing state, regional and countywide data layers defining disadvantaged communities.

In addition to serving and protecting communities equitably, community engagement is also an important driver for a successful regional collaboration approach. Regional stormwater projects have stalled or failed when there has not been adequate community support for their implementation. A recent example of this includes a stormwater capture project conceptualized at Holbrook-Palmer Park in the Town of Atherton. There was significant public opposition to the project being at the Town's only park, with "residents and park users said that the construction

[2] San Francisco Bay Plan, https://www.bcdc.ca.gov/plans/sfbay_plan.html.

process could be too disruptive and the facility would be out of place in the park." [3] As a result, the project was relocated to be beneath the athletic fields at a nearby college and preliminary design and environmental review were performed, but ultimately, the project was abandoned by the college. Adequate community engagement and education, especially with communities characterized by existing social vulnerabilities, on the importance of stormwater management, particularly with respect to addressing the effects of climate change, can increase the likelihood of community support for projects and programs. Community understanding of the need for and importance of managing stormwater – whether addressing water quality mandates, preventing flooding and protecting life and property (now and into the future), or using stormwater beneficially as a resource instead of treating as a waste – is essential for ultimately securing the necessary resources.

Regional stormwater management may result in benefits for which equity issues should be considered. For example, regional stormwater projects can create new or improved recreational facilities, such as new playing fields atop an underground retention facility. The downstream benefits of such a project may benefit some communities more than others, or more directly than the community in which the facility is sited. Decisions around the siting and resultant benefits of such facilities should be viewed through and equity lens. Additionally, programmatic mechanisms implemented at a regional scale can provide increased socioeconomic community benefits including workforce training and development opportunities and job creation, particularly in the "green jobs" sector.

5. OBJECTIVES TO MEET DRIVERS

Objectives, or the preferred outcomes of managing stormwater on a regional scale, are described in this section. Many objectives relate to several of the drivers identified in Section 4. The driver(s) relevant for each objective is included in each subsection. Stormwater capture projects implemented through regional-scale stormwater management should be identified, prioritized, and designed to maximize the number of objectives that are addressed. Metrics that represent these objectives will be developed as part of the business case analyses.

5.1 Objective 1: More Efficiently Use Limited Resources

The primary objective of managing stormwater on a regional scale is to use limited municipal resources more efficiently and effectively. This includes reducing fiscal impacts to individual municipalities, achieving economies of scale through funding of larger projects and implementing these projects in the locations (and within a collaborative framework) that provide the most benefits (e.g., capturing larger quantities of water, reducing flood flows, treating larger scale pollutant loads, and providing other benefits). This also includes a focus on planning and implementing multi-scale (i.e., regional, as well as street and parcel-scale) and multi-benefit projects that together have a higher potential of meeting the requirements of various state and federal grants and therefore increasing opportunity to augment limited existing resources through these funding sources. One example of this would be the State's Integrated Regional Water

[3] "Atherton takes first steps toward moving site of water capture project." The Almanac. September 24, 2018. https://www.almanacnews.com/news/2018/09/24/atherton-takes-first-steps-toward-moving-site-of-water-capture-project

Management (IRWM) approach to distributing water resource funding throughout the state through grant programs (SWRCB, 2021b). ***(Relates to Driver 1)***

5.2 Objective 2: Support Improvements to and/or Alleviate Strain on Existing Stormwater Infrastructure

Identify and prioritize stormwater capture opportunities that can minimize existing storm drain deficiencies or their impacts, as identified in Permittee SDMPs. A major challenge for the C/CAG member agencies is implementation of needed repairs, replacement and upgrades for existing storm drain infrastructure. Many severe storm drain issues may be best managed by upgrades to existing "grey" infrastructure, (i.e., storm drainage pipes, pump stations, detention facilities, or other infrastructure). However, some storm drain capacity issues can be at least partially addressed by regional large-scale and/or distributed stormwater capture projects and GSI, which can reduce or slow runoff while providing other benefits. More frequent flooding events can be minimized through implementation of GSI, which provides localized detention of stormwater (and retention/infiltration where feasible) during lower return frequency storm events and can help to reduce peak flows to the storm drain system. Additionally, even moderate to more severe storm drain deficiencies could potentially be served by diverting runoff to larger regional stormwater capture facilities or managing rainwater where it falls with street and parcel-scale GSI, where feasible. *(Relates to Driver 2 and Driver 1)*

