Stream Corridor Priority Plan

for Stevens Creek

Santa Clara Valley Water District

A Safe, Clean Water Funded Project

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Abbreviations

GIS – Geographic Information Systems

IPMP – Invasive Plant Management Program

KPI – Key Performance Indicator

LWD – Large Woody Debris

Midpen – Midpeninsula Regional Open Space District

SCPP – Stream Corridor Priority Plan

SCVWD – Santa Clara Valley Water District

SCW – Safe, Clean Water and Natural Flood Protection Program

SMP – Stream Maintenance Plan

TMDL – Total Maximum Daily Load

USACE – United States Army Corps of Engineers

CHAPTER 1: INTRODUCTION

The Santa Clara Valley Water District (SCVWD) encourages stream stewardship as a key component of its mission. In support of this stewardship, the SCVWD carries out watershed planning with the goal of improving stream health. Stream Corridor Priority Plans (SCPPs) support this goal and organize and prioritize stream restoration activities on a creek-by-creek or watershed basis. The Safe, Clean Water and Natural Flood Protection (SCW) Program, created by the SCVWD, coined the term SCPPs and defined them as "a document which identifies priorities for stream restoration and which can be a source of information to guide restoration actions by all parties." This SCPP has been developed for Stevens Creek from Stevens Creek Dam downstream to the San Francisco Bay shoreline. The scope of the plan is limited to the riparian corridor and does not significantly expand into upper watersheds or beyond 200 feet from top of bank of the stream.

Purpose

SCPPs are designed to identify priorities for stream restoration on a designated stream and potentially its tributaries. The SCVWD relates SCPPs to one SCW priority (Priority D, see: https://www.valleywater.org/project-updates/safe-clean-water-and-natural-flood-protection-program/priority-d-restore-wildlife-habitat-and-provide-open-space), and two projects and their related key performance indicators (KPIs):

Priority D: *Restore Wildlife Habitat and Provide Open Space*

Project D2: *Revitalize Stream, Upland and Wetland Habitat*

KPI: revitalize at least 21 acres, guided by the five SCPPs, through native plant revegetation and removal of invasive exotic species

Project D3: *Grants and Partnerships to Restore Wildlife Habitat and Provide Access to Trails*

KPI: Develop five SCPPs to prioritize stream restoration activities

The objective of Priority D is to restore and protect wildlife habitat and provide increased access to trails and open space. Funding for this priority pays for control of nonnative, invasive plants, revegetation of native species, and maintenance of revegetated areas. Some other Priority D projects include Fish Habitat and Passage Improvement and Creek Restoration and Stabilization. These projects and their KPIs in turn set the direction for what to include in the SCPPs. See *Development Process* below for details.

While SCPPs are developed by the SCVWD under the direction of the SCW program, the information gathered and priorities set through them may be considered during planning and design of various projects and programs by the SCVWD, other local government and non-profit organizations, and interested members of the public.

Audience

SCPPs are intended for use by any person or organization conducting work on creeks and in watersheds. This includes groups considering application to SCVWD grant programs under SCW Projects D2 and D3. While potential users of a SCPP will vary from watershed to watershed and creek to creek, common types of agencies involved may include municipalities (cities and county), special districts, conservation groups, and other non-profit and non-governmental entities.

Priority Plan Elements

Since the idea of SCPPs was derived as part of SCW program development, it is natural that the plans will incorporate elements included in the SCW priority requiring SCPPs, Priority D. Features for improving stream corridors included in the SCPP are as follows: invasive plant removal, native vegetation planting, maintenance of existing revegetation projects, stream gravel augmentation, large woody debris installation, fish passage improvements including barrier removal, water quality improvements, and geomorphic function improvements including channel incision prevention and sediment balance promotion. These activities are called out in Figure 1.1 below. Additionally, properties may be acquired for habitat conservation and the California Rapid Assessment Method (CRAM) may be used to establish or track the ecological health of streams.

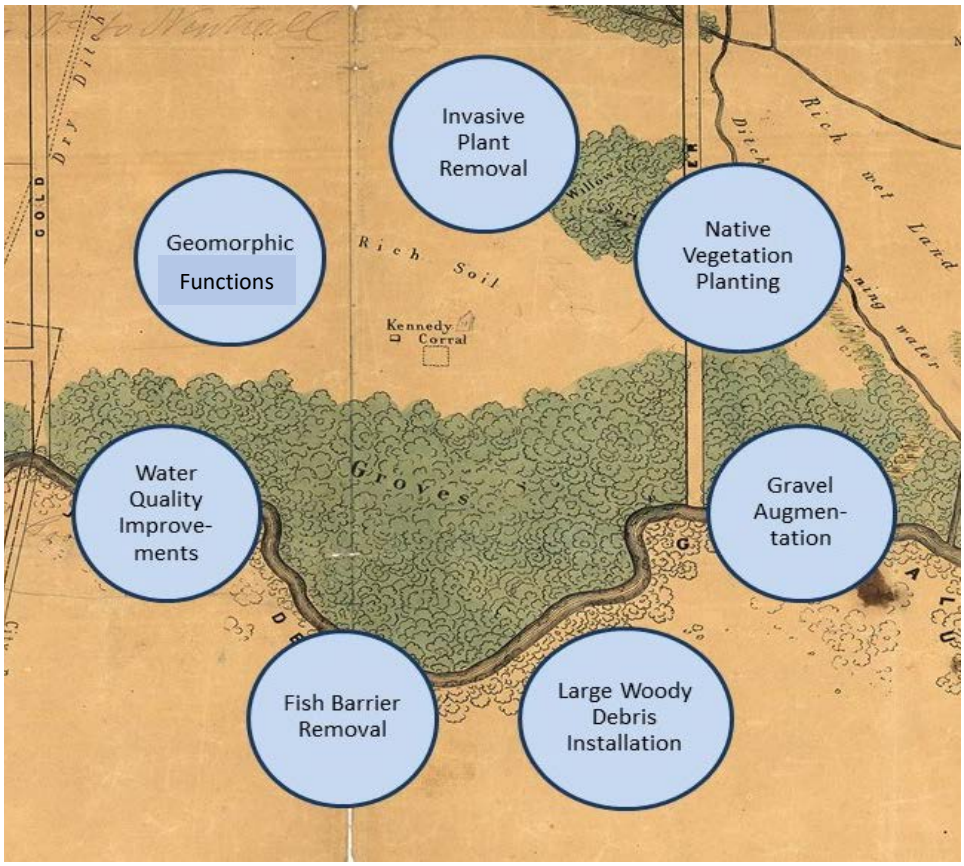


Figure 1.1: Components of the Stream Corridor Priority Plan.

While Figure 1.1 indicates the types of activities that will most likely be needed to improve a stream corridor, and thus the types of activities that should be prioritized, it is not a strict list of required actions. Priorities will vary on a creek by creek basis based on the greatest need and availability of opportunities in each area, as well as funding availability and project constraints in the area. Multiple benefits may be possible by carrying out one or more of these activities, including habitat enhancement, benefits to special-status species, expansion or enhancement of wildlife corridors, access to trails and recreation, improved sediment transport, and improved operations and management. These benefits may support SCVWD goals as well as those in existing restoration and conservation plans by other

agencies such as Santa Clara County Parks, Midpeninsula Regional Open Space (Midpen), municipal master plans, and the South Bay Salt Pond Restoration Plan.

CHAPTER 2: DEVELOPMENT PROCESS

To recommend the priority candidate creek reaches for the first SCPPs, staff collected existing plans, maps, studies, and other relevant information that would support SCPP development. The project team held several discussions with internal subject matter experts (see technical experts list on page 2) on Santa Clara County creek conditions and researched the recent history of habitat enhancement and restoration grant applications, volunteer work, and other indicators of community interest.

Creeks were ranked based on a qualitative assessment over the following four categories: Regional Water Quality Control Board (RWQCB) impaired water bodies, creek reaches with specified maps or studies, creek reaches with demonstrated community interest, and creek reaches that include access or right-of-way for potential projects. The final comparison of creeks that were evaluated can be seen in Appendix A. Selection of projects to be carried out on a SCPP creek would undergo further qualitative and quantitative review prior to funding or implementation.

After consideration, the creek with the highest level of interest and habitat restoration potential was selected from each of the five major watersheds in Santa Clara County, and additional high priority creeks were listed for future consideration. Currently, the creeks that have been selected as priorities are as follows:

Watershed	**Priority Creek Reach**
Lower Peninsula	Stevens Creek (Stevens Creek Reservoir to Bay)
Coyote	Coyote Creek (Anderson Reservoir to Montague Expy)
Guadalupe	Guadalupe River
Pajaro (in Santa Clara County)	Uvas Creek (Uvas Reservoir to Pajaro River)
West Valley	Saratoga Creek

