# Tally Ho Creek Planning Project

TECHNICAL MEMORANDUM

*prepared for*

Coastal San Luis Resource Conservation District

*prepared by*

WATERWAYS CONSULTING, INC.

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*To:* Julie Thomas, Coastal San Luis Resource Conservation District

*From:* Waterways Consulting

*Date:* May 5, 2010

*Re:* Tally Ho Creek Planning Project

## Introduction

Waterways Consulting, Inc. (Waterways) has been retained by the Coastal San Luis Resource Conservation District (CSLRCD) to assess channel and habitat conditions within the mainstem of Tally Ho Creek and evaluate opportunities to enhance stream function and improve flood protection for streamside residents. Tally Ho Creek has been significantly impacted by past channel modifications, development within the floodplain, hydromodification of the watershed, and an increase in sediment supply to the channel. These impacts have directly affected streamside landowners and reduced the functional value of aquatic and riparian habitat.

The purpose of this technical memorandum is to summarize work conducted by Waterways to identify opportunities to reduce localized flood risks on Tally Ho Creek and enhance environmental conditions. The memorandum also identifies the regulatory constraints associated with the recommended project actions and identifies the steps that should be taken to implement a preferred project alternative.

## Problem Statement / Objectives

Tally Ho Creek is a key tributary to the lower portion of Arroyo Grande Creek (Figure 1). Land use within the 4.7 square mile watershed is predominately open space and residential development consisting of low and low-medium density single family residences. Private homes lie adjacent to the creek for nearly the entire length of the study area. The morphology of the watershed is characterized by a broad, low gradient valley along the mainstem of Tally Ho Creek and steep, short, tributary valleys. Geologically, much of the watershed is underlain by recently uplifted marine and coastal dune deposits, resulting in sandy soils that are highly prone to erosion when disturbed.

The project study area encompasses an approximately 1 mile segment of Tally Ho Creek, extending from the Clark property just upstream of Corbett Canyon Road (State Route 227) to East Branch Street near the Tally Ho Creek-Arroyo Grande Creek confluence (Figure 2). The study area is entirely within the City of Arroyo Grande, which is located in the southern portion of San Luis Obispo County, California. The portion of Tally Ho Creek that occurs in the study area is a low to moderate gradient (~1 % slope) intermittent stream with isolated perennial pools.

Historically, the project area consisted of a broad, relatively flat valley that was dominated by a dense understory of willows with a mixed overstory of common riparian species such as willow, sycamore, cottonwood, and potentially alder. Riparian vegetation occupied a corridor that was a few hundred feet wide in some places and consisted of a mosaic of primary and secondary channels and off-channel

wetlands. The footprint of the FEMA 100-year floodplain is probably a good indicator of the extent of the historic valley bottom and riparian corridor (Figure 3). This broad floodplain was historically supported by a combination of the low valley gradient, high sediment load dominated by sand, and dense riparian vegetation.

Channel and riparian conditions in the project area look much different today than they did several hundred years ago. Pressure to utilize flat valley bottoms for agriculture and, later, suburban development, resulted in removal of much of the riparian vegetation, filling of wetlands, road building, and straightening and deepening of Tally Ho Creek. Cleared portions of the valley bottom now consist of single family homes and Tally Ho Road, and Tally Ho Creek has been confined to the eastern edge of the valley floor.

To maintain Tally Ho Creek in its altered condition, vegetation and sediment were periodically removed. This type of management has been more difficult to obtain approval for due to increased concerns from regulatory agencies regarding the impact of such actions and the need to protect species listed under the Endangered Species Act (ESA). Because the low gradient valley condition has not changed and sediment inputs to the valley floor have likely increased, the increased density of vegetation has resulted in sediment accumulation on the valley floor that has increased the risk of flooding to homes adjacent to the creek. In fact, for some landowners, the risk of flooding has increased to the point where it is an annual occurrence.

In response to the increased risk, the City of Arroyo Grande has contracted with Waterways, the CSLRCD, and Central Coast Salmon Enhancement (CCSE) to identify, via topographic data collection, hydrologic and hydraulic modeling, and an exploration of potential engineering opportunities, a solution that will reduce flooding risks to landowners within a framework that emphasizes enhancements to the ecological value of Tally Ho Creek.

## Site Evaluation and Existing Conditions

### *Reconnaissance Assessment*

A reconnaissance-level assessment of the project area was conducted in the summer of 2009 to evaluate channel and floodplain conditions, delineate geomorphic reaches, map features in the immediate channel or floodplain such as fences or structures, and identify opportunities and constraints associated with ecological enhancement or flood protection.

The reconnaissance-level assessment identified six distinct reaches in the project area (Figure 2). Reaches were based on channel and floodplain morphology, degree of channel entrenchment, and locations of existing infrastructure, such as bridges. A brief description of each reach is as follows:

- **Reach 1:** This reach extends from the confluence of Arroyo Grande Creek to the East Branch Street culverts. This reach is not within our study area.
- **Reach 2:** This reach extends from the East Branch Street culverts to a bedrock control. This is an incised portion of Tally Ho Creek. Incision was most likely a result of incision along the mainstem of Arroyo Grande Creek that propagated up Tally Ho Creek. Further incision is controlled by the East Branch Street culverts and the presence of bedrock at depth. Risks to adjacent landowners are low due to the incised nature of the channel.

- **Reach 3:** This reach extends from the bedrock control upstream to the James/Canyon Way outfall. This reach is moderately incised and is characterized by a series of headcuts and heavy confinement of the channel from adjacent landowners. The riparian corridor is also very narrow through this reach. Flood risks are moderate due to the incision.
- **Reach 4:** This reach extends from the James/Canyon Way outfall to the downstream end of a large terrace fill on the east bank. This reach is characterized by a relatively narrow channel and riparian corridor and is the reach posing the highest risk of flooding to adjacent landowners.
- **Reach 5:** This reach extends east from along the large terrace fill upstream to the Printz Road Bridge. The channel is relatively broad and densely vegetated. Flood risk is low to moderate.
- **Reach 6:** This reach includes the Clark Property. The channel is relatively broad with a mature riparian canopy. The remaining floodplain consists primarily of pasture land. Sediment has accumulated under the Printz Road Bridge.

## *Hydrology*

Hydrology for the project area was developed using regional regression equations developed by the United States Army Corps of Engineers (USACE, 1999). The equations were developed to simulate peak flow run-off values for Arroyo Grande Creek, San Luis Obispo Creek, and Santa Rosa Creek. Variables used in the equations include drainage area (DA), mean annual rainfall (MR), length of time of concentration ($L_{tc}$), and length of "blue line" streams ($L_{bl}$). The regional regression equation is shown below with coefficients for each flow presented in Table 1:

$$\text{Log}_{10}\, Q = \text{“A”} \times \text{Log}_{10}\, DA + \text{“B”} \times \text{Log}_{10}\, (DA \times MR) + \text{“C”} \times \text{Log}_{10}\, L_{tc} + \text{“D”} \times \text{Log}_{10}\, L_{bl} - \text{“E”}$$

**Table 1. Regression Equation Coefficients**

| | Coefficients | | | | |
|---|---|---|---|---|---|
| N-year Flood | “A” | “B” | “C” | “D” | “E” |
| 2 | -2.699 | 3.830 | 0.422 | -0.197 | -4.106 |
| 5 | -1.894 | 2.864 | 0.755 | -0.316 | -2.189 |
| 10 | -1.450 | 2.369 | 0.878 | -0.403 | -1.166 |
| 20 | -1.067 | 1.966 | 0.955 | -0.489 | -0.315 |
| 50 | -0.622 | 1.516 | 1.021 | -0.601 | 0.652 |
| 100 | -0.315 | 1.220 | 1.051 | -0.684 | 1.300 |

Drainage area (DA) was obtained from the USGS Arroyo Grande quad map. Plate 3 of the USACE report was referenced to determine mean annual rainfall (MR) at the site. Length of concentration ($L_{tc}$) was measured as the distance water would travel from the hydraulically most remote point of the drainage area to the point of interest. Length of "blue line" streams ($L_{bl}$) was compiled by summing the length of all "blue line" streams on the USGS quad map within the drainage area.

Flows were calculated for two locations along the study reach, the confluence with Poorman Creek and the confluence with Arroyo Grande Creek. The flows calculated at Poorman Creek were used for Reaches 4-6 and the flows calculated at Arroyo Grande Creek were used for Reaches 1-3. Table 2 shows

a comparison of the calculated USACE regression flows to values reported by FEMA and values calculated using the USGS South Coast Regression equations.

**Table 2. Modeled flows in the project area by various methods**

| Reach | Return Period | Modeling Method | | |
|---|---|---|---|---|
| | | USACE Regression[1] | FEMA | USGS South Coast Regression |
| | | (cfs) | | |
| 1-3 | 2-yr | **35** | - | 46 |
| | 5-yr | **173** | - | 173 |
| | 10-yr | **398** | 580 | 334 |
| | 20-yr | **788** | - | - |
| | 50-yr | **1689** | 1800 | 1111 |
| | 100-yr | **2810** | 2600 | 1554 |
| 4-6 | 2-yr | **29** | - | 42 |
| | 5-yr | **138** | - | 157 |
| | 10-yr | **316** | 500 | 303 |
| | 20-yr | **623** | - | - |
| | 50-yr | **1333** | 1600 | 1006 |
| | 100-yr | **2216** | 2300 | 1405 |

[1]Method used for assessment

The USACE regression equations were used because they provided estimates of discharge for the more frequent events such as the 2-year, 5-year, and 10-year and were developed from regional gage data and therefore determined to be more accurate than the regressions developed for the entire South Coast region. In addition, the USGS regression equations more closely mirror the discharges used by FEMA for less frequent events such as the 50-year and 100-year.

## *Hydraulics*

Hydraulic modeling for the project reach was conducted using HEC-RAS Version 4.0 software developed by the USACE. The model spans an approximately 1 mile long reach of Tally Ho Creek (Corbett Creek) between Carpenter Creek and the confluence with Arroyo Grande Creek. Topographic data for Tally Ho Creek and the surrounding floodplain was obtained from multiple sources. In total, forty-one (41) cross-sections were used in the model (Figure 4). Eighteen (18) cross-sections, located at areas of hydraulic control, were surveyed between Highway 227 and Branch Street by Waterways in September, 2009. The cross-section survey data, in the vicinity of station 18+00, was supplemented by a topographic survey completed in November 2007 by Swanson Hydrology and Geomorphology (SH+G). Between station 40+80 and 53+00, fourteen (14) cross-sections were generated from a topographic survey of the Clark property, also conducted by SH+G in November 2007. Bridge data for the Highway 227 crossing was obtained from this SH+G survey. Downstream of station 6+00, nine (9) cross-sections were integrated from the hydraulic model and topographic data provided by North Coast Engineering (NCE). Dimensions for the culvert located at Branch Street were obtained from the data provided by NCE.

Manning's "n" values for the project site were chosen based on field-based observations and aerial photographs of the channel and adjacent floodplains. Roughness values were set between 0.03-0.06 for the channel and between 0.03-0.2 for the stream banks and floodplains (McCuen, 2004). Existing structures located on the floodplains were modeled as blocked obstructions. Fences were modeled as permanent ineffective flow areas to an elevation equal to the top of the fence. Expansion/Contraction coefficients for most cross sections were set to 0.1/0.3. To account for energy losses due to geometric variations in the channel, the coefficients were increased to 0.3/0.5 adjacent to bridges and culverts. The downstream boundary condition was set using the normal depth method. A value of 0.01 was used for the boundary condition, corresponding to the energy grade line at the downstream limit of the model. The HEC-RAS model used a subcritical flow regime to calculate water surface profiles for the project site. Subcritical analysis calculated conservative water surface elevations when there is the potential for supercritical flow.

Results for the existing conditions HEC-RAS model are presented in Figures 5, 6, 7, and 8, for Reaches 2, 3, 4, and 5, respectively. In addition, we have provided the complete output from HEC-RAS in Appendix A. The results suggest that Reach 4 is the area where flood risks are highest with nuisance flooding and threats to infrastructure occurring at around the 5-year event and homes directly affected at around the 10-year event. Flood risks are also substantial in Reach 3 with nuisance flooding occurring between the 5-year and 10-year event and homes and infrastructure being affected just above the 10-year event. Flooding in Reach 2 is limited to flows above the 20-year event and flooding in Reach 5 occurs somewhere between the 50-year and 100-year event.[1]

## *Biotic Conditions*

A general field survey of the study area was conducted on September 5, 2009 by ecologist Kevin Fisher, M.S. of Blue Line Consulting; no species-specific surveys were conducted. The purposes of the survey were to characterize existing biotic habitats, assess the site for the potential to support special status plant and wildlife species, identify potential jurisdictional waters of the U.S, and identify opportunities for habitat enhancement. The survey area encompassed the bed and banks of Tally Ho Creek, extending approximately 100 feet in all directions from the channel.

The dominant vegetation communities in the study area include Marsh (freshwater), Willow Riparian Woodland, Oak Woodland and Non-native Grassland (Table 3). Figure 9 provides a map of the distribution of these communities in the study area.

[1] Flooding in this reach may be more frequent than modeled due to sedimentation under the Printz Road Bridge and a low point in the right bank levee just downstream of the Printz Road Bridge.

| Table 3. Major Vegetation Communities Types within Study Area | | | |
|---|---|---|---|
| **Vegetation Alliance[1]** | **CNDDB Code** | **Plant Association / Community** | **General Location in Study Area** |
| Freshwater Marsh | 52.102.01; 52.105.00 | Bulrush– Cattail Wetland; Duckweed Wetland | Channel |
| Willow Riparian Woodland | 61.201.02 | Red Willow/Arroyo Willow | Streambanks |
| Oak Woodland | 71.060.00; | Coast Live Oak Woodland | High floodplain/terrace |
| Non-native Grassland (includes ruderal/disturbed areas) | 42.000.00 | Wild radish, field mustard, Italian ryegrass | High floodplain/terrace |
| [1]California Department of Fish and Game Vegetation Classification System (CDFG, 2003) | | | |

## Freshwater Marsh

Much of the creek bed is densely vegetated with emergent wetland vegetation. In the upstream portion of the study area (Reach 5) small-fruited bulrush (*Scirpus microcarpus*) forms a dense cover over the streambed. Portions of the streambed that are perennially ponded support duckweed (*Lemma* sp.). Water smartweed (*Polygonum amphibium*), cattail (*Typha latifolia*), California bulrush (*Schoenoplectus* [=*Scirpus*] *californicus*) and umbrella sedge (*Cyperus eragrostis*) are common in and around the margins of the perennial pools.

