LOWER SILVER CREEK WATERSHED PROJECT

UPDATED

MITIGATION AND MONITORING PROGRAM

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Summary

This updated Mitigation and Monitoring Program (MMP) addresses changes to the 1999 MMP prepared by the NRCS and is required by the 2001 Lower Silver Creek Plan Modifications. The updated MMP focuses on the creation of on-site jurisdictional waters and wetlands and on upland plantings. The goal of this MMP is to provide adequate compensation for project impact within the US Army Corps of Engineers jurisdictional waters and wetlands and to about 2 acres of upland trees and shrubs. All mitigation areas will be created on the project site as an integral part of the project design.

A main feature of the MMP is the creation of a minimum of 12 acres of jurisdictional waters (including wetlands) that will develop within a "sediment transport channel" sized to mobilize and transport sediment at an ecologically relevant frequency. It is the relatively frequent occurrence of erosion and deposition during storm events that will shape and reshape the area and over time lead to a channel in dynamic equilibrium that provides open water, floodplain and wetland habitat.

Other elements of this MMP are:

- Approximately 6 acres of upland habitat along the length of the project to add foraging habitat, nesting sites, cover and perches for wildlife and connect with the patches of vegetation existing upstream (at Lake Cunningham) and downstream (Coyote Creek).
- Revegetating the channel invert and slopes with desirable native species to provide erosion and weed control.

Also described in the MMP is the creation of approximately five acres of riparian and shaded riverine aquatic habitat (SRA) habitat mainly to provide shading to the base-flow channel and improve wildlife habitat conditions. The riparian/SRA habitat is an integral part of the Lower Silver Creek Watershed project. Because it is not associated with any project impact, it is not proposed as mitigation for this project but would be considered as an enhancement per the District's Policy.E1.

1. Background and Purpose of this Update

In February 1999, the Natural Resource Conservation Service (NRCS) submitted a Mitigation and Monitoring Program (MMP) for supporting the Lower Silver Creek Watershed Project individual permit application pursuant to section 404 of the Clean Water Act. Constraints identified during the detail design as well as suggestions made during coordination with the Regional Water Quality Control Board, pursuant to the section 401 Water Quality Certification have prompted the Santa Clara Water District (District) to make revisions to the design proposed in the 1999 application (known as the 1998 Plan Update). The project modifications required that the February 1999 Mitigation and Monitoring Program be updated.

This MMP addresses two specifically different requirements of the Project. The first requirement is of a regulatory nature and is to provide adequate compensation for the disposal of fill in waters of the US (per section 404 of the Clean Water Act) and associated wetlands, as well as, for the temporary loss of upland trees and shrubs along the creek (per section 1600 of the California Fish and Game Code). The second requirement is not required by environmental regulations, but is related to District Ends Policy E-1, that states that mitigation, enhancements, or restorations are implemented when determined appropriate by the District's Board. Therefore, the MMP includes additional environmental enhancement and created riparian habitat areas that are an integral part of this project and were approved by the District Board of Directors on December 19, 2000.

2. Project Description

A. Location

Lower Silver Creek, a 4.58-mile tributary of Coyote Creek, is located in the eastern portion of the City of San Jose and the adjacent unincorporated area of Santa Clara County (Figure 1 – Location Map).

B. Summary of Overall Project

A large portion of the Lower Silver Creek project area is urbanized and includes residential, commercial and industrial development. The current channel is man-made and has many bank stabilization and flood control features. It was constructed in the early 1950's as a means to reclaim wetland areas for agriculture around what is presently Lake Cunningham. Over the last 18 years, the Lower Silver Creek Watershed project underwent a number of changes as summarized below.

1983 Recommended Plan

In 1983, a watershed plan was prepared under the authority of the Watershed Protection and Flood Prevention Act. The lead federal agency was the NRCS (at that time known as the Soil Conservation Service), and participating local agencies were the District and Guadalupe Coyote Resource Conservation District. This plan is referred to as the 1983 Recommended Plan.

The project envisioned in the 1983 Recommended Plan consisted of approximately five miles of channel modifications, including approximately 0.9 miles of excavated earthen channel and over three miles of newly constructed or retrofitted concrete-lined channel.

In March 1991, the application for a U.S. Army Corps of Engineers (Corps) permit was withdrawn because of concerns expressed regarding the amount of concrete hardscape included in the project plan. Subsequently, the 1983 Recommended Plan was modified by taking into account environmental concerns from federal, state, and local resource and regulatory agencies, as well as, those of environmental groups.

1998 Plan Update

The 1983 Recommended Plan was subsequently modified by the 1998 Plan Update. The purposes and objectives of the 1998 Plan Update were the same as for the 1983 Recommended Plan, but incorporated the following mitigation measures and enhancements.

- Increase the amount of riparian and/or upland habitat along the sides of and in the Lower Silver Creek channel while continuing to provide the same level of flood protection;
- Make the channel potentially more attractive to fish by including a defined low-flow channel for all new channel work (does not include retrofitting existing structures that will not be modified), and the aforementioned riparian habitat potentially cooling the water;
- Improve the channel's visual appearance (i.e., reducing the amount of concrete channel);
- Reduce the amount of concrete channel compared to the 1983 Recommended Plan;
- Enhance the value of wetland vegetation.

Figure 1:
Location Map

2001 Plan Modifications

The 2001 Plan Modifications include changes to the general cross-sections as well as additional environmental enhancements. A complete description of the 2001 Plan Modifications is provided in the [draft] Addendum to the Initial Study/Negative Declaration and Environmental Assessment/Finding of No-Significant Impact (SCVWD 2001).

Cross-section Changes

As part of the 2001 Plan Modifications, the cross-sections along most of the creek would be altered by moving the maintenance road above the channel invert, thereby allowing for the construction of a sediment transport channel and the creation of a naturally formed base-flow channel in all earthen bottom channel sections. These modifications are described below and illustrated for each reach and sub-reach in typical cross sections provided under Attachment 1.

Maintenance Road. The 1998 Plan Update would be modified to construct the creek maintenance road above the channel invert rather than in the bottom of the channel. Removing the maintenance road from the channel bottom allows for the construction of the sediment transport channel.

