APPENDIX C

County of San Mateo Advancing Regional Stormwater Capture Projects: Project Opportunities Analysis Memorandum

County of San Mateo

Advancing Regional Stormwater Capture Projects

Project Opportunities Analysis Memo FINAL

26 January 2022

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
ac-ft	acre-feet
ABAG	Association of Bay Area Governments
BMP	Best Management Practice
C/CAG	City/County Association of Governments of San Mateo County
cfs	cubic feet per second
DEM	Digital elevation model
ft	feet
hr	hour
HSG	Hydrologic soil group
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
PCB	Polychlorinated biphenyls
POC	Pollutant of Concern
RAA	Reasonable Assurance Analysis
ROW	Right-of-Way
SMC	San Mateo County
SRP	Stormwater Resource Plan
SSURGO	Soil Survey Geographic Database
TMDL	Total Maximum Daily Loads

1.0 BACKGROUND & CONTEXT

The following provides introduction to the Project and rationale for the need to advance the best opportunities for regional stormwater capture across San Mateo County.

1.1 OVERVIEW

To address the requirements of the Municipal Regional Permit (MRP), the City/County Association of Governments of San Mateo County (C/CAG) and member agencies are collaborating to determine the most impactful and effective ways possible to capture stormwater and improve water quality across managed watersheds across their jurisdictional boundaries. The MRP, a Phase I municipal stormwater permit, was issued by the San Francisco Regional Water Quality Control Board and includes compliance requirements by Permittees to address regional TMDLs (Total Maximum Daily Loads) for mercury and PCBs (polychlorinated biphenyls) as part of the San Francisco Bay Basin Plan. To provide required pollutant reductions and contribute to other regional watershed management goals (flood management, green infrastructure, water reuse, etc.), C/CAG has taken a progressive approach to achieve compliance with the MRP in a cost-efficient manner, while promoting multi-benefit projects with a heavy focus on leveraging collaboration and funding sources. The approach has undertaken several large-scale planning efforts to date with the goals of modeling watersheds, planning strategies, and quantifying needs to provide a sound determination of how member agencies can collectively work together to develop solutions that will both meet regulatory compliance requirements and provide multi-benefit infrastructure solutions in a cost-effective manner. The approach is a multi-scaled approach that provides site development guidance, green street instruction, and regional scale opportunities identification. The focus of this analysis is on regional-scale stormwater capture projects and identifying opportunities/watershed areas that can support regional-scale programmatic implementation of green infrastructure at a distributed scale. Previous planning efforts have begun to identify how this might be carried out, but there is a need to further advance this analysis to determine the best potential opportunities across San Mateo County where these program ideals can be realized.

1.2 ADVANCING REGIONAL STORMWATER CAPTURE PROJECTS

Highly distributed green infrastructure has been shown to be an effective stormwater management practice in many instances, and while it is an important component of new development, it can be difficult and expensive to fully implement in previously developed areas which require extensive retrofits. Because of this and increasingly stringent water quality requirements, regional stormwater capture projects have been shown to be a more cost-effective alternative in highly developed areas, with more focused and centralized capture and treatment of stormwater at strategic locations. Furthermore, the areas where PCBs have historically accumulated (i.e. old industrial land use areas) tend to not be the most effective and efficient locations for implementing distributed green infrastructure. The Stormwater Resources Plan watershed-based opportunities analysis began to identify feasible locations for regional stormwater capture projects, but there is a need to identify more potential opportunities, provide further detail for project potential, and develop a more focused feasibility and prioritization assessment of these opportunities so that C/CAG can ensure that County-wide efforts are pursuing the most cost-effective and impactful projects moving forward. Additionally, it is necessary for potential project identification to incorporate an assessment of technical feasibility and multi-benefit evaluation that will provide C/CAG assurance that identified opportunities can be effectively engineered and that they will contribute to a broad range of watershed goals in addition to the water quality benefits that they can impart. The result of this analysis contained herein will provide a strong list of the best regional stormwater capture projects across the County, vetted through focused engineering feasibility and project potential metrics, that will provide the best options for C/CAG to further pursue for refined engineering feasibility and design studies moving forward.

1.3 REGIONAL-SCALE FRAMEWORK

The identification and conceptualization of the regional stormwater capture projects is one part of the multi-pronged approach to manage stormwater within San Mateo County. The larger effort's goal is to catalyze countywide collaboration on regional-scale stormwater management to address key drivers, create a framework under which that collaboration can take place, prioritize and conceptualize opportunities for regional-scale stormwater management, and explore innovative funding and financing approaches. The effort is broken into four interrelated project components:

1) Building the business case for regional-scale stormwater management
   a. Establishes the 'What, Why, and How' regional-scale management should be performed. Includes development of drivers and objectives, benefits realized by collaborating, and how collaboration could function across jurisdictional boundaries.
2) Prioritizing and conceptualizing regional-scale stormwater management opportunities
   a. Creates an identification and prioritization framework to find and rank the best regional opportunities. Concept designs for the top identified locations serve to move towards finding funding opportunities.
3) Credit trading marketplace analysis
   a. Evaluates the opportunity to allow private developers or member agencies to buy and sell stormwater management credits to increase overall stormwater management project implementation per the drivers and objectives established.
4) Innovative funding and financing analysis – a
   a. Pursues innovative funding and financing options for various scales of stormwater management.

This technical report focuses on the identification and prioritization frameworks to help find the top project concepts that will be field evaluated and conceptualized in a future task. Ultimately, these projects will be incorporated into the Stormwater Resources Plan to provide a comprehensive plan for the region.

2.0 PROJECT IDENTIFICATION & FEASIBILITY EVALUATION

The following section summarizes the methodology and datasets used to identify potential regional stormwater capture project opportunities and characterize them to focus further feasibility assessment and engineering evaluation to determine a narrowed roster of the top opportunities for full modeling evaluation.

All parcels within the County were considered as possible candidate sites and entered the site feasibility analysis. Initial screening narrowed the potential list to approximately 300 parcels where a project could reasonable be completed. The 300 projects were reviewed by a design engineer who performed aerial imagery and street view analysis of the sites to provide an initial thought on project complexity and provided an assessment of not feasible, significant constraints, and minimal constraints. The projects identified as having minimal constraints equated to 74 project sites that were then parameterized for prioritization. The priority modeling provided a ranking of each project relative to the drivers and objectives (see the Drivers and Objectives memorandum) where the highest-ranking ones across multiple objectives were selected for further evaluation. **Figure 2-1** provides a brief overview of the identification and prioritization process followed.

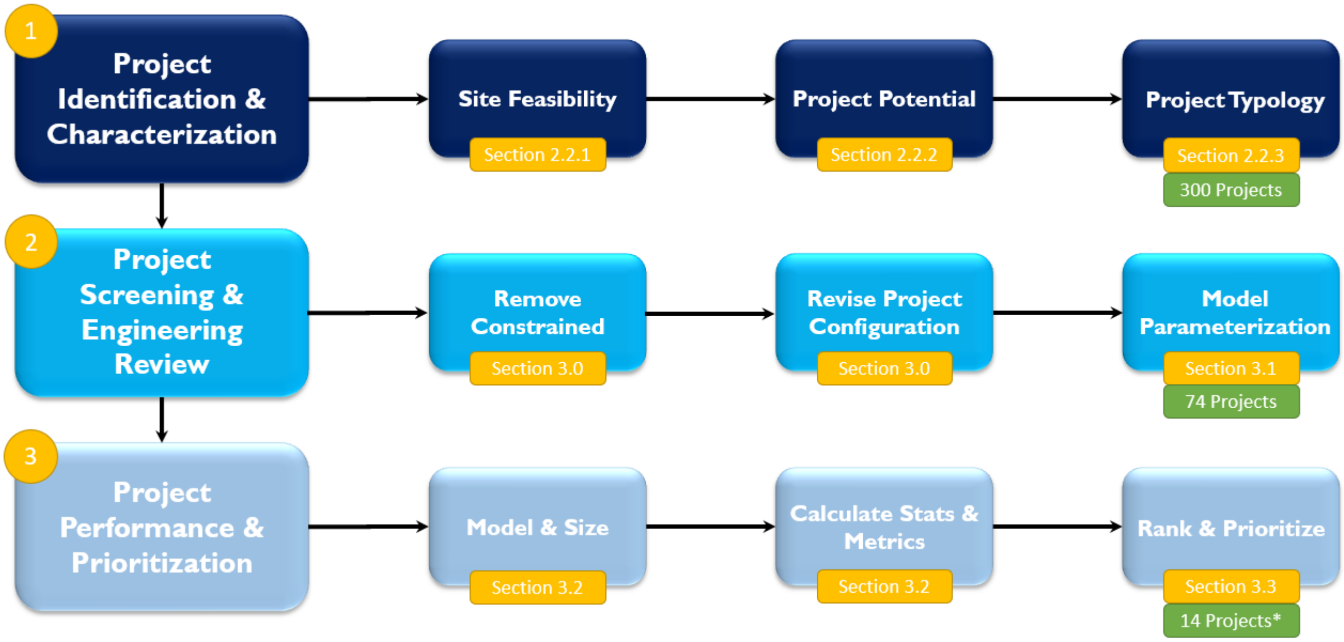

Figure 2-1. Regional project identification and prioritization process flow chart. *14 projects evaluated by the jurisdictions. Ten (10) projects will be ultimately selected for field visits and five (5) for project concepts.

2.1 PROJECT IDENTIFICATION AND CHARACTERIZATION

In the first step of project identification, the goal is to evaluate the applicability of feasible regional scale stormwater capture projects based on the site feasibility, project potential, and project typology. High-resolution geospatial analysis was used to identify regional stormwater capture project opportunities across San Mateo County and characterize these opportunities to serve as a basis for further engineering analysis, project performance quantification, and prioritization that will narrow the list of potential opportunities to a short list of the most impactful and cost-effective projects that C/CAG can pursue. A variety of spatial datasets were provided by C/CAG and member agencies for these purposes, and this data was integrated with engineering feasibility assessment analysis to develop the most realistic determination of project potential possible at a County-wide scale. The methodology used in this analysis is detailed below across three key project assessment criteria, and specific datasets utilized for these purposes are summarized in **Table 2-1**.

Project opportunities were identified across San Mateo County and characterized along the following three assessment criteria to provide context to focus the efforts of engineering feasibility analysis on the projects with the greatest chance of success.

Project Site Feasibility

A regional stormwater capture project can be engineered and built almost anywhere using brute force and human ingenuity given sufficient funding, but the most cost-effective projects capitalize on locations that are the most amenable to construction and the incorporation of stormwater projects within current site conditions. Preliminary feasibility screening was performed to identify potential project sites that avoid building footprints, existing utility infrastructure, and fault zones and that each site has constructable areas with a moderate ground slope that can be readily built upon. Provided datasets were used to screen out areas where these conditions would not be amenable to project implementation (see **Table 2-1** for greater screening detail). The results of this analysis (feasible project area) were summarized at the County parcel level. Because publicly owned parcels offer much fewer barriers to project implementation than do private parcels, these have been prioritized in this analysis for advancing the best options found. However, the full project characterization analysis has been carried out for all parcels countywide (public or private) to (1) assist in the credit market feasibility analysis to identify optimal locations for implementing projects on public/private sites to determine future demand/supply for credit trading and (2) possible future public-private partnerships for top project opportunities on these lands in the future. In addition to the defined public parcels, key areas of right-of-way (ROW) have been assessed for potential project opportunities as well because of their public nature and potential to incorporate stormwater capture with other maintenance and construction activities. These have been identified where major roadway corridors are crossed by existing storm drains to assess the ROW locations with the greatest potential for stormwater capture.

Project Capture Potential

With nearly 4,500 public parcels identified in San Mateo County, it is not possible to provide an in-depth engineering analysis for project opportunities at each of these individual sites. Ranking these sites based on their potential to capture stormwater provides a preliminary list of project opportunities that can be assessed in order of rank to narrow the list of projects to a manageable number for more in-depth modeling assessment. The potential for a project opportunity to capture stormwater is rooted in (1) available space to construct the project and (2) access to an appreciable amount of stormwater runoff via diversion from existing storm drains. The former

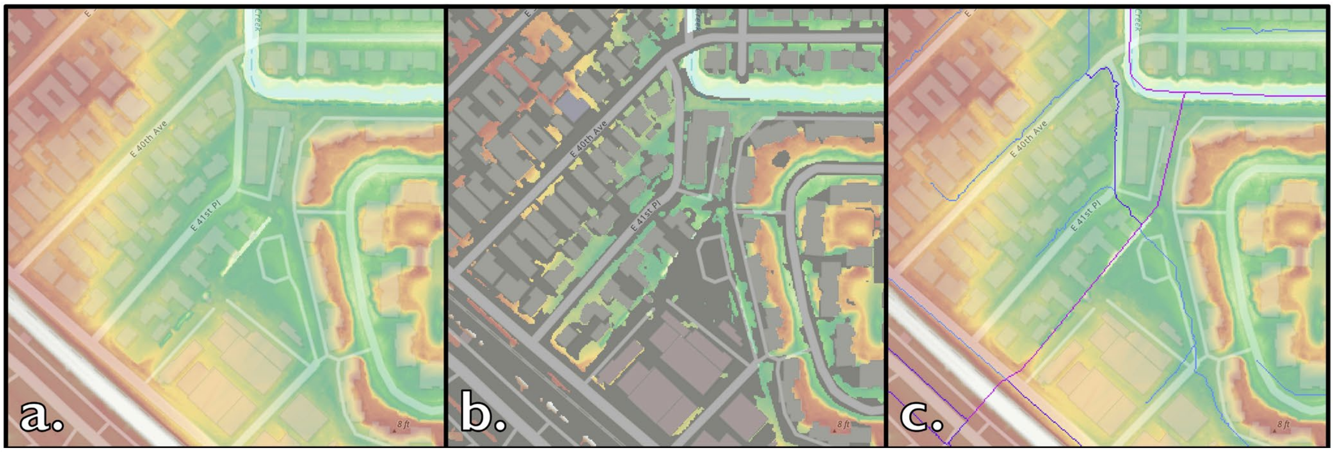

Figure 2-2. Combining DEM-based drainage patterns (a) with impervious surface data (b) and storm drain lines (c) to be used to assess project potential.

has been assessed based on the results of the Project Site Feasibility Analysis. The latter has been assessed using high-resolution drainage mapping and elevation analysis.