## Willow Riparian Woodland

There is a narrow corridor of willow riparian woodland along the banks of Tally Ho Creek. This vegetation community is dominated by arroyo willow (*Salix lasiolepis)* and red willow (*S. laevigata*); coast live oak (*Quercus agrifolia*) saplings are scattered in the understory. In the upstream portion of the study area (Reach 5) the willows have been managed for flood protection; there are few willows along the left bank and those on the right bank are relatively young trees. In the downstream reaches (Reaches 1 to 4), mature willow trees form a dense canopy over the creek. In places with an open canopy, kikuyu grass (*Pennisetum clandestinum*) is the dominant herbaceous species in the understory. In areas with a dense willow canopy, blackberry (*Rubus* spp.*)* and poison oak (*Toxicodendron diversilobum*) dominate the understory. Invasive vines such as English ivy (*Hedera helix*), Cape ivy (*Delairea odorata*) and vinca (*Vinca major*) are widespread in the Reaches 1 to 3.

## Oak Woodland

Oak woodland occurs in Reaches 1 through 4 of the study area on the high floodplain and terraces. Coast live oak is the dominant species. The understory is dominated by non-native annual grasses and ruderal vegetation. In the area around the Reach 3/4 transition, some native species have been planted as part of a mitigation project; most of these plants appeared stressed at the time of the survey.

### NON-NATIVE GRASSLAND/DISTURBED

The largest area of non-native grassland in the study area is on the left floodplain/terrace in Reach 5. This area is disturbed and regularly mowed, and consequently provides limited habitat value. No burrows or burrowing animals were observed. Mature Monterey pines (*Pinus radiata*) line the left bank of the creek in Reach 5. There are a few scattered blue gum eucalyptus (*Eucalyptus globulus)* within the non-native grassland near the upstream end of the study reach. The oak wood and non-native grassland areas are bounded by residential development with ornamental landscaping.

### WILDLIFE

The riparian habitat in the study area provides roosting, foraging and nesting habitat for various passerine bird species. Raptors, including several species of hawks, may also forage along the riparian corridor and adjacent grasslands. Some wading and waterbirds such as herons and ducks may forage in and around the creek; a black-crowned night heron (*Nycticorax nycticorax*) was flushed from an undercut bank during the field survey. Amphibians and reptiles that are likely to occur in the study area include California red-legged frog (*Rana draytonii*), tree frog (*Hyella regilla*), bullfrog (*Rana catesbeiana*), western fence lizard (*Sceloporus occidentalis*) and western aquatic garter snake (*Thamnophis couchii*). The Tally Ho Creek corridor likely provides habitat for various small to medium sized mammals such rodents and raccoon (*Procyon lotor*); two blacktailed deer (*Odocoileus hemionus*) were observed bedding in the creek channel in Reach 5.

### SPECIAL STATUS SPECIES

For the purposes of this document, special status species are those that are listed as species of concern, rare, candidate, threatened or endangered by federal, state and non-governmental agencies (i.e., CNPS). Listed species with potential to occur in the study vicinity were identified from the following sources:

- The California Natural Diversity Database (CNDDB) records within a five mile radius of the study area (CNDDB, 2009).
- The U.S. Fish and Wildlife Service (USFWS) species list for San Luis Obispo County

## Special Status Plant Species

Figure 10 shows the location of special status plant occurrences within a five-mile radius of the study area. Special status plant species were evaluated as having: no, low, moderate or high potential to occur in the study area based on habitat descriptions, and the known distribution or range of the species. Plant species that have no or low potential to occur in the study area because suitable habitat is not present or the plants distribution is extremely limited are listed in Appendix B. Most of the plants listed in Appendix B are associated with chaparral habitat, which does not exist in the study area. Most species listed in Appendix B that are associated with woodland and grassland habitats are not likely to occur in study area given the relatively high level of disturbance to existing habitats. Special status plant species that have the moderate or high potential to occur in the study area are listed in Table 4.

**Table 4. Special status plant species with the potential to occur in the study area.**

| Species | Status[1] | Habitat | Potential To Occur Within Study Area |
|---|---|---|---|
| Hoover's bent grass *Agrostis hooveri* | CNPS 1B | Chaparral woodland and foothill grassland | **Moderate**. Potential to occur in Oak Woodland understory and adjacent grasslands. |
| black-flowered figwort *Scrophularia atrata* | CNPS 1B | Closed-cone coniferous forest, chaparral, coastal dunes, coastal scrub, riparian scrub. | **Moderate**. Potential to occur in riparian areas. |
| San Bernardino aster *Symphyotrichum defoliatum* | CNPS 1B | Meadows and seeps, coastal scrub, woodland, mesic areas near ditches and streams | **Moderate**. Potential to occur in Oak Woodland and disturbed areas. |

**[1]KEY TO STATUS**

**CNPS Status:**

**List 1B:** These plants (predominately endemic) are rare through their range and are currently vulnerable or have a high potential for vulnerability due to limited or threatened habitat, few individuals per population, or a limited number of populations. List 1B plants meet the definitions of Section 1901, Chapter 10 of the CDFG Code.
**List 2:** These plants are considered Rare, threatened, or endangered in California, but more common elsewhere.

The species in Table 4 are considered rare by CNPS; none are afforded a federal or state status of protection. Targeted surveys for special status plant species should be conducted when specific restoration/enhancement plans are developed. The surveys should be conducted during appropriate bloom periods and should include the species listed in Table 4. If Oak Woodland or Non-Native Grassland habitats are impacted by project activities, then the floristic surveys should include those species listed in Appendix B that are associated with foothill woodland, foothill grassland or cismontane woodland habitats.

## Special Status Terrestrial and Aquatic Wildlife Species

Figure 11 shows the location of special status terrestrial and aquatic wildlife species occurrences within a five-mile radius of the study area. Special status wildlife species were evaluated as having no, low, moderate or high potential to occur in the study area based on habitat descriptions, the known distribution or range of the species and any known nearby occurrences of the species. Table 5 lists the special-status terrestrial and aquatic wildlife species with moderate and high potential to occur at the study area. Species that are have no or low potential to occur in the study area because of lack of suitable habitat, species range, or other considerations are listed in Appendix B, but are not considered further in this document.

| Table 5. Special status wildlife species with the potential to occur in the study area. | | | |
|---|---|---|---|
| **Species** | **Status[1]** | **Habitat** | **Potential Occurrence On Site** |
| **Amphibians** | | | |
| California red-legged frog *Rana aurora draytonii* | FT, CSC | Creeks, rivers, marshes, estuaries and ponds for foraging and dispersal; still water at least into June for breeding. | ***High**. Suitable breeding habitat likely present.* |
| **Reptiles** | | | |
| Southwestern pond turtle *Emys(=Clemmys) marmorata pallid* | CSC | Creeks and ponds with water of sufficient depth for escape cover, and structure for basking; grasslands or bare areas for nesting. | **Moderate**. Suitable aquatic habitat is present, but basking and nesting habitats are marginal. |
| **Birds** | | | |
| Yellow warbler[1] *Dendroica petechia brewsteri* | CSC | Riparian forests with dense understory vegetation | **Moderate**. Study area provides suitable habitat. |

[1] Key to status:

| | | | | | |
|---|---|---|---|---|---|
| FC | = | Candidate for federal listing | SE | = | State listed as endangered species |
| FE | = | Federally listed as endangered species | ST | = | State listed as threatened species |
| FT | = | Federally listed as threatened species | CSC | = | California species of special concern |

[1]No CNDDB occurrences of the species within a 5 mile radius of the project site; suitable habitat may exist.

### *California Red-legged Frog*

California red-legged frog (CRLF) was federally listed as threatened throughout its California range in 1996 and the USFWS published a final designation of critical habitat for the CRLF in 2006 (USFWS, 1996; USFWS, 2006). There is no designated critical habitat in the study area. The primary constituent elements identified in the critical habitat designation for the CRLF are presence of suitable aquatic breeding habitat; suitable non-breeding aquatic habitat that provides food, cover, and space; suitable upland habitats that provide food and shelter; and suitable habitat between aquatic sites to allow dispersal (USFWS, 2006).

CRLF are closely tied to aquatic habitats, requiring still or slow moving water during the winter breeding period for egg laying and development of larvae. They are known to travel relatively great distances (up to 2 miles) over land to disperse between winter and summer habitats (Bulger, 2003; Fellers and Kleeman, 2007). In general, CRLF adults congregate at breeding ponds in the winter, and then after egg-laying, disperse more widely to foraging areas for the remainder of the year. Some adults may be year round residents at breeding ponds where conditions are favorable; some juveniles and sub-adults may disperse from their natal pond to other nearby creeks and wetlands where competition for food is less during the few years until they reach reproductive age. The most favorable habitat elements that have been identified for CRLF include emergent or overhanging vegetation in breeding ponds for egg attachment, sites with adequate shallow water habitat with algae for tadpole rearing, deep water and/or adjacent vegetation for adult escape cover, upland habitats for shelter during drought and upland and aquatic corridors free of barriers for both adult and juvenile dispersal (USFWS, 2002).

There are two documented occurrences of CRLF in the study area (Figure 12). In 2000, biologists from the Morro Group observed 1 adult in the pool under the Highway 227 Bridge (CNDDB Occurrence 418). Surveys conducted by LFR, Inc. documented occurrences of CRLF in 1999 through 2002, including juveniles in 2002 (CNDDB Occurrence 459). The observation of juveniles suggests that Tally Ho Creek in the study area provides suitable breeding habitat for CRLF. No CRLF were observed during the field survey conducted for this study, or during compliance monitoring for 2009 vegetation maintenance activities (Rincon Consultants, 2009). It is important to note that the lack of detection of CRLF in 2009 does not verify the absence of the species or indicate that CRLF have been extirpated from the study area. More rigorous, USFWS protocol-level surveys for CRLF would be required prior to implementing management activities or restoration plans that have the potential to impact CRLF or their habitat.

### *Western Pond Turtle*

Western pond turtles *(Actinemys marmorata)*, including both the northwestern (ssp. *marmorata)* and southwestern (ssp. *pallida*) subspecies, are a California species of concern. Western pond turtles occur in a variety of permanent and intermittent aquatic habitats, such as ponds, marshes, rivers, streams, and ephemeral pools. Pond turtles require suitable basking and haul-out sites, such as emergent rocks or floating logs, which they use to regulate their temperature throughout the day (Holland, 1994). In addition to appropriate aquatic habitat, these turtles require an upland oviposition site in the vicinity of the aquatic habitat, often within 200 m (656 ft). Nests are typically dug in grassy, open fields with soils that are high in clay or silt fraction. Egg laying usually takes place between March and August (Zeiner et al., 1988).

The study area may provide suitable aquatic habitat for western pond turtles, but basking and nesting habitats would be considered marginal because basking sites are limited (i.e., the creek is mostly shaded) and grassy areas that provide potential nesting habitat are regularly disturbed by human activity. For these reasons, Tally Ho Creek in the study area is not likely to support western pond turtle, but they do have the potential to occur. In the unlikely event that western pond turtle are present, then implementation of channel improvement have the potential to result in impacts to this species. Protection and minimization measures will be developed concurrent with project planning to reduce the potential for the project to adversely affect western pond turtle.

### *Yellow Warbler*

The yellow warbler (*Dendroica petechia brewsteri*) breeds and forages in riparian woodlands, montane chaparral, open ponderosa pine, and mixed conifer habitats with substantial brush, from coastal and desert lowlands up to 8,000 feet in the Sierra Nevada. The species is usually found in riparian deciduous habitats in summer in cottonwoods, willows, alders, and other small trees and shrubs typical of low, open-canopy riparian woodland. Breeding occurs from mid-April into early August with peak activity in June. There are no documented occurrences of this species within a 5 mile radius of the study area, but suitable foraging habitat and marginal nesting habitat occurs within the riparian woodland of the study area. Pre-construction surveys for nesting yellow warblers should be conducted if project activities will disturb existing riparian habitat. In the long-term, implementation of riparian enhancements such as expanding the riparian corridor would likely benefit this species.

## ***Potential Jurisdictional Waters of the U.S.***

Tally Ho Creek is largely an intermittent stream with perennial pools; select reaches have perennial flow. Tally Ho Creek is tributary to “traditional navigable waters of the U.S.” and streamflow is “relatively

permanent" (i.e., continuous seasonal flow), thus the creek is likely to be subject to CWA Section 404 regulations. The stream in the study reach is not navigable or tidal and is therefore not subject to Section 10 jurisdiction.

Ordinary High Water (OHW) in Tally Ho Creek can be delineated based on changes in vegetation communities (i.e., marsh to willow riparian) and scour lines (i.e., bankfull indicators). In general, the area of the channel below the elevation of OHW is designated non-wetland waters of the U.S., but in Tally Ho Creek much of this area is vegetated and would be considered jurisdictional wetlands. Above OHW the creek supports a narrow corridor of hydrophytic vegetation (e.g., willow, blackberry) along the channel banks. Because the streambanks are steep and the streamflow is "flashy", the distribution of jurisdiction wetlands above OHW is limited. A formal jurisdictional delineation should be conducted in the specific areas that restoration/enhancement measures are proposed. No isolated or off-channel wetlands were observed during the field survey.

## Enhancement Opportunities and Constraints

Clarification of site opportunities and constraints establishes limits on what is possible at the proposed project site by considering the human context, current and historical land use, hydrologic and hydraulic conditions and the potential to restore biological functions. An opportunities and constraints analysis, when conducted early on in the project planning and design phase, provides an envelope or range of possibilities with which to define what is desired for the site. It also clearly lays out potentially competing desires for the site, allowing managers to openly discuss and define project priorities.