Sediment Transport Channel. The 1998 Plan Update (NRCS 1998) included a "low-flow" channel throughout the length of the project and a maintenance road directly adjacent to the low-flow channel to provide stability and access for in-stream maintenance activities. During the design review process, these elements raised concerns about the susceptibility of the low-flow channel to excessive sedimentation and the stability of the maintenance road during storm events. A concern was also expressed over the absence of an effective means of transporting sediment downstream and the subsequent requirement for frequent sediment removal activities.

The design review led to the development of an alternative approach to the 1998 Plan Update low-flow channel design. The rationale for proceeding with this alternative approach was that it satisfied the same general objectives that the original design while incorporating a sediment transport channel sized to mobilize and transport sediment and a base-flow channel sized and formed by natural fluvial processes. Given the dynamic nature of Lower Silver Creek and the variability of the factors affecting the creek, it was decided that a design that takes advantage of fluvial processes to achieve ecological restoration would be more effective than a design that relies on structural means and regular maintenance.

The sediment transport channel and naturally formed base-flow channel approach actually depends on the natural processes of erosion, deposition, and sediment transport. In this regard, the short-term success of the proposed design is probably less predictable than that of the 1998 Plan Update. However, long-term success is much more likely for this process-based approach as the habitat that develops will be appropriately sized and distributed in Lower Silver Creek by the natural processes in the channel.

The sediment transport channel will be designed so that sediment will be mobilized during flow events with return intervals that are ecologically relevant (i.e. occur frequently enough to maintain habitat diversity and complexity). It is the relatively frequent occurrence of erosion and deposition during storm events that will shape and reshape the area during inundated and base flow conditions and over time lead to a channel in dynamic equilibrium that provides open water and wetland habitat. Large storm events will flow out of the sediment transport channel. This will dissipate the energy associated with these higher flows and help maintain a more appropriately sized open-water habitat area within the base-flow channel.

As shown in the attached cross-sections, the proposed design will be implemented in varying degrees to accommodate the range of right of way availability in each project sub-reach. It should be noted that the this design approach will be the most effective in areas with relatively wide right of way because a larger in-channel "floodplain" will allow more of the energy associated with high flows to be dissipated.

The sediment transport channel concept will be applied to all earth-lined sub-reaches. In concrete-lined sections (Reaches 2, 3b, 4a) a fixed low-flow channel will be designed to connect with the sediment transport channel so that base flows are uninterrupted. Where feasible, this concrete low-flow channel will be designed to optimize sediment transport in concrete-lined sections, However, the base flow will be interrupted as it runs into some concrete box culverts (i.e. King and McKee intersection, I-680, Story Road) or over concrete slabs (i.e. US-101). At these crossings, waters are expected to flow over the concrete surface and flow back into the sediment transport channel at the downstream end. Box culverts at Sunset Avenue, Alum Rock Boulevard, Jackson Drive and Capitol Expressway will be retrofitted during project construction to allow for continuity of base flows.

C. Responsible Party

The responsible party for this Mitigation Program is the Santa Clara Valley Water District, represented by Mr. Marc Klemencic, Assistant Operating Officer of the Coyote & Uvas/Llagas Watersheds Office of the District. This unit is located at 5750 Almaden Expressway, San Jose, California, 95118-3686.

Questions regarding technical aspects for this MMP should be directed to René Langis Ph.D., biologist for the Coyote Watershed Program, Santa Clara Valley Water District, 2471 Autumnvale Drive, San Jose, CA 95131, (408) 586-0110.

D. Jurisdictional Areas to be Filled

The project impacts to Corps and California Department of Fish and Game (CDFG) jurisdictional areas result mostly from grading and the reconfiguration of the six channel reaches, not from the placement of fill. A total of 4.7 acres of wetlands and 4.1 acres of open water are within the Corps' jurisdiction (Table 1). The wetlands within the project area occur exclusively inside the banks of Lower Silver Creek. Emergent wetland vegetation and other wetland plants are growing along the low-flow channel and at varied distances upslope. The limit of US Army Corps of Engineers (Corps) jurisdictional waters was determined by direct field observation and an analysis by USDA's Unit Hydrograph Model TR-20 for the @ 2.3 year discharge.

For base map showing Corps verified jurisdictional area(s) see companion report "Identification of Waters of the U.S. Jurisdictional Delineation" prepared by the NRCS (1998).

Table 1:
Corps Jurisdictional and CDFG (California Department of Fish and Game)-Jurisdictional Areas (acres) within Project Footprint [1]

	Area Delineated (ac.)	Area Impacted by Project (ac.)	Proposed Areas (ac.)	Mitigation Replacement Area ratio
CORPS JURISDICTIONAL AREAS				
Wetlands	4.7	4.7	—	
Waters (summer low flow)	4.1	4.1	—	
Total	8.8	8.8	12.7	1.4:1
CDFG JURISDICTIONAL AREAS				
Upland trees and shrubs[2]	2.0[2]	2.0[2]	2.0	1:1
Additional top-of-bank plantings			4.0	(landscaping feature)
Riparian/SRA[3]	0	0	5.0	(enhancement feature per District Policy E-1)
Total	2.0	0	11.0	

[1] From NRCS. 1998. Lower Silver Creek Watershed Project - Identification of Waters of the U.S. Jurisdictional Delineation.

[2] Definition and acreage revised from the 4.1 acres of riparian habitat reported in NRCS (1998) and 4.5 acres reported in 1983 EIR/EIS following field verification by the NRCS for the 1999 MMP.

[3] SRA: Shaded Riverine Aquatic Habitat.

E. Type, Functions and Values of Jurisdictional Areas to be Filled

Based on the jurisdictional wetland delineation, performed in July 1998, 8.8 acres of jurisdictional wetlands and waters of the United States were identified within the project area, 4.7 acres are wetlands and 4.1 are open water habitat (Table 1). The limit of jurisdictional waters was determined to be the elevation of the ordinary high water (OHW) line, calculated as the 2.3-year probability discharge of 1,340 cubic feet per second at the confluence with Coyote Creek and 700 cubic feet per second at Cunningham Avenue. According to the NRCS, numerous factors were used to determine the OHW line. Stream gauge data, flood history and frequency of inundation were analyzed. Field visits were undertaken to observe inundation, saturated soil, sediment deposition, watermarks and erosion. The corresponding elevations were then transposed to base maps. Construction of the Project would directly impact the all 8.8 acres of jurisdictional waters and wetlands surveyed within the right of way. See companion report "*Identification of Waters of the U.S. Jurisdictional Delineation*" prepared by the NRCS (1998).