5.3 Objective 3: Cost Effectively Comply with Water Quality Regulatory Requirements

Implementation of large-scale stormwater capture facilities that can allow permittees to cost-efficiently meet water quality regulatory requirements. In addition to programmatic needs relating to enforcing and complying with MRP requirements, the RAA Report found that high levels of investment in structural stormwater controls are needed to meet the PCBs TMDL target across the County. However, the RAA Report demonstrated substantial modeled cost savings (~35%) in meeting TMDL targets with implementation at a countywide scale instead of each jurisdiction having to implement an individual distributed GSI system to achieve a proportionate share of water quality improvement (SMCWPPP, 2020a). If additional regional projects are identified and optimized for load reduction potential, these savings could potentially be increased due to less need for small-scale, distributed GSI facilities on public rights-of-way or parcels. Based on a review of statewide GSI design and construction cost data, the unit cost for regional treatment is significantly less than the unit cost for distributed GSI or green street projects (Geosyntec, 2018). There are added cost benefits relating to inspection and maintenance efficiencies with centralized facilities in comparison to distributed GSI. Countywide implementation of strategic distributed scale stormwater management systems may also provide similar benefits but result in increased inspection and maintenance requirements.

In addition to the MRP compliance needs relating to GSI and PCBs load reductions, there are additional requirements, such as Provision C.3 (new development/redevelopment) and Provision C.10 (trash control), that may require additional investment in water quality control measures, and new requirements expected in MRP 3.0 as described in Driver 3. Maximizing the water quality benefits provided by any given facility implemented through regional-scale stormwater management (i.e., regional stormwater capture facilities as well as strategically placed distributed GSI), can allow for efficiencies in meeting these requirements. Additional MRP provisions that

address other sources of stormwater pollution that could also be beneficially addressed through regional-scale SW management. ***(Relates to Driver 3 and Driver 1)***

5.4 Objective 4: Consider and, Where Appropriate, Design for Projected Future Impacts Resulting from Climate Change

Site and design stormwater capture facilities to avoid future climate impacts and/or to help mitigate future climate impacts. These impacts include flooding from sea level rise or upland floods, heat stress, and water stress. For example, stormwater capture projects should not be sited in locations where there is a strong likelihood of inundation from sea level rise in the future (unless specifically designed to be inundated) or where rising groundwater levels due to sea level rise will limit infiltration capacity or infringe upon the necessary depth separation for groundwater protection. Facilities should be sited and designed to alleviate future impacts from climate change to the extent feasible, providing that other high priority objectives are met through the same facilities or other stormwater capture facilities. Siting considerations relating to climate change resiliency could include, for example: locating a facility where it could serve to detain peak flows projected to be higher in the future; siting in locations upstream of areas that are anticipated to have compound effects of sea level rise and increased runoff; siting a facility where it could provide increased water supply through recharge, detention, and/or diversion (also see Objective 5); or siting sub-regional facilities or integrated distributed GSI and large-scale projects where there are projections of increased heat stress.

If a facility is sited such that it could serve to mitigate some of these climate impacts, it must also be designed appropriately in consideration of those projected changes. A facility sited to cool urban heat islands should include vegetation that maximizes shade and/or cooling through evapotranspiration. Similarly, a facility sited to detain increasing peak flows should be designed with an outfall structure or other features that can manage these peaks. Importantly, climate projections range widely and where facilities are designed to mitigate increased peak flow, there should also be consideration of the range of potential future outcomes for precipitation to minimize the potential for unintended consequences. ***(Relates to Driver 2, Driver 4 and Driver 5)***