To identify potential opportunities to reduce flood hazards while improving aquatic, riparian, and floodplain quality and function, Waterways staff conducted a field reconnaissance of the entire project area, evaluated the results of the existing conditions hydraulic model, and consulted with local landowners. Specific opportunities and constraints were identified by reach, and are summarized in Table 6 and Figures 13, 14, and 15. Opportunities to reduce flood risk and enhance aquatic and riparian conditions generally fell into the following categories:

- **Riparian corridor enhancement/management:** Although a continuous riparian corridor exists throughout the project area, most of the corridor is narrow, lacks diversity, and is infested with non-native invasive species (e.g. ivy, periwinkle) that limit the diversity and complexity of the canopy. Efforts to enhance the quality of the riparian corridor could be included in a vegetation management strategy that increases flood conveyance. Such a strategy would need to be described in a comprehensive management plan for the project area that identifies the specific management strategies that will be used and how enhancement will proceed.

- **Floodplain/wetland enhancement:** Floodplain and wetland enhancement consists of converting off-channel areas to floodplain to create additional channel capacity, provide flood detention areas, lower water surfaces, create off-channel wetlands, and improve the values and functions of a broader riparian corridor. Although much of the project area is currently constrained by adjacent land uses, there are several locations where floodplain enhancement could be valuable and cost effective. Those areas include a large portion of the Clark Property, upstream of Printz Road, and two areas along the left bank, downstream of Printz Road, that have not been developed. Constraints to enhancing the floodplain include the cost associated with purchasing

| Reach | Enhancement Opportunity | Issue Addressed | Constraints |
|---|---|---|---|
| 2 | Remove non-native vegetation along riparian corridor | Degraded riparian habitat | Private ownership; Access to channel |
| | Replace culvert at East Branch Street | Reduce flood risk associated with backwatering at crossing | High cost; Loss of potential grade control structure |
| | Floodplain and riparian width enhancement | Local erosion; Confinement of channel | Contrained by existing infrastructure; Private ownership |
| 3 | Floodplain and riparian width enhancement | Local erosion; Confinement of channel | Contrained by existing infrastructure; Private ownership |
| | Remove non-native vegetation along riparian corridor | Degraded riparian habitat | Private ownership; Access to channel |
| 4 | Floodplain and riparian enhancement along left bank | Reduce flood risks by increasing channel capacity; Enhance riparian habitat and floodplain function | Moderate cost; Short-term construction impacts; Private ownership |
| | Remove non-native vegetation along riparian corridor | Degraded riparian habitat | Private ownership |
| | Increase channel capacity | Reduce flood risk associated with sediment deposition | Access to channel; CRLF rearing habitat; Regulatory concerns; Need for long-term maintenance strategy |
| | Manage riparian vegetation | Reduce flood risk | Access to channel; CRLF rearing habitat; Regulatory concerns; Need for long-term maintenance strategy |
| 5 | Manage sediment under Printz Road Bridge | Reduce flood risk | CRLF rearing habitat; Regulatory concerns; Need for long term maintenance strategy |
| | Floodplain and riparian enhancement along left bank | Reduce flood risks by increasing channel capacity; Enhance riparian habitat and floodplain function | Moderate cost; Short-term construction impacts; Private ownership |
| | Close gap in levee near Printz Road Bridge | Reduce flood risk | Local drainage; Secondary effects |
| 6 | Wetland enhancement | Create and/or enhance wetland and CRLF habitat; Possibly enhancement of pond turtle habitat | High cost; Private ownership |
| | Peak flow management and sediment retention | Reduce flood risks downstream | High cost; Private ownership; Benefits limited to moderate discharge events |
| | Floodplain and riparian enhancement along left bank | Reduce flood risks by increasing channel capacity; Enhance riparian habitat and floodplain function | Moderate cost; Short-term construction impacts; Private ownership |

**TABLE 6**
Enhancement opportunities and constraints matrix.

the property, the potentially high cost of fill removal, and, in some cases, the limited benefit of reducing water surface elevations if the area is already frequently flooded. In those cases, the focus of floodplain enhancement is primarily to restore riparian habitat to areas that were historically cleared and converted to another land use.

- **Increased channel capacity:** A preliminary geomorphic analysis suggests that the current Tally Ho Creek channel through the project area consists of a ditch that was dug to accommodate the lot split and construction of homes within the historic valley floor. This ditch has been maintained over time in response to regrowth of riparian vegetation and aggradation of the channel associated with the large amount of sediment that is delivered to this portion of the channel. Improving protection for adjacent landowners from frequent flooding will require lowering the current bed elevation and periodic maintenance of the channel to remove built up sediment deposits. This is especially true throughout Reach 4. In many locations, informal levees have been constructed but have proven to be ineffective because the sediment primarily consists of sand which maintains a groundwater connection between the channel and the opposite side of any levee. A levee might be effective if it were engineered and composed of a clay core, but that approach is most likely cost prohibitive.

Although site opportunities and constraints vary by reach, the overall strategy would consist of increasing channel capacity through Reach 4, managing riparian vegetation to improve flood capacity, removing non-native vegetation, increasing species diversity of native riparian species, and enhancing floodplain and off-channel habitats. The primary constraint to achieving the flood control objectives in Reach 4 is associated with the impacts that sediment removal would have on rearing habitat for CLRF. The best potential approach to mitigate those impacts would be to enhance floodplain and create off-channel wetland habitat for CLRF on the Clark Property, if plans for developing a floodplain restoration/sediment detention project on this property are successfully pursued in the future. It is likely that creation of off-channel wetland habitat[2] on the Clark Property would enhance both breeding and rearing habitat for CLRF, thereby creating a situation where the habitat is not just being replaced, but enhanced.

## Proposed Project Alternatives

### *Overview*

Following identification of site opportunities and constraints and two public meetings, Waterways developed a set of proposed project alternatives with the goal of reducing the frequency of flooding while enhancing aquatic, riparian, and floodplain habitat. Each of the proposed projects was evaluated using the HEC-RAS model to evaluate the extent to which water surface elevations are lowered. In addition, cost estimates were developed for each proposed project. Although the proposed projects were evaluated independently, project elements could be combined to further lower water surfaces.

[2] Typical CRLF breeding/rearing habitat consists of seasonal ponds that maintain inundation through CLRF metamorphosis in the summer months, but dry in the late summer/fall to avoid bullfrog invasion. Consultation from a CLRF biologist should be employed for a specific inundation period and depth.

The proposed projects, described below, include the following:

- Reach 4 Sediment Removal – Low Flow Channel Option
- Reach 4 Sediment Removal – Grade from Headcut Option
- Floodplain Bench Option

Each of the proposed project alternatives incorporates vegetation management activities which determine the roughness values used in the HEC-RAS model. For the model, vegetation maintenance activities were assumed to reduce Manning's roughness coefficients for the channel from 0.05 to 0.04 and bank roughness values from 0.1 to 0.07. Potential future enhancements to the Clark Property were also evaluated within the context of each of the proposed project alternatives. The Clark property scenario involves the creation of off-channel wetland areas with the potential to attenuate flows along Tally Ho Creek, downstream of the Printz Road Bridge. An unsteady model of Reach 6 was used to determine peak flow reductions for the various modeled discharges. Off-channel storage at the Clark Property was estimated to reduce the 5-year peak flow by 13 cfs and the 10-year peak flow by 36 cfs.

## *Project Alternatives*

### Reach 4 Sediment Removal – Low Flow Channel Option

Under this alternative a low flow channel would be excavated through sediment that has built up over the years along Reach 4. Specifically, a low flow channel would be cut between stations 18+60 and 23+65 (Figure 4). The thalweg was lowered approximately 3 feet at station 18+60 and slightly less elsewhere.

The results of excavating a low flow channel is presented in Figures 16 and 17 and summarized in Table 7. The project has more benefit at lower flows with less benefit at higher flows. If implemented, the Low Flow Channel Option is expected to reduce 5-year water surfaces by 1.7 feet at Cross Section 18+60 and 10-year water surfaces by 1.1 feet. The benefit falls off significantly in the upstream direction with no effect on water surfaces occurring at Cross Section 25+53.

Implementation of the project would involve direct removal of sediment from the channel using an excavator. Access to the channel in the area where the work would be performed would still need to be identified but it is likely that riparian vegetation would need to be removed to access the channel and conduct the channel grading. Dewatering may not be necessary if work is conducted when the channel is dry. The cost to implement this project, not including permitting, administrative costs, construction inspection, and any required mitigation, was estimated to be $90,000 (Table 8). The estimated cost includes planning and design, construction, and a 15% contingency.

### Reach 4 Sediment Removal – Grade from Headcut Option

This option is similar to the Low Flow Channel Option but involves excavation of a larger and deeper channel over a longer channel length. The Headcut Option takes advantage of an existing discontinuity in the existing profile grade near the transition between Reach 3 and Reach 4. The discontinuity consists of a large headcut (or nickpoint) that is likely a result of downcutting associated with historic incision along the mainstem of Arroyo Grande Creek. In response to this incision on Arroyo Grande Creek, incision was initiated on Tally Ho Creek, resulting in migration of a series of headcuts on Tally Ho Creek

| Model Geometry | Reach 4 – Cross Section 18+60 | | | | | Reach 4 – Cross Section 25+53 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Return Period | | | | | Return Period | | | |
| | 5-yr | 10-yr | 20-yr | 50-yr | | 5-yr | 10-yr | 20-yr | 50-yr |
| | Water Surface Elevation (ft) | | | | | Water Surface Elevation (ft) | | | |
| Existing Conditions | 119.7 | 120.5 | 120.7 | 121.7 | | 125.7 | 126.7 | 127.9 | 129.4 |
| Sediment Removal – Grade from Headcut | 116.5 (-3.2) | 118.4 (-2.1) | 112.0 (-0.7) | 121.5 (-0.2) | | 123.5 (-2.2) | 124.8 (-1.9) | 126.2 (-1.7) | 128.5 (-0.9) |
| Sediment Removal – Low Flow Channel | 118.0 (-1.7) | 119.4 (-1.1) | 120.6 (-0.1) | 121.6 (-0.1) | | 125.7 | 126.7 | 127.9 | 129.4 |
| Floodplain Bench | 119.7 | 120.5 | 120.7 | 121.7 | | 125.3 (-0.4) | 126.1 (-0.6) | 127.0 (-0.9) | 128.3 (-1.1) |
| Vegetation Management | 119.7 | 120.4 (-0.1) | 120.7 | 121.5 (-0.2) | | 125.5 (-0.2) | 126.4 (-0.3) | 127.6 (-0.3) | 129.2 (-0.2) |

**TABLE 7**

Water surface elevations for existing conditions and proposed enhancement options.

that have lowered portions of the channel over time (e.g. – Reaches 1, 2 and 3). Because we expect the headcut to continue to migrate in the upstream direction over time, resulting in a lowered bed through the project reach, this proposed Option takes advantage of that process to improve flood capacity through Reach 4 where the risk is the highest. The benefit of this approach is that the sediment that would have been eroded over time from Tally Ho Creek, due to headcut migration, will be excavated and removed from the system permanently, thereby minimizing impacts downstream on the mainstem of Arroyo Grande Creek.

The project approach consists of replacing the large headcuts located between station 17+79 and 30+61 with a smooth channel profile (Figures 18 and 19). In this scenario, the existing conditions channel geometry was not altered at stations 17+79 and 23+65, which correspond to locations immediately downstream of a headcut. At the remaining sections the channel base was lowered between 2-5 feet in order to create a smooth profile between stations 30+61 and 17+79. Not only would this approach improve flood capacity, but would also likely limit continued upstream migration of any headcutting. If implemented, the Headcut Option is expected to reduce 5-year water surfaces by 3.2 feet at Cross Section 18+60, 10-year water surfaces by 2.1 feet, 20-year water surfaces by 0.7 feet and 50-year water surfaces by 0.2 feet (Table 7). At Cross Section 25+53, the Headcut Option is expected to reduce 5-year water surfaces by 2.2 feet, reduce 10-year water surfaces by 1.9 feet, 20-year water surfaces by 1.7 feet and 50-year water surfaces by 0.9 feet.

Implementation of the project would involve direct removal of sediment from the channel using an excavator. Access to the channel in the area where the work would be performed would still need to be identified but it is likely that riparian vegetation would need to be removed to access the channel and conduct the channel grading. Dewatering may not be necessary if work is conducted when the channel is dry. The cost to implement this project, not including permitting, administrative costs, construction inspection, and any required mitigation, is estimated to be $185,000 (Table 8). The estimated cost includes planning and design, construction, and a 15% contingency. Because the grading work is more extensive for this Option, it is likely that impacts will include temporary loss of riparian vegetation and permanent loss of CRLF rearing habitat. Consequently, mitigation costs could be high, although those costs could be addressed through floodplain enhancement within Reach 4 or on the Clark Property.

### FLOODPLAIN BENCH OPTION

During our reconnaissance level survey, a site was identified along the left bank of Reach 4 that may provide an opportunity to enhance floodplain and riparian conditions while moderately lowering local water surface elevations. The site is currently privately owned, but is mostly vacant except for what appears to be an abandoned out-building along the margins of the existing riparian area. This project could be combined with the Low Flow Channel Option or the Headcut Option to reduce local water surface elevations and provide an area of on-site mitigation for any impacts associated with those projects.

The Floodplain Bench Option would consist of lowering the existing bank and terrace from Cross Section 22+50 through 27+50 so that the surface is inundated at flows equal to or exceeding the 2-year discharge (Figures 20 and 21). At its widest, the terrace would be cut back approximately 40 feet, adding approximately .35 acres of functional floodplain. Off-channel wetlands could be developed within the excavated terrace and the site would be revegetated with native riparian species to improve riparian corridor width and function. If implemented, the Floodplain Bench Option is expected to reduce

5-year water surfaces by 0.4 feet at Cross Section 25+53, 10-year water surfaces by 0.6 feet, 20-year water surfaces by 0.9 feet and 50-year water surfaces by 1.1 feet (Table 7). No benefits are expected at Cross Section 18+60.

Implementation of the project would involve direct removal of sediment from off-channel area. Consequently, we do not expect any impacts to existing channel, riparian, or wetland habitat from this project. The cost to implement this project, not including permitting, administrative costs, construction inspection, or land acquisition, was estimated to be $100,000 (Table 8). The estimated cost includes planning and design, construction, and a 15% contingency.