Jurisdictional wetlands are typical of wetlands located in Santa Clara County channelized streams. Dominant wetland vegetation species reported during the 1998 wetland delineation included native erect emergent vegetation such as cattails (*Typha angustifolia, T. latifolia)* and hardstem bulrush *(Scirpus acutus)*, as well as a mix of non-natives and annuals. The non-native/annual mix is dominated by a variety of weedy, non-native annual and perennial grasses and forbs such as common smartweed (*Polygonum lapathifolium*), dotted smartweed (*Polygonum punctatum*), barnyard grass (*Echinochloa crus-galli*), rabbitfoot grass (*Polypogon monspeliensis*), Italian ryegrass (*Lolium multiflorum*), and cocklebur (*Xanthium strumarium*).

Functions and values of these wetlands are generally limited to water quality improvement and wildlife habitat for native and non-native species. Fish include the native prickly sculpin (*Cottus asper*) and three-spine stickleback (*Gasterosteus aculeatus*), as well as the non-native carp (*Cyprinus carpio*). Birds include great egrets (*Ardea alba*), snowy egrets (*Egretta thula*), mallards (*Anas platyrhynchos*), American coots (*Fulica americana*), and gulls. Typical mammals include red foxes (Vulpes vulpes), raccoons (*Procyon lotor*), and muskrats (*Ondatra zibethicus*). These wetlands do not support any federally or state listed rare or endangered species. No recreational use, besides bird-watching, is known to occur along the project site.

There is no riparian habitat within the project area. The vegetation survey for Lower Silver Creek indicates that 2.0 acres of upland trees, shrubs and other plants are growing within the channel right of way. Because it is mostly man-made, it is doubtful that Lower Silver Creek ever had any quality riparian habitat. There are few trees existing along the creek at Plata Arroyo Park and Mayfair Park. These trees were presumably planted as part of the park landscaping and include a few eucalyptus and sycamores. Other reaches of the creek have scattered ornamentals species planted near apartments.

3. Goal of Mitigation

The goal of the mitigation for the Lower Silver Creek Watershed Project is to replace wetland habitat and upland vegetation affected by flood control construction with higher quality native plantings. The project also will provide erosion and weed control within the channel and banks, as well as, create some additional riparian habitat where appropriate in consistency with the District policy of improving the natural habitat when economically feasible.

The mitigation objectives for this project are:

- Create **12.7 acres** of jurisdictional wetlands and open water habitat within **the sediment transport channel**. Because the sediment transport channel and the naturally formed base-flow channel will be a dynamic element of the overall flood control channel, especially for the first few years after implementation of the project, it is difficult to predict the actual areas of emergent wetlands and open water habitat. The actual configuration of wetlands and open water will depend largely on the hydrology in the watershed after construction and erosion/deposition process, therefore several years might be necessary for the naturally formed base-flow channel to achieve a dynamic equilibrium. The naturally meandering base-flow channel will likely form within the sediment transport channel (which will vary between 20 and 60 feet in width depending on available right of way) following the general model of natural channel formation. Storm flows will erode and excavate bed materials from some locations of the sediment transport channel and deposit them in others and different species of wetland vegetation will colonize these "new surfaces", as they become available. Based on field observations and a recent District study (Rankin 2000), it is expected that emergent wetlands will colonize the appropriate areas of the sediment transport channel as early as one to two years after channel excavation.
- The District maintenance staff will need to control the establishment of woody vegetation (e.g. willows and box elders) in the sediment transport channel to meet the project's tight flood conveyance requirements. Removal of target woody vegetation would be combined with removal of invasive species, such as the giant reed (*Arundo donax)*, which might invade the newly established wetland areas. Removal of target vegetation would follow the methods and Best Management Practices (BMPs) described in the District Stream Maintenance Program (SMP). Target woody vegetation consists of native riparian species such as willows and box elders and non-natives such as eucalyptus. The woody riparian vegetation removed is comprised of seedlings and saplings no greater than 2" in diameter at breast height (at height of 48" dbh) for herbicide application and 6" for hand removal methods. Large stature, mature vegetation is not removed. Herbicide application and hand removal would be generally conducted once every year during the July 1st to October 15 period.

- Mitigate 2.0 acres of upland trees and shrubs to be removed during construction by establishing approximately **2 acres of self-sustaining native upland plantings**. When added to the approximately 4 acres of other top of bank native planting, this would provide a vegetated corridor along most of the length of the project that would add foraging habitat, nesting sites, cover and perches for wildlife as well as connect the ecological patches of riparian vegetation existing at Lake Cunningham and Coyote Creek. Self sustaining upland plantings are located in Reaches 1a, 1d, 3a, 3e, 3f and 6b will require a minimum of three years of irrigation. However in narrow sections, where upland planting areas will be cut-off from the groundwater table by floodwall foundations or gabions, permanent irrigation might be required. Upland plantings are expected to attain full canopy development within 10 to 15 years.
- Provide **erosion and weed control** by revegetating the channel slopes, gabions and floodplain with desirable native species. Prior to final revegetation, a hydroseed mix of grasses and forbs will be applied to the entire project area. However, as described under the first bullet, the sediment transport channel will be revegetated through volunteer wetland species.

  As an added habitat enhancement, per District Policy E-1, the District would also create approximately five acres of shaded riverine aquatic habitat (SRA) and riparian habitat. SRA would be installed in all earth bottom reaches where flood conveyance capacity can accommodate the higher roughness associated with SRA plantings (i.e. Reaches 1, 3, 4, 5 and 6). The SRA will consist of a 5 feet wide bench of willows and cottonwoods located on the south/east [right] bank to optimize shading of the base-flow channel. In earthen channel sections, the SRA will be extended to the top of the bank forming a wider riparian habitat.

  The SRA would shade the base-flow channel to lower heat gain, provide a source of energy input to the creek and provide low cover for wildlife moving along the creek corridor. The total area of SRA formed would be approximately 1.5 acres and the riparian habitat would reach approximately 4 acres. The SRA is expected to have a developed canopy within 5 years and depend on the existing ground water table instead of irrigation. Although not required to mitigate project impacts, the SRA/Riparian habitat would improve overall habitat value.