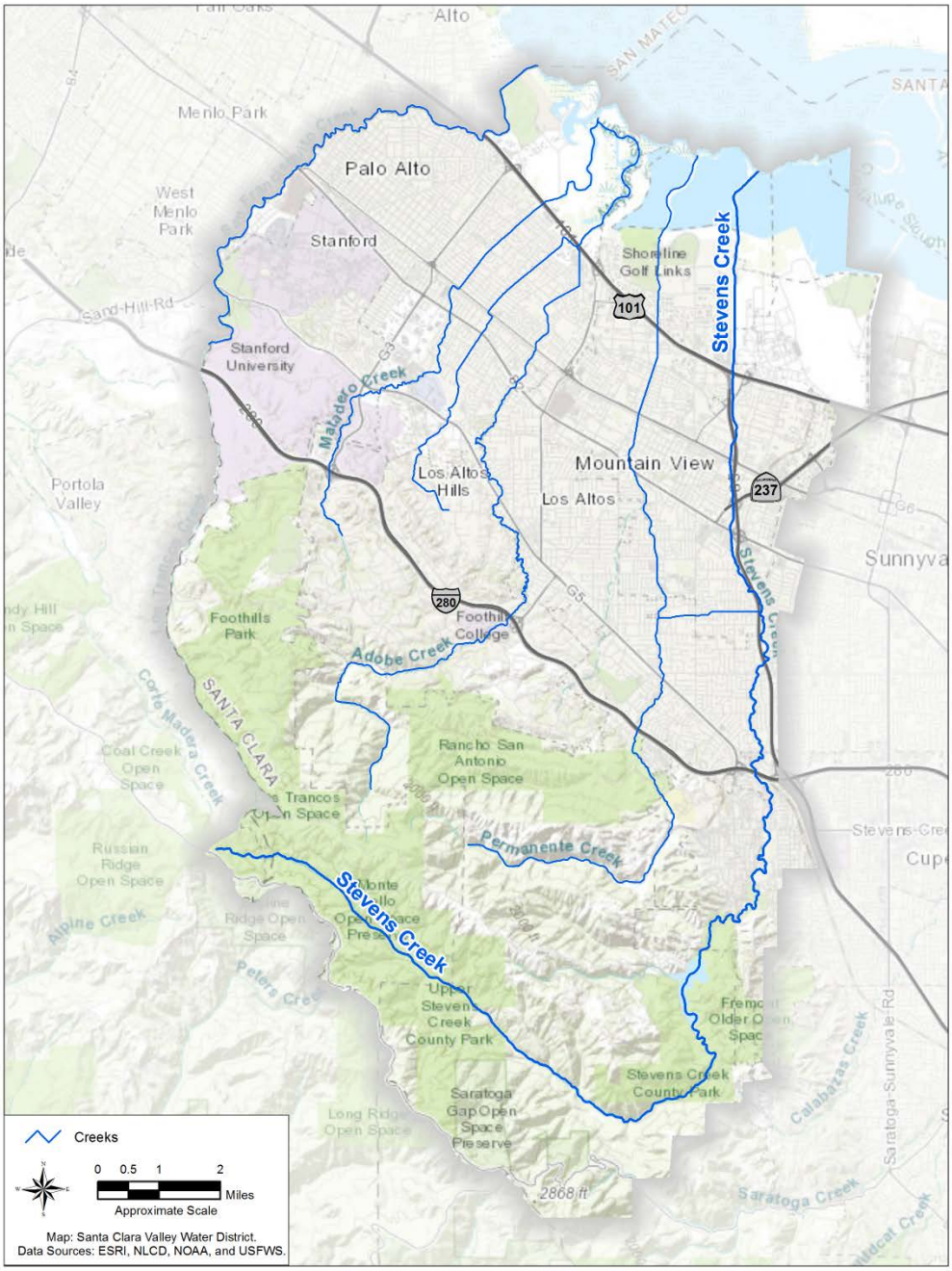
Stevens Creek corridor, downstream of Stevens Creek Dam and extending to the Bay edge, was selected as the top candidate for developing the first SCPP. The creek has a high degree of water quality impairments according to the RWQCB, it supports the federally threatened steelhead trout (*Oncorhynchus mykiss*), has many existing reports and studies, has a very high level of community and stakeholder interest, has existing restored reaches that may be expanded upon, has mostly completed flood protection improvements, and provides some property access that could support potential grant projects.

Examples of goals and objectives that may be met through project implementation in the Stevens Creek corridor include One Water Plan Objective C (High quality surface water and groundwater), E (Expanded and protected buffer lands adjacent to water bodies), and G (Resilient habitats and resources for native species). Specific benefits to the stream corridor could include, but are not limited to, arresting and reducing the potential for channel incision and bank erosion, ensuring passage and enhancing habitat conditions for steelhead, and increasing public awareness of creek resources and issues.

Stevens Creek

Stevens Creek is located within what is referred to by the SCVWD as the Lower Peninsula watershed, in the western part of Santa Clara County. At 22 miles, it is the longest creek in the watershed and drains approximately 46 square miles (Stevens Creek and Permanente drainage), beginning in the Santa Cruz Mountains and flowing north to San Francisco Bay. This drainage area includes a portion of the Permanente Creek Watershed, due to the Permanente diversion channel that connects the two creeks downstream of Fremont Avenue.

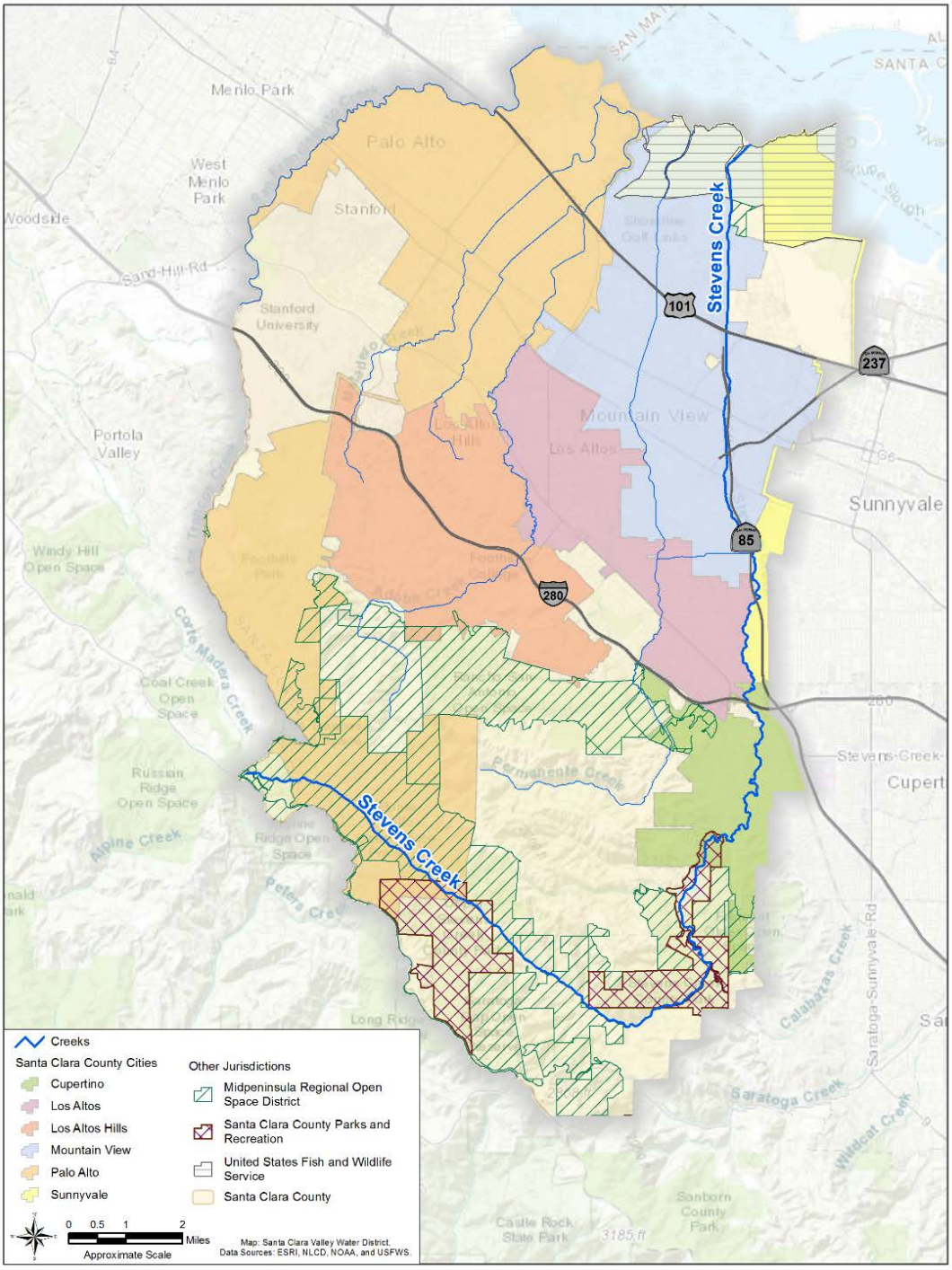
Lower Peninsula Watershed



Upstream of Stevens Creek Reservoir, the creek follows the San Andreas Fault and receives runoff and sediment from the Santa Cruz Mountains. Much of that sediment is then trapped by the Stevens Creek Reservoir, which was built in 1935 to store flows and provide groundwater recharge. Stevens Creek Dam at the reservoir, located about two miles southwest of Cupertino, splits the watershed and separates the headwaters from the area downstream of the reservoir. Below Stevens Creek Dam, Stevens Creek is highly urbanized with flows being regulated by Stevens Creek Reservoir. The dam creates a barrier to anadromy, as well as hydrogeomorphic changes to the creek downstream. As a result of the presence of steelhead, any projects proposed on Stevens Creek below the dam that may affect fisheries must be consistent with the SCVWD's Fisheries and Aquatic Habitat Collaborative Effort (FAHCE, see https://www.valleywater.org/project-updates/creek-river-projects/fahce-fish-and-aquatic-habitat-collaborative-effort).

As Stevens Creek flows north it passes through many jurisdictions along its approximately 13.1-mile corridor below the reservoir, including the cities of Cupertino, Los Altos, Mountain View, Palo Alto, and Sunnyvale, and unincorporated Santa Clara County. This area below the reservoir includes approximately 40 bridge crossings and structures that can also trap sediment and create barriers to natural stream habitat (Tetra Tech, 2006).

Jurisdictional Boundaries



Stevens Creek provides many opportunities for stream restoration. It is one of the few creeks in the Lower Peninsula watershed that has a relatively continuous riparian corridor. Therefore, areas where the riparian corridor is discontinuous or interrupted may be a focus for native revegetation, where appropriate. Lack of hardscape structures in most portions of the creek increases habitat value of the

creek for fish and wildlife. Reaches with high-quality fish habitat can be reconnected through the removal of fish barriers, discussed in more detail below. There is also an extensive trail network along parts of the creek, as well as many nearby parks and public spaces (Tetra Tech, 2006). And while recreation must be balanced with ecological resources to avoid conflict, this recreation brings the public closer to nature and provides an opportunity for environmental education through interpretive signage.

Natural habitat is threatened by urbanization, invasive vegetation, fish barriers, bank and invert erosion, limited sediment transport, and poor water quality. The 2016 Watershed Asset Management Plan rated almost all reaches of Stevens Creek downstream of the reservoir as "high risk" with high economic, environmental, and social costs of channel failure, as well as high probability of channel failure (GHD, Kayuga Solution, SCVWD, 2016). The SCW Project D5 Lower Peninsula CRAM watershed assessment found the Stevens and Permanente Creek watersheds to be in fair condition (Lowe et al., 2017). The creeks were, however, difficult to assess due to insufficient access, which may lead to future challenges for maintenance on existing projects and any future improvements.