**Table 8. Estimated cost to implement proposed project alternatives**

| Alternative | Planning/Design | Construction[1] | Total Estimated Cost |
|---|---|---|---|
| Reach 4 Sediment Removal – Low Flow Channel Option | $15,000 | $75,000 | $90,000 |
| Reach 4 Sediment Removal – Grade from Headcut Option | $35,000 | $150,000 | $185,000 |
| Floodplain Bench Option | $25,000 | $75,000 | $100,000 |

[1]Includes a 15% Contingency

## Conclusions

This study has identified Reach 4 as an area of highest flood risk where project actions should be focused to reduce flooding impacts that, in some locations, occur on an annual basis. Opportunities exist to address the more persistent flooding problems locally. Unfortunately, riparian enhancements and/or flood control improvements on Tally Ho Creek have the potential to affect existing vegetation communities, aquatic habitats and the species that utilize these habitats. The most significant concern with respect to biological resources is potential impacts to CRLF or their habitat, specifically habitat conditions that support rearing and oversummering habitat for CLRF.

Perennial pools in the study area that provide potential breeding habitat for CRLF are located in the vicinity of active headcuts within the channel, although breeding has not been documented. It is not clear if these perennial pools will persist in the streambed given the existing erosion/sedimentation regime. Monitoring of these features may be prudent to determine their stability in relationship to channel adjustments. If it is determined that ongoing channel adjustments through sedimentation/erosion are likely to impact existing CRLF habitat, then stream restoration/flood control improvements that can provide more permanent CRLF habitat may be viewed favorably by resources agencies (e.g. – floodplain enhancement and/or wetland enhancement on the Clark Property).

The alternative that would most likely result in a long-term benefit to landowners, and the largest reduction in water surface elevations at discharges up to the 50-year event, is the Reach 4 – Grade from

Headcut Option (Table 8). This Option would need to be combined with the Floodplain Bench Option or enhancement measures proposed for the Clark Property to offset short and long-term impacts to riparian and aquatic habitat. In addition, a long-term strategy to manage riparian vegetation and sediment accumulation in the channel would be necessary.

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# TALLY HO CREEK
# PLANNING PROJECT

## FIGURES

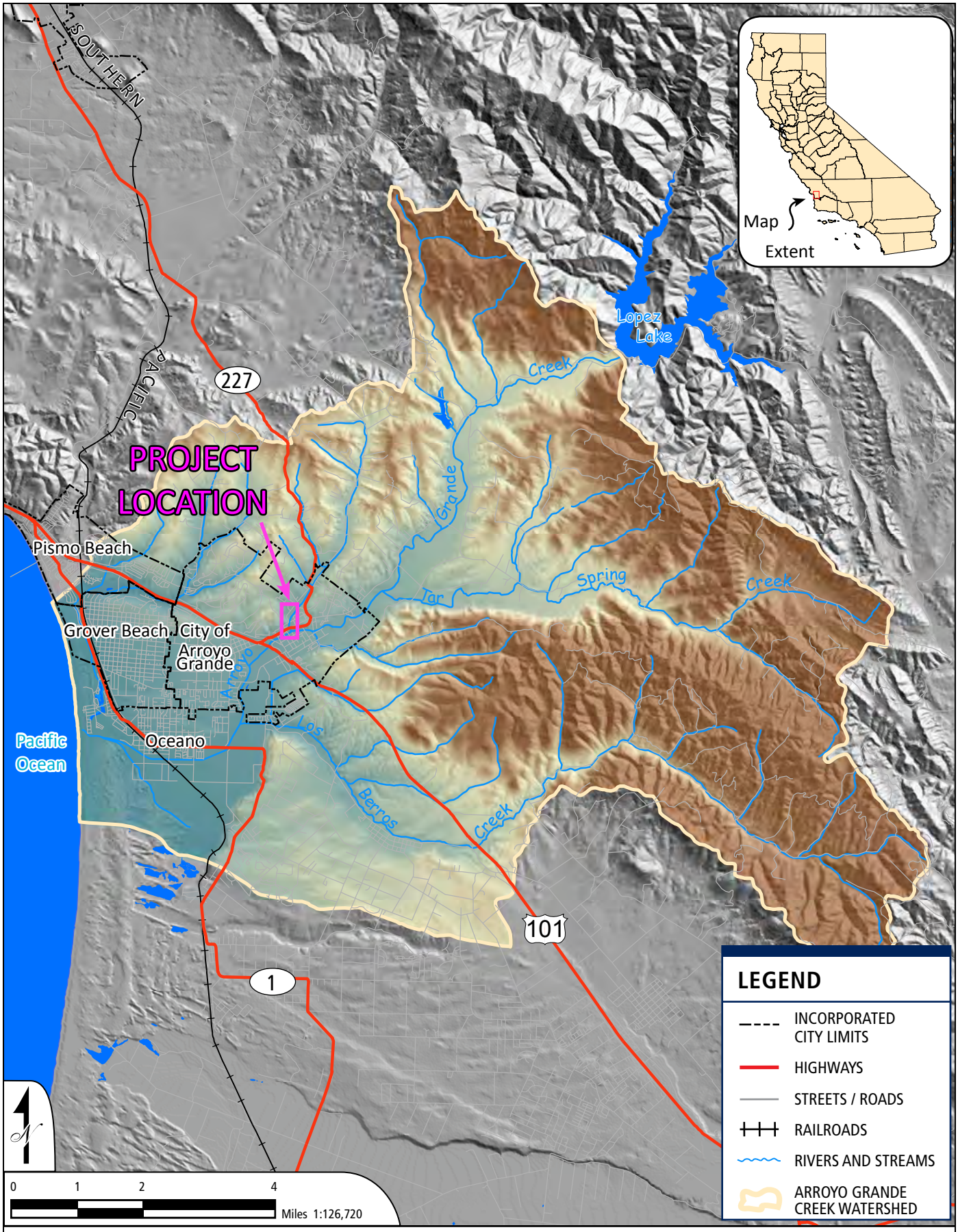


**FIGURE 1**

Location map for the project area on Tally Ho Creek (also known as Corbett Canyon Creek). Shaded relief includes the Arroyo Grande Creek watershed.

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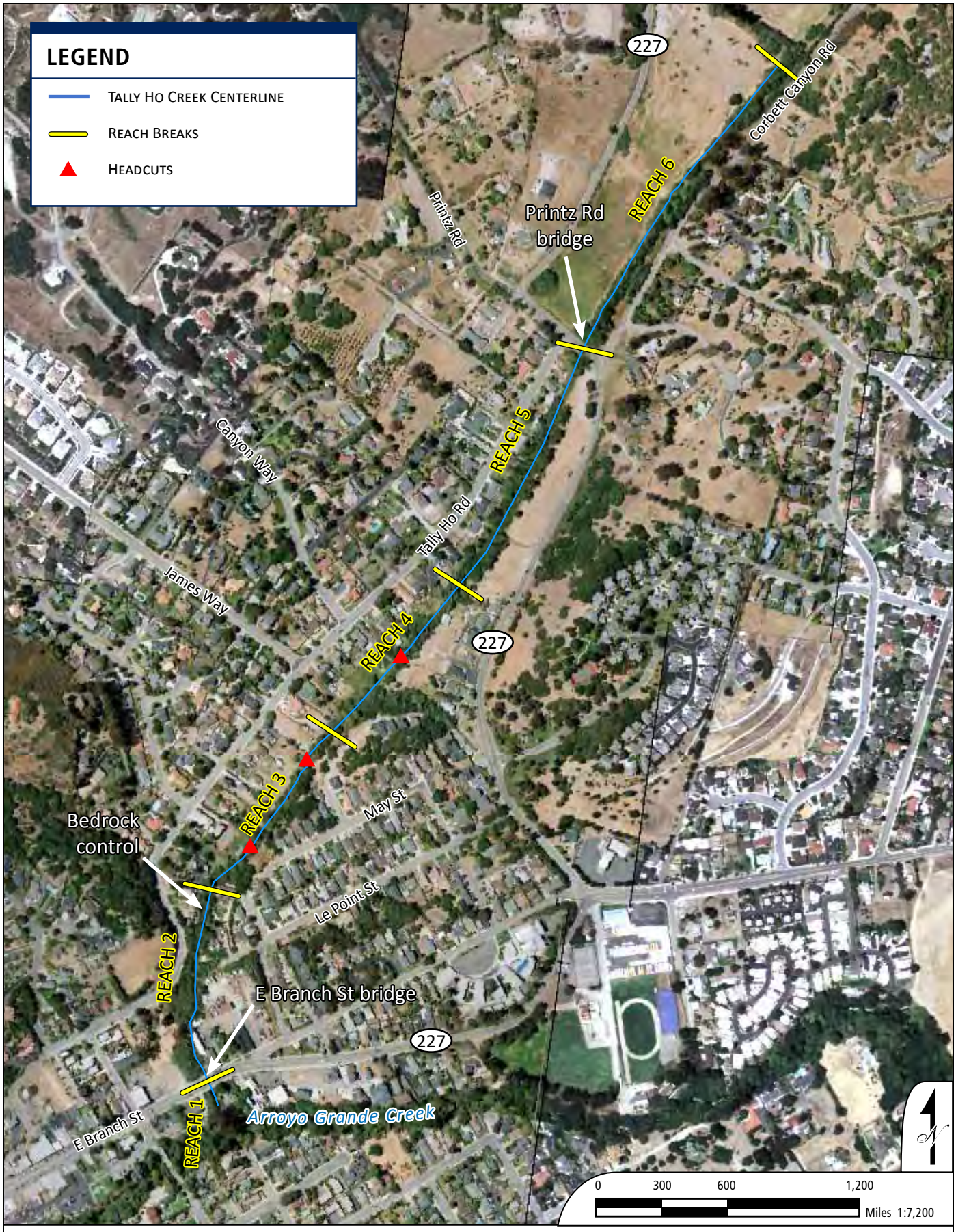


**FIGURE 2**
Project area map and reach overview

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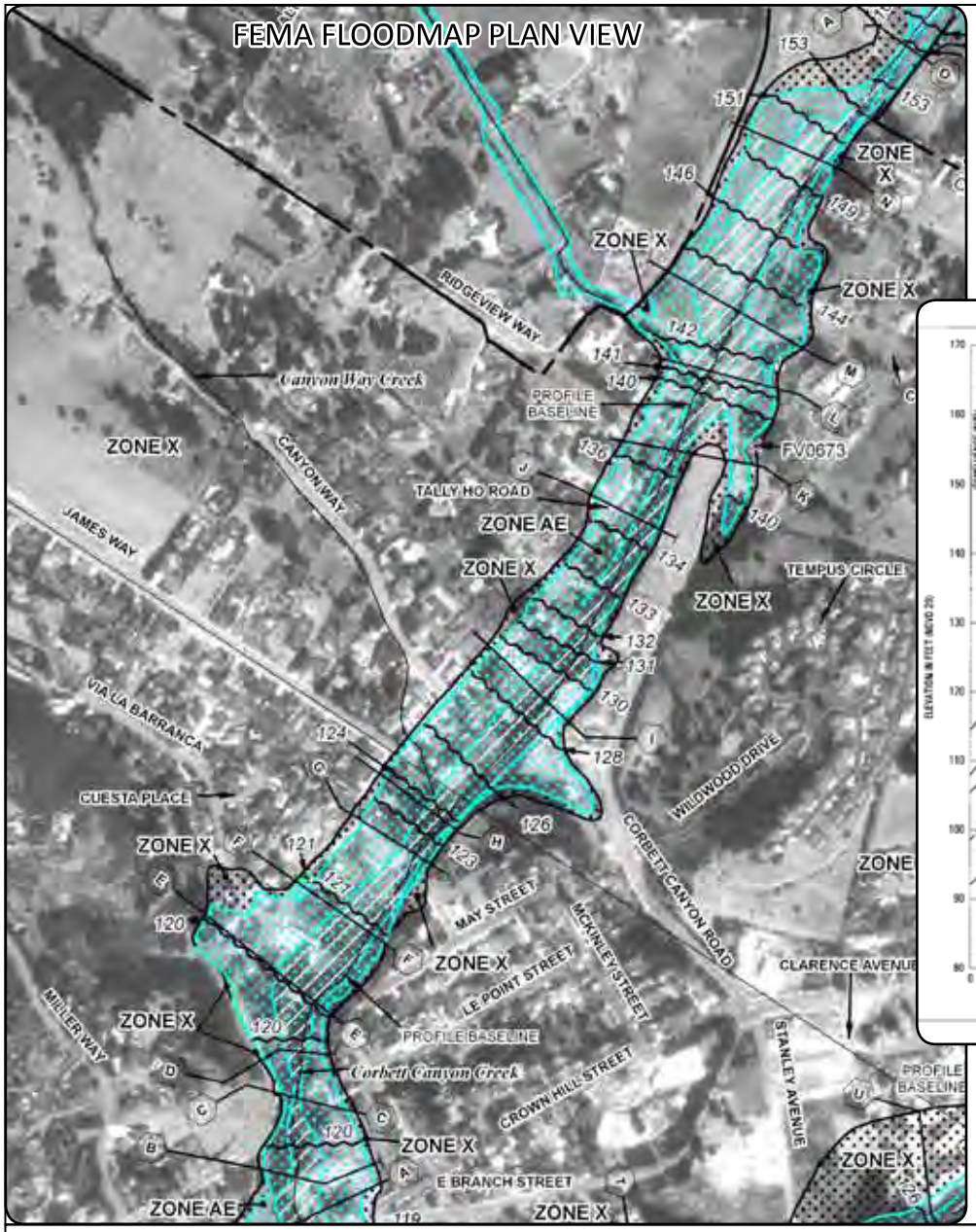