5.5 Objective 5: Supplement County Water Supply Portfolio with Stormwater Where Feasible

Where economically and physically feasible, use stormwater capture projects to supplement the County Water Supply Portfolio. Examine opportunities for using regional-scale stormwater management to supplement water supply through groundwater recharge, capture, treatment, and use, larger-scale detention and diversion to treatment plants to supplement recycled water operations and opportunities for using distributed parcel-scale GSI to offset potable water use with rainwater capture and onsite use. Facilities sited for water supply should also be designed specifically to provide those water supply benefits, for example, to infiltrate optimally for recharge or use an active controlled outfall to divert water to a recycled water treatment facility when the timing is optimal or, for distributed parcel-scale facilities, integrate stormwater capture as a source of water supply in water supply planning.

A key objective of the BAWSCA Long-Term Reliable Water Supply Strategy includes identifying and evaluating water supply management projects that could be developed to meet drought year demands, during which supply shortfalls could be experienced. Stormwater capture

and use is identified as a potential water supply project under consideration, but BAWSCA identified only a small proportion of the projected drought shortfall to be made up by rainwater capture (i.e., rain barrels) in their Strategy (BAWSCA, 2015). There could be the opportunity to increase the stormwater portion of water supply portfolios in the County (depending on the groundwater basin) even during drought years with innovative stormwater capture and groundwater recharge projects.

The economics of stormwater use as water supply vary widely depending on a number of factors, and include storage, treatment, and conveyance considerations. Based on a study by Diringer et al. (2020), recharge to groundwater provides the most cost-efficient solution due to the smaller storage requirements as compared to detention facilities, and centralized capture systems are substantially less expensive than decentralized facilities.

According to Cooley et al. (2019), the levelized cost of stormwater capture and use for water supply is less expensive than non-potable reuse, indirect potable reuse, and seawater desalination. However, some Peninsula and South Bay POTW facilities that have recycled water operations are currently not considering supplementing operations with stormwater supply. This is largely related to the fact that stormwater has lower concentrations of pollutants and does not require the same level of treatment as wastewater (thus potentially a waste of energy to treat similarly to wastewater), and that stormwater quantity is unpredictable and would not arrive at the POTW at a steady flow rate without substantial storage (City of San Mateo, 2021a; Santa Clara Valley Water District, 2021).

An example of a regional-scale stormwater management project that will supplement county water supplies is the Orange Memorial Park water capture facility in South San Francisco, that began construction in March 2021. The $15 million project will divert flow from the hardened Colma Creek channel within Orange Memorial Park, and, after providing initial treatment to remove pollutants, will direct water either to an infiltration gallery for groundwater recharge or to an onsite treatment and disinfection facility for subsequent irrigation of Orange Memorial Park and adjacent park facilities. The project is expected to infiltrate 240 acre-feet of water annually into the Westside Groundwater Basin, which is actively used for water supply purposes, and offset 15 million gallons annually in potable water usage for irrigation purposes.

It is possible that the economics of stormwater capture and use as water supply will become more favorable as state water conservation initiatives are enacted and effects of climate change are increasingly felt. If so, the objective to use regional stormwater capture facilities to expand the water supply portfolio may become a higher priority in the coming years. Furthermore, while recognizing the cost-efficiencies of more centralized options for beneficial reuse of stormwater, there is also the potential to leverage existing programs to capture and reuse stormwater at a site or parcel scale, including the rain barrel rebate partnership between BAWSCA and C/CAG, or local policy changes related to new or redevelopment project onsite water usage. ***(Relates to Driver 4 and Driver 5)***