4. Success Criteria

A. Target Function and Values

In-Channel Corps Jurisdictional Habitat (Wetlands and Open Water)

The created jurisdictional habitat to be created within the active sediment transport channel will provide a highly dynamic system creating open water habitat within a continuous base-flow channel and wetland and emergent wetland habitat adapted to a variable microtopography. Sediment will be mobilized during storms and form sediment bars with sufficient varying elevations to result in an assemblage of emergent and non-emergent wetlands. Because the application of the sediment transport channel concept in a constricted urban setting such as Lower Silver Creek is innovative, success criteria will be linked to its main function, which is to effectively move sediment through the system while providing open water, floodplain and wetland habitat.

Non-native wetland species are diverse and common in Santa Clara County flood control channels and cannot be effectively controlled; therefore, weed control efforts will be concentrated on the more ecologically significant and invasive giant reed.

Final (Year 10) success criteria associated with the created jurisdictional habitat are:

- Open water habitat is provided within the base-flow channel along the entire project length, except under exceptionally prolonged drought conditions;
- Wetland vegetation with a dominance of obligate, facultative wetland or facultative plant species is established according to channel microtopography (except in severe drought years or following catastrophic flood event). These wetlands should establish over most of the channel area.

In addition, the following performance criteria are added to measure trends toward channel stability and establishment of appropriate wetland habitat:

- Channel sedimentation does not cause channel realignments that would jeopardize adjacent and downstream plantings on SRA bench and channel banks;
- Localized erosion or scour does not jeopardize the stability or function of SRA bench, channel banks and floodplain;
- The sediment transport channel will be kept free of significant stands of giant reed.

Upland Trees and Shrubs

- By year 5, all self-sustaining planted stock (trees and shrubs) must have either 70 percent survival or the revegetation sites must have an absolute woody vegetation canopy cover of 30 percent or greater within a specific sub-reach planting site.
- At year 10, the average absolute woody vegetation canopy cover of trees and shrubs must show a steady trend towards 70 percent or greater, and no less than 50 percent absolute woody vegetation canopy cover of trees and shrubs species is to occur at any revegetation site.

Because of some planting areas could be isolated from the groundwater table by floodwall foundations or gabions, permanent irrigation will likely be necessary to meet canopy cover goals are to be reached. In other areas, plants are expected to become self-sustaining three to five years after planting.

SRA and Riparian Habitat

- By year 5, all self-sustaining planted stock (trees and shrubs) must have either 70 percent survival or the revegetation sites must have an absolute woody vegetation canopy cover of 30 percent or greater within a sub-reach planting site.
- At year 10, the average absolute woody vegetation canopy cover of trees and shrubs must show a steady trend towards 70 percent or greater, and no less than 50 percent absolute woody vegetation canopy cover of trees and shrubs species is to occur at any revegetation site.

Dedicated Conveyance Area

Although intended as native grass community, this habitat type will be regularly mowed to maintain design flood conveyance and is not expected to provide any specific wildlife use other than for food and loafing. The primary goal of the revegetation will be to provide erosion control in the higher flow, non-jurisdictional subsection. No mitigation credits are requested for these areas, therefore, no success criteria are proposed.

Vegetated Gabions

The primary goal of the vegetation on gabions is to provide higher aesthetic value and minimize heat reflection, therefore, no mitigation credits are requested from these plantings and no success criteria are proposed.

B. Target Hydrological Regime

Jurisdictional areas, as determined by the Corps' definition of the Ordinary High Water mark, should approximately correspond to the area of the sediment transport channel. The development of hydric soil conditions and establishment of wetland vegetation is dependent on ponding or water saturation. Therefore, the target hydrological regime will follow the Corps 1987 Wetland Delineation Manual definition of seasonal wetland hydrology as conditions that provide inundated or saturated soils for a minimum of 12.5 percent of the growing season (or 45 consecutive days) in most years.

Observations of Lower Silver Creek, conducted in October 2000, showed that water flows in the low-flow channel under dry conditions. Minimal flow measurements of 3 cubic feet per second were made at the upstream end of the project alignment and of 8 cubic feet per second at the confluence with Coyote Creek. To provide functional open water habitat and account for possible drought years, flowing water must be present in the base-flow channel for a minimum of 10 months in most years.

C. Target Jurisdictional Acreages

Target acreages for jurisdictional and non-jurisdictional areas are provided in Table 1.

5. Proposed Mitigation Site

A. Location and Size of Mitigation Area

This project is self-mitigating since mitigation measures (revegetated areas and sediment transport channel) are and integral part of the project. In consequence, the mitigation areas are distributed along the entire project footprint from the confluence with Coyote Creek to Lake Cunningham. Mitigation areas will cover a total area of approximately 24 acres.

B. Ownership Status

The mitigation areas are located within the Santa Clara Valley Water District's right of way except for limited areas of Reach 3 and Reach 6 where permanent easements or right of way would be purchased.

C. Existing Functions and Values of Mitigation Areas

Mitigation will be conducted on the project site. For description of functions and values under existing conditions see Section 2 E, Type, Function and Values of Jurisdictional Areas.

D. Present and Proposed Uses of Mitigation Area

The mitigation area is primarily used for flood control purposes. Under the Project, this area will continue to be used for flood protection but will also provide natural habitat functions as well as aesthetic and recreational values for residents of the east San Jose. Recreational values would however be subordinate to habitat goals as they would be limited to passive activities such as wildlife observation, nature walks, etc., from access areas such as Plata Arroyo Park and Mayfair Park. In addition it is anticipated that outdoor classroom activities would be conducted in creek-adjacent schools (i.e. Mathson Middle School, Ocala Middle School and Rogers Elementary).

E. Present and Proposed Uses of Adjacent Areas

The mitigation sites border residential, commercial, industrial and recreational properties (City Parks). No change in neighboring land uses is anticipated.

6. Implementation Plan

A. Rationale for Expecting Implementation Success

Wetlands and other jurisdictional areas will be established or reestablished within the existing project area under known hydrological and soil conditions. Information collected to this date indicates that conditions are favorable to a successful implementation of the mitigation project if appropriate installation measures are followed.

Hydrology data available at this time shows that hydrological conditions can adequately support the Project mitigation goals. Groundwater elevation is currently adequate to provide wetland hydrology along Lower Silver Creek. In addition, data collected in October 2000 indicates that there is sufficient surface water flowing in the creek during the dry season to maintain open water habitat year-round. Hydrological modeling results indicate that during a 1 percent flood event (100 year event), flow velocities would only be marginally erosive and therefore would be unlikely to cause substantial scour, even during the first few years following construction.