FEMA PROFILE VIEW

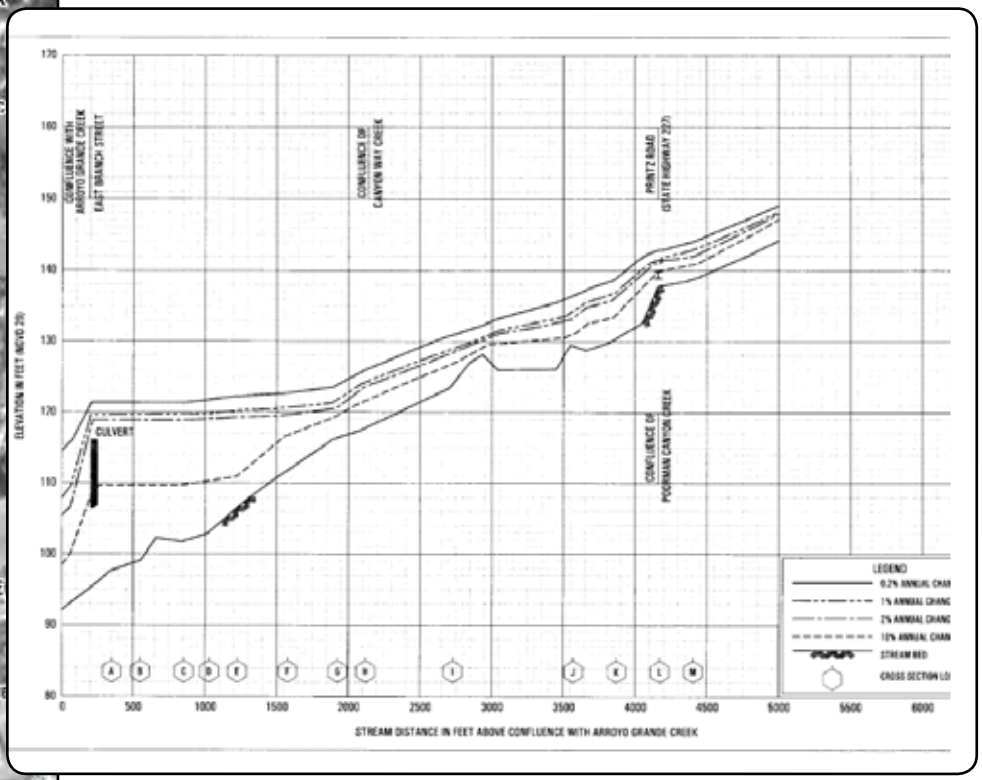


**FIGURE 3**
FEMA plan view and proifile view flood maps

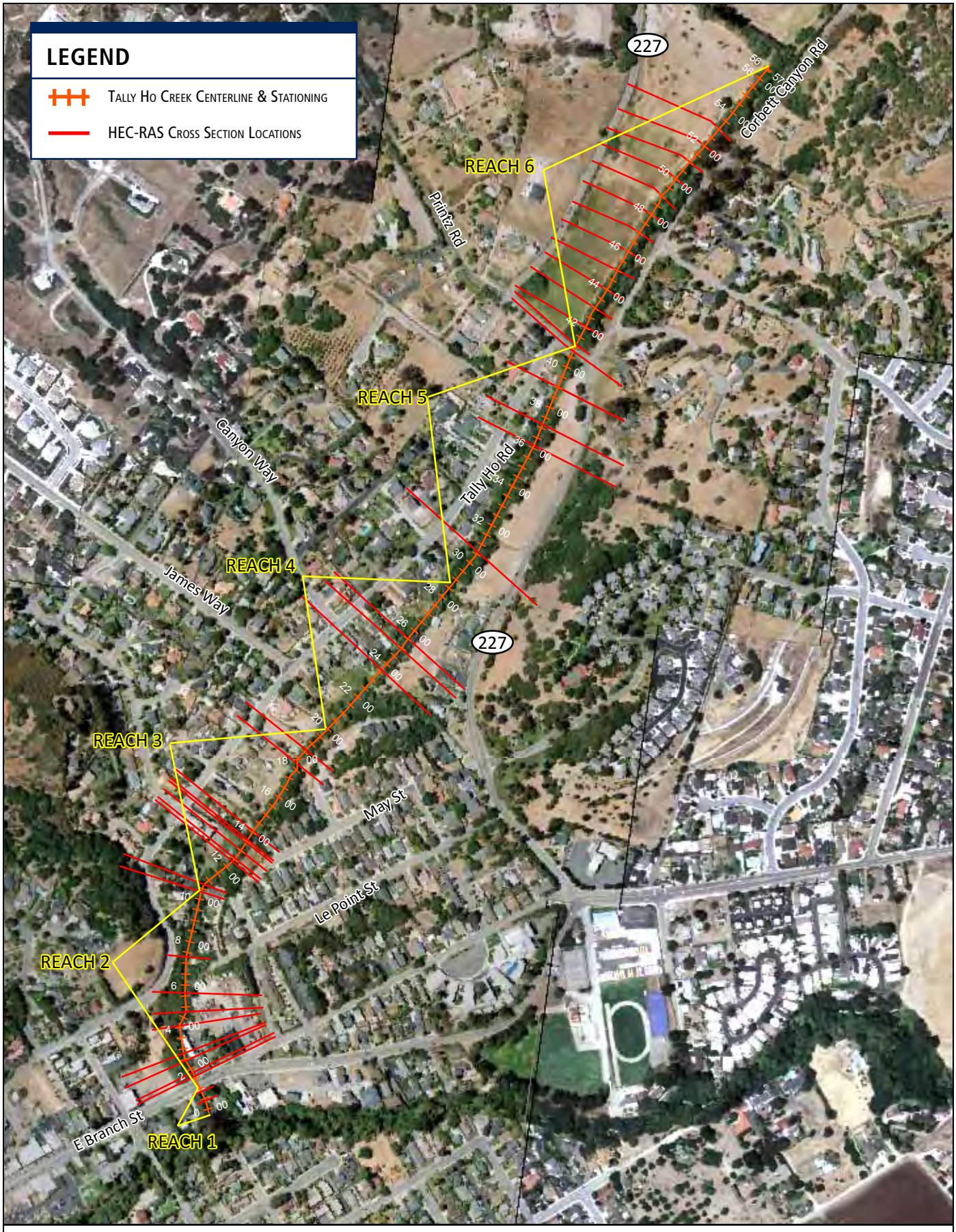


**FIGURE 4**
HEC-RAS cross section and stationing overview

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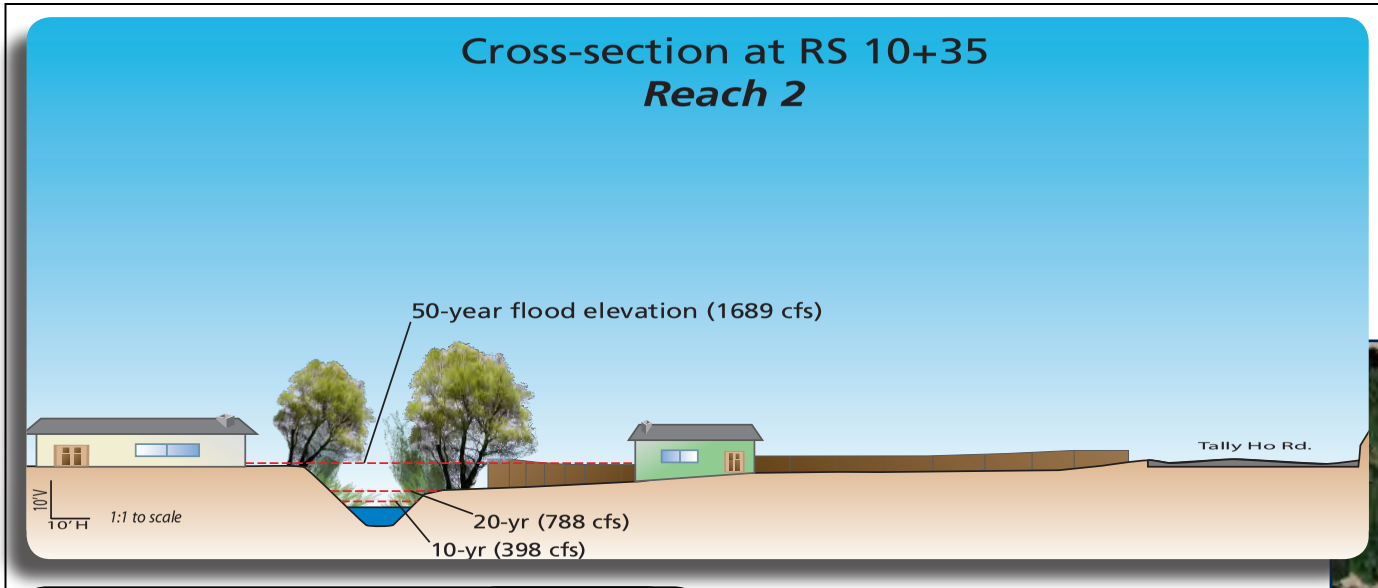
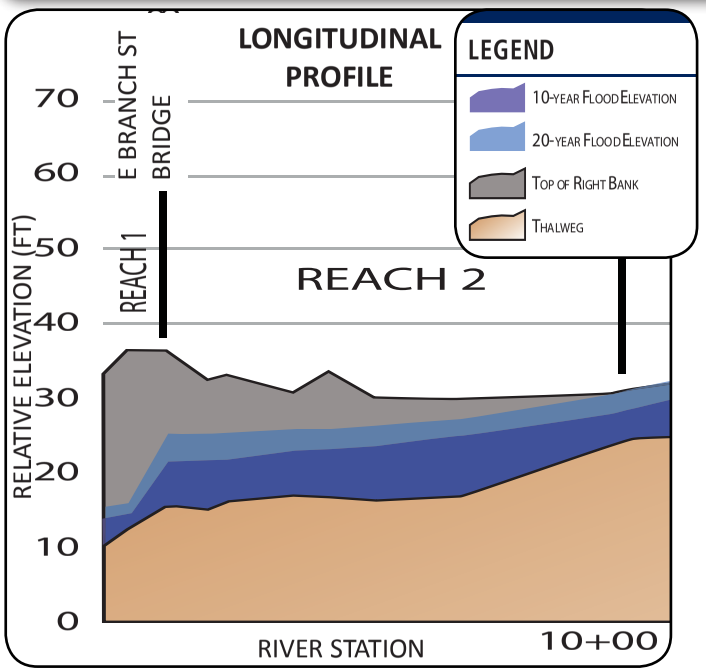



# EXISTING CONDITIONS

## REACH 1+2



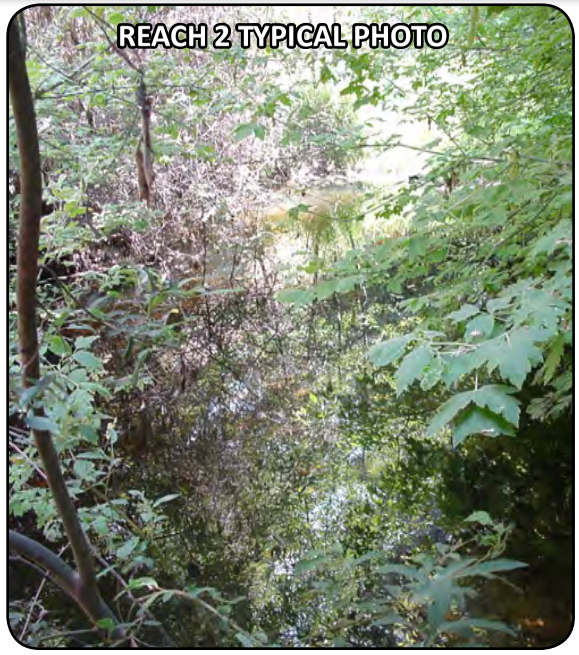





**FIGURE 5**
Existing conditions for Reaches 1 &2

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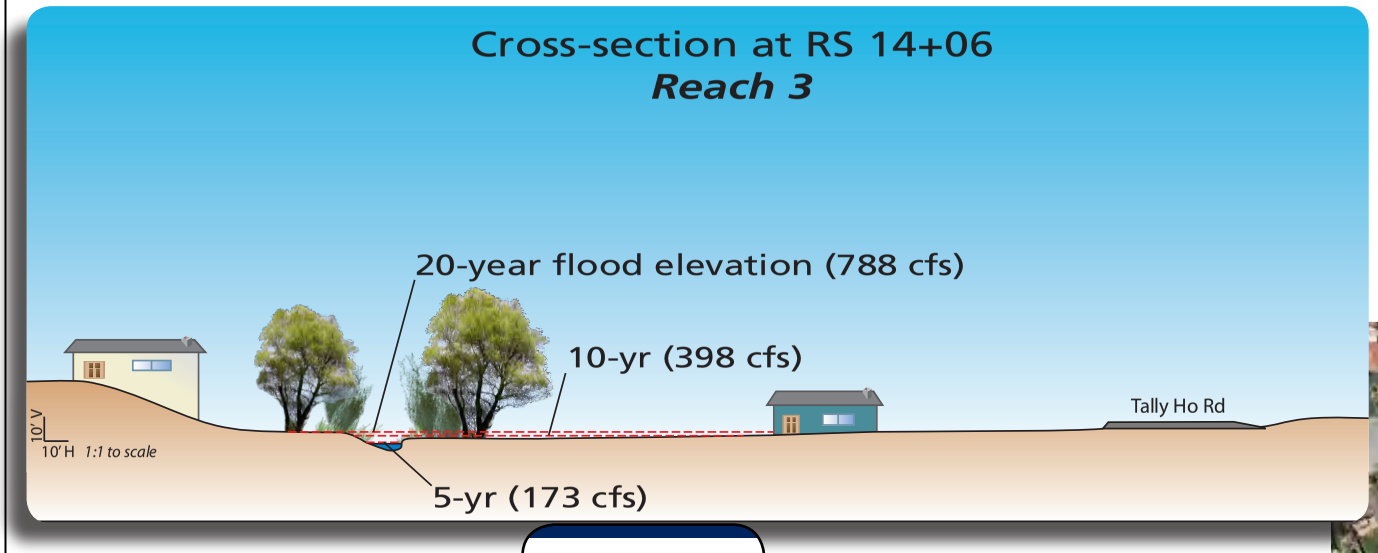
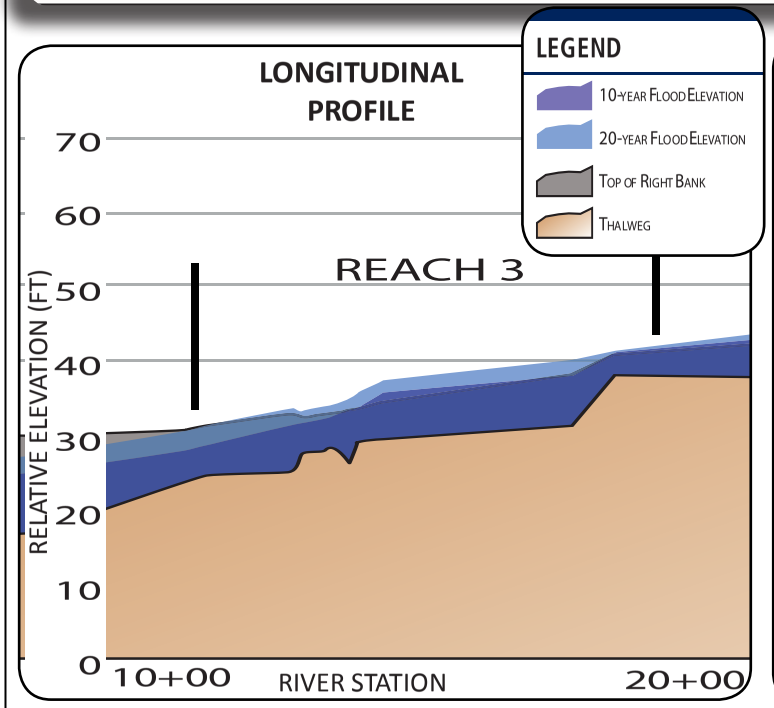