The beneficial uses of Stevens Creek identified in the San Francisco Bay Basin Plan (2017) include municipal and domestic water supply, freshwater replenishment, groundwater recharge, commercial and sport fishing, cold and warm freshwater habitat, fish migration and spawning, preservation of rare and endangered species, wildlife habitat, recreation, and navigation. These beneficial uses define the resources, services, and qualities of aquatic systems that are the ultimate goals of protecting and achieving high water quality (Basin Plan, 2017). Proposed projects and activities must consider these beneficial uses regulated by the San Francisco Bay RWQCB, as well as other environmental laws and regulations when working in the creek and its jurisdictional habitats (i.e., creek channel, riparian corridor, and wetlands).

CHAPTER 3: STREAM CORRIDOR PRIORITY ELEMENTS

The following stream corridor priority elements, consistent with Figure 1.1, are described in terms of general characteristics and priority considerations while addressing the elements in and along the creek corridor. Priority locations for recommended improvements are discussed under Chapter 4. For any proposed improvements, compliance with CEQA and regulatory permits is necessary, as is proactive coordination with existing SCVWD programs (e.g., O&M, SMP, FAHCE) for consideration of related flood protection and conveyance.

Invasive Vegetation

Nonnative plants are species that have been introduced or spread into the region (i.e., species that did not occur in the region historically). Invasive plants are species with physiological traits that allow them to disperse and establish at high rates in certain habitats and that can change physical processes, plant and animal communities, and vegetation structure. The SCPP is primarily concerned with those species that are both nonnative to, and can become invasive in, the region.

Currently, the SCVWD manages invasive plants on SCVWD-owned property (fee) and easements through the Stream Maintenance Program (SMP) and Project D2 of the SCW Program; this amounts to approximately 255 acres on fee and 167 acres on easements along Stevens Creek, mostly in the downstream portion. The non-SCVWD fee and easement areas create many opportunities for stakeholders to apply for grants, to look for ways to educate property owners on how to manage

invasive vegetation, or volunteer to conduct invasive vegetation management. Project priority will be given to projects located in the upper stream reaches below the reservoir or on non-SCVWD property (Table 1). The SCVWD currently has a partnership with Midpen under its SCW Project D2 to control invasive plants on Midpen preserves, where invasive vegetation continues to spread from upslope or upstream sources. Thus, projects proposing to revitalize riparian and wildlife habitat corridors connecting to preserve lands are highly desired. Since most of the property managed by the SCVWD is in the downstream portion of Stevens Creek, there is a greater need for invasive vegetation management in the watershed above SCVWD-managed property but below the reservoir. Working in an upstream to downstream pattern is also preferred biologically, since it reduces downstream migration of seeds and propagules allowing invasive vegetation to spread.

Table 1. Priority Rankings for Invasive Vegetation Removal Based on Land Ownership and Location.

SCVWD-Owned Property (Fee)	SCVWD Easement on Property Owned by Others	Non-SCVWD Property**	Property in Upper Watershed***
N/A*	Medium	High	High

*N/A: Invasive vegetation removal on SCVWD property is generally reserved for the SCVWD's SMP program and mitigation opportunities.
**With written permission from landowners, environmental permits, and authorizations.
*** Upper watershed defined as upper reaches of the creek below the reservoir for the purposes of the SCPP.

Priority will be given to projects where invasive nonnative vegetation has one of the following characteristics:

1. Vegetation is identified as a highly invasive nonnative plant species occurring in the watershed (e.g., giant reed (*Arundo donax)*, cape ivy (*Delairea odorata*));
2. Vegetation impacts sensitive plant or animal communities, especially habitats for state or federally listed species;
3. Vegetation reduces hydraulic flow conveyance, or removal is recommended by the U.S. Army Corps of Engineers (USACE) for levee stability;
4. Vegetation grows adjacent to, but not within, SCVWD mitigation or revegetation sites;
5. Vegetation removal revitalizes, or otherwise improves, habitat function of riparian or tidal habitat;
6. Vegetation removal expands or enhances wildlife corridors by increasing connectivity of habitat;
7. Vegetation grows in upper creek reaches (but below reservoir) with potential to migrate downstream; or
8. Vegetation located closer to the creek, immediately upslope, or within the riparian corridor buffer (approximately 200 feet from top of bank).

Projects should include working upslope to downslope during removal efforts and implement monitoring and maintenance of treated vegetation to help ensure successful removal. Replanting native

vegetation in areas of invasive nonnative plant removal, or monitoring for natural recruitment and recolonization from native seed banks within the watershed, may increase the desirability of the project. If invasive plants are removed from a creek reach with flow conveyance issues, however, replanting a native species would not be encouraged within the channel.

Controlling invasive giant reed along Stevens Creek and in other watersheds is a SCVWD supported activity that is also carried out on SCVWD property. This invasive species is an example of an invasive plant prioritized for removal due to its detrimental effects on flood and storm flows, native habitat, and its support of vermin and animal pests.

Native Vegetation Planting

Native vegetation planting can provide improved habitat for California's endangered, threatened, and protected species. It can provide shelter and food sources for wildlife and pollinators; shade for water temperature moderation in streams; terrestrial insect input to streams from overhanging vegetation for fish; contaminant filtering from runoff; various uses by native cultures; social connection with ecological history; and the plants tend to be more drought-tolerant and adapted to local conditions.

The SCVWD plants and maintains native vegetation on SCVWD fee title property, leaving many opportunities for grant applicants to expand on this work on non-SCVWD managed areas of Stevens Creek. Since most of the property managed by the SCVWD is in the downstream portion of Stevens Creek, there is a greater need for native planting in the creek upstream of this, primarily from Stevens Creek Boulevard, excluding McClellan Ranch Park, up to Stevens Creek Dam (see Table 2).

Priority should also be given to projects within the riparian corridor or a stream buffer, as opposed to further away from the creek. However, any planting within the riparian corridor along any portion of the creek must be coordinated with SCVWD staff to ensure flow conveyance considerations are managed. Projects should include appropriate native habitat types, appropriate plant species for site conditions, and where planting of native trees would be appropriate to increase connectivity of wildlife corridors. For example, creating paths through urban areas with native vegetation to connect to parks may provide wildlife refuge even in developed areas. They should also consider where special-status wildlife species currently occur, and plant species that may be beneficial to those species (e.g., provide food or cover resources). They should also consider how plantings may affect species presently at the site; for example, planting tall trees in downstream tidal areas may increase perching habitat for raptors, which could be detrimental to vulnerable species such as the state and federally endangered and fully protected saltmarsh harvest mouse (*Reithrodontomys raviventris*), state threatened and fully protected California black rail (*Laterallus jamaicensis coturniculus*), or state Species of Special Concern burrowing owl (*Athene cunicularia*). Projects should consider monitoring and maintenance of newly planted vegetation to ensure the long-term success of native plants.

Table 2. Priority Rankings for Native Vegetation Planting Based on Land Ownership and Location.

SCVWD-Owned Property (Fee)	SCVWD Easement on Property Owned by Others	Non-SCVWD Property**	Located in Upper Watershed***
N/A*	Medium	High	High

*N/A - This is a high priority project that is being managed by the SCVWD.
** With written permission from landowners and environmental permits or authorizations.
*** Upper watershed defined as upper reaches of the creek below the reservoir for the purposes of the SCPP.

Gravel Augmentation and Large Woody Debris Installation

SCVWD developed Phase 1 of a study of Santa Clara County steelhead streams to identify priority locations for gravel augmentation and large woody debris (LWD) placement in April 2018 (Balance Hydrologics, EOA, Helix Environmental Planning, 2018). The plan identifies locations below Santa Clara County reservoirs that are good candidates for placing gravels or LWD to increase or enhance spawning and rearing habitat for central California coast steelhead. Stevens Creek is designated as critical habitat for central California coast steelhead; therefore, results of the gravel augmentation plan were included in this SCPP development. Two sites were evaluated for suitability of placement of gravels or LWD in Stevens Creek; one was enhanced by the SCVWD as part of a mitigation project; leaving one site to include in this report. See description of this site in Chapter 4 for the reach Interstate 280 to Stevens Creek Reservoir.

Projects seeking to install gravels and LWD in areas not identified by the augmentation plan should provide an evaluation of site suitability for placement of gravels and LWD including a description of current habitat conditions; specify materials, sizing and placement; and provide justification that these materials are appropriate for the channel conditions at the site and the habitat to be restored, including rationale that placement will not hinder flow conveyance or significantly reduce channel capacity. LWD selected for installation should be consistent with the size and amount of what is naturally available in the riparian area. Attributes including rate of decay, density, and diameter should also be considered (i.e., larger, denser pieces of wood or conifers may decay more slowly than smaller, less dense or hardwood species). Projects should consider placement of gravels upstream of large woody debris to prevent gravels from being flushed downstream during high flows and provide sufficient cover for pools formed by large wood. Priority will be given to projects that consider ease of construction and maintenance access to the installation site. Projects should also consider future monitoring for effectiveness, mitigation of any flood-related consequences, sourcing gravels from local sediment sources (upstream reservoirs and stream maintenance activities) when feasible, and bed and bank scour when proposing improvement sites.

Fish Barrier Removal

Prior to construction of Stevens Creek Dam, steelhead potentially had access to 22 miles of stream. The dam is considered a complete barrier to anadromy and it has reduced potential accessible habitat for steelhead to only 12.5 miles downstream of the reservoir. Within these 12.5 miles of stream, structural

and sometimes natural in-channel features (e.g., grade control weirs, bridge abutments, critical riffles, etc.) may create conditions that preclude successful fish passage. SCVWD's quantitative Stevens Creek Fish Passage Analysis, which is currently underway and estimated to be completed in 2019, is assessing and prioritizing 32 potential barriers affecting fish habitat restoration.

In general, priority should be given to barrier removals that are further downstream, as opposed to upstream, but the Stevens Creek Fish Passage Analysis will provide more detailed information about which barriers are the most essential for removal along the entire reach from the dam to the Bay. Again, any projects proposed on Stevens Creek that may affect fisheries must be coordinated with the FAHCE project.

Water Quality

Water quality is a continuous issue for Stevens Creek, which suffers from many of the typical water quality challenges faced by urban streams, including trash, pesticides, fertilizers, and animal and human waste. Additional monitoring may be necessary to determine causes and potential solutions.