Preliminary engineering studies have shown that soils conditions along specific sections of the project alignment are less than ideal for planting. For example, soils in the lower part of Reach 1 and most of Reach 3 are characterized by dense and poorly drained soils. Dense soils can hamper root penetration resulting in shallow rooting systems. Many riparian species require deep roots to acquire water during dry periods. Without adequate amendments, plantings in this section are likely to exhibit stunted growth and high mortality. To improve planting area conditions, 2 to 4 feet of native topsoil will be removed and replaced with coarse topsoil. In addition, species known to be tolerant of clay soils will be selected for planting. Reach 6 soils have been shown to be ultramafic (i.e. possess severe calcium imbalances, high pH (up to pH 9.1), high magnesium, boron, and sodium). The plantable surfaces of Reach 6 will either require plants that are adapted to ultramafic soils as shown in table 3 or their soils will need to be improved through addition of topsoil, organic matter, and/or gypsum and sulfur as required. Other reaches of the project have acceptable soil conditions.

B. Responsible Party

The Santa Clara Valley Water District, represented by Mr. Marc Klemencic, Assistant Operating Officer of the Coyote & Uvas/Llagas Watersheds Office of the District would be responsible for implementing the mitigation project. Mr. Klemencic's unit is located at 5750 Almaden Expressway, San Jose, California, 95118-3686. He can be reached at (408) 265-2607, extension 2084.

C. Site Preparation

Site Design/Grading Plans

Design plans and grading details will be prepared as part of the final bidding package.

Soil Preparation

Soil preparation details will be prepared as part of the final bidding package.

Irrigation Plans

Detailed irrigation plans will be prepared as part of the final bidding package.

Planting Areas

In-Channel Jurisdictional Habitat (Wetlands and Open Water)

Jurisdictional habitat will be created exclusively within the sediment transport channel (see cross-sections, Attachment 1). Native emergent wetland species, such as those presented in Table 2, are expected to naturally colonize this area as well as locally common non-native species. To maintain the channel's flood capacity woody vegetation will not be allowed to establish in the sediment transport channel.

Upland Plantings

The upland revegetation sites will be planted along the top of the channel banks with a composition of plants species that are typically found between mid slope and top of the bank in the lower reaches of the Lower Silver Creek watershed. Plant species will be combined to form a complex structure including an overstory, midstory and understory canopies, where possible. The overstory will include trees such as valley and coast live oaks. The mid-story canopy would include box elder, buckeye and blue elderberry. Native shrubs such as California rose and Coyote brush will comprise the dominant understory.

In some space-restricted planting areas, where floodwalls are combined with gabions, such as along Reach 3c, 3d, most of reaches 4, 5 and 6, plantings would be limited to native grasses and/or shrubs such as snowberry or coffeeberry (in ultramafic soil areas) and will likely require permanent irrigation.

SRA/Bank Riparian Habitat

SRA and bank riparian habitat, which not offered for mitigation on this project but as an enhancement, will be located between the top of right bank and the toe of the slope. Plant species will be combined to form a complex structure of different canopy layers. Overstory plantings will include, California sycamore, coast live and valley oaks, and Fremont cottonwood. Mid-story layer will include box elders, California buckeyes, blue elderberries and arroyo willows. Mugwort, marsh baccharis, coyote brush, California rose, California blackberry common snowberry, and western asterwill dominate the understory.

The lower section of Bank Riparian Habitat (as well as limited section of gabion-lined reaches) will provide the SRA habitat and will be planted immediately adjacent to the sediment transport channel. The SRA habitat will provide shade and overlying cover to the sediment transport channel and the base-flow channel depending on location of meanders. Typical species will include Fremont cottonwood, willows, mugwort, and creeping wild rye.

Dedicated Conveyance Area

A section of the channel would be dedicated to conveyance and will be maintained to allow only short grasses and forbs through the application of a hydroseed mix including California brome, meadow barley, three-week fescue, and other herbaceous species appropriate to the watershed.

Vegetated Gabions

In sections where right of way constraints do not allow for earth-lined banks, gabions must be used to prevent bank failure. This area will be covered with native grasses and vines.

The conceptual cross-sections (Attachment 1) and the revegetation plans (Attachment 2) illustrate the typical location of each habitat type for each sub-reach. In most reaches, the top of bank tree canopy will be only one tree wide due to the right of way constraints. Wider corridors of trees and shrubs will be planted along reaches 1a, 1d, 3a, 3f and 6b.

The trees and shrubs are planted to shade the base-flow channel to help reduce heat gain between 10:00 AM and 3:00 PM and provide cover for fish. The vegetation would also provide a food source for invertebrates. Native emergent freshwater marsh vegetation is expected to colonize most of the sediment

transport channel, except for deeper areas of the base-flow channel. Trees and shrubs planted on top of banks and on the south bank slope will serve as a corridor for birds and small mammals between Coyote Creek and the upstream reaches through Lake Cunningham Park.

Soil analyses revealed interleaved high clay and coarse loam or sand along portions of several reaches. These soils are most susceptible to compaction by grading equipment. Heavy equipment will be kept away from planting locations where topsoil or soil amendments have been introduced over the graded surface, or where planting wells have been prepared. This is to avoid either compaction or unwanted dispersal of topsoil.

Areas disturbed during site preparation will be seeded with a native seed mix, mulched with straw, or treated with erosion control blankets.

Planting Plans

Plant Procurement

The container stock to be installed will be contract grown. Efforts will be made to collect all propagules, first, from the Lower Silver Creek watershed at sites similar to the mitigation areas and, second, from adjacent drainages within the Diablo Range drainage of Santa Clara County, if sufficient supply of propagules for a particular species is not available. Seeds and cuttings will be collected approximately one year prior to installation to allow sufficient time for plants to grow. Plant collection and growth would be monitored by qualified biologists to ensure that healthy and vigorous plants are installed.

A list of proposed plant species is presented in Table 2. In addition, Table 3 presents a list of species that are adapted to the ultramafic soils (calcium imbalanced, high pH, high magnesium) of Reach 6.