# *EXISTING CONDITIONS*

## REACH 3





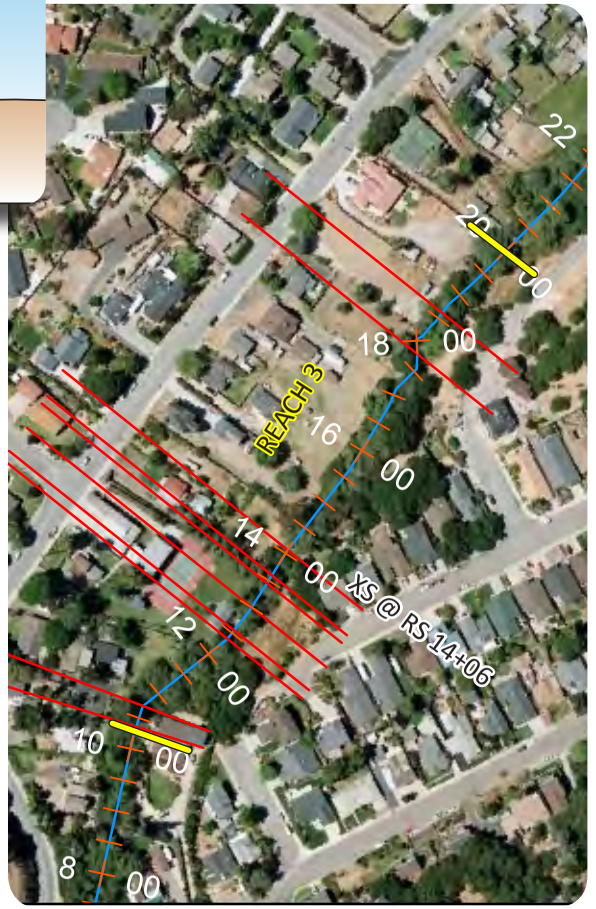



**FIGURE 6**
Existing conditions for Reach 3

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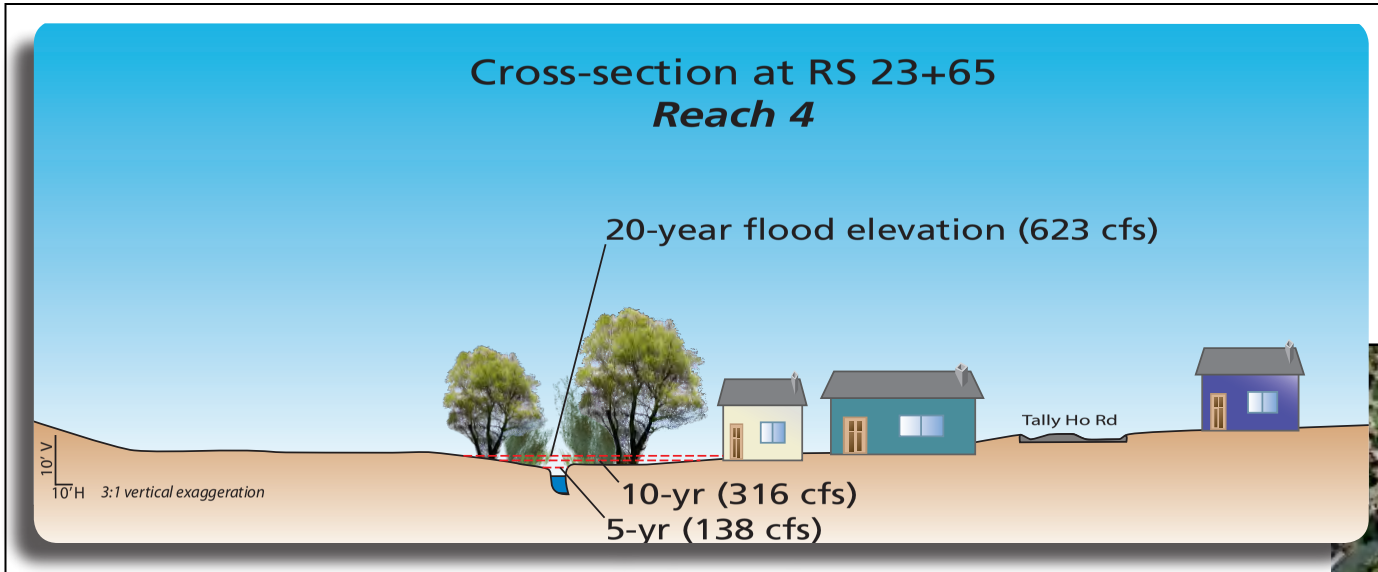


## *EXISTING CONDITIONS*

## REACH 4

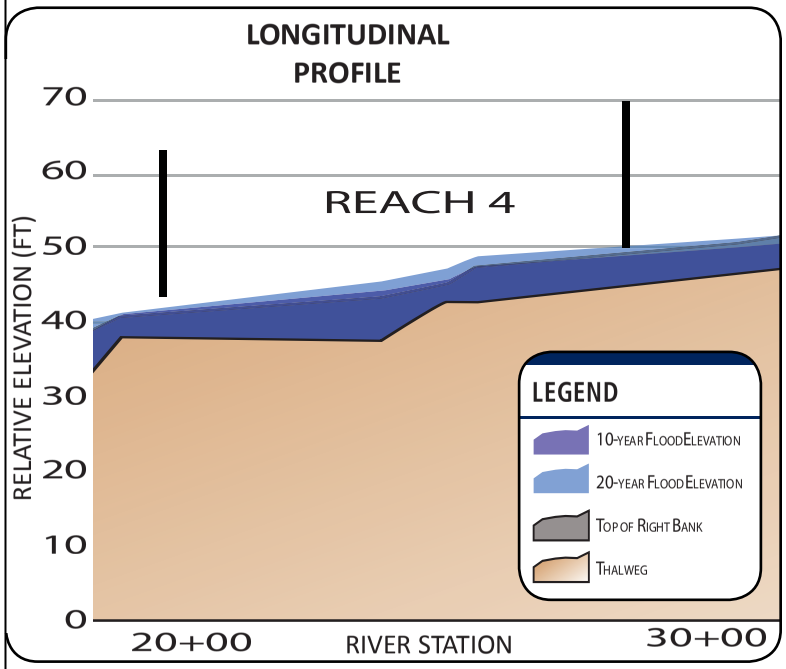




**FIGURE 7**
Existing conditions for Reach 4

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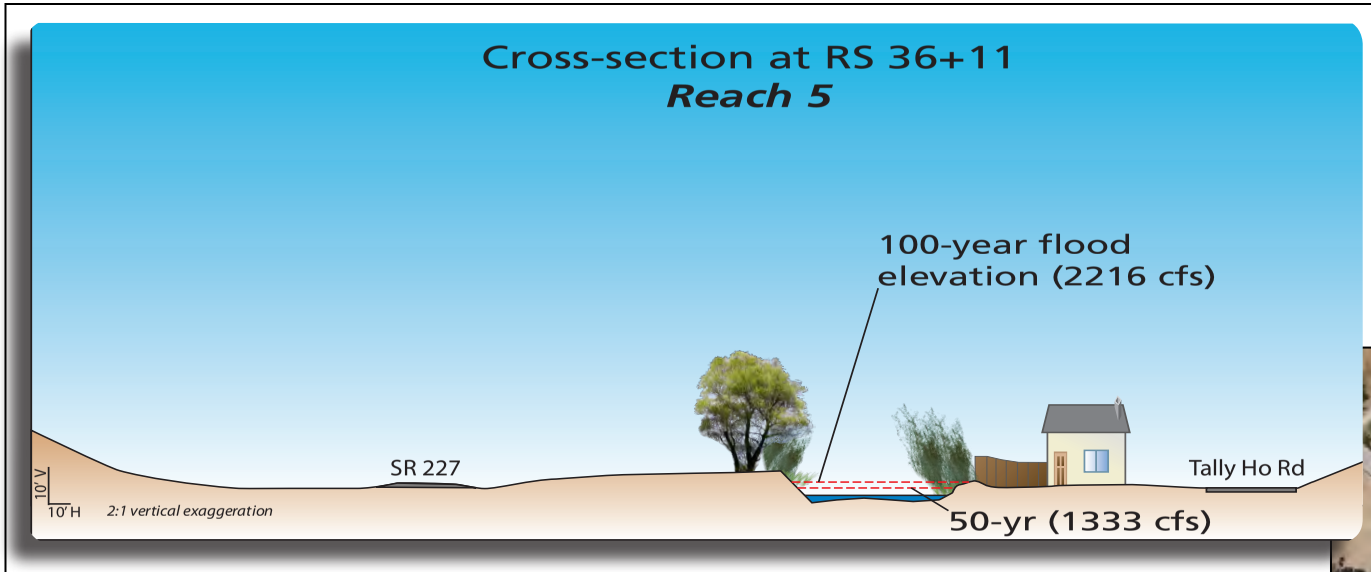


# EXISTING CONDITIONS

## REACH 5

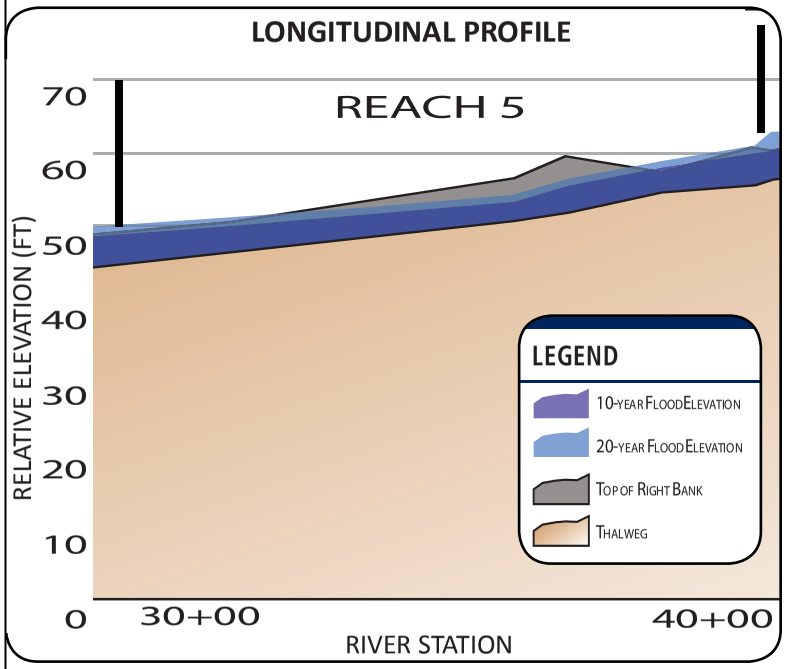




**FIGURE 8**
Existing conditions for Reach 5

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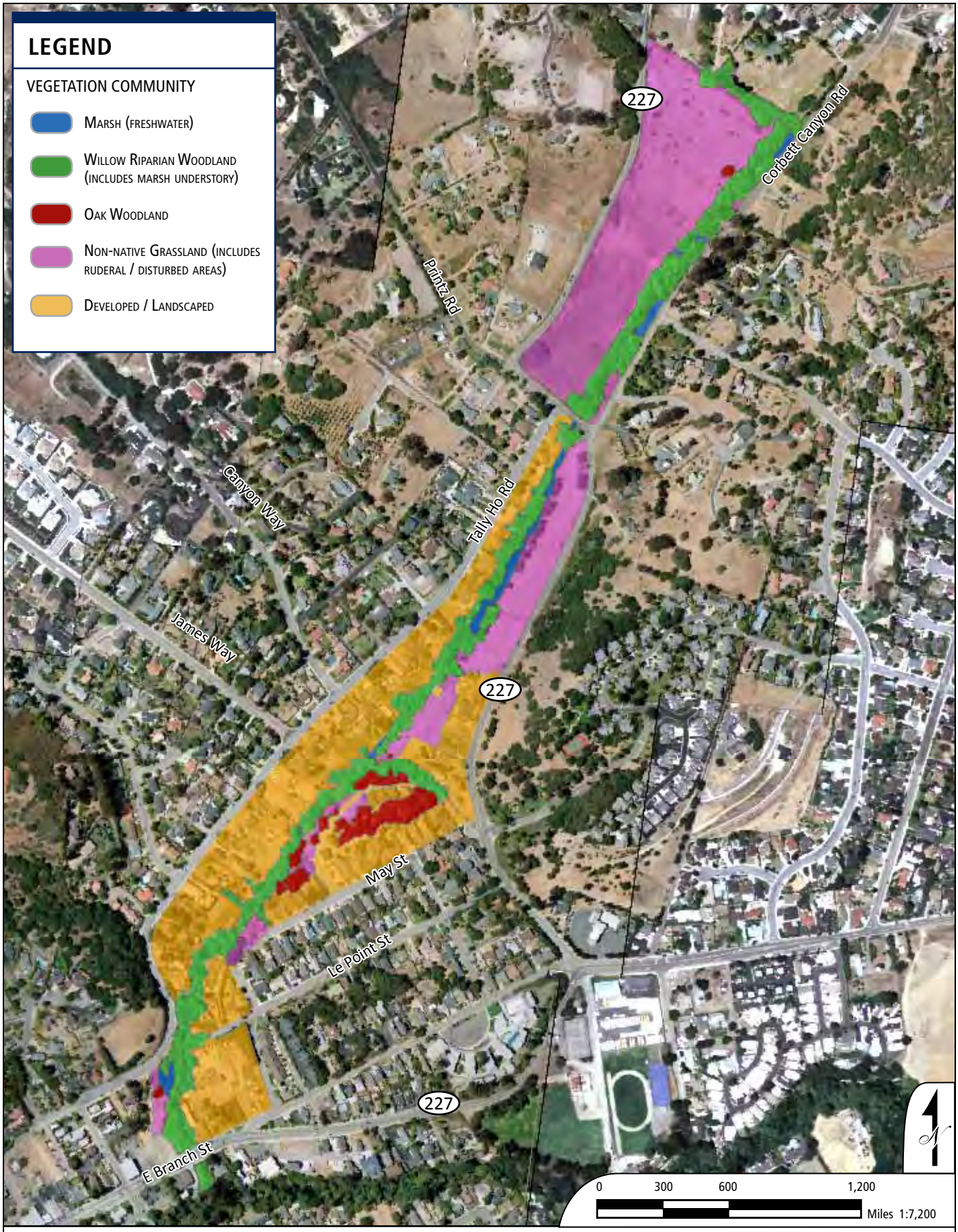