In addition to these water quality challenges, the creek has been listed as impaired by the State Water Resources Control Board for diazinon, temperature, trash, and toxicity (California Water Board R2, 2010). Data used to list Stevens Creek for the toxicity impairment was collected in 2002 and 2003. Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) staff conducted an investigative monitoring project at Stevens Creek in 2007 and 2008. Results of the investigative monitoring indicated water in Stevens Creek was not consistently toxic to test organisms. However, the investigative monitoring found sediment toxicity was present in Stevens Creek and was shown to be especially elevated after large rain events. Greater magnitude and frequency of sediment toxicity during the winter wet season has been indicated by data collected by the San Francisco Bay Estuary Regional Monitoring Program. A total maximum daily load (TMDL) staff technical report for Stevens Creek is expected to be completed by the Water Board in 2019 to assess the status of the impairment.

Stevens Creek continues to be monitored by SCVURPPP on behalf of all stormwater permittees (including the SCVWD). Monitoring in Water Year 2017 included bioassessment, nutrients, general water quality, turbidity, chlorine, toxicity/sediment chemistry, and pathogen indicators.

- Pathogen indicators at Blackberry Farm exceeded the Municipal Regional stormwater Permit (MRP) trigger for enterococcus.
- Toxicity in Stevens Creek was observed for dry weather pesticides and toxicity monitoring. Data is available in the report found here: http://scvurpppw2k.com/pdfs/1718/ucmr_wy2017/SCVURPPP_WY2017_UCMR_UMBRELLA_FINAL_3-30-18.pdf.
- Turbidity levels at the Stevens Creek Reservoir outlet to Stevens Creek tends to be higher than other reservoirs in Santa Clara County.

Geomorphic Functions

Addressing erosion, bank stabilization, and floodplain connectivity, while improving habitat for aquatic and riparian species, requires consideration of geomorphologic processes and functions in the system.

The 2006 Watershed Stewardship Plan for Stevens Creek (Tetra Tech, 2006) recommended the following stewardship actions. These actions remain relevant today and should be considered general recommendations with more specific priorities in Chapter 4.

1. Introduce rock and log habitat structures channels into the creek in strategic locations to increase the amount of channel complexity and wintering habitat for relevant species.
2. Re-establish floodplain connection and fish refugia in selected locations by cutting lowered benches into the incised banks.
3. Promote the use of bank stabilization methods that dissipate excess erosive energy, minimize channel incision at tributary confluences, and increase habitat values (e.g., biotechnical methods).
4. Remediate grade control and bank stabilization structures to promote more natural geomorphic and ecologic processes. For example, by replacing drop structures with the use of step-pool structures.
5. Consider reducing the number of stream crossings or replacing them with structures that do not eliminate pool habitat.

Geomorphologic considerations are important. While step-pool structures (noted above as an example) can be an effective improvement, environmentally sensitive stream restoration methods may prove better suited to site conditions than step-pools, such as increasing stream sinuosity, decreasing slope down the stream, adding riffles to dissipate flows and enhance fish habitat, lowering one bank to form flood benches, and widening floodplains. Increasing stream sinuosity and decreasing slope decreases stream energy. Raising the bed elevation and terracing the banks can allow access to the floodplain. Recent fish habitat restoration findings have highlighted the multiple benefits of floodplains. Creating vegetated swales in appropriate locations may slow flows and hold water on the landscape longer. Riffles can dissipate energy, as well as enhance habitat value for fish. Vegetative buffers along creeks can add roughness, store water to reduce peak runoff, and stabilize streambanks. For example, willow stakes can be planted to stabilize stream banks, and can be used to anchor rocks in place while enhancing habitat value for wildlife. Projects should consider site appropriateness and target species when selecting design, methods, and materials. For example, habitat complexity, passage conditions, flow velocities, and jump heights in relation to steelhead life stages.

Because the SCVWD manages erosion on its own property, priority for partner efforts and grant-funded erosion control projects should be given to SCVWD easement or non-SCVWD property for the benefit of the public and not just private property. Projects should consider that it is more cost-effective to treat sediment at the source, such as erosion control measures, best management practices (BMPs) for stormwater and storm runoff reduction, bioswales, natural habitats and biotechnologies for slope stabilization.

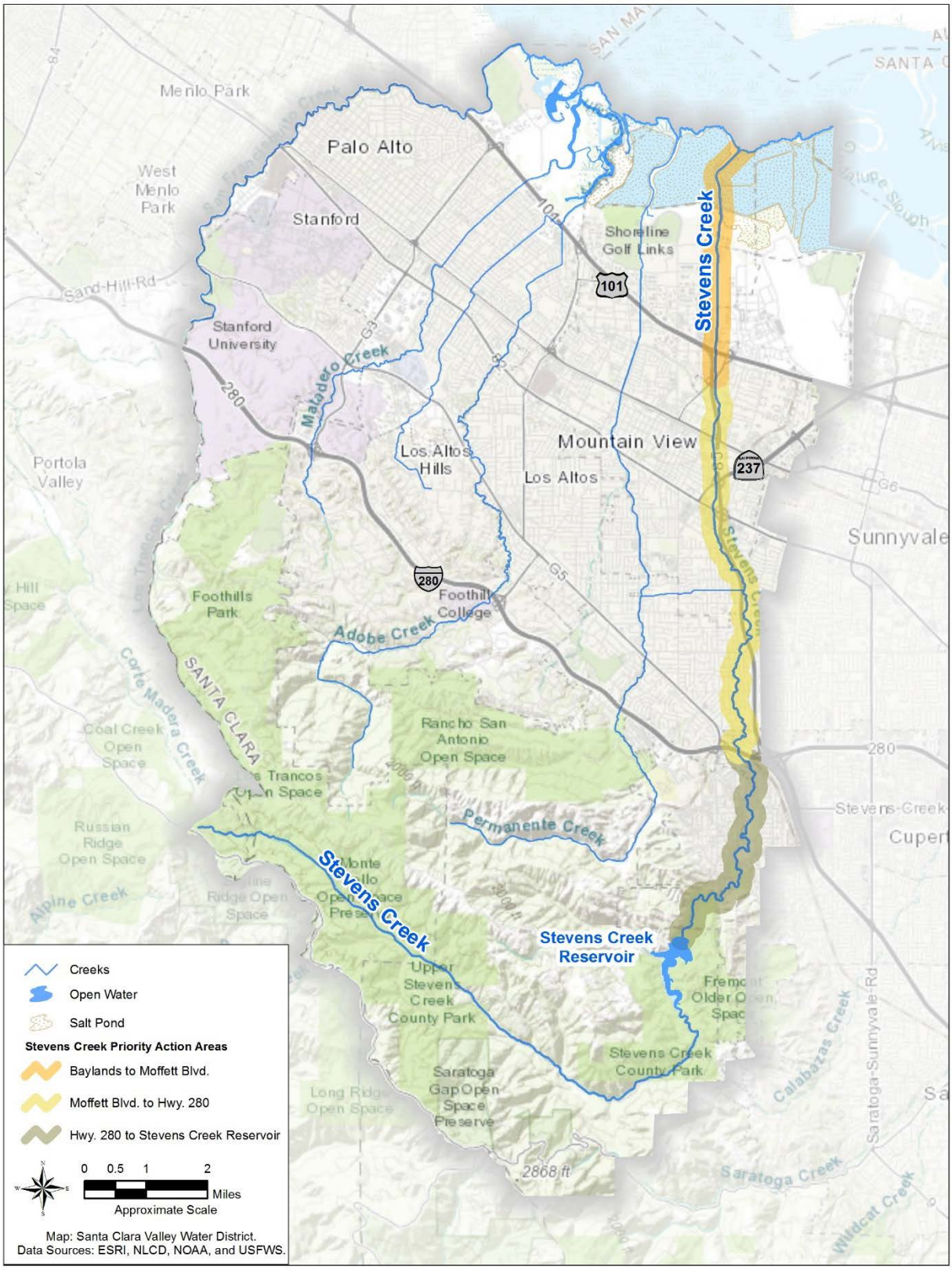
SCVWD Priorities

For all SCPP elements, special consideration must be given to flood protection and water supply as primary SCVWD missions. Thus, any improvements made for stream stewardship must not worsen existing conditions or otherwise increase flood risk and must not degrade existing water supply functions in the watershed. To ensure this, coordination with SCVWD staff is necessary.

CHAPTER 4: STREAM CORRIDOR PRIORITY ACTIONS

This SCPP identifies the areas of the Stevens Creek stream corridor that have the highest need for habitat restoration, based on the seven elements described in Chapter 3, and provide the greatest benefit to the creek. Information included in the following Priority Actions sections are aspects of creek habitat restoration that public agencies, non-profit organizations, and the public should consider as future enhancement activities on Stevens Creek and incorporate into proposals for available grant and partnership opportunities to increase the likelihood that they will receive approval and funding.