The drainage mapping analysis integrates digital elevation models (DEMs; **Figure 2-2a**), storm drain inventories, automated drainage area delineation, and proximity analysis to identify feasible diversion points for runoff from the storm drain network to each potential project location and the associated drainage area that would be treated by capturing this runoff. Once the drainage area for each project is identified using the DEM and storm drain network in conjunction, it is further assessed to quantify the magnitude of impervious surfaces within the drainage to gauge potential project performance (**Figure 2-2b** shows how elevation and impervious surfaces interact to forge runoff accumulation paths in **Figure 2-2c**). While overall drainage area is a good indicator of potential runoff to a site, the impervious drainage area provides an even better indicator of not only runoff magnitude but also potential pollutant loading. Impervious surfaces are often associated with higher runoff volumes and pollutant loads because runoff transmitted across them is mostly concentrated and carries with it all accumulated pollutants that result from land use, human activity, and the collective ambient conditions of pollutant deposition. The results of these two project opportunity metrics (feasible space and treatable impervious area) were combined in a balanced ranking (geometric mean) to focus the engineering analysis wherein the top potential opportunities are individually screened using "engineering eyes" and accompanying project characterization data to provide a more refined feasibility assessment to determine which projects move on to the modeling and prioritization analysis.

Project Typology Evaluation

A variety of categorical evaluative factors are useful in the engineering analysis to determine the potential options that may or may not be viable at any given location and the potential for success of any given project opportunity. These factors are typically categorical in nature and/or binary measures of project specific conditions (yes/no; presence/absence). These types of data may not apply to all potential BMP types, but they can be used to select among multiple BMP types at a given site or exclude certain options that may not be feasible. Because of this, these data do not necessarily define the potential performance of a project opportunity at any given site. Rather, these evaluative factors help focus the engineering analysis of potential options at a given site (e.g. open field versus parking lot, a deep versus shallow water table, relatively constrained footprint versus larger footprint) and provide guidance as to what might be the best BMP type to pursue once detailed site analysis is performed. Details of the evaluative factors that were used in the full analysis are found in **Table 2-1**, and maps of how these factors vary across the County are provided in Section 2.2.3. These factors have been used in the engineering analysis as well as further project opportunity evaluation for the top projects to select among a variety of desired BMP types for the County.

2.2 MULTI-DRIVERS SCREENING CRITERIA DATA & METHODS

The second step in the identification process is the screening using readily available datasets from countywide sources and previous studies. The goal of the screening is to further refine the list of regional project opportunities from several thousand to a number that can reasonable be evaluated by engineering eyes in an aerial evaluation and to further evaluate the opportunities based on the full set of objectives in the Drivers and Objectives Report. The following approach and data were used to conduct the geospatial analysis of opportunities that help maximize the benefit of these projects. The table below summarizes metrics, datasets, and classification details used to identify, screen, rank, and evaluate the full roster of County-wide project opportunities and narrow this list down to a focused group of the best opportunities to undergo full modeling analysis for prioritization. Key maps follow to demonstrate how these criteria varied across the County, and all final characterization will be included in the geospatial project database.

Table 2-1. Summary of geospatial datasets used in project opportunity characterization.

Assessment Criteria	Metric/Constraint	Data Source	Classification	Notes
Site Feasibility	Building Footprints	C/CAG Impervious Surface Data	Footprint + 20' buffer	Building footprint plus offsets screened out for BMP feasibility
	Utility Conflicts	C/CAG and Member Agency Utility Data	Asset + 4' buffer	Utility avoidance keeps costs lower and minimizes delays; screened out for BMP feasibility
	Constructable Slope	C/CAG 2017 1m DEM	15% Grade Breakpoint	Slopes ≤ 15% more easy to construct upon; any areas with higher slopes screened out for BMP feasibility
	Fault Hazards	ABAG Fault Hazards	Presence/Absence	Higher probability of failure; areas screened out for BMP feasibility
Potential Stormwater / Hydrology Performance	Drainage Patterns	DEM Analysis	DEM-based Flowpath	Indicate surface runoff pathways
	Storm Drain Diversions	C/CAG and Member Agency Utility Data	Drains ≥ 24 in. Diameter	Identify potential project drainage area rom storm drain diversion point to BMP via GIS analysis of subsurface runoff pathways forming drainage areas in conjunction with surface runoff pathways
	Impervious Drainage Area	DEM Analysis	DEM-based Flowpath	Assessed at project diversion points; indicate greater runoff volume with heavier pollutant loading
Project Typology Evaluative Factors	Hydrologic Soil Group	Soil Survey Geographic Database (SSURGO)	A = 1, B = 2, C = 3, D = 4	High (HSG A) to Low (HSG D) infiltration potential
	Soil Liquefaction Potential	C/CAG Stormwater Resource Plan (SRP) Datasets	Presence/Absence	May raise costs for infiltrative BMPs
	Aquifer Recharge Potential	C/CAG SRP Datasets	Presence/Absence	Areas where infiltration has been prioritized
	Sewer Discharge Potential	C/CAG and Member Agency Utility Data	Within 200' of Sanitary Sewer for potential discharge	Full water quality treatment and water supply provisioning
	Pervious Footprint Area	C/CAG Impervious Surface Data	Portion of Feasible Space designated Pervious	Lower cost to construct BMP in existing pervious areas
	Flooding Risk	C/CAG SRP Datasets	Within Floodprone Watershed (Yes/No)	Flood management contributions of higher priority
	SMC Water Pollution Prevention (WPP) Trash Generation Capture Potential	SMC WPP Trash Generation Designation Dataset	Upstream area with Medium/High/Very High Trash Generation designation	Centralized projects can provide significant capture of upstream trash
	Potential CALTRANS Trash Capture Opportunities	Catchment areas with substantial CALTRANS ROW coverage.	Upstream drainage area coinciding with CALTRANS ROW areas	Projects in these catchments can offer multi-benefits and collaborative potential

2.2.1 Project Site Feasibility Screening

The goal of the project opportunity feasibility screening was to both identify parcels in San Mateo County where regional stormwater capture projects could be implemented and provide an upper estimate of the potential footprint for a BMP at these sites. This screening involved elimination of areas with discernible conditions that would make construction of a BMP difficult, costly, or infeasible. Note that potential opportunities identified as feasible at this stage are only vetted based on this analysis and any opportunity identified herein could become infeasible as more detailed site assessment is conducted. The screening process used is displayed in **Figure 2-2**, demonstrating the key screening criteria used to define the County-wide feasible project space to be further evaluated for project potential and suitability. This process started by eliminating building footprints, buffered to 20' to allow adequate setback for construction (**Figure 2-3a**). Subsequently, utility conflicts were eliminated as well where data was available, buffered to 4' for storm drains (**Figure 2-3b**) and sanitary sewer lines (**Figure 2-3c**). Ground slope was considered, eliminating areas where the local slope exceeded a 15% grade (**Figure 2-3d**). Finally, fault hazard areas were eliminated from consideration for BMPs due to the higher risk of failure for infrastructure in these areas of the County (not shown in the figure). The result of these screening criteria is shown in the focus area in **Figure 2-3e** (green areas) and is displayed for the full County in **Figure 2-4**. Parcel ownership was also accounted for in the feasibility screening, separating parcels by ownership based on tax status and known public owner agencies. These are highlighted in both **Figure 2-3f** (light blue overlay) and county-wide in **Figure 2-4**.

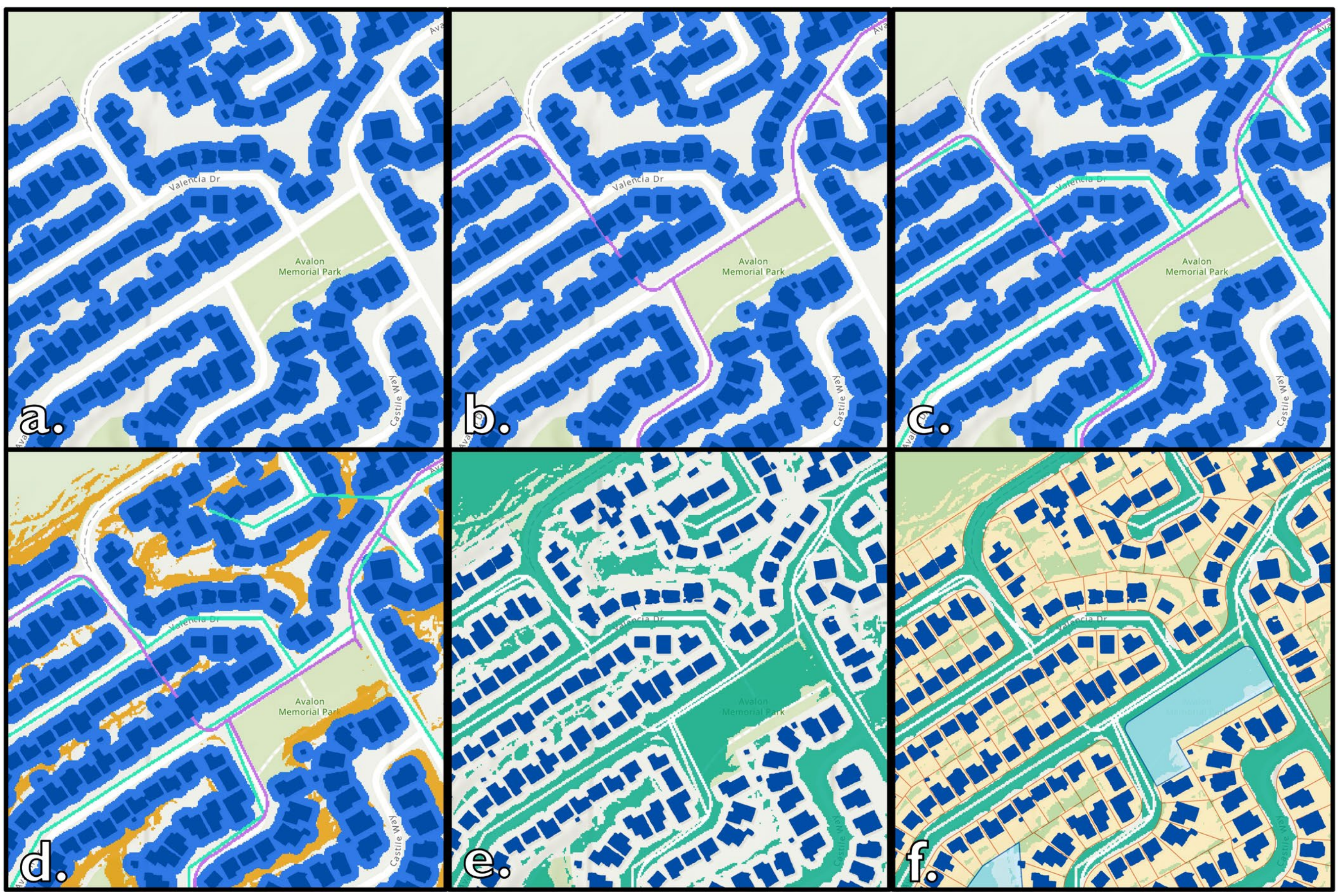

Figure 2-3. Progression of feasibility assessment used to determine potential space where a regional stormwater capture project could be readily built. (a) Buildings are buffered, (b) storm drains are embedded, (c) sewer lines and other utilities mapped, (d) slopes are overlaid, (e) remote sensing of open areas, and (f) possible areas for implementation shown in blue.