**FIGURE 9**
Vegetation communities in the project area.

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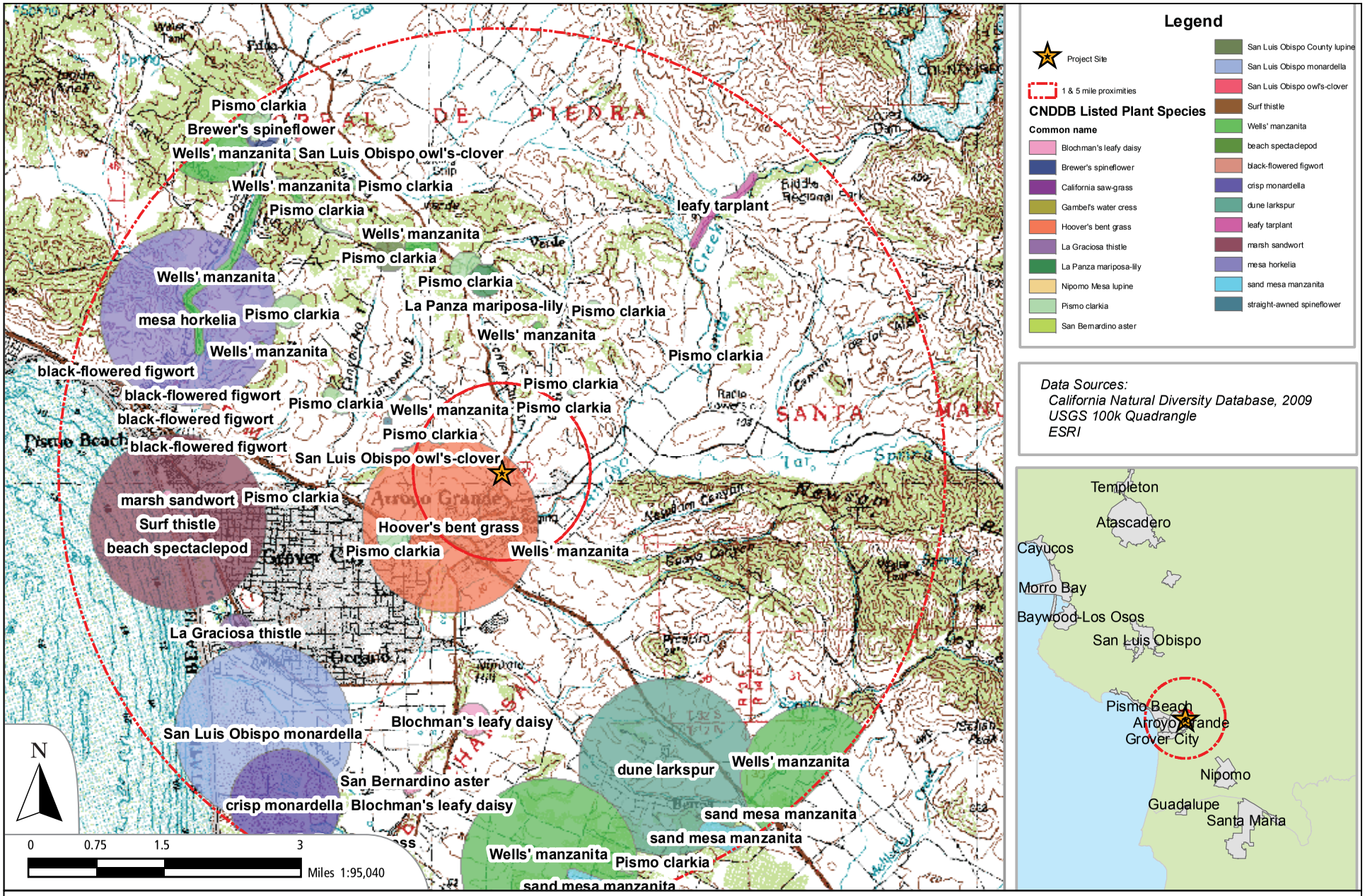


**FIGURE 10**

Map of California Natural Diversity Database (CNDDB) sensitive plant species occurrences within a 5-mile radius of the Project site.

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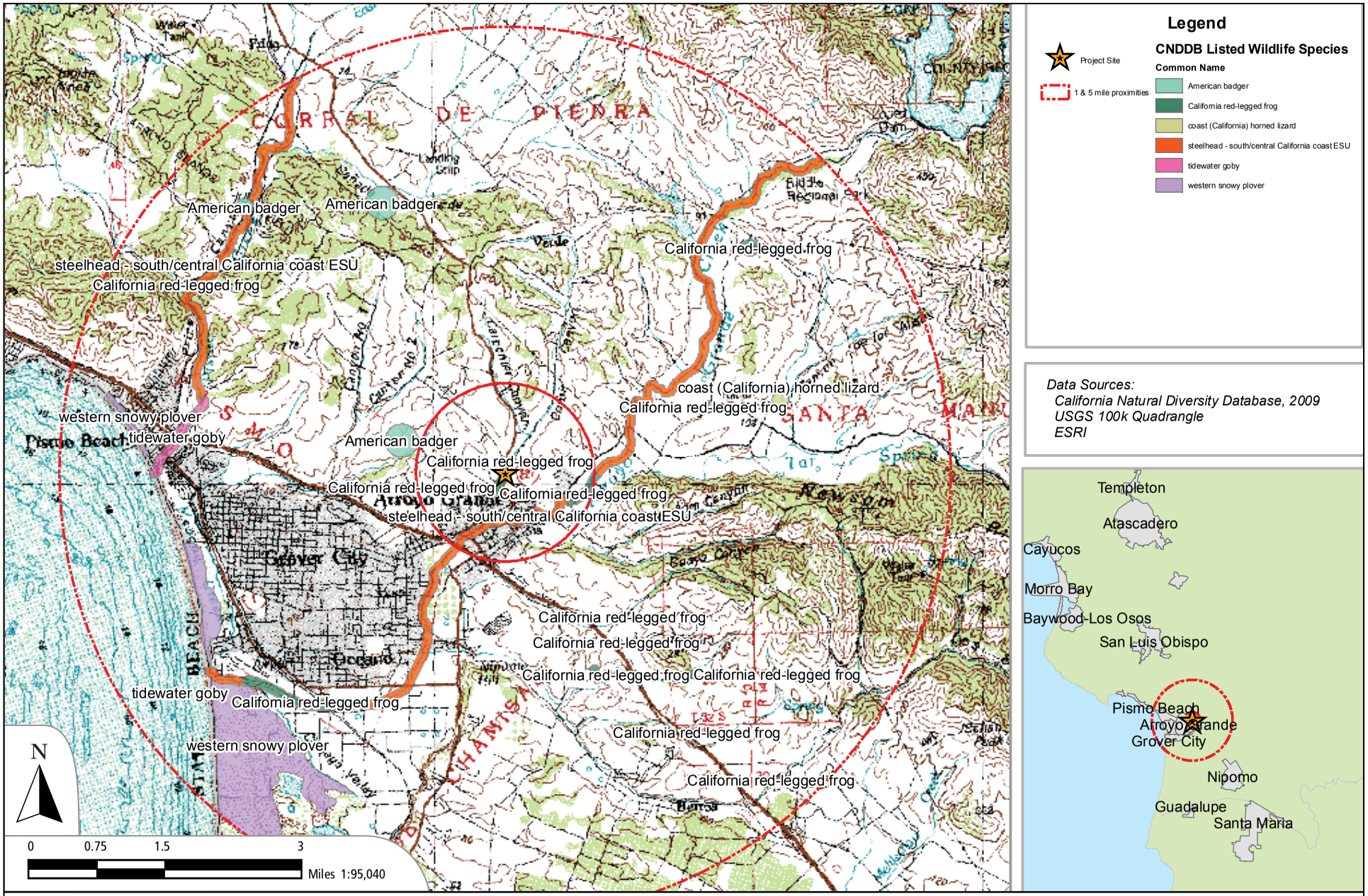


**FIGURE 11**

Map of California Natural Diversity Database (CNDDB) sensitive wildlife species occurrences within a 5-mile radius of the Project site.

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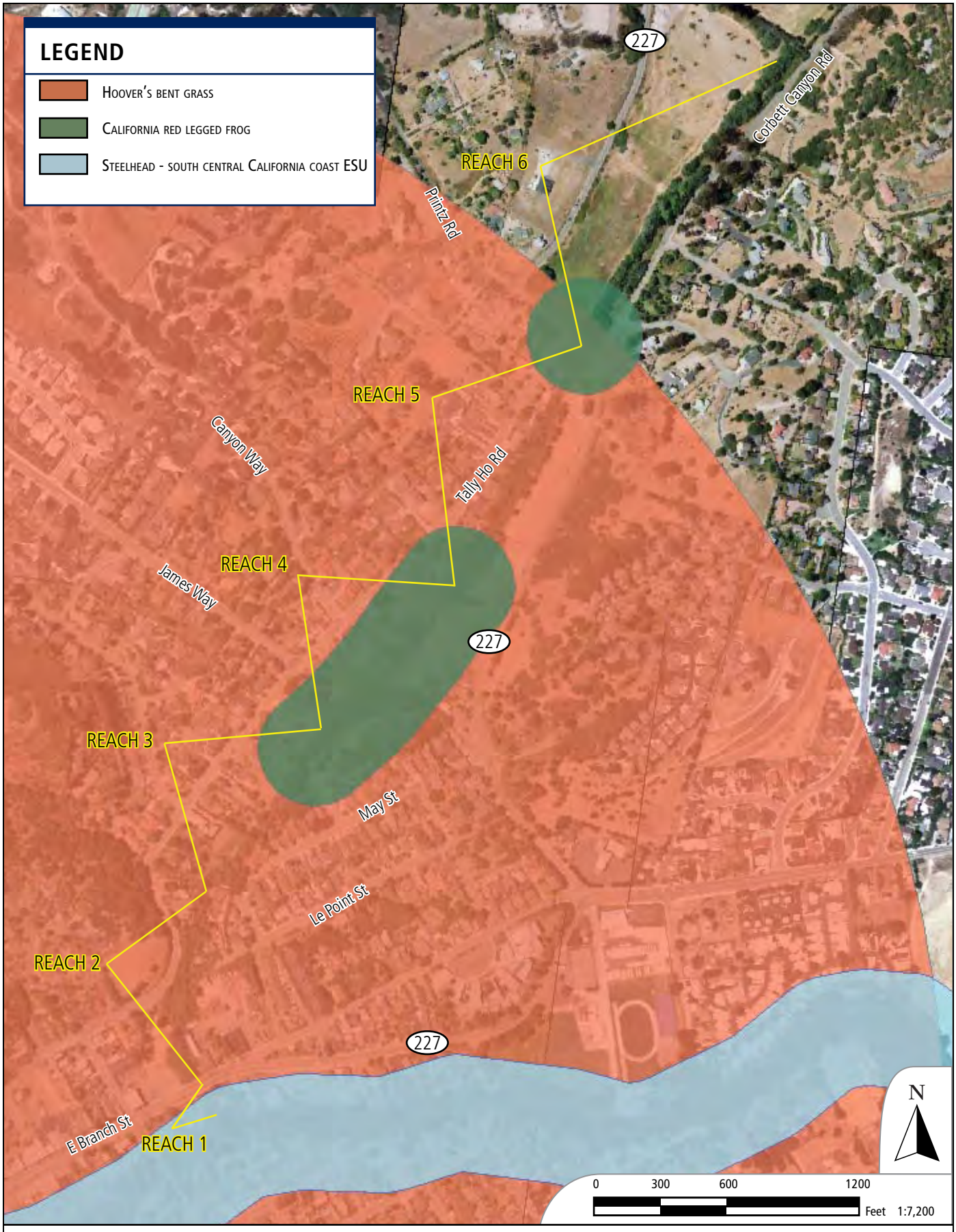