5.6 Objective 6: Site and Design Projects to Equitably Serve and Protect Communities

Site and design facilities to equitably serve and protect communities, particularly disadvantaged communities and socially vulnerable communities. Consistent with OPR's General Plan Guidelines, communities across the County should have equitable access to

services, amenities, resiliency, and benefits provided through stormwater capture facilities. Equitable access should consider racial, socio-economic, and health factors. Additionally, as feasible, facilities could be sited and designed to increase amenities or resiliency in communities to provide more equitable distribution of these benefits more generally. Communities identified as disadvantaged or socially vulnerable should be of focus when considering equitable implementation of regional stormwater capture facilities of all scales (Figure 1). As possible, communities that may be expected to be disproportionately impacted by climate change and/or poor water quality should be of focus when considering how climate resiliency benefits can be incorporated into the suite of regional/sub-regional stormwater capture projects and distributed GSI implemented through regional-scale stormwater management. Additionally, the intersection of climate change impacts and other related environmental issues needs to be better considered and anticipated (e.g., impacted water supplies or water contamination from nearby industrial facilities). Similarly, if public amenities can be incorporated into regional stormwater capture projects, equitable implementation of these amenities should be of priority. The mobilization and demolition cost and effort needed for implementing a regional stormwater capture project could be used to benefit other community projects that may not have sufficient funding for full implementation. A programmatic approach to regional-scale distributed parcel-scale GSI facilities could provide opportunities to equitably engage community members disproportionately impacted by localized flooding. These approaches, e.g., parcel-scale rainwater harvesting systems, which should consider the economic means of the participants, may allow installation of multi-benefit projects that can partially mitigate these impacts while also helping to reduce individual's cost of potable water use. ***(Relates to Driver 6 and Driver 5)***

5.7 Objective 7: Consider Local Community Benefits and Concerns in Project Implementation

Educate and engage residents regarding stormwater management needs, stormwater capture facilities, and associated benefits to maximize the potential for community support. A key success factor for implementation of regional-scale stormwater management through a range of stormwater capture facility sizes is support from the local community. Inadequate education and outreach to the local community can stymie projects simply because residents are unaware of the benefits of stormwater management or view short-term impacts of constructing a project as outweighing the long-term benefits, especially if those benefits are primarily experienced in downstream communities. The residents of San Mateo County have elected federal and state officials with a focus on environmental issues (i.e., see California League of Conservation Voters Scorecard). Therefore, presumably an understanding of the environmental benefits of stormwater capture could increase overall support for facility implementation. Additionally, if a stormwater fee increase is ultimately brought to property owners or the voters, this education and understanding may increase the likelihood of success (as well as support for the potential renewal of C/CAG's Measure M vehicle registration fee in 2035). A programmatic approach to regional-scale distributed parcel-scale GSI may offer additional community engagement opportunities. These facilities can be built on residential and commercial properties in partnership with the property owners and can be highly visible to the larger community. This type of direct engagement can also build support for larger-scale projects.

Additionally, if other benefits can be maximized through facility implementation (see, for example, those listed in Objective 8), those benefits can be designed with consideration of the needs and desires of the local community. If the local community is aware of the environmental

benefits and has a chance to weigh in on other additional community benefits provided by a stormwater capture facility, there is increased potential for support from nearby residents. Additional benefits can be provided programmatically in the process of project implementation, such as through including contractual requirements for workforce training and development and job creation as part of a regional-scale facility implementation approach. ***(Relates to Driver 6 and Driver 1)***

5.8 Objective 8: Maximize Other Benefits, Where Possible

Regional-scale implementation of stormwater capture projects should entail siting and designing facilities to maximize additional benefits provided. Facilities implemented through a regional-scale approach should be designed to maximize other potential benefits, including but not limited to:

1. Integrating waterways into communities (opportunities for wetlands, stream restoration, or creek daylighting that can be integrated into regional stormwater capture facilities);
2. Community amenities (including trails, parks, etc.);
3. Habitat (use of native plants, design to maximize ecosystem benefits);
4. Safety/Health/Active Transportation (green space for urban health and reduction of heat island, GSI as a buffer feature in multi-modal transportation design, GSI as part of a larger project to encourage walking or biking); and
5. Education (siting and signage selected with consideration of public education benefits, GSI facility tours).
6. Reducing sediment loads to tidally influenced drainages that require ongoing dredging.