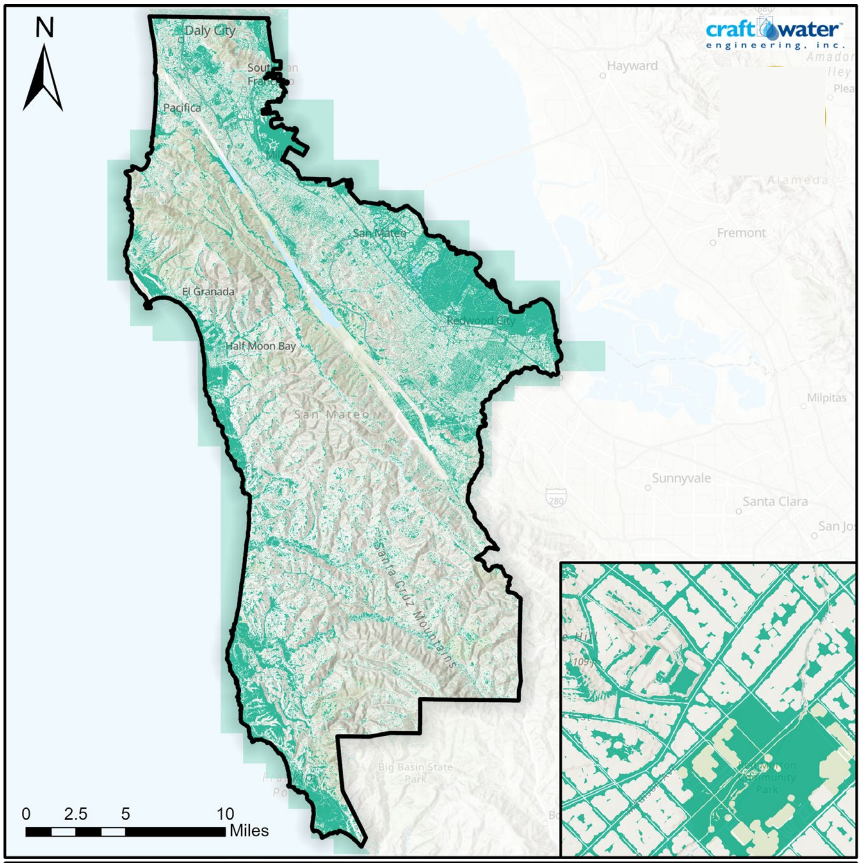

Figure 2-4. Feasible BMP project space across San Mateo County. Identifies parcels and parkway spaces.

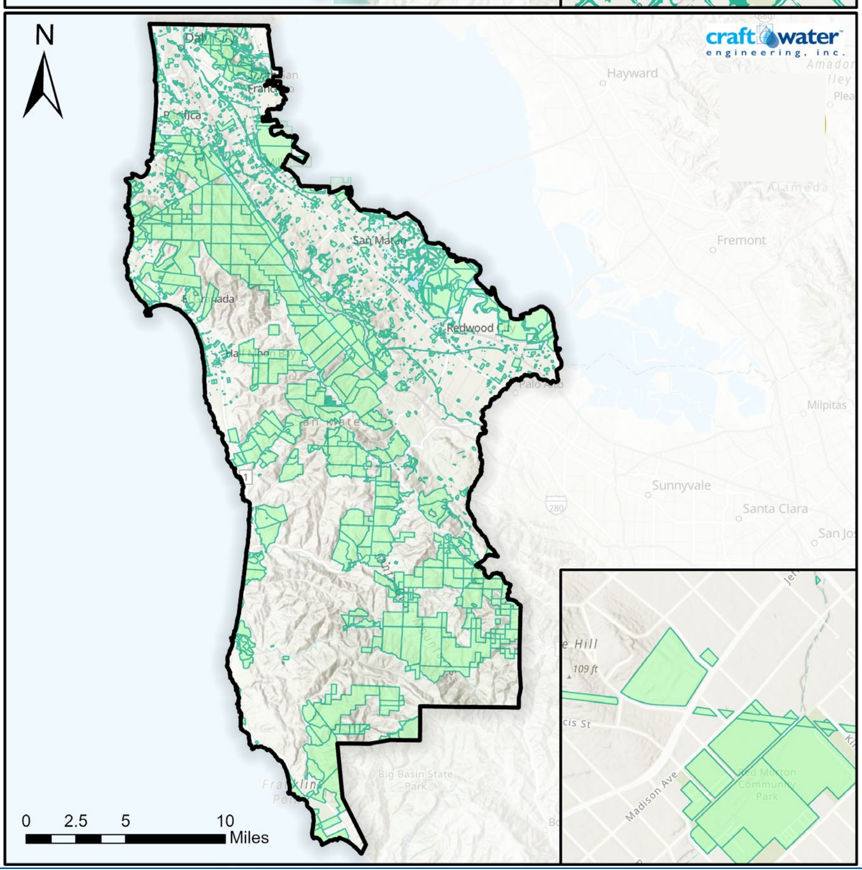

Figure 2-5. Public parcels across San Mateo County.

2.2.2 Project Capture Potential Analysis

As mentioned before, the potential for a given project opportunity to capture stormwater is related to a balance between the available space to construct a BMP and access to runoff from a large drainage area via diversion from the storm drain network to the BMP. Because water quality benefits are such an integral component of stormwater capture success, BMPs that capture runoff from a large area of impervious surfaces typically capture the greatest runoff volumes carrying the highest pollutant loads. These two ideals (feasible space and impervious drainage area) form the basis of estimating the potential performance at identified project sites. These data were assessed County-wide and cross-referenced with project opportunities to provide a ranked list of potential projects and focus more in-depth engineering analysis to identify the top projects across San Mateo County. A subset of this data is highlighted in **Figure 2-6**.

Drainage area assessment and proximity analysis were combined with potential project locations to identify the maximum divertible impervious drainage area to the project site, constrained by feasible diversion line lengths of approximately 1000 feet. This metric was combined with feasible project space at each site to form a balanced ranking which provided a roadmap for further engineering analysis to focus on the locations with the greatest stormwater capture potential across the County.

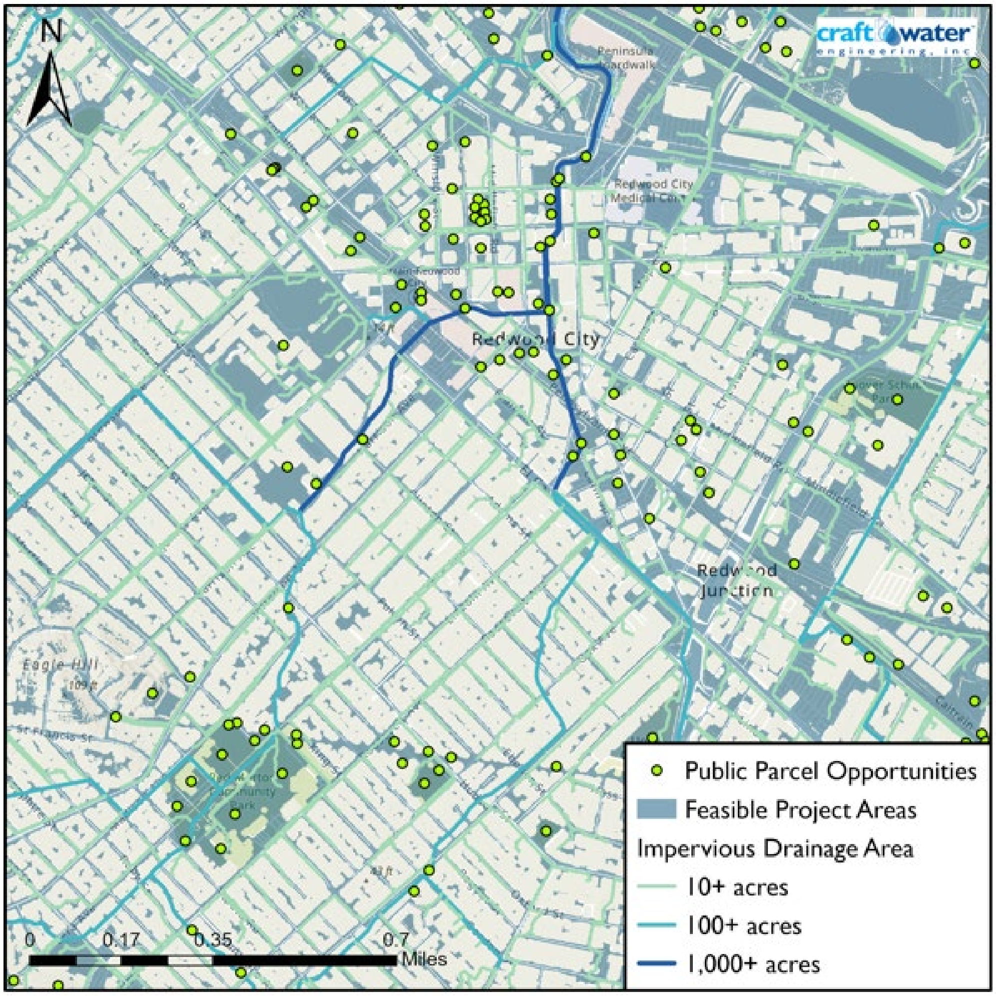

Figure 2-6. Estimating project potential with feasible space and upstream impervious drainage area.

2.2.3 Project Typology Evaluation

The following figures highlight datasets used to provide evaluative criteria to aid in project opportunity engineering analyses and assist in optimal BMP typology and options definitions for potential sites.

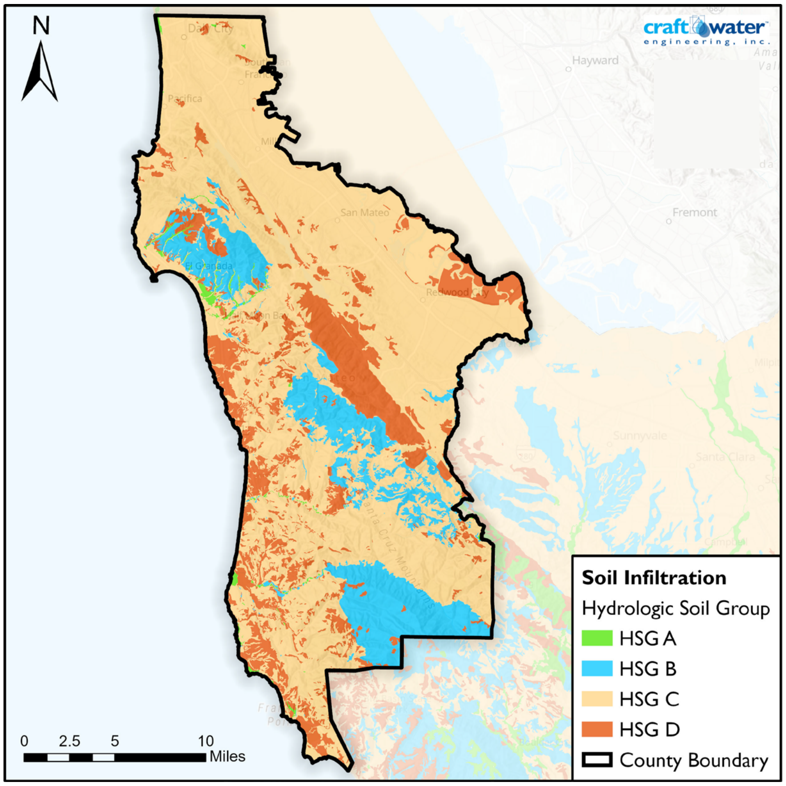

Figure 2-7. Soil hydrologic soil groups per SSURGO. Indicative of infiltration potential.

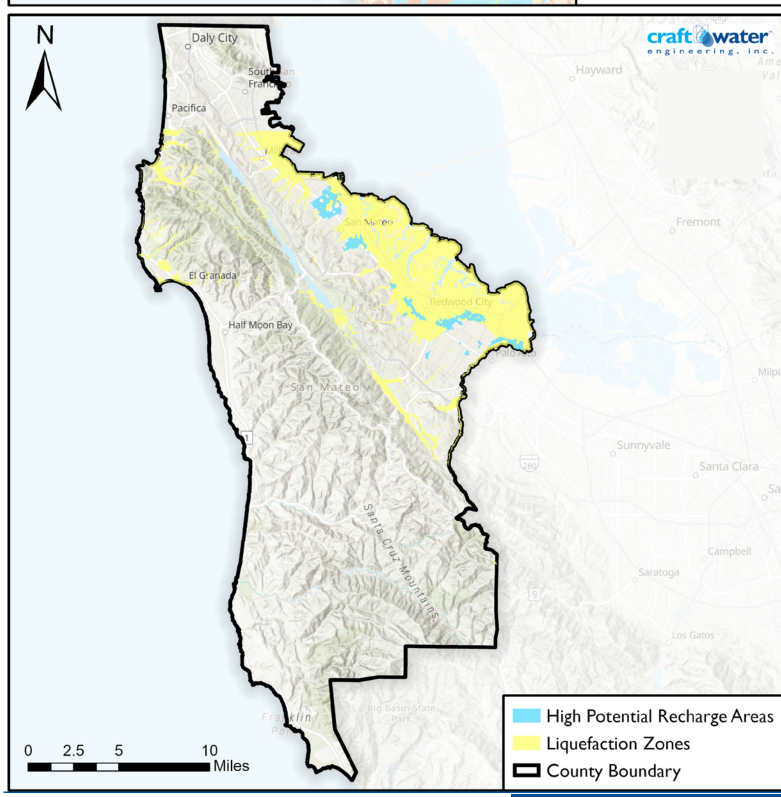

Figure 2-8. High potential recharge areas and liquefaction zones.