Plant Installation

The size of the plant materials to be used will range from seed, rooted and unrooted cuttings, *treepots (4-inch by 14-inch)*, *deepots (2.5-inch by 6-inch)* and *treeband (2.25-inch by 5-inch)* container stock. Willow fascines, brush layering, joint planting and other soil bioengineering techniques will be used, where appropriate, to stabilize and vegetate earth channel banks. Trees, shrubs and groundcovers will be established along the tops of banks and along the south-side slope down to the sediment transport channel, as directed by the plans. Conceptual planting plans are presented in Attachment 2. Final planting plans, details, specifications, cost estimates and detailed mitigation maintenance and operation plans will be prepared concurrently with the preparation of the phased structural construction drawings.

Plants will be installed in fall or spring following channel excavation. Planting holes will be irrigated before and after planting. Amendments will include the addition of coarse textured soils in Reach 1a. A 3-foot diameter irrigation basin with a 4-inch high lip will be constructed around each plant. The proposed planting density is 450 trees and shrubs per acre, which is an average density for comparable restoration sites given soil and water conditions. Some herbaceous species will be planted at a density of 650 planting basins per acre. Relative amounts of each species will be determined as part of the preparation of plans and specifications.

Irrigation

Plants will be irrigated with a sub-surface system to avoid potential damage by rodents and vandals. Although efforts will be made to promote self-sufficiency within 2 to 3 years, specific structural constraints, such as the presence of floodwall or gabions may dictate the use of permanent irrigation for upland plantings.

Weed Control

Weeds around individual trees and shrubs will be controlled with wood chips or rice straw mulch or weed control fabric. Mulch will be applied so that it does not contact plant stem. Outside of planting basins,

weeds will be controlled by mowing, post emergent herbicide, hand pulling or a combination thereof. Care will be taken to avoid damage to native woody species that may colonize the gap between plantings.

Table 2:
Plant List for Lower Silver Creek

Scientific Name	**Common Name**	**Habitat / Plant Association**
Trees:		
Acer negundo	Box elder	Upland/Riparian: Bank and Top of Bank
Aesculus californica	California buckeye	Upland/Riparian: Bank and Top of Bank
Platanus racemosa	California sycamore	Riparian: Bank
Populus fremontii	Fremont cottonwood	Riparian: Bank and SRA
Quercus agrifolia	Coast live oak	Upland/Riparian: Bank and Top of Bank
Quercus douglasii[1]	Blue oak	Upland/Riparian: Bank and Top of Bank
Quercus lobata	Valley oak	Upland/Riparian: Bank and Top of Bank
Salix exigua	Sandbar willow	Riparian: SRA
Salix laevigata	Red willow	Riparian: SRA
Salix lasiolepis	Arroyo willow	Riparian: SRA
Sambucus mexicana	Blue elderberry	Riparian: Bank and Top of Bank
Umbellularia californica	California bay	Upland/Riparian: Bank and Top of Bank
Shrubs and Vines:		
Artemisia californica[1]	California sagebrush	Upland/Riparian: Bank and Top of Bank
Artemisia douglasiana	Mugwort	Riparian: Bank
Aster chilensis	Western aster	Riparian: Bank
Baccharis douglasii	Marsh baccharis	Riparian: Bank
Baccharis pilularis	Coyote brush	Upland/Riparian: Bank and Top of Bank
Baccharis salicifolius[1]	Mule fat	Upland/Riparian: Bank and Top of Bank
Prunus ilicifolia[1]	Holly-leaf cherry	Upland/Riparian: Bank and Top of Bank
Rosa californica	California rose	Upland/Riparian: Bank and Top of Bank
Rubus ursinus	California blackberry	Riparian: Bank
Symphoricarpos albus var. *laevigatus*	Common snowberry	Riparian: Bank
Symphoricarpos mollis[1]	Creeping snowberry	Upland/Riparian: Bank and Top of Bank

Table 2:
Plant List for Lower Silver Creek (Continued)

Scientific Name	Common Name	Habitat / Plant Association
Grasses and Forbs:		
Bromus carinatus[1]	California brome	Hydroseed Mix
Hordeum brachyantherum[1]	Meadow barley	Hydroseed Mix
Leymus triticoides[1]	Creeping wild rye	Riparian: SRA and Bank
Lupinus succulentus[1]	Arroyo lupine	Hydroseed Mix
Nassella lepida	Foothill needlegrass	Riparian: Bank/Gabions
Nassella pulchra	Purple needlegrass	Riparian: Bank/Gabions
Satureja douglasii[1]	Yerba buena	Riparian: Bank/Gabions
Vulpia microstachys[1]	Three week fescue	Hydroseed Mix
Wetland / Aquatic Species:		
Typha angustifolia[2]	Narrow leaf cattail	Emergent Wetland
Typha latifolia[2]	Broad leaf cattail	Emergent Wetland
Scirpus acutus var. occidentalis[2]	Common tule	Emergent Wetland
Scirpus californicus[1, 2]	California bulrush	Emergent Wetland

[1] Additions to MMP plant list (NRCS 1999)
[2] These species are expected to volunteer

Table 3:
Ultramafic Soil Adapted Species (for Reach 6)

Scientific Name	Common Name	Habitat/Plant Association
Shrubs		
Ceanothus cuneatus	Buckbrush	Riparian: Bank and Top of Bank
Rhamnus californica[3]	Coffeeberry	Riparian: Bank and Top of Bank
Toxicodendron diversilobum[3]	Poison oak	Riparian: Bank and Top of Bank
Grasses and Forbs		
Eschscholtzia californica[3]	California poppy	Riparian: Bank and Top of Bank
Festuca californica[3]	California fescue	Riparian: SRA, Bank and Top of Bank
Wetland/Aquatic Species		
Hordeum brachyantherum[3]	Meadow barley	Seasonal Wetland
Juncus balticus[3]	Baltic rush	Seasonal/Emergent Wetland
Juncus xiphioides[3]	Iris-leaved rush	Emergent Wetland

[1] Species with local or regional preference for ultramafic soil substrates in California according to Kruckeberg (1984).
[2] Serpentine endemic species with the highest fidelity to grow on ultrabasic substrates according to Kruckeberg (1984).
[3] Bodenvag plant species, taxa indifferent to serpentine substrates confirmed by Kruckeberg (1984) and/or Franklin & Dyrness 1973.

Construction Inspection

The Santa Clara Valley Water District or the USDA/NRCS will administer the mitigation contract Service as a District or federal contract. An inspector will monitor the contractor to insure full compliance with the project plans and specifications.