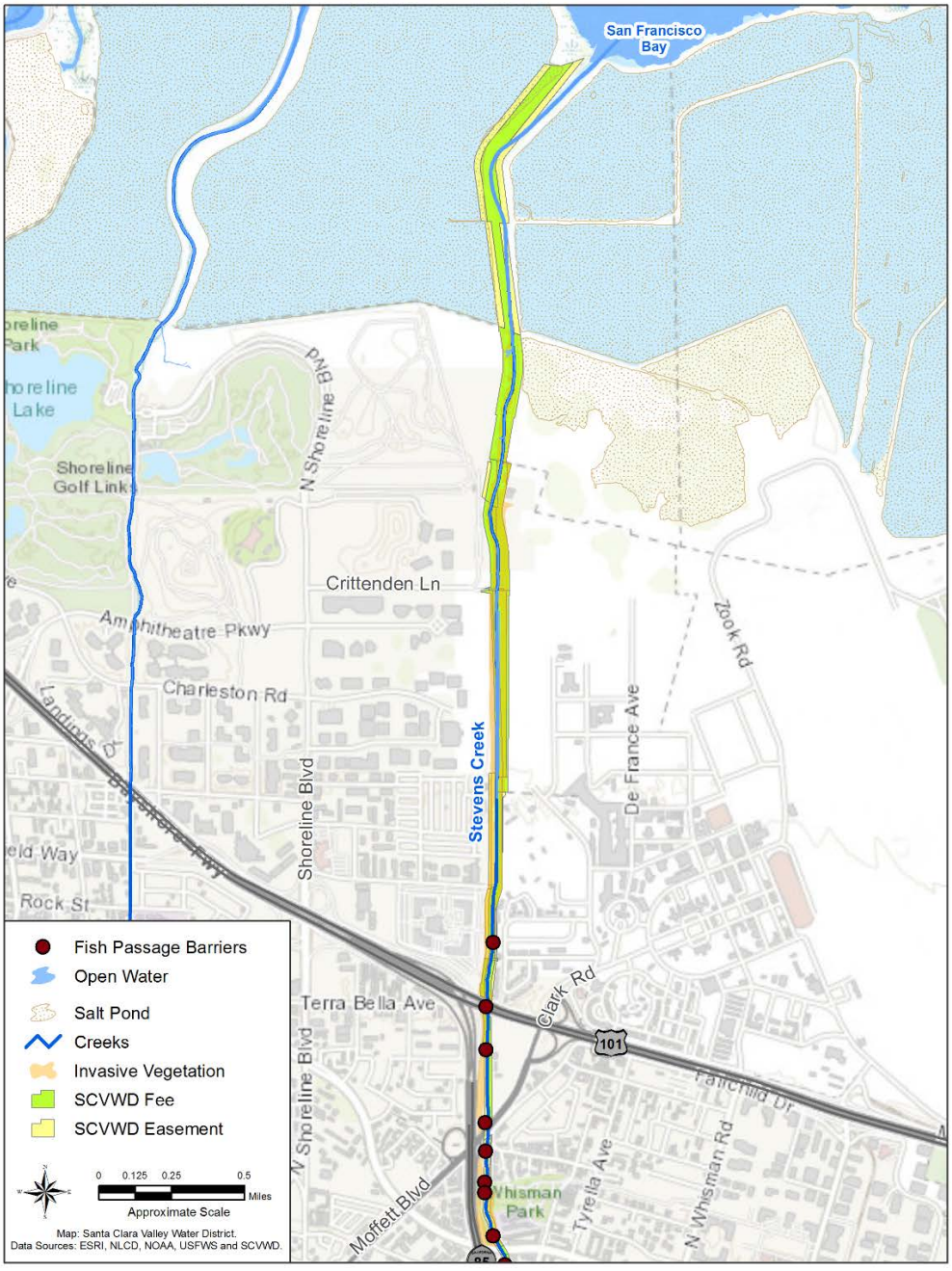
Stevens Creek Priority Action Areas



4.1 Baylands to Moffett Boulevard

In this reach, Stevens Creek historically dispersed into marsh lands and as the area developed for human habitation and agriculture, it was confined to a channel that was altered, enlarged and straightened over the years from its original dispersion into marsh lands. The area is characterized by tidal habitat at the edge of San Francisco Bay, transitioning to a freshwater stream as it moves upstream. The tidal extent is downstream of Highway 101. The SCVWD owns most of this reach and has easements over the rest. The channel has SCVWD-owned levees on both the right and left banks, which extend from Moffett Boulevard to the furthest downstream extents of the creek, where it opens to the San Francisco Bay. For this reach, the greatest needs and opportunities for restoration are prioritized below.

Stevens Creek: Baylands to Moffett Blvd.



Invasive Vegetation Removal and Native Vegetation Planting

According to mapping from Aerial Information Systems (AIS), the reach consists of native halophytes including pickleweed (*Salicornia* spp.), Pacific cordgrass (*Spartina foliosa)*, salt grass (*Distichlis spicata)*, and fleshy jaumea (*Jaumea carnosa*) at the extreme downstream end, and other native plants including coyote brush (*Baccharis pilularis*), Fremont cottonwood (*Populus fremontii*), bulrush (*Bolboschoenus maritimus, Schoenoplectus californicus*), and cattail (*Typha* spp.) mixed with nonnative and invasive trees.

SCVWD's Invasive Plant Management Program (IPMP) carries out work in this reach and has been removing English ivy, Fennel, Himalayan blackberry, Periwinkle, Stinkweed, Ash, Eucalyptus, Italian buckthorn, Olive, Palm, Peruvian pepper tree, Privet, Walnut, Cape ivy, Harding grass, Holly oak, Pampas grass, Pepperweed, Tree of heaven, and Weeping willow from the Baylands to Moffett Boulevard. As of 2018, SCVWD is in Year 2 of the 5-year monitoring period for this invasive plant management site.

Project needs in this reach are more general and include the following:

> Native Vegetation Mapping: Currently, there is a need for detailed native vegetation mapping in all reaches of the creek, including ground-truthing of existing maps. Work would include using various Geographic Information Systems (GIS) and remote sensing resources to map areas of dominant vegetation types reach scales. There are GIS and map resources at State and County scales, but these are difficult to apply to a watershed, sub-watershed, or reach. California Invasive Plant Council (Cal-IPC) and Calflora are improving their statewide invasive plant detection and mapping systems. AIS maps are a good resource but are from 2006 data with supplemental information from 2009, thus they may need to be ground-truthed for current land cover. Some resource agencies are using this new application, which is available to the public, including as a cell phone application, but more data needs to be added to prioritize and select sites for restoration. Detailed maps (i.e., 10m resolution or better) with acreages of invasive and nonnative vegetation cover are essential for conducting habitat revitalization in jurisdictional habitats (creek, slough, and river channels, riparian corridor, and wetlands).

Gravel Augmentation and Large Woody Debris Installation

Gravel augmentation would not be beneficial in this reach, as steelhead spawn upstream in freshwater reaches of the creek. The benefits of large woody debris in tidal restoration sites are unclear at this time and may not align with historic conditions. Any restoration and enhancement actions should consider the historical context of the site, what is appropriate for the reach in question, the best available science, and benefits to special-status species.

Fish Barrier Removal

SCVWD is working on the Stevens Creek Fish Passage Barrier Prioritization study, which is evaluating all potential fish passage barriers downstream of Stevens Creek Reservoir, including the following four potential fish barriers in this reach:

1. Grade Control Structure at Vernon Avenue
2. HWY 101 Culvert and Chute
3. Moffett Fish Ladder and Grade Control Structure
4. Concrete Channel at Moffett Avenue Bridge

The Prioritization Study is scheduled for completion by December 2019 and will determine the degree to which each potential barrier hinders passage for adult and juvenile steelhead trout at relevant creek flows and the amount of benefit if the barrier was remediated. Projects should address the highest priority barriers. It should be noted that these are partial fish barriers since steelhead have been documented upstream.

Water Quality

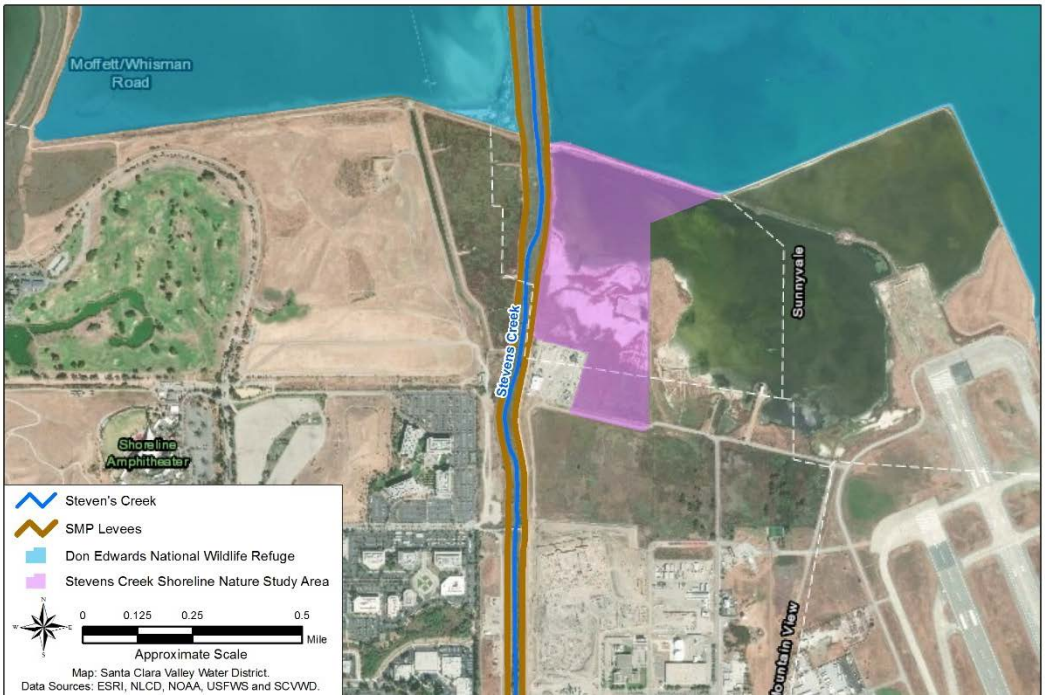
Priorities for this reach are projects that would help address the pollutants included in the RWQCB impairment list, and consider urbanized environmental challenges such as homelessness and trash, including:

1. Creek monitoring: Monitor specific water quality characteristics, such as dissolved oxygen, conductivity, turbidity, and temperature, consistently along the creek and document potential contributing issues in the area.
2. Outreach program and volunteer clean-ups for trash: Trash is a widespread problem along creeks in Santa Clara County. Public Outreach or volunteer programs and campaigns that focus on reducing sources of trash entering the creek would be helpful.
3. Project aimed at reducing use of pesticides in the watershed would be beneficial.

Geomorphic Functions

The following restoration activity would greatly improve geomorphic processes in the channel:

Reconnect Tidal Channel to the Baylands: At its furthest downstream end, Stevens Creek flows into the San Francisco Bay (see map below). The creek flows between earthen levees adjacent to the former salt ponds A2w, Ab1, A2e, and Crittenden Marsh (now part of the Don Edwards National Wildlife Refuge), and to the Stevens Creek Shoreline Nature Study Area, a nature preserve owned and managed by Midpen. The levees, built to isolate the creek from the salt-production ponds, currently separate it from land that is slated to be restored to tidal action as part of the South Bay Salt Pond Restoration Project. The possibility of re-connecting Stevens Creek to a restored Baylands habitat should be investigated, as this type of connection has been regionally determined as a priority action for the Baylands to create a more resilient shoreline. Widening the mouth of the creek is also likely to assist sediment supply to tidal wetlands the restoration of tidal/ freshwater interactions at the Bay edge. Restoring large marsh areas would create a broader, continuous marsh corridor and potentially reestablish native vegetation, with benefits for endemic species dependent on tidal marsh habitat, as well as buffers to tidal flooding.