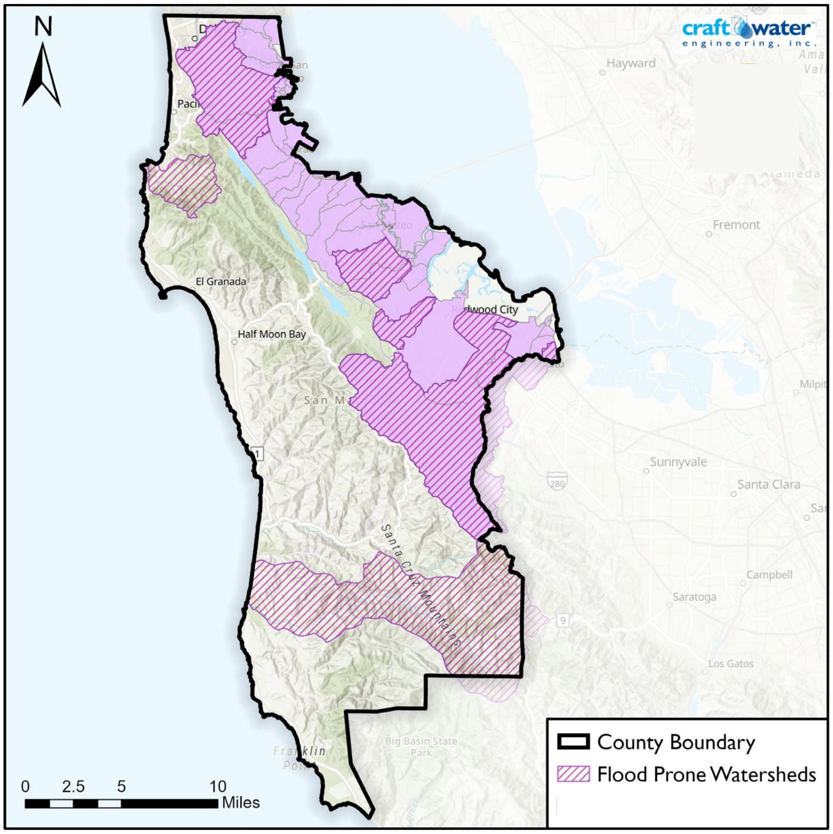

Figure 2-9. Watersheds with known flooding issues per the SRP.

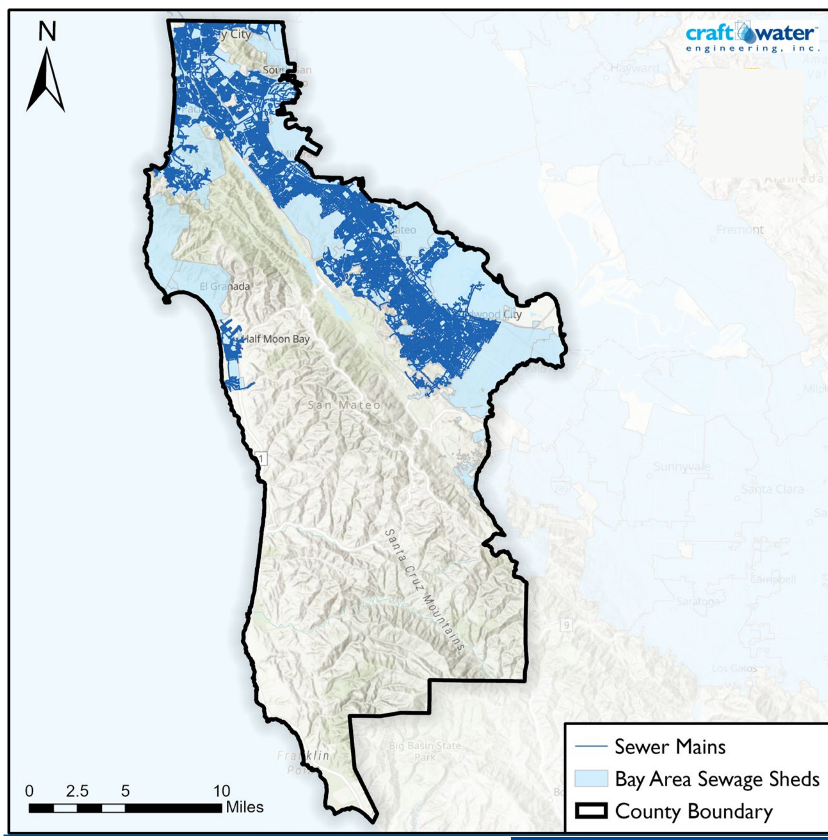

Figure 2-10. Locations of known sewer mains.

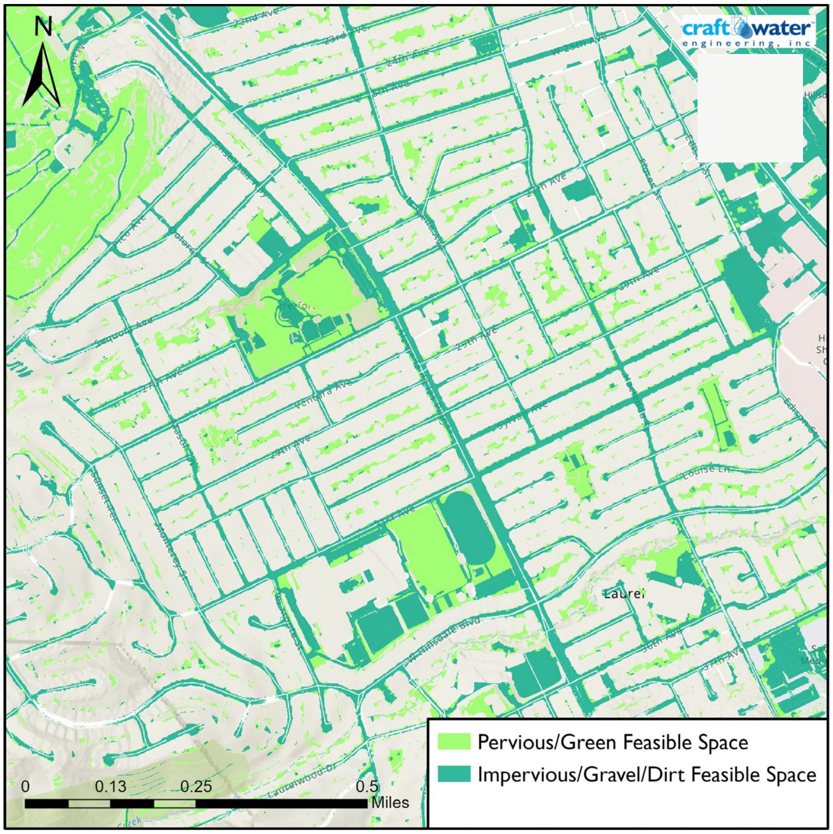

Figure 2-11. Pervious vs impervious area.

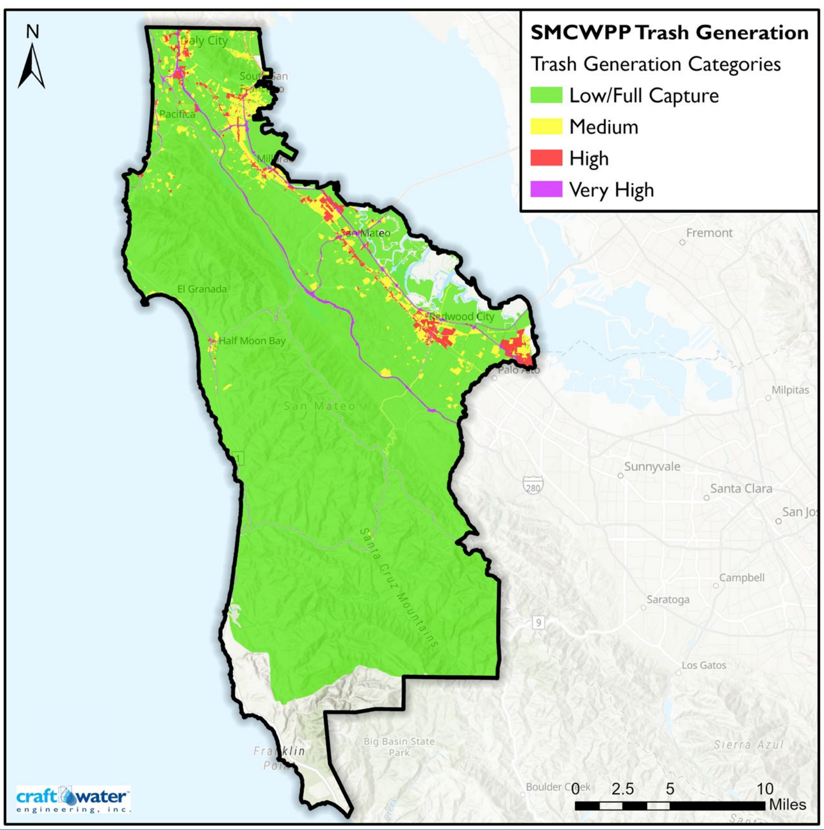

Figure 2-12. SMC WPP Trash Generation dataset. Category descriptions available within the SMC WPP Trash Generation Report

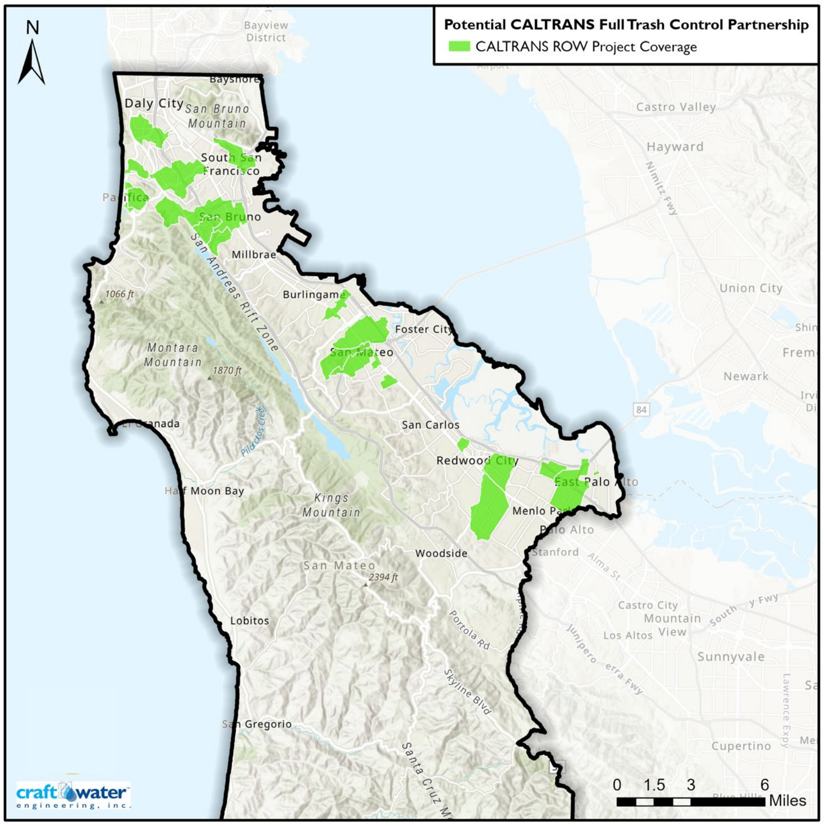

Figure 2-13. CALTRANS Full Trash Capture opportunity drainages. Areas highlighted are of highest priority to Caltrans and illustrates where they desire to have a project area treat.

3.0 PROJECT PERFORMANCE & PRIORITIZATION

Detailed engineering analysis was conducted for approximately 300 of the top opportunities resulting from the previous analysis. These opportunities were narrowed to a field of 74 feasible regional projects that passed the engineering analysis as viable project opportunities. With the potential opportunities for regional stormwater capture projects narrowed through the project identification and evaluation analyses, more detailed quantification of potential project performance of these 74 opportunities was performed. For each of the project opportunities in the narrowed list, drainage areas were delineated to provide an even more detailed assessment of project performance focusing on the BMP menu and performance metrics developed between the Project Team and C/CAG (see **Figure 3-1**). To accurately quantify these metrics, an integrated assessment using long-term hydrology and water quality modeling, BMP sizing and configuration optimization, and balanced project prioritization was utilized. Details for this methodology are summarized below.

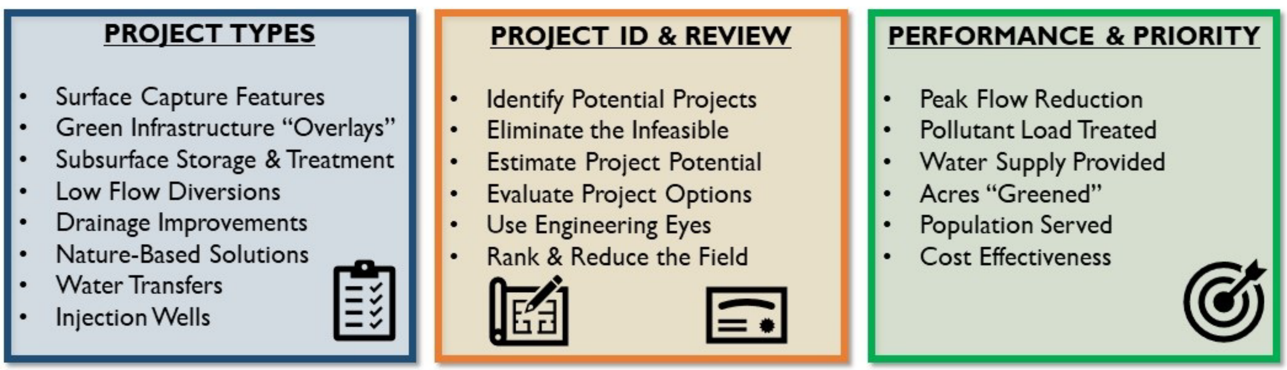

Figure 3-1. Summary of screening approach and performance metrics to be used in project opportunity prioritization.