Relating to community amenities, the FSLRRD has authority to implement projects that provide recreational benefits. The incorporation of community amenities into or through stormwater capture project implementation can also encourage public buy-in to projects in their communities (see Objective 7). ***(Relates to Driver 5 and Driver 6)***

6. SUMMARY AND NEXT STEPS

6.1 Identification of Projects to Meet Objectives

As described in Section 3, the vision for managing stormwater on a regional scale is to:

- Cost-effectively implement multi-benefit stormwater infrastructure solutions that collectively improve water quality; increase resiliency to climate change impacts; mitigate localized flooding; utilize stormwater as a resource; and serve communities equitably, both locally and regionally.

A next step in meeting this vision is to identify potential multi-benefit regional stormwater capture project locations and designs of varying scales that could address the objectives of managing stormwater on a regional scale. A number of plans reviewed as part of the development of this report include relevant information that can be used to identify and prioritize

multi-benefit stormwater capture projects, such as deficient storm drain infrastructure identified in storm drain master plans, high priority water quality facilities included in member agency GSI Plans, facility locations incorporated into RAA output, projects identified through the County Stormwater Resource Plan (SMCWPPP, 2017), and potential resiliency solutions identified in San Francisco Estuary Institute's Adaptation Atlas (Beagle et al., 2019).

Importantly, Driver 1, limited resources, relates to a number of regional-scale stormwater management approach objectives. As described in Sections 4.1 and 4.2, there is currently not enough funding to upgrade deficient infrastructure in many jurisdictions, let alone meet all eight objectives summarized in Section 5. As such, prioritization of identified stormwater capture projects may be difficult if choices must be made between meeting different objectives in any given facility. Additionally, identified facilities may preferentially alleviate impacts in the jurisdiction(s) in which they are located and/or adjacent to. This tension is something that will need to be considered as stormwater capture projects of varying scales are identified and the regional-scale stormwater management approach is developed further.

A visual of how the drivers and objectives interact is shown in Figure 1, below.

Figure 1: Drivers and Objectives

6.2 Project Next Steps

The existing plans described in Section 6.1 can be used as input to the list of regional stormwater capture projects identified to meet the objectives described in this report and shown in Figure 1. Craftwater will be incorporating the analyses summarized in existing plans, along with the findings of this report, into the identification and prioritization of feasible regional stormwater capture projects to be implemented through a regional-scale stormwater management approach.

With consideration of the drivers and objectives, Geosyntec and Craftwater will develop the approach for the business case demonstration, beginning with the development of metrics that can be used to quantitatively assess the potential for a suite of stormwater capture facilities to meet objectives. Craftwater will conduct modeling and analyses to develop quantitative output to support the business case. This may include estimates of facility performance in terms of water quality benefits, including load reduction, peak flow reduction, and other quantitative metrics.

Geosyntec will work collaboratively with Craftwater to evaluate the output of this analysis alongside comparative benefits achieved from smaller-scale distributed facilities. It is anticipated that planning-scale cost analyses will be conducted for both sets of potential projects to demonstrate the potential economic benefits of siting regional stormwater capture facilities where they can optimally meet the objectives. The results of these analyses will be summarized in the Project Business Case Memorandum.

The Business Case Memorandum will be presented to the Project TAC and C/CAG member agencies to obtain input. These considerations will be used to develop a draft regional collaboration framework that will be summarized in a final white paper as part of the Project.