Implementation Schedule

Mitigation contracts will be installed reach by reach directly after the completion of the structural contract for that reach. In some cases, certain components (e.g. irrigation mainlines) will be installed by the structural contractor. Irrigation systems may be installed at any time, while container plants will be installed only during certain fall and spring planting periods. Bio-technical plantings, such as willow matting or willow fascines, would be installed during winter, which is the dormant season for willows.

As-built drawings

The mitigation contractor will be obligated to prepare a set of as-built drawings while construction is in progress. All changes in locations of irrigation system components, plants or other mitigation features or changed site conditions will be illustrated on a final as-built drawing set and turned over to the contracting officer for reference. Drawings will show location and boundaries of all mitigation sites and other planting sites (Riparian/SRA and native landscaping).

Establishment period

The contractor will be retained for a three to five-year establishment period to insure proper function of the irrigation systems and to monitor for possible changed site conditions, plant stress or other emergency. The contractor will be responsible for weed control, irrigation system inspection and maintenance, basin repair, herbivore protection, replanting of any dead or dying plant material and assisting in site assessment and joint inspections.

Long-Term Maintenance

The District is responsible for long-term maintenance activities. Most of the revegetation areas are planned to become self-sustaining systems and are not expected to require maintenance past year 5. However, yearly maintenance of revegetation in the higher flow channel inverts and along the sediment transport channel may be required. The revegetation areas will be inspected yearly to identify any potentially significant problems, such as large dead or downed trees or invasion by non-native species. In addition, thinning of planted stock might be required if plant competition and/or density is shown to be detrimental to site development towards meeting the success criteria.

Long-term maintenance associated with the **sediment transport channel** would include the removal of woody vegetation, occasional sediment removal, and bank protection. Sediment removal would be required although the sediment transport channel is designed optimize sediment transport, uncertainties associated with a mostly impermeable watershed as well as the potential for landslides in the upper watershed. The District would only consider sediment removal if flood conveyance capacity is reduced so that water elevation of a 1- percent flood event would reach half of the freeboard height or if localized sediment deposit threatens the alignment of the sediment transport channel. Further information on the project's maintenance requirements is provided in the *Lower Silver Creek Watershed Project Maintenance Plan*.

The **SRA/Riparian area** (which is not a mitigation site for this project) would only require the minimal maintenance such as removal of large debris items (dead trees, shopping carts, etc.) since the project hydraulic modeling accounted for the roughness of a fully developed SRA/Riparian area on the south [right] bank of the creek. Maintenance would also need to include minimal bank repair following potential failures as described in the companion *Lower Silver Creek Maintenance Plan.*

7. Monitoring Plan

A. Monitoring Methods

The District will monitor the sediment transport channel and revegetation sites for the ten years following completion of each phase of the project. All revegetation monitoring activities will be conducted by or under the supervision of a qualified biologist while physical processes related to the sediment transport channel will be supervised by an engineer/geomorphologist. Monitoring procedures will be followed to determine overall success of the created in-channel jurisdictional habitat and of the upland plantings. Monitoring transects extending from top-of-bank to top-of-bank will be set up at representative reaches. Permanent photographic stations will be established within and overlooking sections of the project area. Photos will be taken at the same time period in years 1, 2, 3, 5, 7 and 10. Photos will also be taken to document events that could significantly affect the development of the sediment transport channel and the revegetation success such as floods, fire, or vandalism.

Monitoring and reporting would end in Year 10. However, if the final success criteria are not met in Year 10, monitoring will continue on year to year basis until success criteria have been met or an alternative monitoring plan has been prepared and approved by the regulatory agencies (Corps, Regional Water Quality Control Board [RWQCB], and CDFG). Elements to be monitored include:

- Formation of a functional base-flow channel
- Successful development of open water habitat in the sediment transport channel
- Sediment transport/deposition
- Wetland vegetation cover, species composition and wetland indicator status
- Survival and canopy development in upland plantings

Also proposed is a monitoring plan are areas not targeted for mitigation on this project but to provide valuable ecological benefits to the Lower Silver Creek system.

In Channel Corps Jurisdictional Habitat (Wetlands and Open Water)

Because the sediment transport channel process-based design approach will result in a dynamic system, the proposed monitoring and adaptive management program will be critical to the long term success of the project as well as be valuable for design of future similar projects. Therefore channel geometry and vegetation establishment will be monitored for the naturally formed base-flow channel and the sediment transport channel.

Cross-sectional profiles will be measured at permanent monitoring stations in each project reach shortly after construction to assess the magnitude of erosion/deposition of sediment in the sediment transport channel and the development of the base-flow channel. Twenty representative stations will be established, one per sub-reach. Cross-sectional profile measurements (width and depth at each channel stage) would be done in years 1, 2, 3, 5, 7, and 10, as well as dictated by significant "channel-forming" storm events. These cross-sectional measurements will also provide information on the development of the channel's longitudinal profile.

Photo points will also be established at each station to monitor geomorphic patterns and vegetation development. This will provide information that could be used to estimate the roughness in the sediment transport channel and identify areas of overgrowth that could inhibit natural channel forming processes.

The District will install a stage gage and recorder at one of these cross sections (or at a bridge crossing) to collect post project flow information. This would make it possible to determine the magnitude and duration of the flow events that form the base-flow channel.

The development of wetland habitat will be monitored more specifically at the same 20 stations during the summer using methods described in the Corps 1987 Wetland Delineation Manual. Vegetation cover and species diversity will be assessed in years 1, 3, 5, 7 and 10. Wetland hydrology will be determined in years 5 and 10 as part of a formal wetland delineation of the created jurisdictional area. Qualitative or visual observations of hydrology will be made in years 1, 3 and 7. It is anticipated that the wetland portion of the sediment transport channel will meet the vegetation (obligate, facultative wet, or facultative) and hydrology criteria as described in the 1987 Corps Wetland Delineation Manual by the end of the 5-year period.

Upland plantings

As-built landscaping plans will be prepared soon after upland plantings are complete to provide a monitoring baseline at "time = zero." The as-built plans will show all deviations from the planting plans including number of plants installed, planting locations, unplanted areas and any feature not shown on landscape plans.