3.1 PROJECT TYPES

Characterizing the type of practice that is suitable for each of the identified potential project areas is the first step in determining the potential project performance and subsequent prioritization. For purposes of this study, the regional projects are first divided into two categories: surface and subsurface. Both surface and subsurface projects can utilize infiltration or filtration methodologies for treatment pending geotechnical investigations for infiltration rates, depth to groundwater, and soil contamination. As a part of this analysis, the infiltrative practices were only assigned to areas identified as potential groundwater recharge regions. Below describes typical surface and subsurface practices considered in the performance modeling. The project type can be changed or updated based on site-specific conditions observed during more in-depth evaluations.

3.1.1 Subsurface Practices

Subsurface galleries are underground storage reservoirs that temporarily store and then infiltrate and/or filter stormwater runoff. The subsurface units allow for siting water quality/water supply projects where surface space is limited or where alternate surface uses are desired (i.e. athletic fields and/or parking). Infiltrative practices percolate captured runoff through openings along the bottom of the unit and into the subgrade and subsoils. If site conditions do not allow for infiltration, water is filtered through a media or cartridge system and directed back to the stormwater conveyance system. Alternatively, captured runoff can be directed to local sanitary sewer systems for treatment pending capacity and feasible proximity. For purposes of this analysis, any already developed parcels that identified as a possible opportunity were assigned a subsurface facility and potential discharge method (infiltration/filtration/sewer discharge) were assigned where feasible. Since filtration is feasible anywhere for subsurface practices, it was assigned lowest priority in designation. Infiltration was assigned highest priority given its nature-mimicking hydrologic benefits.

Subsurface systems can be precast concrete structures or poured-in-place solutions depending on the desires of the municipality. Precast units typically have shorter install times and allow for modular installation while poured-in-place can reduce overall project costs and generally results in lower construction traffic. There are multiple modular precast concrete systems available including the following example systems; StormPrism by Precon, StormTrap, StormCapture by Oldcastle, and Jensen StormVault. All subsurface systems are designed to maximize storage space while meeting or exceeding HS-20 traffic loading thus providing sufficient strength to support covering soils and resist buoyancy. An example subsurface system is shown in **Figure 3-2**.

Figure 3-2. Example subsurface regional practices.

3.1.2 Surface Practices

Surface treatment facilities are basins that store and then infiltrate and/or filter stormwater runoff. These practices can contain a permanent pool of water (i.e. treatment wetland) or only contain water during wet-weather events (i.e. extended detention ponds). Both systems can be designed as an infiltration or filtration facility depending on the geotechnical conditions. Surface practices require open space and for purposes of this analysis, only areas that are currently undeveloped were considered for surface practices. An example surface system is shown in **Figure 3-3**.

Figure 3-3. Example surface regional practices.

3.2 PROJECT PERFORMANCE MODELING

Initial estimates for potential project performance were assessed using long-term baseline hydrology and water quality modeling from the C/CAG's previous Reasonable Assurance Analysis (RAA) conducted to determine overall County needs for BMP implementation to meet the requirements of the TMDLs (C/CAG 2020). This model provided a drainage-specific 10-year timeseries (WY2006-2015) to be used in BMP modeling and optimization at each site. With this timeseries at each location, a range of BMP options, sizes, and configurations were modeled across engineering-feasible and site-specific ranges to assess the potential performance at the site by quantifying expected PCB load reductions. Planning level cost functions were applied to encapsulate differences in each of these modeled options with relative differences in overall project cost, and these were paired with BMP performance results to identify the optimal BMP size and configuration to deliver cost-effective benefits at any given location.

BMP performance for each opportunity was assessed in isolation as if each opportunity would manage stormwater on its own. However, it is known that BMPs in overlapping drainages can be impacted when additional BMPs are placed upstream. Full evaluation of BMPs in so-called "nested" drainage areas is complex and can be highly variable depending on the mix of BMPs, their sizes, placement, and other factors. Final performance of BMPs with nested drainages is dependent upon a defined system of projects due to their interdependent capture and treatment, so any change in system-defining variables (# of BMPs, size of BMPs, specific BMPs included) will shift the overall performance of the system of BMPs. Because BMP selection is often guided by decisions concerning a variety of other factors external to BMP capture potential alone, it is best to focus on defining the most impactful BMP opportunities available and selecting them across several different non-nested drainage areas wherein regional treatment can be distributed over the County's many isolated drainages to maximize capture with the most impactful projects over the greatest area of need.

3.3 FINAL PROJECT PRIORITIZATION AND RANKING

The final step in the identification and prioritization is relating the performance to the Drivers and Objectives Memo that outlines the categories and metrics of interest. Modeling results provided values for metrics that were utilized to make an initial prioritization of project opportunities and present the County with a solid list of the top candidates from the field of 74 that would offer the most well-rounded impact to their current stormwater program. Regional BMPs that have already advanced in conceptualization and design throughout the County were included in the analysis to provide a point of comparison for any new opportunities selected. However, these BMPs were not included in the prioritization selection, and any opportunities located close to these existing concepts were deemphasized. Tabulated metrics (**Table 3-1**) were assessed for all 74 candidate opportunities, and each was ranked to show how each project performed for each compared to other project opportunities.

Rankings for each metric were used to select several top tier opportunities to potentially advance to further conceptualization. To identify these top candidates, water quality rankings were first assessed. Moving down the list of the best performers, projects were included or not based on the balance of their water quality ranking in comparison to their other multi-benefits that might be provided. Additionally, projects were selected in a way to distribute top opportunities geographically across the County, among distinct watersheds to provide treatment of different drainages, as well as among BMP typologies to provide C/CAG a variety of concepts to explore their options in regional capture with. Using rankings allowed for flexible, engineering-focused comparisons to be made amongst metrics and in relation to other potential projects as opposed to assigning a final score with arbitrary weighting to each project opportunity. This approach provides flexibility to the decision-making process, a basis for comparison among project alternatives across different sets of criteria and allows the County to revisit project opportunities in the future and compare these metrics for further decision-making down the line as more projects become implemented and the next crop of options is being sought. Following **Table 3-1** are several maps that highlight the rankings for key values to demonstrate how they vary among projects and across the County.

Table 3-1. Summary of BMP project opportunity performance metrics.

CATEGORY	METRIC	DESCRIPTION	UNITS
Community Benefits	Walkable Population	Estimated 2010 population within ½ mile walkable radius to project	people
	Project Community Benefit	Designates project is on Park or School parcel; "NEW" indicates undeveloped parcel with potential to convert to Park; "NO" indicates limited community benefit from site	na
Flood Management	Peak Flow Reduction	Reduction in peak flow for 10 Year, 24 Hour storm event	cfs
	Flood Volume Reduction	Volume captured for 10 Year, 24 Hour storm event	ac-ft/yr
Water Quality	Water Quality Reduction	Average annual reduction in PCBs for the drainage area	g/yr
	"Greened" Acres	Proxy of impervious area "treated" from drainage area by the project	acres
	Volume Managed	Average annual runoff volume captured by project for treatment	ac-ft/yr
Water Supply	Volume Used	Average annual water volume utilized/supplied; assumed full for infiltration, 33% for sewer discharge (which is typically limited to discharge in off-peak hours of ~ 10pm – 6am, or $^{1}/_{3}$ of the day), and 0 for other options which return water to drains	ac-ft/yr
	Demand Offset	Demand of regional offset; based on 680 ac-ft/yr demand for stormwater harvesting projected for regional projects supply (BAWSCA 2015)	percentage
Trash Capture	SMCWPP Trash Capture	Potential area treated with Medium/High/Very High trash generation designation from the SMCWPP baseline	acres
	CALTRANS Opportunity Full Capture	Potential area treated coinciding with CALTRANS Full Capture opportunity drainage areas.	acres

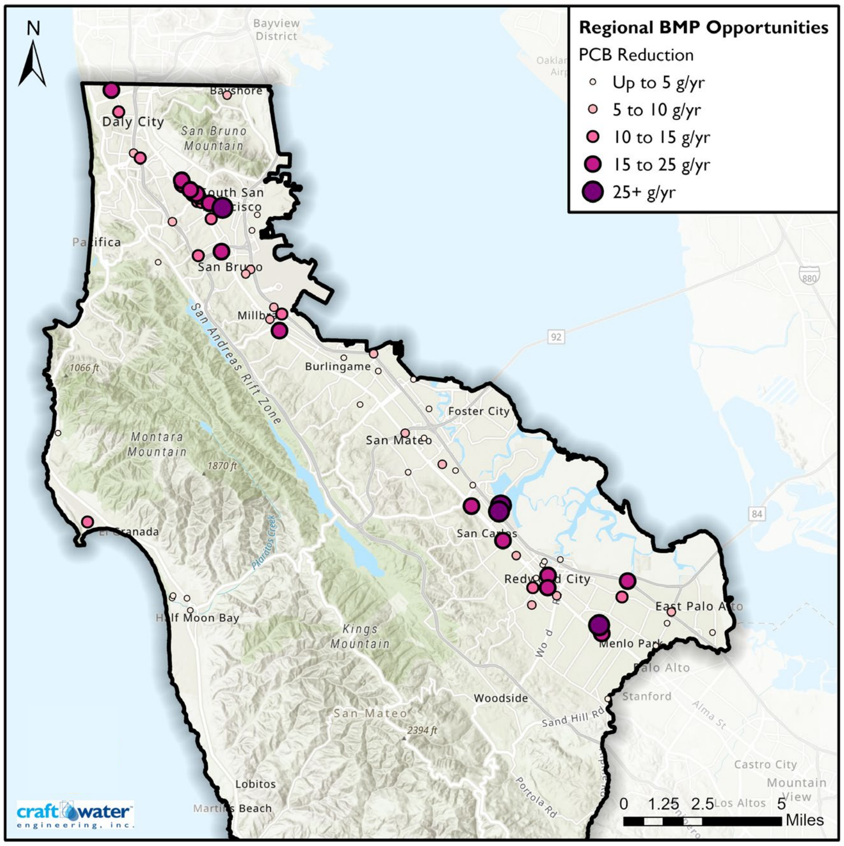

Figure 3-4. PCB Reduction across candidate opportunities.

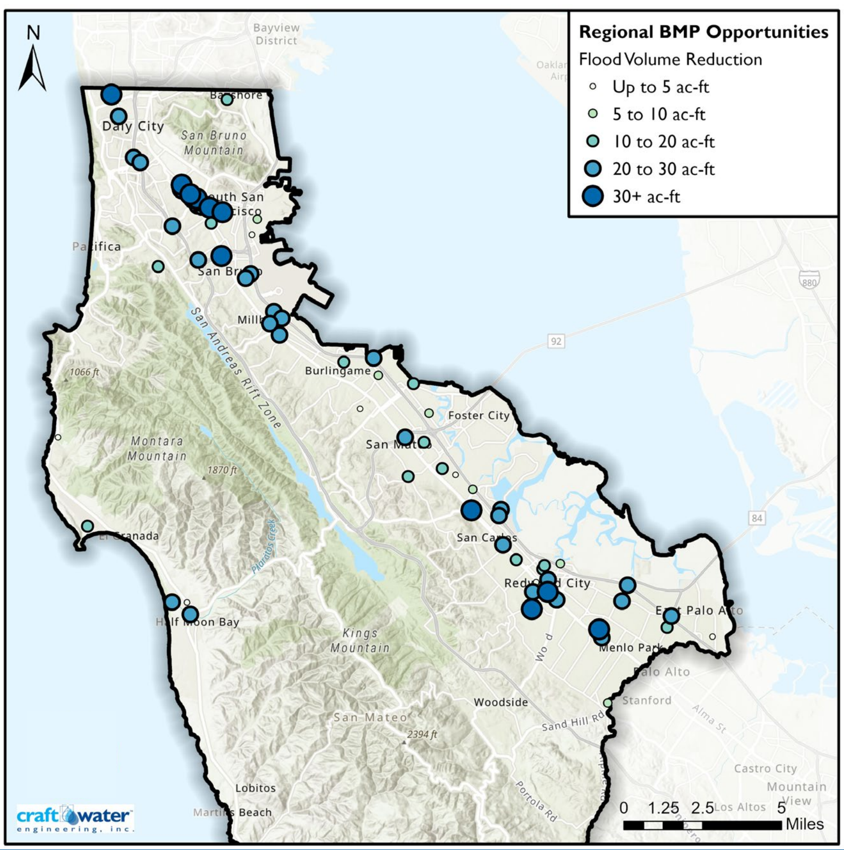

Figure 3-5. Flood volume managed by candidate opportunities.