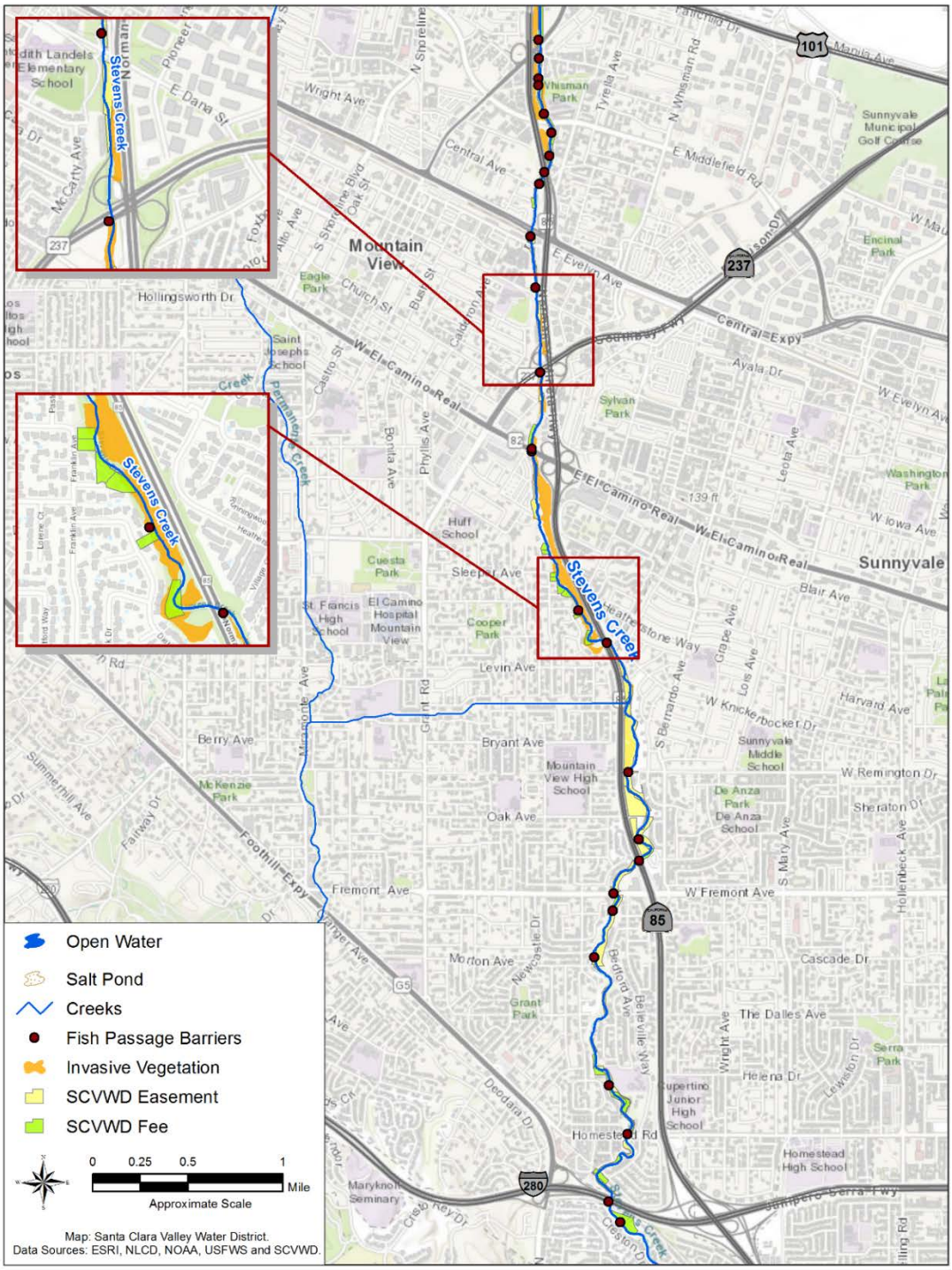


Carrying out improvements listed above for each element could benefit and should consider impacts to the following special-status species that may have potential to occur in the area: central California coast steelhead (*Oncorhynchus mykiss*), California Ridgway's rail (*Rallus obsoletus obsoletus*), California black rail (*Laterallus jamaicensis coturniculus*), yellow rail (*Coturnicops noveboracensis*), burrowing owl (*Athene cunicularia*), saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*), saltmarsh harvest mouse (*Reithrodontomys raviventris*), saltmarsh wandering shrew (*Sorex vagrans halicoetes*), and other tidal marsh species.

4.2 Moffett Boulevard to Highway 280

In this reach, Stevens Creek is a deeply-incised channel, characterized by steep bank slopes with great potential for erosion. The riparian corridor is mostly continuous, and the bed channel typically contains sand, gravel, and cobbles (Tetra Tech, 2006). This reach is highly urbanized, but may support wildlife including fish, bats, birds, reptiles, amphibians, or small mammals. Some special-status species, including steelhead and white-tailed kite (*Elanus leucurus*), may also occur in this reach. The SCVWD owns some fee and easement in this reach, but there are many areas where the creek flows through privately-owned land.

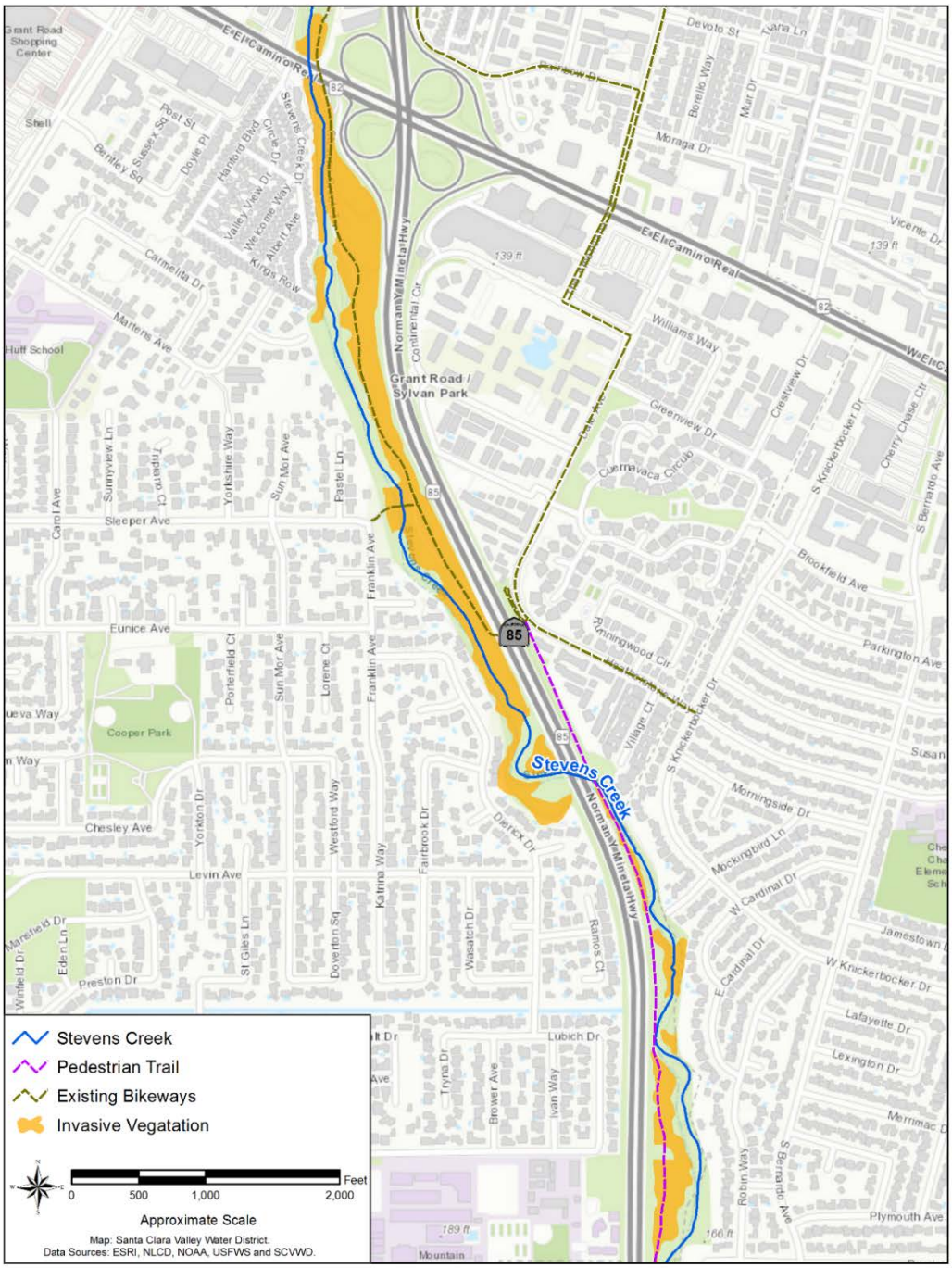
Stevens Creek: Moffett Blvd. to Hwy 280



From Moffett Boulevard to Fremont Avenue, the areas surrounding the creek corridor are primarily public lands owned by the City of Mountain View, with a very well-established trail system. Upstream of Fremont Avenue, the creek runs through the cities of Los Altos and Sunnyvale, with mostly residential land use and no trail system. The greatest needs and opportunities for restoration from Moffett Boulevard to Highway 280 are prioritized below:

Invasive Vegetation Removal and Native Vegetation Planting

While the SCVWD owns only small portions of fee and easement in this section of the creek, it has mapped all invasive vegetation on these properties and is in year 3 of 5 for monitoring following removal of that vegetation under its IPMP. Invasive plants removed since 2015 between Middlefield Road to upstream of Dana Street include Ash, Eucalyptus, Privet, Walnut, Cape ivy, English ivy, Fennel, Giant reed, Himalayan blackberry, Periwinkle, and Poison hemlock.



Apart from SCVWD fee and easement properties, there is little information about the presence or type of invasive vegetation species found in this reach. According to mapping from AIS, the reach consists of native species including coast live oak (*Quercus agrifolia*), California sycamore (*Platanus racemosa*), red willow, (*Salix laevigata*), Fremont cottonwood, and elderberry (*Sambucus* sp.) mixed with nonnative trees including eucalyptus, giant reed, and ruderal, nonnative grasses. Some broken riparian canopy is identified between Fremont Avenue and Penny Way.

Native plantings to fill riparian gaps may be considered along this reach, if appropriate. Any observations of giant reed are high priority and should be targeted for removal following applicable environmental laws and regulations, and properly disposed of to avoid further spreading of the species. Monitoring for possible retreatment or removal is recommended as is carried out on SCVWD properties.