Plant survivorship will be determined by field counts of at least 10 percent of all planted trees and shrubs. Plantings to be monitored will be randomly selected within each sub-reach. These plants will also be assessed for plant health and vigor and documented by photographs. Plant survivorship will be conducted over the first 5 years or until such time that the growth of plants makes survivorship too difficult to assess. At that time percent cover will become the primary indicator of planting success. Plant survivorship will be recorded by species.

Percent cover will be estimated by the line intercept method (Bonham 1989). Permanent transects will be established (one per distinct monitoring site) to facilitate accurate replication over successive years. At least one transect will be established per sub-reach. Transect location (within sub –reach) will be randomly selected. Photo documentation will be made at each station to monitor quality of canopy development. Tree and shrub cover will be recorded by species.

Bank riparian Habitat (and SRA)

As-built landscaping plans will be prepared soon after upland plantings are complete to provide a monitoring baseline at "time = zero The as-built plans will show all deviations from the planting plans including number of plants installed, planting locations, unplanted areas and any feature not shown on landscape plans.

Plant survivorship will be determined by field counts of at least 10 percent of all planted trees and shrubs. Plantings to be monitored will be randomly selected within each sub-reach. These plants will also be assessed for plant health and vigor and documented by photographs. Plant survivorship will be conducted over the first 5 years or until such time that the growth of plants makes survivorship too difficult to assess. At that time percent cover will become the primary indicator of planting success. Plant survivorship will be recorded by species.

Percent cover will be estimated by the line intercept method (Bonham 1989). Permanent transects will be established to facilitate accurate replication over successive years. At least one transect will be established per sub-reach. Transect location (within sub –reach) will be randomly selected. Photo documentation will be made at each station to monitor quality of canopy development. Tree and shrub cover will be recorded by species.

Dedicated Conveyance Area

No performance criteria and, therefore, no monitoring are proposed.

B. Long-Term Monitoring

A long-term monitoring program of the revegetation sites was proposed under the 1999 MMP for the life of the project (100 years). Although not a regulatory requirement, long-term monitoring would also be conducted under this updated MMP but would focus on the main project elements. The goal of long-term monitoring is to allow the District, the NRCS and the GCRCD to assess the general condition of the project site and determine the need for additional management.

Monitoring would focus on the stability of the sediment transport channel and the conditions of planted vegetation. Sediment transport channel assessment would include the identification of zones of erosion, incision and sedimentation that could cause channel realignment and threaten the integrity of adjacent or downstream channel/bank stabilization. This assessment would be conducted on a yearly basis and coordinated with regular maintenance inspections.

The condition of all mitigation revegetation sites would be assessed every two to five years mainly to identify sick and dead trees and monitor invasive weeds.

C. Reports

Reports of monitoring results will be submitted following each monitoring event, in years 1, 2, 3, 5, 7 and 10. Any deficiencies will be noted and a remedial plan will be prepared for agency review and approval if project fails to meet success criteria in years 5 and 10 for upland planting areas and year 10 for in-channel Corps jurisdictional habitat mitigation area. The reports will include the names of monitoring personnel, a copy of the Corps permit and 1601 Streambed Alteration Agreement and special conditions and modifications, analysis of monitoring data, photographs for all specified photopoints, maps or plans of monitoring areas and copies of field data sheets.

Mitigation and monitoring reports for Lower Silver Creek mitigation will be prepared between May and October of each year for years 1-3, 5 and 7 with a final report in year 10. Special reports will be prepared for any unforeseen occurrence or for any repair or replacement necessary to bring the mitigation areas to targeted success criteria.

D. Completion of Monitoring Period and Final Report

When the initial monitoring period is complete and after it is demonstrated that the final success criteria have been met, the sponsor will submit a final report and new jurisdictional delineation to the Corps for approval. A site visit to be attended by the Corps, the RWQCB, CDFG and the project sponsors will then be arranged.

8. Contingency Measures

The District is responsible for insuring the integrity and success of the mitigation areas. If success criteria are not met at the end of the 10-year monitoring program, monitoring will be prolonged and remedial actions will be taken with appropriate coordination with permitting agencies. The frequency of monitoring activities will allow the District to identify and correct problems early enough to avoid major failures and increase probability of meeting mitigation goals. Problems and discrepancies from mitigation objectives and applied corrective measures will be documented in the scheduled monitoring reports. It is understood that only the project element associated with the corrective or remedial action would be object of any extension of the monitoring period.

A. Remedial Action

If scheduled monitoring indicate that the year 5 and 10 success criteria for the upland planting area and/or the year 10 success criteria for the in-channel Corps jurisdictional habitat will not be met, a remedial action plan will be prepared and submitted to the Corps, RWQCB and CDFG for approval. The action plan will include a review of the monitoring data, study of possible contributing factors, and description of remedial action. Alternative mitigation sites are not considered at this time since the Lower Silver Creek project site is deemed suitable for habitat revegetation under the proposed implementation plan. Planning of alternative sites or the rearrangement of project revegetation sites will be initiated if it becomes apparent that the final success criteria will not be reached in a foreseeable future.

Depending on the severity of the problem, remedial actions addressing channel configuration could involve the stabilization of the creek banks, addition of rock material to control incision, or removal of sediment, all these are considered to be part of routine maintenance activities. The sediment transport channel is designed to maximize sediment transport, however uncertainties associated with a mostly impermeable watershed as well as the potential for landslides in the upper watershed do not completely eliminate the need for sediment removal. The District would only consider sediment removal if flood conveyance capacity is reduced below the 1-percent flood conveyance design criteria or if localized sediment deposit threatens the alignment of the sediment transport channel.

If remedial action is required, the monitoring schedule will be reset to year zero and would only apply to the mitigation element that is subject to a remedial action. This new monitoring plan would be submitted to the to regulatory agency for approval.

B. Responsible Party.

The responsible party for contingency action is the Santa Clara Valley Water District, represented by Mr. Marc Klemencic, the Assistant Operating Officer of the Coyote & Uvas/Llagas Watersheds Unit of the District. This unit is located at 5750 Almaden Expressway, San Jose, California, 95118-3686.

C. Funding Mechanism

Any required contingency actions will be funded by the same mechanism used to fund the mitigation. This funding consists of existing revenues form property tax allocation and flood control benefit assessments, and debt financing by way of certificates of participation or other borrowing mechanisms.

Attachment 1: Typical Cross-Sections for Reaches 1 through 6

Attachment 2: Conceptual Revegetation Plansfor Reaches 1 through 6