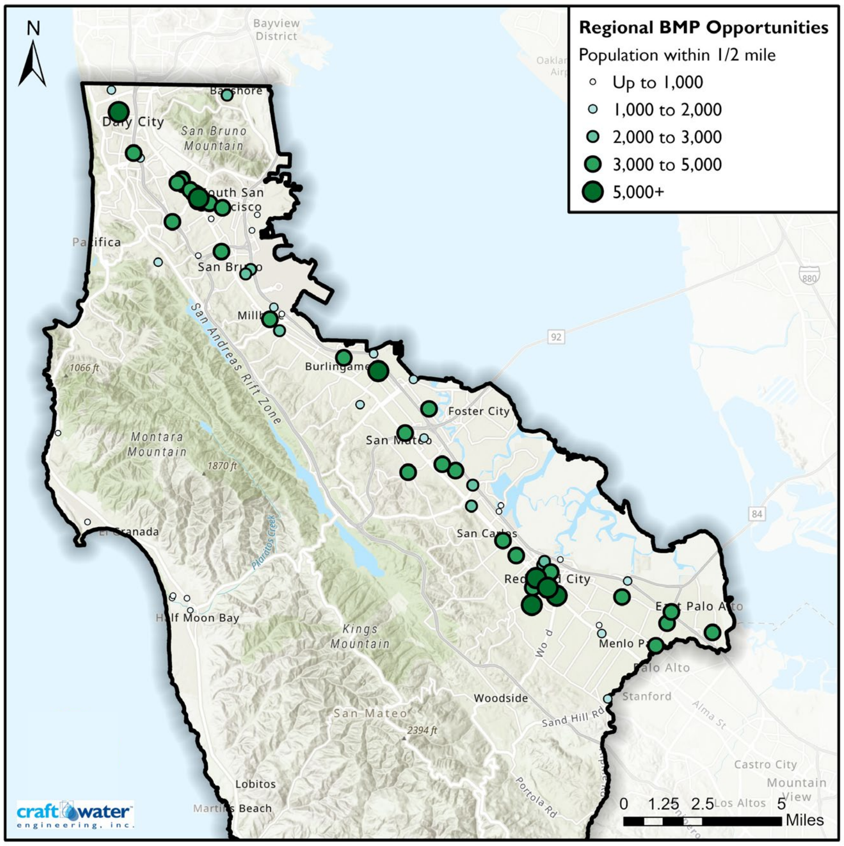

Figure 3-6. Population benefited by candidate opportunities.

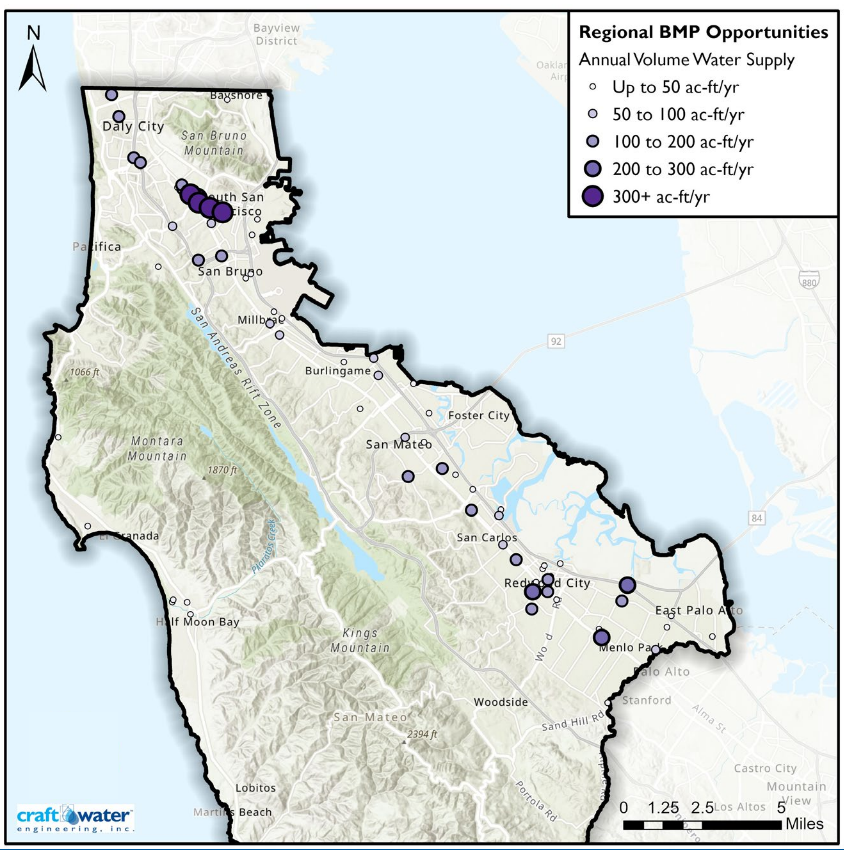

Figure 3-7. Potential water supply for candidate opportunities.

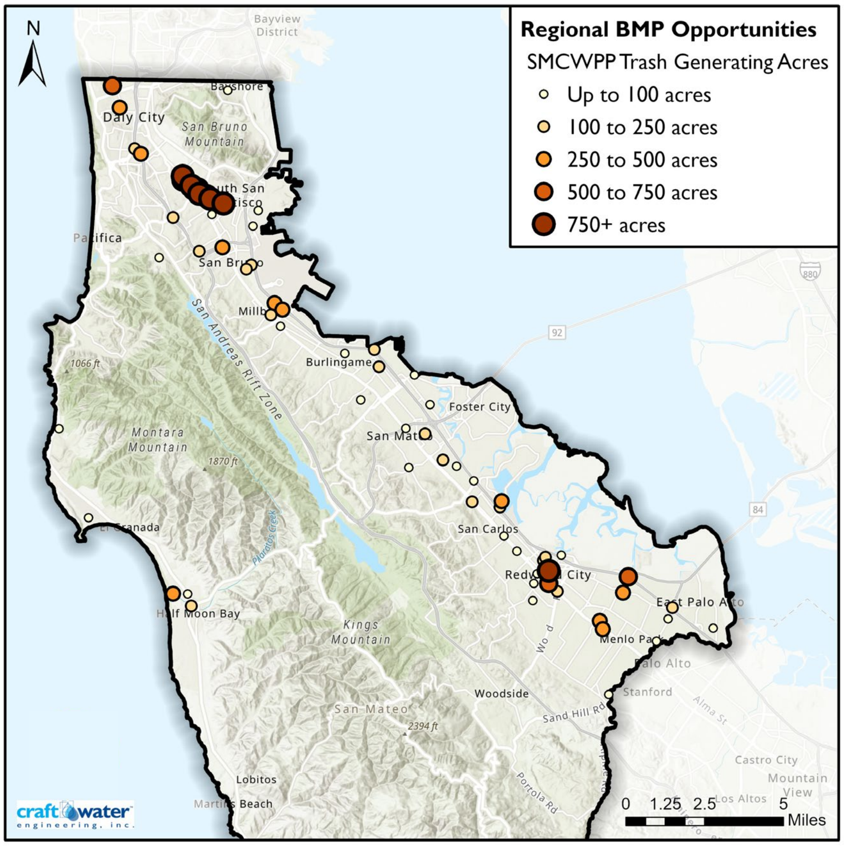

Figure 3-8. Potential trash capture for candidate opportunities drainage areas.

4.0 TOP PROJECT OPPORTUNITIES

The analysis of candidate opportunity metrics and performance focused the BMP opportunity list to a group of 14 top tier projects (**Figure 4-1**) that will provide the most impactful and cost-effective options for the County to pursue further in study and design. These different projects were chosen with a focus on performance metrics but also with an eye on (1) distributing projects among diverse drainage areas to provide options across County watersheds, (2) sensitivity to protecting the performance of previously planned projects currently in construction or design, and (3) providing a range of BMP types to develop a range of options for the County to utilize in building out their stormwater management portfolio. Discussion with the C/CAG member agencies and project TAC will follow and will determine which of the top opportunities will be advanced to more detailed concepts following review of this report.

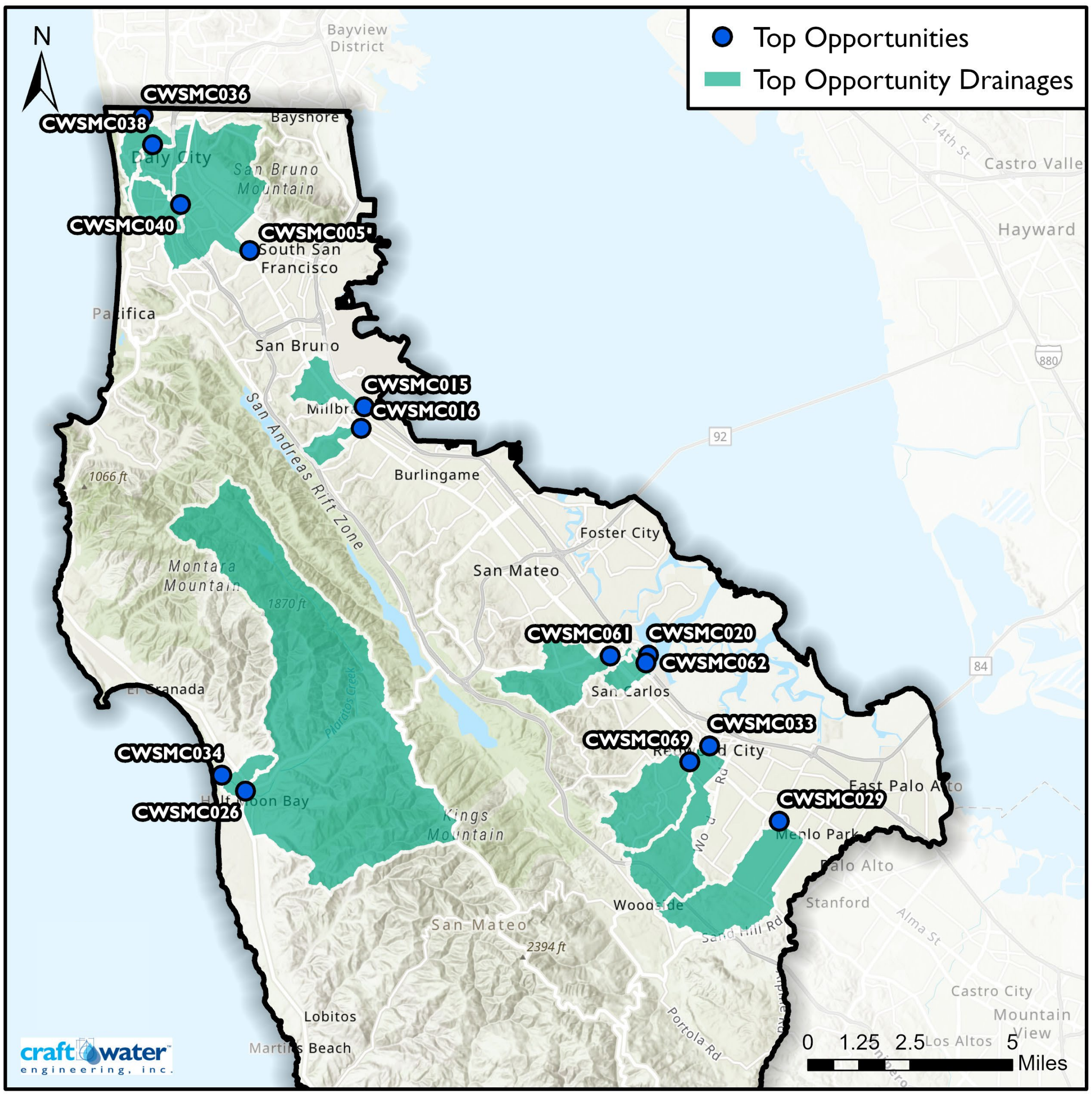

Figure 4-1. Top priority opportunities for regional BMPs in San Mateo County.

5.0 REFERENCES

Bay Area Water Supply & Conservation Agency (BAWSCA), 2015. *Long-Term Reliable Water Supply Strategy Strategy Phase II Final Report.* February 2015.

C/CAG, 2020. *San Mateo County-Wide Reasonable Assurance Analysis Addressing PCBs and Mercury: Phase I Baseline Modeling Report*. September 2020.

C/CAG, 2017. *San Mateo County Stormwater Resource Plan*. February 2017.

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Geosyntec Consultants, 2021. *Advancing Regional Stormwater Capture Projects: Business Case for Regional Collaboration – DRAFT MEMORANDUM.* August 2021.