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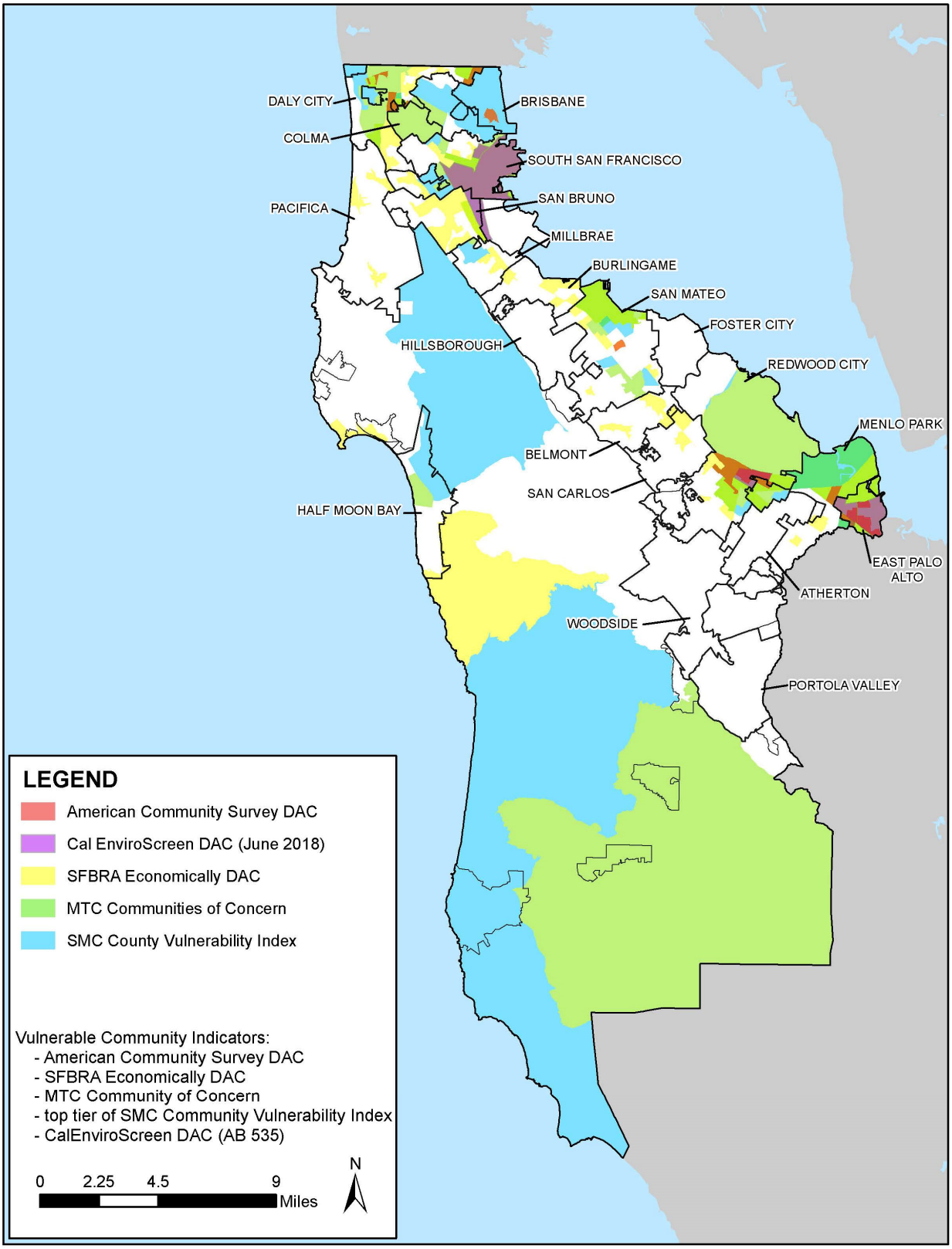
EXHIBIT 1
Vulnerable Communities



Note: Map was prepared by Lotus Water Engineering for the San Mateo Countywide Sustainable Streets Master Plan (C/CAG, 2020).

San Mateo County
Vulnerable Community Indicators

C/CAG Advancing Regional Stormwater Capture Projects: Drivers and Objectives

Geosyntec consultants

CWR0650	February 2021

Exhibit 1

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ATTACHMENT A

Drivers Matrix

Advancing Regional Stormwater Capture Projects: Drivers and Objectives
Attachment A: Maxtrix of Drivers
City/County Association of Governments of San Mateo County