Despite these data gaps, invasive removal in this project reach is still medium priority, because it would help prevent invasive propagation to downstream portions of the creek. Project needs in this section for the creek include the following:

1. Vegetation Mapping: See summary included in Baylands to Moffett Section above. Mapping of both native and nonnative species. Include ground-truthing of existing data sets.
2. Large-Stature Tree Mapping: There are many large-stature trees along Stevens Creek. Work would include exploring various Geographic Information Systems (GIS) and remote sensing resources to map large-stature trees and to identify and map over creek reaches. In addition to location of trees, type of tree (native or nonnative) and habitat value for wildlife should be considered. This project would include SCVWD property, as well as public and private property along the creek corridor. There are GIS and map resources that have been mapped by cities or other jurisdictions, but they have yet to be mapped in one consistent database. Good quality maps are essential for protecting and preserving large-stature trees in the creek corridor.

Gravel Augmentation and Large Woody Debris Installation

The Fish Functions and Value Analysis for gravel augmentation and LWD considerations has identified Stevens Creek upstream of Highway 237 to Highway 280 as warm water with potential for trout (i.e., steelhead and non-anadromous rainbow trout). Installation of LWD would provide beneficial habitat for fish species including trout utilizing this reach and enhance the migratory corridor for anadromous fish. Projects should consider site suitability for spawning when recommending installation of gravels, including habitat and water characteristics such as temperature and dissolved oxygen. Some sections in this reach may be used for spawning if it is accessible, suitable habitat. Public access is generally limited in this area, however, which may make it difficult to install or maintain projects. Gravel augmentation and LWD projects need to be carefully designed to ensure flow conveyance is not compromised and flood risk is not increased for the community.

Fish Barrier Removal

The SCVWD is working on the Stevens Creek Fish Passage Barrier Prioritization study, which is evaluating all potential fish passage barriers downstream of Stevens Creek Reservoir, including the following 23 identified potential fish barriers in this reach:

1. Drop Structure at Walker Dr.
2. Drop Structure at the Hetch Hetchy Pipeline Crossing

3. Concrete Chute at Whisman Elementary School
4. Drop Structure D/S Middlefield Pkwy
5. Drop Structure U/S Middlefield Pkwy
6. Drop Structure at Cypress Pt. and Easy Dr.
7. Drop Structure and Chute at Hwy 85 Crossing
8. Gauging Weir (SF35) with Drop Structure Central Ave. Fish Ladder
9. Weir at Footbridge over Central Expressway
10. Dana Street Low Flow
11. Chute at Hwy 237 Bridge Crossing
12. Bridge (El Camino Real and HWY 85 Bridge)
13. Chute at El Camino Bridge
14. Concrete Rubble at Heatherstone Dr.
15. Chute at Hwy 85 Bridge Crossing
16. Concrete and Flashboard Dam
17. Fremont Fish Ladder
18. Hwy 85 Bridge (D/S of Fremont Ave.)
19. Aggraded Sediments at Fremont Ave.
20. Losse Drive
21. Drop Structure at Kircher Ct.
22. Rock Piles at West Valley Elementary School
23. Degraded Bed Armoring D/S Homestead Rd.

As in the downstream reach, these are partial fish barriers since steelhead have been documented upstream.

Water Quality Improvements

Priorities for this reach are projects that would effectively address the pollutants included in the RWQCB impairment list and consider urbanized environmental challenges such as homelessness and trash. Project needs in this reach include the following:

1. Water quality monitoring: There is a need for monitoring for specific water quality characteristics, such as dissolved oxygen, conductivity, turbidity, and temperature consistently along the creek, including documentation of potential contributing issues in the area.
2. Outreach program and volunteer clean-ups for trash: Trash is a widespread problem along creeks in Santa Clara County. Public Outreach or volunteer programs and campaigns that focus on reducing sources of trash entering the creek would be helpful.

Geomorphic functions

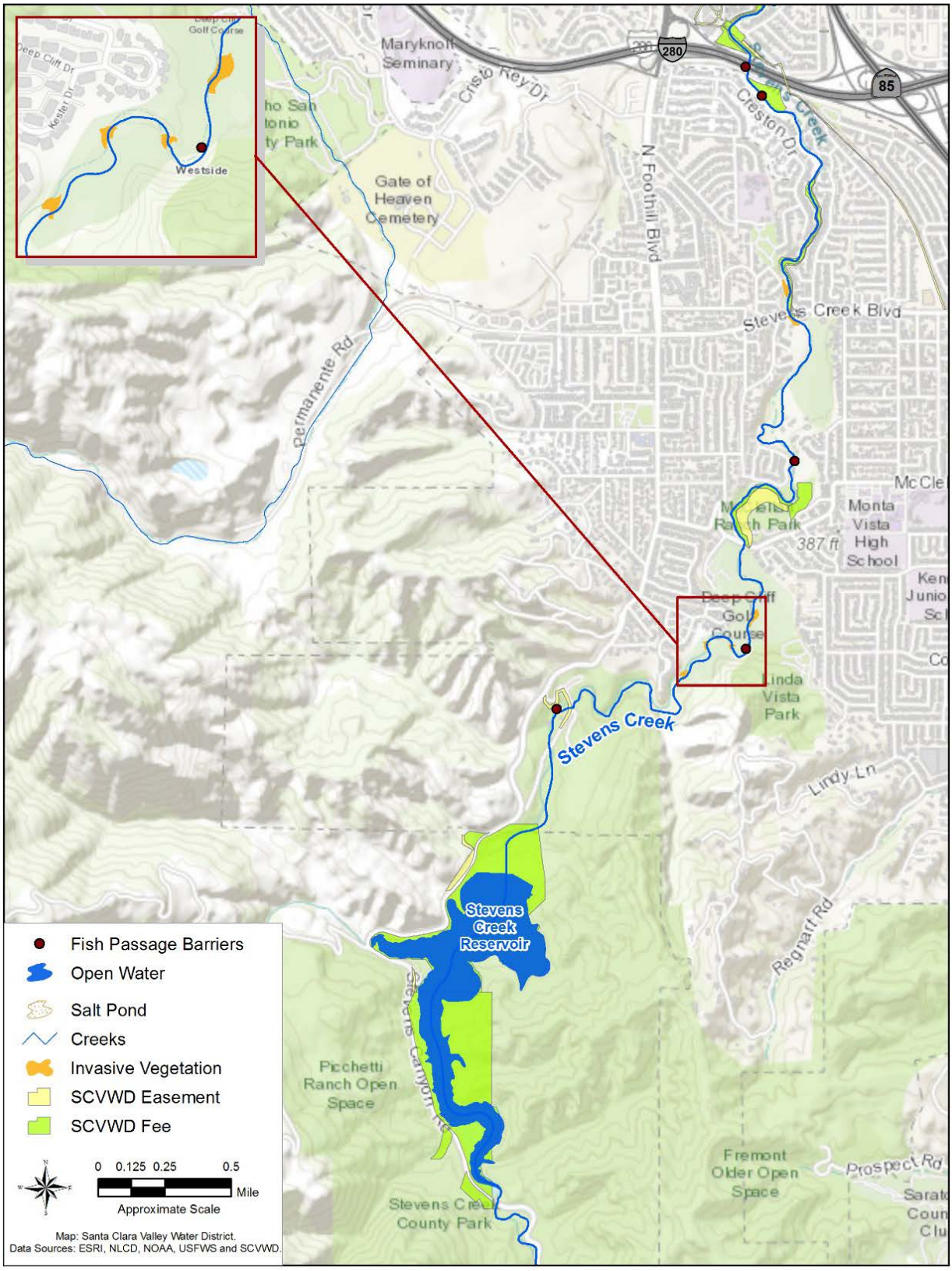
In this reach, the channel is typically very deep and side slopes are steep, indicating decades of channel incision. This has created very unstable banks easily susceptible to erosion. The creek has experienced major erosion issues in recent years, creating aggradation downstream with resulting impacts to vegetation, fish, and increasing flood risk, failing riparian corridor due to loss of banks, and threatening trails and public access to the creek corridor. In addition to gravel and LWD augmentation projects, the following general activities are recommended, where possible given the constrained corridor, for this reach of the creek:

1. Re-establish floodplain connection and fish refugia in selected locations by raising the bed elevation, cutting lowered benches into the banks, and reconnecting the creek to open space without creating basins that may capture or entrain fish.
2. Promote the use of bank stabilization methods that dissipate excess erosive energy in any highly unstable channel sections and that increase habitat values (e.g., natural and biotechnical methods).
3. Remediate grade control and bank stabilization structures to promote more natural geomorphic and ecologic processes; examples include: introduction of step-pool structures to replace drop structures, increasing stream sinuosity in the low flow channel, adding riffles to dissipate flows and enhance fish habitat, lowering one bank to form flood benches, and widening floodplains.
4. Consider reducing the number of stream crossings or replacing them by structures that do not eliminate pool habitat.
5. Study and then re-establish or mimic more natural geomorphic and sediment discharges to the system on an as-needed basis.

4.3 Highway 280 to Stevens Creek Reservoir

In this reach, Stevens Creek is not as heavily incised as its downstream locations, and the riparian corridor is mostly continuous. There is evidence of gravel embedding due to fine sediments in the areas downstream of the reservoir, the exact source of which is unknown (Tetra Tech, 2006). The creek in this reach runs through the City of Cupertino and unincorporated areas. The SCVWD owns very little fee and easement. Residential properties border the creek on both banks from Highway 280 to Stevens Creek Boulevard. Upstream, property along the creek is a mixture of residential, park land, and golf course use, including well-established public trails. The Stevens Creek Reservoir is owned by the SCVWD, with surrounding lands owned by Santa Clara County and Midpen. The habitat is used by a wide variety of wildlife. Special-status species with potential to occur in this reach may include steelhead, bats, California red-legged frog (*Rana draytonii*), California tiger salamander (*Ambystoma californiense*), and Santa Cruz black salamander (*Aneides niger*). Sensitive plants may include woodland woollythreads (*Monolopia gracilens*) and western leatherwood (*Dirca occidentalis*). For this reach, the greatest needs and opportunities for restoration are prioritized below.