APPENDIX A: PROJECT OPPORTUNITY DATABASE

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CATEGORY	ATTRIBUTE	DESCRIPTION and NOTES	UNITS
Project Baseline	CWID	Craftwater Project ID	na
	FULLDA_AC	Full Upstream Drainage Area to project diversion point	acres
	IMPDA_AC	Impervious Area in project drainage area	acres
	IMPDA_PCT	Percentage of drainage area impervious	percentage
	BASE_RUN_af	Baseline Runoff to project diversion point	ac-ft/yr
	BASE_PCB_g	Baseline PCBs to project diversion point	g/yr
	10YR_PEAK_cfs	Peak Flowrate for 10 Year, 24 Hour storm event to project diversion point	cfs
	10YR_VOL_af	Runoff Volume for 10 Year, 24 Hour storm event to project diversion point	ac-ft/yr
Project Attributes	DIV_CFS	Preliminary Project Diversion Rate	cfs
	STOR_ACFT	Preliminary Project Storage Volume	ac-ft/yr
	BMPTYPE	Type of BMP	na
	TREATMENT	Type of BMP treatment recommended	na
	PLANCOST	Planning Level Cost Estimate	$ dollars
Community Benefits	WLKBL_POP	Estimated 2010 population within 1/2 mile walkable radius to project	people
	PARKS_REC	Designates project is on Park or School parcel; "NEW" indicates undeveloped parcel with potential to convert to Park; "NO" indicates limited community benefit from site	na
Flood Management	PEAK_RDX	Reduction in peak flow for 10 Year, 24 Hour storm event	cfs
	VOL_RDX	Volume captured for 10 Year, 24 Hour storm event	ac-ft/yr
Water Quality Benefit	PCB_RDX	Average annual reduction in PCBs for the drainage area	g/yr
	GREEN_ACRES	Proxy of impervious area "treated" from drainage area by the project	acres
	VOL_MAN	Average annual runoff volume captured by project for treatment	ac-ft/yr
Water Supply	VOL_USE	Average annual water volume utilized/supplied; assumed full for infiltration, 33% for sewer discharge, and 0 for other options which return water to drains	ac-ft/yr
	DEM_OFFSET	Demand of regional offset; based on 680 ac-ft/yr demand for stormwater harvesting via other capture initiatives	percentage
Trash Capture	SMCWPP_TRASH	Aggregate area of Medium/High/Very High trash generation areas in project drainage area from the SMCWPP Trash Generation designations	acres
	CALOPPS_TRASH	Aggregate of drainage covered by potential CALTRANS trash capture opportunities	acres

CWID	DA_AC	IMPDA_AC	IMPDA_PCT	BASE_RUN_af	BASE_PCB_g	10YR_PEAK_cfs	10YR_VOL_af	DIV_CFS	STOR_ACFT	BMPTYPE	TREATMENT	PLANCOST
CWSMC001	322.23	144.35	44.80%	212.02	10.64	94	35.77	50	6.2	Subsurface Vault	Infiltration	$8,900,000
CWSMC002	1154.17	436.74	37.84%	519.46	19.36	307	99.78	80	16.5	Subsurface Vault	Infiltration	$21,400,000
CWSMC003	4578.7	1717.13	37.50%	1327.71	28.40	543	163.16	80	18	Subsurface Vault	Filtration/Sewer	$23,200,000
CWSMC004	423.97	164.57	38.82%	255.99	5.60	110	37.16	50	6.6	Subsurface Vault	Filtration/Sewer	$9,300,000
CWSMC005	4682.47	1784.88	38.12%	2824.00	61.80	1209	409.94	80	20	Wetland/Detention	Wetland/Filtration	$25,600,000
CWSMC006	5111.42	1952.77	38.20%	3084.05	67.49	1320	447.69	70	17.5	Subsurface Vault	Filtration/Sewer	$22,500,000
CWSMC007	6711.06	2728.64	40.66%	3708.36	103.77	2353	707.27	50	8	Wetland/Detention	Wetland/Filtration	$4,300,000
CWSMC008	1449.81	677.78	46.75%	801.50	22.43	508	152.86	70	14	Subsurface Vault	Filtration/Sewer	$18,300,000
CWSMC009	1589.68	553.23	34.80%	528.66	9.70	321	119.26	60	23.5	Subsurface Vault	Filtration/Sewer	$31,600,000
CWSMC010	1452.26	679.49	46.79%	802.26	22.45	509	153.01	80	13	Wetland/Detention	Wetland/Filtration	$6,500,000
CWSMC011	1723.04	408.43	23.70%	605.37	15.01	242	78.51	20	0.7	Modular Wetland	Filtration	$1,700,000
CWSMC012	89.44	79.29	88.65%	59.63	2.99	26	10.06	30	2.3	Subsurface Vault	Filtration/Sewer	$4,100,000
CWSMC013	32.4	27.51	84.91%	19.88	1.00	9	3.35	20	0.7	Modular Wetland	Filtration	$1,700,000
CWSMC014	703.52	376.3	53.49%	342.04	11.26	161	65.64	80	11.5	Wetland/Detention	Wetland/Filtration	$5,800,000
CWSMC015	787.92	411.79	52.26%	383.47	12.62	181	73.59	80	13.2	Wetland/Detention	Wetland/Filtration	$6,500,000
CWSMC016	475.37	189.83	39.93%	284.89	19.13	176	54.72	60	10.6	Subsurface Vault	Filtration/Sewer	$14,200,000
CWSMC017	177.72	101	56.83%	70.60	2.62	59	17.52	20	1.6	Subsurface Vault	Filtration/Sewer	$3,200,000
CWSMC018	159.46	30.92	19.39%	137.51	1.40	17	7.60	20	0.6	Subsurface Vault	Infiltration	$1,000,000
CWSMC019	584.89	204.44	34.95%	253.04	9.82	165	56.47	80	9.6	Subsurface Vault	Filtration/Sewer	$13,100,000
CWSMC020	563.08	360.92	64.10%	299.17	56.15	254	89.58	70	10.6	Wetland/Detention	Wetland/Filtration	$5,400,000
CWSMC021	776.05	283.42	36.52%	322.16	20.15	185	60.00	60	9	Subsurface Vault	Filtration/Sewer	$12,300,000
CWSMC022	245.05	137.71	56.20%	90.33	2.62	49	18.26	40	4.8	Subsurface Vault	Filtration/Sewer	$7,100,000
CWSMC023	4506.59	1054.12	23.39%	1060.00	68.69	796	301.62	70	21.5	Subsurface Vault	Infiltration	$26,300,000
CWSMC024	3838.55	838.01	21.83%	902.81	58.50	678	256.89	60	18.5	Subsurface Vault	Infiltration	$22,700,000
CWSMC025	1278.46	476.2	37.25%	474.23	13.76	258	95.86	50	14.2	Wetland/Detention	Wetland/Filtration	$7,000,000
CWSMC026	17352.11	648.21	3.74%	4918.27	7.53	269	112.73	50	9.4	Wetland/Detention	Wetland/Filtration	$4,900,000
CWSMC027	267.6	85.58	31.98%	69.35	4.48	67	19.20	40	3.2	Subsurface Vault	Filtration	$5,200,000
CWSMC028	2979.77	697.01	23.39%	701.29	45.44	527	199.55	60	21.5	Subsurface Vault	Filtration	$27,300,000
CWSMC029	2891.96	650.96	22.51%	679.80	44.05	511	193.43	60	21.5	Subsurface Vault	Infiltration	$26,300,000
CWSMC030	242.87	86.5	35.62%	101.17	1.63	18	9.38	20	4.2	Subsurface Vault	Filtration	$6,300,000
CWSMC031	246.14	157.65	64.05%	106.36	4.13	69	23.73	40	3.7	Subsurface Vault	Filtration/Sewer	$5,800,000
CWSMC032	34.71	17.42	50.19%	10.21	0.32	8	2.85	20	0.4	Bioretention	Filtration	$1,300,000
CWSMC033	5951.65	2113.52	35.51%	2210.23	64.14	1201	446.79	60	14.6	Subsurface Vault	Filtration/Sewer	$19,000,000
CWSMC034	17807.65	765.47	4.30%	5048.39	7.73	276	115.71	50	8	Wetland/Detention	Wetland/Filtration	$4,300,000
CWSMC035	393.51	48.2	12.25%	109.29	0.17	6	2.51	20	0.7	Wetland/Detention	Wetland/Filtration	$1,200,000
CWSMC036	1463.63	863.55	59.00%	1064.78	31.04	624	184.50	90	26	Subsurface Vault	Filtration/Sewer	$32,800,000
CWSMC037	193.54	82.18	42.46%	114.70	6.62	77	23.10	40	4	Subsurface Vault	Filtration/Sewer	$6,200,000
CWSMC038	759.12	471.56	62.12%	551.43	16.07	323	95.55	70	13.5	Subsurface Vault	Infiltration	$17,700,000
CWSMC039	481.19	244.43	50.80%	421.40	10.22	181	56.49	50	9.2	Subsurface Vault	Infiltration	$12,500,000
CWSMC040	764.24	389.32	50.94%	668.70	16.21	287	89.65	60	11	Subsurface Vault	Infiltration	$14,700,000
CWSMC041	397.55	57.51	14.47%	115.38	2.47	47	14.18	40	13	Subsurface Vault	Filtration/Sewer	$17,000,000
CWSMC042	4576.48	1715.52	37.49%	1327.03	28.39	542	163.08	90	22.5	Subsurface Vault	Filtration/Sewer	$28,600,000
CWSMC043	29.57	15.63	52.86%	21.52	0.43	8	2.77	20	0.6	Modular Wetland	Filtration	$1,600,000
CWSMC044	4639.95	1756.28	37.85%	2799.62	61.26	1198	406.40	90	26	Subsurface Vault	Infiltration	$32,800,000
CWSMC045	5145	1976.6	38.42%	3104.36	67.93	1329	450.64	50	9.4	Subsurface Vault	Filtration/Sewer	$12,700,000
CWSMC046	6802.07	2780.93	40.88%	4103.94	89.81	1756	595.74	90	26	Subsurface Vault	Infiltration	$32,800,000
CWSMC047	7177.41	3002.5	41.83%	4757.10	238.76	2112	802.69	80	28.8	Subsurface Vault	Infiltration	$36,100,000
CWSMC048	610.99	276.8	45.30%	337.95	9.46	214	64.46	60	11	Subsurface Vault	Filtration/Sewer	$14,700,000

CWSMC049	532.94	209.58	39.33%	239.34	8.92	141	45.98	40	8.5	Wetland/Detention	Wetland/Filtration	$4,500,000
CWSMC050	991.53	341.56	34.45%	445.81	16.62	263	85.64	60	14.2	Subsurface Vault	Infiltration	$18,500,000
CWSMC051	263.56	66.36	25.18%	118.36	4.41	70	22.74	30	4.4	Wetland/Detention	Wetland/Filtration	$2,700,000
CWSMC052	530.41	208.95	39.39%	238.03	8.87	141	45.72	40	8.4	Wetland/Detention	Wetland/Filtration	$4,500,000
CWSMC053	434.64	198.53	45.68%	211.57	6.96	100	40.60	30	7.2	Subsurface Vault	Filtration/Sewer	$9,900,000
CWSMC054	520.32	271.16	52.11%	248.22	9.07	211	62.42	50	8.4	Subsurface Vault	Filtration/Sewer	$11,500,000
CWSMC055	344.6	185.19	53.74%	136.73	5.07	115	33.94	30	5.2	Subsurface Vault	Infiltration	$6,500,000
CWSMC056	73.01	46.2	63.28%	40.37	1.72	25	9.20	20	0.8	Modular Wetland	Filtration	$1,800,000
CWSMC057	298.4	52.55	17.61%	158.14	0.45	9	3.44	50	16.5	Wetland/Detention	Wetland/Filtration	$8,000,000
CWSMC058	1676.15	553.83	33.04%	493.64	15.43	382	137.63	60	17.2	Subsurface Vault	Infiltration	$21,100,000
CWSMC059	1427.66	404.52	28.33%	420.44	13.15	326	117.22	50	13.8	Subsurface Vault	Infiltration	$17,000,000
CWSMC060	93.66	51.42	54.90%	27.24	0.85	21	7.59	20	0.6	Modular Wetland	Filtration	$1,600,000
CWSMC061	1831.69	548.64	29.95%	648.29	25.54	323	115.20	60	18	Subsurface Vault	Filtration/Sewer	$23,100,000
CWSMC062	447.91	274.67	61.32%	237.99	44.66	202	71.26	50	12.8	Subsurface Vault	Filtration/Sewer	$16,800,000
CWSMC063	531.78	121.79	22.90%	273.69	17.69	70	22.02	40	6	Subsurface Vault	Filtration	$8,600,000
CWSMC064	2173.94	422.31	19.43%	823.65	25.16	222	86.45	50	14.4	Subsurface Vault	Infiltration	$17,700,000
CWSMC065	115.37	88.99	77.13%	42.34	1.23	23	8.56	20	0.8	Modular Wetland	Filtration	$1,800,000
CWSMC066	281.08	166.22	59.14%	104.44	3.03	57	21.11	30	4.5	Subsurface Vault	Filtration/Sewer	$6,700,000
CWSMC067	20.04	15.94	79.54%	8.47	0.25	5	1.71	10	0.5	Modular Wetland	Filtration	$1,500,000
CWSMC068	199.68	100.15	50.16%	73.39	2.13	40	14.84	20	1.5	Subsurface Vault	Infiltration	$2,000,000
CWSMC069	2077.36	771.66	37.15%	770.62	22.36	419	155.78	70	25	Subsurface Vault	Infiltration	$30,500,000
CWSMC070	3472.76	1091.24	31.42%	1290.01	37.43	701	260.77	80	23	Subsurface Vault	Filtration/Sewer	$29,200,000
CWSMC071	258.63	46.93	18.15%	72.86	0.11	4	1.67	30	5.5	Subsurface Vault	Filtration/Sewer	$7,900,000
CWSMC072	653.71	242.32	37.07%	169.23	10.93	162	46.85	70	12.2	Subsurface Vault	Filtration	$16,200,000
CWSMC073	39.15	28.31	72.31%	16.47	0.27	3	1.53	10	0.5	Modular Wetland	Filtration	$1,500,000
CWSMC074	264.42	125.78	47.57%	110.58	1.78	20	10.25	30	4.2	Subsurface Vault	Infiltration	$5,300,000