Agency	Title	Year	Report Category	Driver 1: Limited Resources	Driver 2: Existing Stormwater Infrastructure Deficiencies	Driver 3: Water Quality	Driver 4: Climate Resiliency	Driver 5: Beneficial Use of Stormwater	Driver 6: Equity and Community Engagement
SFBRWQCB	Municipal Regional Stormwater NPDES Permit (MRP)	2015	Permit			X			
SFBRWQCB	San Francisco Bay Mercury TMDL	2008	TMDL			X			
SFBRWQCB	San Francisco Bay PCBs TMDL Project	2010	TMDL			X			
SFBRWQCB	Pescadero and Butano Creeks Watershed Sediment TMDL	2018	TMDL			X			
SFBRWQCB	San Vicente Creek and Fitzgerald Marine Reserve Fecal Indicator Bacteria Project	2016	TMDL			X			
SFBRWQCB	Pillar Point Harbor and Venice Beach Bacteria TMDL (Open for Public Comment)	2020	TMDL			X			
SFBRWQCB	San Francisquito Creek Sediment TMDL		TMDL			X			
SFBRWQCB	San Gregorio Creek Sediment TMDL		TMDL			X			
SFBRWQCB	Kiteboard Beach and Oyster Point Beach Bacteria TMDL		TMDL			X			
SFBRWQCB	San Pedro Creek and Pacifica State Beach Bacteria TMDL	2012	TMDL			X			
SFBRWQCB	San Francisco Bay Beaches Bacteria	2016	TMDL			X			
San Francisquito Creek Joint Powers Authority	Website	2020	Flood Management		X		X		
San Mateo County	Climate Adaptation Risk Analysis for the San Mateo Countywide Sustainable Streets Master Plan, Sustainable Streets Master Plan	2020 (DRAFT)	Climate Change Adaptation		X		X	X	X
San Mateo County	SMC Energy and Water Strategy for 2025	2020 (DRAFT)	Water Supply Management		X		X	X	X
BAWSCA	Long-Term Reliable Water Supply Strategy (Risk Assessment)	2015	Water Supply Management					X	
FSLRRD	FSLRRD BOS Presentation, December	2020	Climate Change Adaptation		X		X	X	X
SFEI	SFEI SF Bay Shoreline Adaptation Atlas	2019	Climate Change Adaptation		X		X	X	X
San Mateo County	County of San Mateo Sea Level Rise Vulnerability Assessment	2018	Climate Change Adaptation		X		X	X	X
Coastside County Water District	Coastside County Urban Water Management Plan	2016	Groundwater	X				X	
San Mateo County	San Mateo Plain GW Basin Assessment	2018	Groundwater					X	
City of San Bruno/Daly City	South Westside Basin GWMP	2012	Groundwater					X	
California's Groundwater Bulletin	Half Moon Bay Terrace (Coastside) GWMP		Groundwater					X	
San Mateo County	SMC Hazard Mitigation Plan	2016	Climate Change Adaptation		X			X	
San Mateo County	Stormwater Resource Plan for San Mateo County	2017	Stormwater Resource Plan		X		X	X	X
SMCWPPP	San Mateo County-Wide Reasonable Assurance Analysis Addressing PCBs and Mercury	2020	TMDL/MRP Compliance			X	X	X	
San Mateo County	Climate Ready Viewer	2020	Climate Change Adaptation		X		X		
Silicon Valley Clean Water	Solids Management	2021	Sustainability				X		
San Mateo County	Groundwater Information	2020	Groundwater					X	
San Mateo County Board of Supervisors	FLSSRD CEO Len Materman's presentation to the San Mateo County Board of Supervisors	2020	Presentation				X		X
Atherton	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
Belmont	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
Brisbane	Green Infrastructure Plan	2020	GSI Plan			X	X	X	X
Burlingame	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
Colma	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
Daly City	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
East Palo Alto	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
Foster City	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X