Stevens Creek: Hwy 280 to Stevens Creek Reservoir

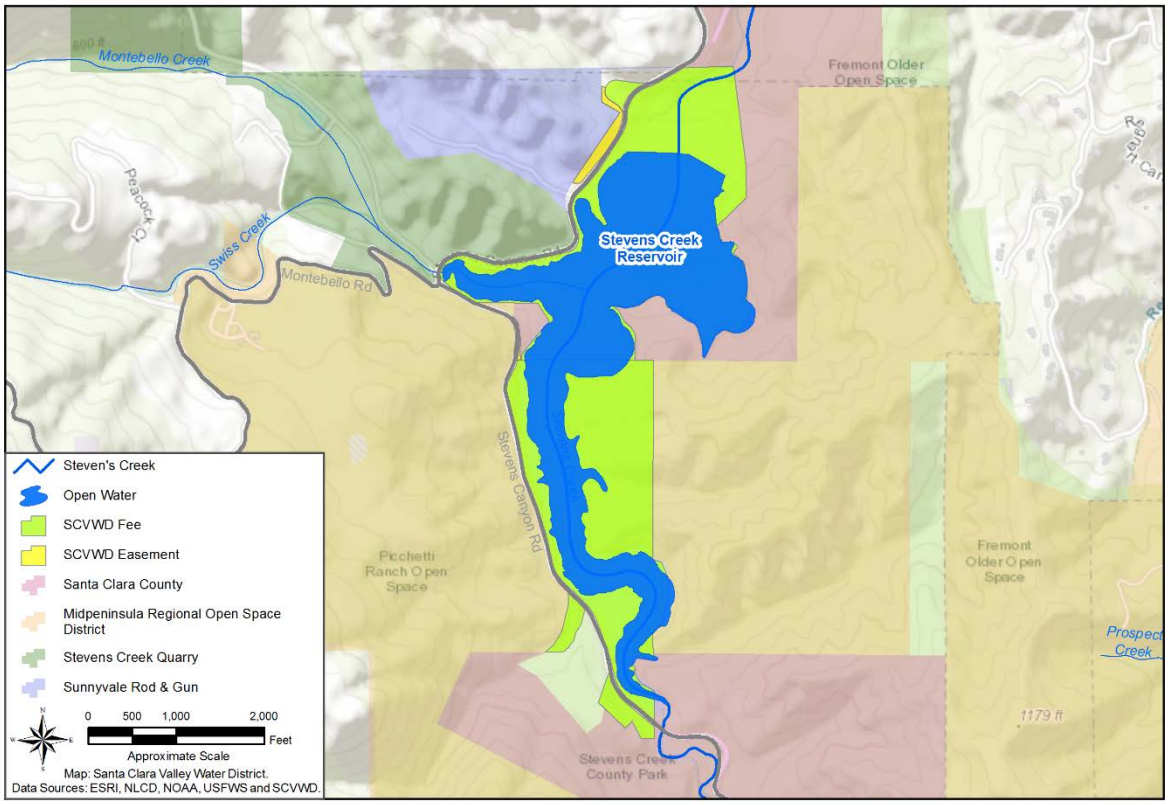


Invasive Vegetation Removal and Native Vegetation Planting

From Hwy 280 to the reservoir the SCVWD has mapped invasive vegetation on all SCVWD fee and easement property, this includes 40 different species such as Peruvian pepper tree, Walnut, Periwinkle, Poison hemlock, Tree of heaven, Cotoneaster, Cape ivy, Fennel, English ivy, Privet, Himalayan blackberry, Italian buckthorn, Olive, Palm, Giant reed, Holly oak, and Weeping willow.

On properties not owned by the SCVWD, little information is available about the presence or type of invasive vegetation in this reach. According to AIS, native plant species in this reach include coast live oak, California sycamore, valley oak (*Quercus lobata*), red willow, white alder (*Alnus rhombifolia*), box elder (*Acer negundo*), and coyote brush. Nonnative trees including eucalyptus and walnut (*Juglans* sp.) and ruderal, nonnative grasses (Aerial Information Systems). Despite these data gaps, invasive removal in this project reach is designated as high-priority because it would help prevent invasive propagation to downstream portions of the creek. Project needs in this section for the creek include the following:

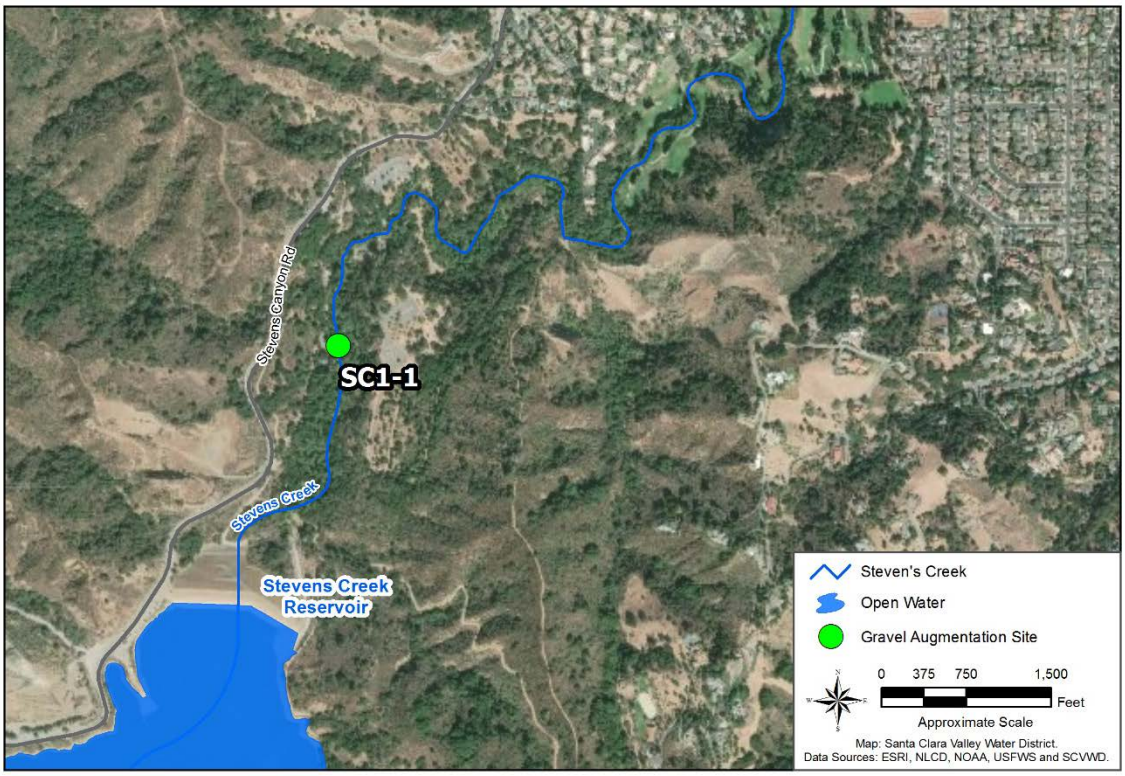
1. Invasive Plant Removal at Stevens Creek Reservoir: Additional mapping of invasive nonnative plants is needed to determine if removal is needed (see map below).
2. Vegetation Mapping: See summary included in Baylands to Moffett Section above.
3. Large-Stature Tree Mapping: See summary included in Moffett to HWY280 Section above.



Gravel Augmentation and Large Woody Debris Installation

The Fish Functions and Values Analysis identifies the stretch of Stevens Creek from Highway 280 to Stevens Creek Reservoir as cold-water habitat for steelhead, making downstream habitat a corridor for migratory anadromous fish. This reach has potential for habitat restoration using gravels and LWD, due to the large amount of creek adjacent to public parks and golf courses, if landowners are engaged and

supportive of such opportunities. Stevens Creek 1-1: This site, identified by the Study of Santa Clara County Steelhead Streams to Identify Priority Locations for Gravel Augmentation and Large Woody Debris (LWD) Placement is in Stevens Creek County Park, upstream of the Bay Tree Picnic area (see map below). A gravel injection site is proposed on the right bank of the creek and it is suggested that LWD be installed on the opposite bank downstream. More information on this project can be obtained from the published plan (Balance Hydrologics, EOA, Helix Environmental Planning, 2018).



Fish Barrier Removal

The SCVWD is working on the Stevens Creek Fish Passage Barrier Prioritization study, which is evaluating all potential fish passage barriers downstream of Stevens Creek Reservoir, including the following in this reach:

1. Chute at Hwy 280 Bridge Crossing
2. Rock Piles (3) at Creston Dr.
3. Diversion Structure at Blackberry Farms
4. Drop Structure at Linda Vista Park
5. Gauging Weir (SF44) at Stevens Creek Park

As in the downstream reaches, these are partial fish barriers since steelhead have been documented spawning upstream.

Water Quality Improvements

Project needs in this reach include the following:

1. Identify and reduce the sources of turbidity discharging downstream of Stevens Creek Reservoir.
2. Identify and reduce sources of diazinon.
3. Creek monitoring: There is a need for monitoring for specific water quality indicators, such as dissolved oxygen, conductivity, turbidity, and temperature consistently along the creek, and documentation of potential contributing issues in the area.
4. Outreach program and volunteer clean-ups for trash: Trash is a widespread problem along creeks in Santa Clara County. Public Outreach or volunteer programs and campaigns that focus on reducing sources of trash entering the creek would be helpful.

Geomorphic functions

Very little data is recorded in this section of the creek about current erosion status of the creek banks. In addition to gravel and LWD augmentation projects, the following activities are recommended for this reach of the creek:

Encourage creek stewardship in and adjacent to golf courses along the creek, where stream restoration and enhancements have not already been completed.

4.4 Stevens Creek Reservoir to Headwaters

This stretch of Stevens Creek, Stevens Creek Reservoir to its headwaters in the Santa Cruz mountains, is not included in this SCPP. This upper watershed area will be included in the future One Water Plan - Lower Peninsula Watershed report, wherein the watershed-scale will be considered and potential projects away from the creek corridor may be prioritized in addition to aquatic and riparian areas.

4.5 Conclusion

This first Stream Corridor Priority Plan under the SCVWD's Safe Clean Water Program establishes priorities for three separate reaches of Stevens Creek, from the Bay to Stevens Creek Reservoir. Because additional studies are under way for fisheries and gravel augmentation/large woody debris, recommendations are general in some respects. Field verification is needed for invasive vegetation on non-SCVWD property, and further monitoring would be of great value for water quality. Priorities, therefore, are intended to provide information on what types of activities would provide an overall benefit to the creek corridor for each of the seven Stream Corridor Priority Plan elements. The Plan may be updated over time as studies are completed and new information is available.

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