CWID	WLKBL_POP	PARKS_REC	PEAK_RDX	VOL_RDX	PCB_RDX	GREEN_ACRES	VOL_MAN	VOL_USE	DEM_OFFSET	SMCWPP_TRASH	CALOPPS_TRASH
CWSMC001	528	SCHOOL	29.7	19.78	10.06	82.33	183.78	183.78	27.0%	59.83	4.2
CWSMC002	3259	NO	0	30.46	15.17	137.74	364.00	364.00	53.5%	257.82	1061.38
CWSMC003	4813	NO	0	32.25	15.18	188.00	501.29	167.10	24.6%	1223.4	801.62
CWSMC004	4344	NO	27.86	20.38	5.06	84.27	217.10	72.37	10.6%	55.63	3.64
CWSMC005	4161	NEW	0	34.27	18.95	419.67	1100.96	0.00	0.0%	1243.09	814.9
CWSMC006	4867	NO	0	31.77	17.57	427.58	1119.19	373.06	54.9%	1299.96	818.54
CWSMC007	2274	NEW	0	22.25	9.31	185.52	456.28	0.00	0.0%	1592.37	2049
CWSMC008	4659	NO	0	28.25	12.16	191.42	409.45	136.48	20.1%	258.88	1228.31
CWSMC009	6353	PARK	50.56	37.29	7.79	130.13	373.93	124.64	18.3%	37.64	0
CWSMC010	4177	NEW	0	27.25	12.21	189.27	404.52	0.00	0.0%	260.42	1229
CWSMC011	3086	SCHOOL	0	14.55	3.52	44.50	187.73	0.00	0.0%	97.72	0
CWSMC012	357	NO	10.29	9.19	2.96	51.93	58.58	19.53	2.9%	69.19	8.14
CWSMC013	311	NO	0.63	3.32	1.00	16.86	19.85	0.00	0.0%	29.07	0
CWSMC014	1013	PARK	30.96	25.21	9.74	144.42	270.00	0.00	0.0%	327.72	31.35
CWSMC015	636	PARK	32.72	26.92	10.83	155.83	298.17	0.00	0.0%	336.38	31.35
CWSMC016	2892	NO	25.1	24.41	17.25	92.45	231.52	77.17	11.3%	74.23	0
CWSMC017	1972	PARK	4.38	11.83	2.40	36.19	63.68	21.23	3.1%	75.17	0
CWSMC018	1353	SCHOOL	0.03	0.66	0.12	4.19	21.63	21.63	3.2%	0	6.69
CWSMC019	3656	NO	11.33	23.35	8.92	72.76	208.18	69.39	10.2%	60.4	577.6
CWSMC020	837	NEW	0	24.34	44.62	139.36	217.42	0.00	0.0%	278.65	0
CWSMC021	3207	NO	0	22.76	16.10	81.19	222.32	74.11	10.9%	24.41	0
CWSMC022	2867	NEW	30.25	15.24	2.47	46.56	82.86	27.62	4.1%	102.62	36.53
CWSMC023	1675	NO	1.09	23.49	15.43	52.91	226.19	226.19	33.3%	606.46	79.49
CWSMC024	3151	NO	0.93	20.21	13.27	42.39	194.18	194.18	28.6%	407.15	9.81
CWSMC025	7006	NO	0	27.96	9.94	113.27	304.10	0.00	0.0%	174.44	1203.86
CWSMC026	35	NEW	0	23.74	3.89	67.98	1819.86	0.00	0.0%	240.02	0
CWSMC027	3515	NO	22.05	14.03	4.05	19.61	61.30	0.00	0.0%	23.33	256.3
CWSMC028	859	NO	0	35.37	28.19	93.67	400.46	0.00	0.0%	340.56	9.28
CWSMC029	1084	NO	1.08	23.48	15.61	45.87	203.78	203.78	30.0%	312.06	9.28
CWSMC030	1976	SCHOOL	10.21	9.38	1.61	35.75	100.38	0.00	0.0%	33.65	0
CWSMC031	1428	NO	22.68	16.04	3.94	61.61	96.19	32.06	4.7%	101.22	2.11
CWSMC032	4625	PARK	0	2.59	0.32	5.11	10.17	0.00	0.0%	0	0
CWSMC033	4783	NO	0	28.88	15.72	185.46	522.24	174.08	25.6%	874.14	1263.29
CWSMC034	11	NEW	0	22.35	3.82	79.16	1841.47	0.00	0.0%	284.33	0
CWSMC035	31	NEW	0	2.51	0.14	11.69	95.44	0.00	0.0%	6.16	0
CWSMC036	1810	NO	0	40.25	18.21	327.45	554.99	185.00	27.2%	570.16	19.45
CWSMC037	2059	NO	25.5	16.3	6.34	43.64	102.77	34.26	5.0%	47.63	0
CWSMC038	7301	NEW	0	27.6	11.65	220.37	354.75	354.75	52.2%	395.87	19.27
CWSMC039	3409	NO	3.38	23.36	9.11	185.38	364.94	364.94	53.7%	189.44	460.17
CWSMC040	1108	NO	0	25.26	12.27	265.91	521.99	521.99	76.8%	401.6	657.47
CWSMC041	4162	SCHOOL	32.16	13.59	2.29	15.04	103.95	34.65	5.1%	28.71	0
CWSMC042	4434	NO	0	36.75	16.71	201.32	537.05	179.02	26.3%	1221.18	801.62
CWSMC043	4110	NO	0	2.68	0.43	11.31	21.40	0.00	0.0%	10.64	0
CWSMC044	4058	NO	0	40.27	21.57	438.25	1157.82	1157.82	170.3%	1236.83	801.62
CWSMC045	5119	NO	0	23.67	12.50	384.91	1001.89	333.96	49.1%	1318.71	819.56
CWSMC046	4340	PARK	0	40.28	22.22	576.36	1409.75	1409.75	207.3%	1600.83	2050.63

CWSMC047	3405	NO	0	43.07	51.11	541.62	1294.73	1294.73	190.4%	1774.47	2060.32
CWSMC048	3261	NO	0	25.25	7.81	116.92	258.08	86.03	12.7%	121.95	458.77
CWSMC049	2296	NO	25.88	22.27	7.81	76.92	195.59	0.00	0.0%	116.29	460.31
CWSMC050	443	NO	0	28.11	13.05	110.34	320.30	320.30	47.1%	181.1	898.74
CWSMC051	1012	NO	22.16	16.43	4.18	26.86	106.67	0.00	0.0%	28.19	260.43
CWSMC052	2781	NEW	25.35	22.17	7.77	76.63	194.53	0.00	0.0%	116.29	457.78
CWSMC053	3995	NO	22.16	20.64	6.24	81.34	178.08	59.36	8.7%	107.99	0
CWSMC054	1786	NO	0	22.32	7.58	101.81	195.37	65.12	9.6%	180.04	30.21
CWSMC055	6381	SCHOOL	0.26	5.68	2.63	28.44	52.92	52.92	7.8%	232.43	222.05
CWSMC056	3294	SCHOOL	1.84	7.18	1.68	24.77	39.15	0.00	0.0%	6.98	47.03
CWSMC057	134	NEW	0.69	3.44	0.37	26.86	152.51	0.00	0.0%	0.03	0
CWSMC058	4684	SCHOOL	0.86	18.79	6.01	53.66	162.40	162.40	23.9%	142.76	18.39
CWSMC059	3566	SCHOOL	0.69	15.07	4.86	37.47	132.24	132.24	19.4%	67.1	13.16
CWSMC060	2072	NO	0	5.98	0.82	14.30	26.05	0.00	0.0%	24.32	0
CWSMC061	2595	NO	0	31.82	17.37	112.78	376.52	125.51	18.5%	191.38	0.44
CWSMC062	593	NO	14.02	26.51	38.69	118.42	193.12	64.37	9.5%	196.51	0
CWSMC063	167	NO	32.16	18.47	14.37	57.45	250.84	0.00	0.0%	0.05	0
CWSMC064	3302	NO	0.73	15.74	9.49	32.42	166.91	166.91	24.5%	78.94	0.62
CWSMC065	736	NO	1.84	6.82	1.14	30.10	39.03	0.00	0.0%	78.84	7.36
CWSMC066	2036	NO	22.16	15.95	2.79	54.63	92.37	30.79	4.5%	137.8	38.55
CWSMC067	4142	NO	0	1.71	0.25	6.73	8.46	0.00	0.0%	20.04	0
CWSMC068	5017	SCHOOL	0.08	1.64	0.60	8.25	16.45	16.45	2.4%	72.81	0
CWSMC069	3920	SCHOOL	1.26	27.3	10.12	90.09	242.54	242.54	35.7%	60.97	0
CWSMC070	7550	NO	0	37.02	18.22	168.13	535.05	178.35	26.2%	546.3	1224.7
CWSMC071	51	NO	0	1.67	0.10	12.87	70.94	23.65	3.5%	22.79	0
CWSMC072	3324	NO	58.45	25.81	9.55	53.08	143.19	0.00	0.0%	193.48	633.54
CWSMC073	4054	SCHOOL	0	1.53	0.27	11.91	16.47	0.00	0.0%	39.15	0
CWSMC074	3901	NO	7.29	4.58	1.28	37.98	79.84	79.84	11.7%	0.22	0.36

CWID	PEAKRDX_RANK	VOLRDX_RANK	PCBRDX_RANK	GRNAC_RANK	VOLMAN_RANK	VOLUSE_RANK	DEMOFF_RANK	SMCWPP_RANK	CALOPPS_RANK
CWSMC001	8	44	30	33	44	16	16	53	44
CWSMC002	40	13	19	21	22	7	7	25	9
CWSMC003	40	10	18	13	14	20	20	8	14
CWSMC004	9	42	46	32	35	31	31	54	45
CWSMC005	40	9	7	5	7	47	47	6	13
CWSMC006	40	12	10	4	6	5	5	5	12
CWSMC007	40	39	35	14	15	47	47	3	3
CWSMC008	40	15	26	11	16	23	23	24	6
CWSMC009	2	5	40	22	20	26	26	57	50
CWSMC010	40	20	25	12	17	47	47	23	5
CWSMC011	40	54	53	50	43	47	47	43	50
CWSMC012	21	59	54	47	63	45	45	49	41
CWSMC013	36	66	64	64	70	47	47	59	50
CWSMC014	6	26	32	19	27	47	47	19	31
CWSMC015	3	21	28	18	26	47	47	18	31
CWSMC016	13	27	12	30	31	29	29	47	50
CWSMC017	24	57	58	55	61	44	44	46	50
CWSMC018	39	74	73	74	68	43	43	73	43
CWSMC019	20	34	37	39	36	32	32	52	19
CWSMC020	40	28	2	20	34	47	47	22	50
CWSMC021	40	35	14	35	33	30	30	62	50
CWSMC022	7	52	57	48	58	41	41	41	30
CWSMC023	29	31	17	46	32	12	12	11	27
CWSMC024	31	43	21	52	41	14	14	14	38
CWSMC025	40	17	31	25	25	47	47	34	8
CWSMC026	40	29	51	40	2	47	47	26	50
CWSMC027	18	55	49	63	62	47	47	64	25
CWSMC028	40	8	4	29	18	47	47	17	39
CWSMC029	30	32	16	49	37	13	13	20	39
CWSMC030	22	58	61	56	54	47	47	58	50
CWSMC031	14	49	50	41	55	39	39	42	46
CWSMC032	40	68	69	73	73	47	47	73	50
CWSMC033	40	14	15	15	12	19	19	10	4
CWSMC034	40	36	52	36	1	47	47	21	50
CWSMC035	40	69	72	69	56	47	47	69	50
CWSMC036	40	4	9	7	9	15	15	12	34
CWSMC037	11	48	43	51	53	38	38	55	50
CWSMC038	40	18	27	9	23	8	8	16	35
CWSMC039	25	33	36	16	21	6	6	31	21
CWSMC040	40	24	24	8	13	4	4	15	17
CWSMC041	4	56	59	65	52	37	37	60	50
CWSMC042	40	7	13	10	10	17	17	9	14
CWSMC043	40	67	67	70	69	47	47	67	50
CWSMC044	40	3	6	3	5	3	3	7	14
CWSMC045	40	30	23	6	8	9	9	4	11
CWSMC046	40	2	5	1	3	1	1	2	2

CWSMC047	40	1	1	2	4	2	2	1	1
CWSMC048	40	25	39	24	28	27	27	37	22
CWSMC049	10	38	38	37	38	47	47	38	20
CWSMC050	40	16	22	27	24	10	10	32	10
CWSMC051	15	47	48	61	51	47	47	61	24
CWSMC052	12	40	41	38	40	47	47	38	23
CWSMC053	16	41	44	34	45	35	35	40	50
CWSMC054	40	37	42	28	39	33	33	33	33
CWSMC055	37	63	56	59	64	36	36	27	26
CWSMC056	26	60	60	62	65	47	47	68	28
CWSMC057	34	65	68	60	48	47	47	72	50
CWSMC058	32	45	45	44	47	22	22	35	36
CWSMC059	35	53	47	54	50	24	24	50	37
CWSMC060	40	62	65	66	67	47	47	63	50
CWSMC061	40	11	11	26	19	25	25	30	48
CWSMC062	19	22	3	23	42	34	34	28	50
CWSMC063	4	46	20	42	29	47	47	71	50
CWSMC064	33	51	34	57	46	21	21	44	47
CWSMC065	26	61	63	58	66	47	47	45	42
CWSMC066	16	50	55	43	57	40	40	36	29
CWSMC067	40	70	71	72	74	47	47	66	50
CWSMC068	38	72	66	71	72	46	46	48	50
CWSMC069	28	19	29	31	30	11	11	51	50
CWSMC070	40	6	8	17	11	18	18	13	7
CWSMC071	40	71	74	67	60	42	42	65	50
CWSMC072	1	23	33	45	49	47	47	29	18
CWSMC073	40	73	70	68	71	47	47	56	50
CWSMC074	23	64	62	53	59	28	28	70	49