Agency	Title	Year	Report Category	Driver 1: Limited Resources	Driver 2: Existing Stormwater Infrastructure Deficiencies	Driver 3: Water Quality	Driver 4: Climate Resiliency	Driver 5: Beneficial Use of Stormwater	Driver 6: Equity and Community Engagement
Half Moon Bay	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
Hillsborough	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
Menlo Park	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
Millbrae	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
Pacifica	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
Portola Valley	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
Redwood City	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
San Bruno	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
San Carlos	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
San Mateo, City	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
San Mateo County	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
South San Francisco	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
Woodside	Green Infrastructure Plan	2019	GSI Plan			X	X	X	X
Atherton	Climate Action Plan	2016	Climate Action Plan				X	X	X
Belmont	City of Belmont 2017 Climate Action Plan	2017	Climate Action Plan				X	X	X
Brisbane	City of Brisbane Climate Action Plan	2015	Climate Action Plan				X	X	X
Burlingame	City of Burlingame 2030 Climate Action Plan	2019	Climate Action Plan				X	X	
Colma	Town of Colma Climate Action Plan	2013	Climate Action Plan				X	X	X
Daly City	Daly City's Green Vision, A Climage Action Plan for 2011 - 2020 and Beyond	2005	Climate Action Plan				X	X	X
East Palo Alto	City of East Palo Alto Final Climate Action Plan	2011	Climate Action Plan				X	X	
Foster City	Foster City Climate Action Plan	2015	Climate Action Plan		X		X	X	X
Hillsborough	Town of Hillsborough	2010	Climate Action Plan				X	X	
Menlo Park	2030 Climate Action Plan	2020	Climate Action Plan				X	X	X
Millbrae	City of Millbrae Final Climate Action Plan	2020	Climate Action Plan				X	X	X
Pacifica	City of Pacifica Climate Action Plan	2014	Climate Action Plan				X	X	X
Redwood City	Climate Action Plan City of Redwood City	2020	Climate Action Plan				X	X	X
San Bruno	City of San Bruno Climate Action Plan	2012	Climate Action Plan				X	X	
San Carlos	City of San Carlos Climate Action Plan	2009	Climate Action Plan				X		X
San Mateo, City	City of San Mateo 2020 Climate Action Plan	2020	Climate Action Plan				X	X	X
San Mateo County	San Mateo County Energy Efficiency Climate Action Plan	2013	Climate Action Plan				X	X	X
San Mateo County	County of San Mateo Government Operations Climate Action Plan	2012	Climate Action Plan				X	X	
South San Francisco	City of South San Francisco Climate Action Plan	2014	Climate Action Plan				X	X	
Woodside	Town of Woodside Climate Action Plan	2015	Climate Action Plan				X	X	X
C/CAG	RICAPS Climate Action Plan Template	2020	Climate Action Plan				X	X	X
Atherton	Town of Atherton Townwide Drainage Study Update	2015	Storm Drain Master Plan	X	X	X			
Belmont	Belmont-Wide Storm Drainage Study	2009	Storm Drain Master Plan	X	X	X			
Brisbane	Storm Drainage Master Plan	2003	Storm Drain Master Plan	X	X	X			
East Palo Alto	City of East Palo Alto Storm Drain Master Plan	2014	Storm Drain Master Plan	X	X	X			
Half Moon Bay	Half Moon Bay Storm Drain Master Plan Update	2016	Storm Drain Master Plan	X	X				
Hillsborough	Hillsborough Storm Drain Master Plan	2015	Storm Drain Master Plan	X	X	X			
Menlo Park	City-Wide Storm Drainage Study	2003	Storm Drain Master Plan	X	X				
Millbrae	City of Milbrae Storm Drain Master Plan	2018	Storm Drain Master Plan	X	X	X			
Pacifica	City of Pacifica Storm Drainage System Master Plan	2012	Storm Drain Master Plan	X	X				
San Bruno	City of San Bruno Storm Drain Master Plan	2014	Storm Drain Master Plan	X	X	X			
San Carlos	City of San Carlos Storm Drain System Master Plan	2017	Storm Drain Master Plan	X	X				
San Mateo, City	Storm Drain Master Plan San Mateo, California	2004	Storm Drain Master Plan	X	X				
South San Francisco	City of South San Francisco Storm Drain Master Plan	2016	Storm Drain Master Plan	X	X	X			