**FIGURE 12**
CNDDB sensitive species occurrences within the project area.

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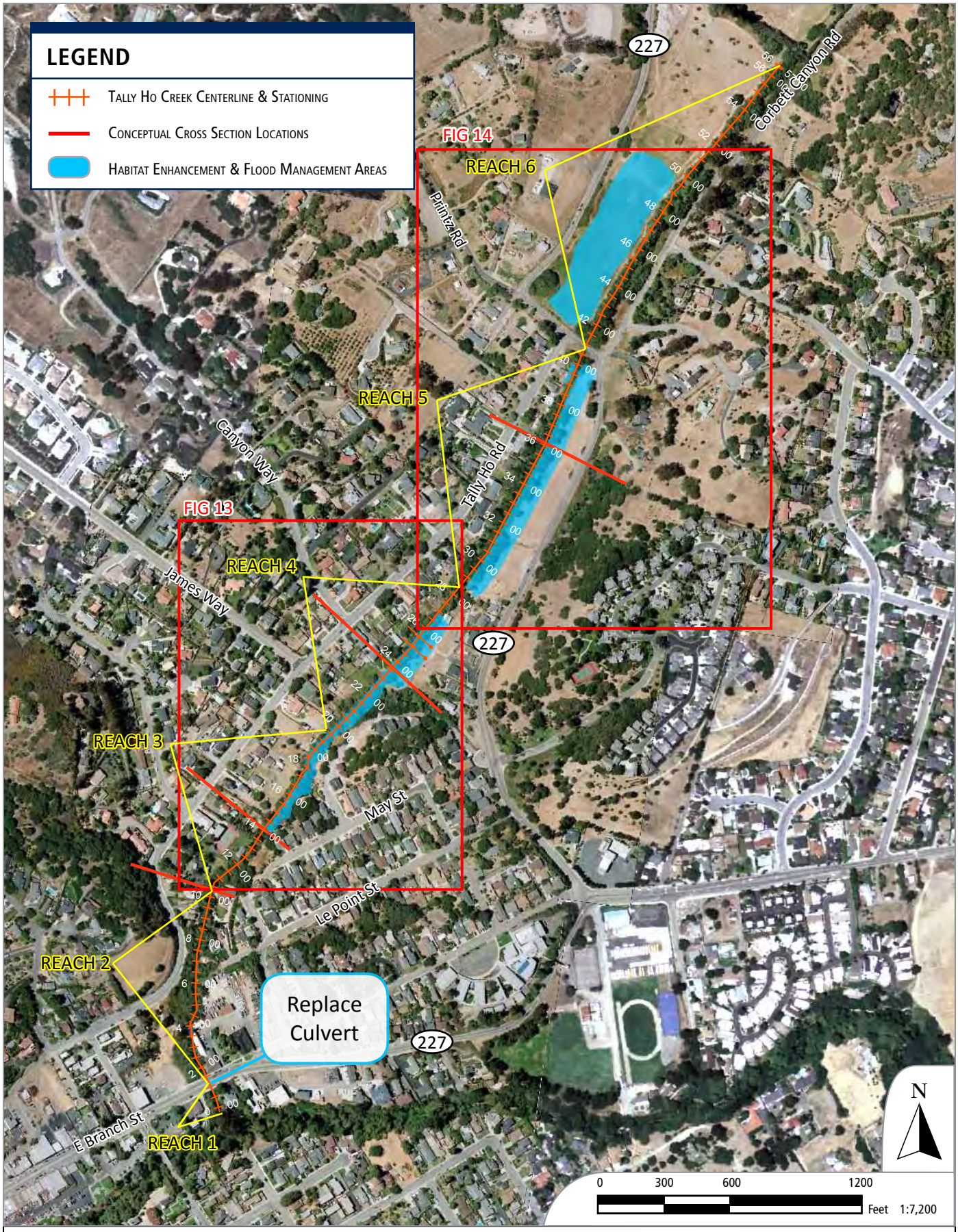


**FIGURE 13**

Overview of habitat enhancement, sediment and flood management areas.

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**FIGURE 14**
Enhancement options along Tally Ho Creek

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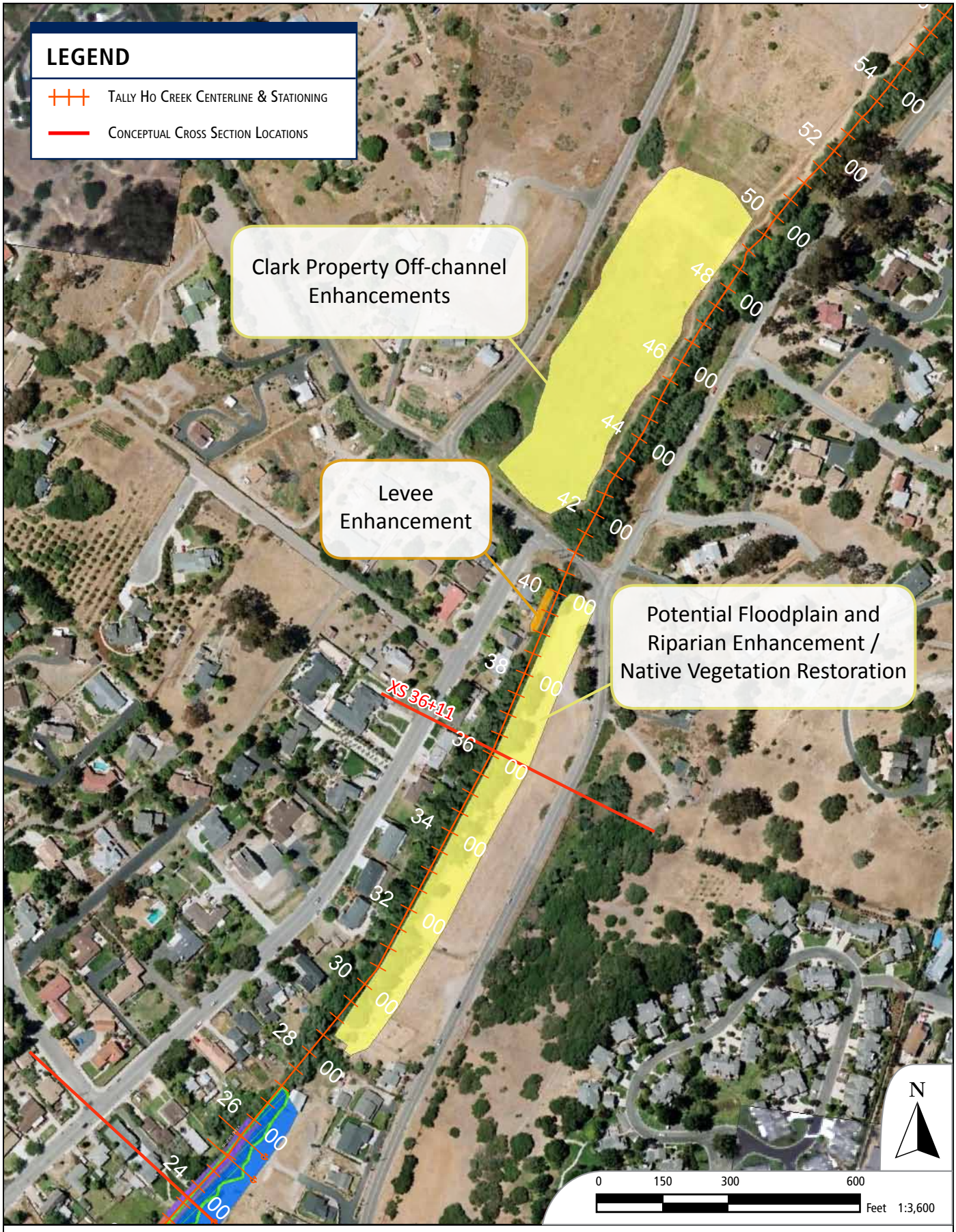


**FIGURE 15**
Enhancement options along Tally Ho Creek

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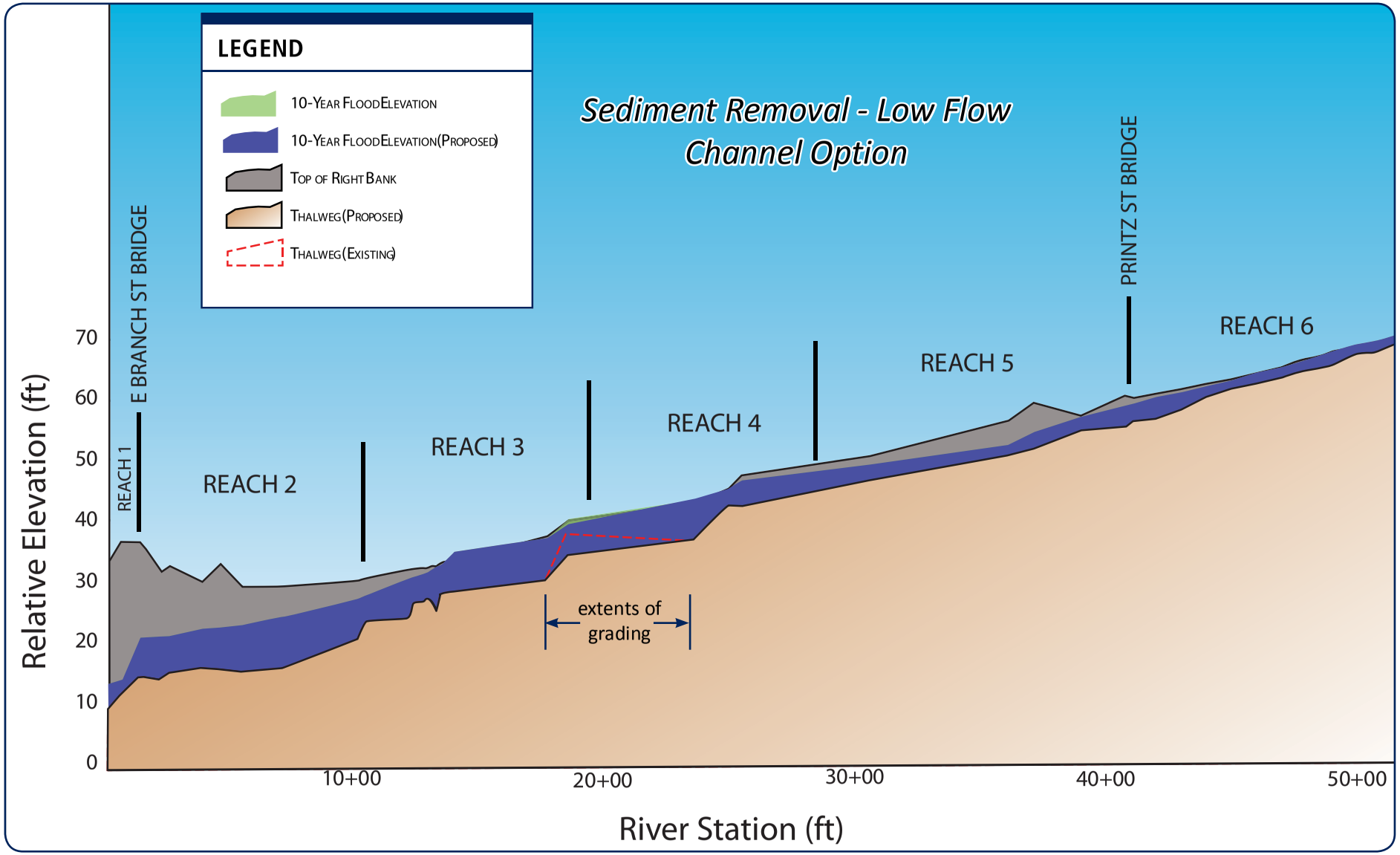


**FIGURE 16**

Longitudinal profile and water surface elevations for existing and proposed conditions with the sediment removal - low flow channel enhancement option.

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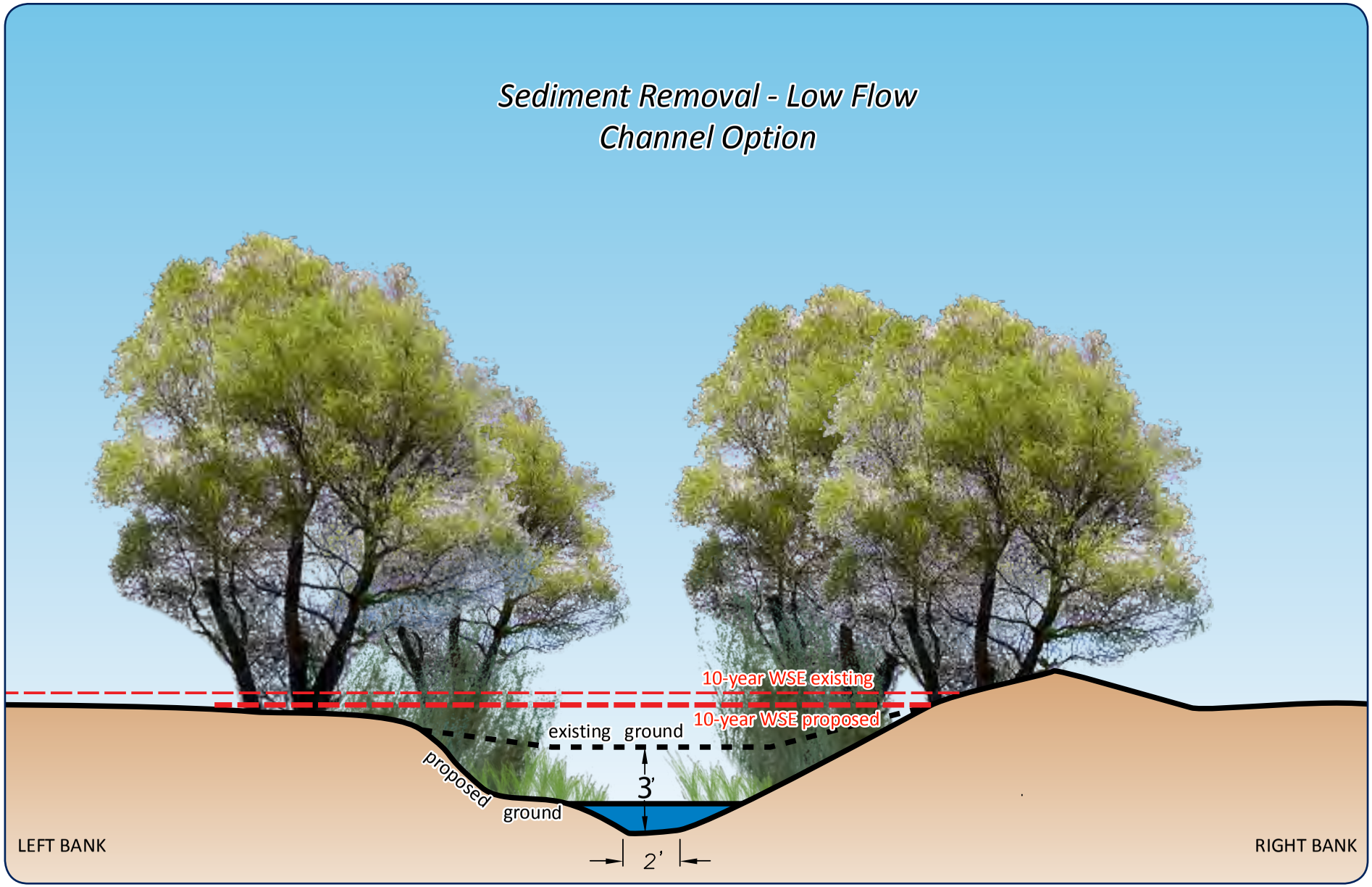


**FIGURE 17**

Conceptual cross section for the sediment removal - low flow channel option at River Station 18+60 (See Figure 15 for grading extents).

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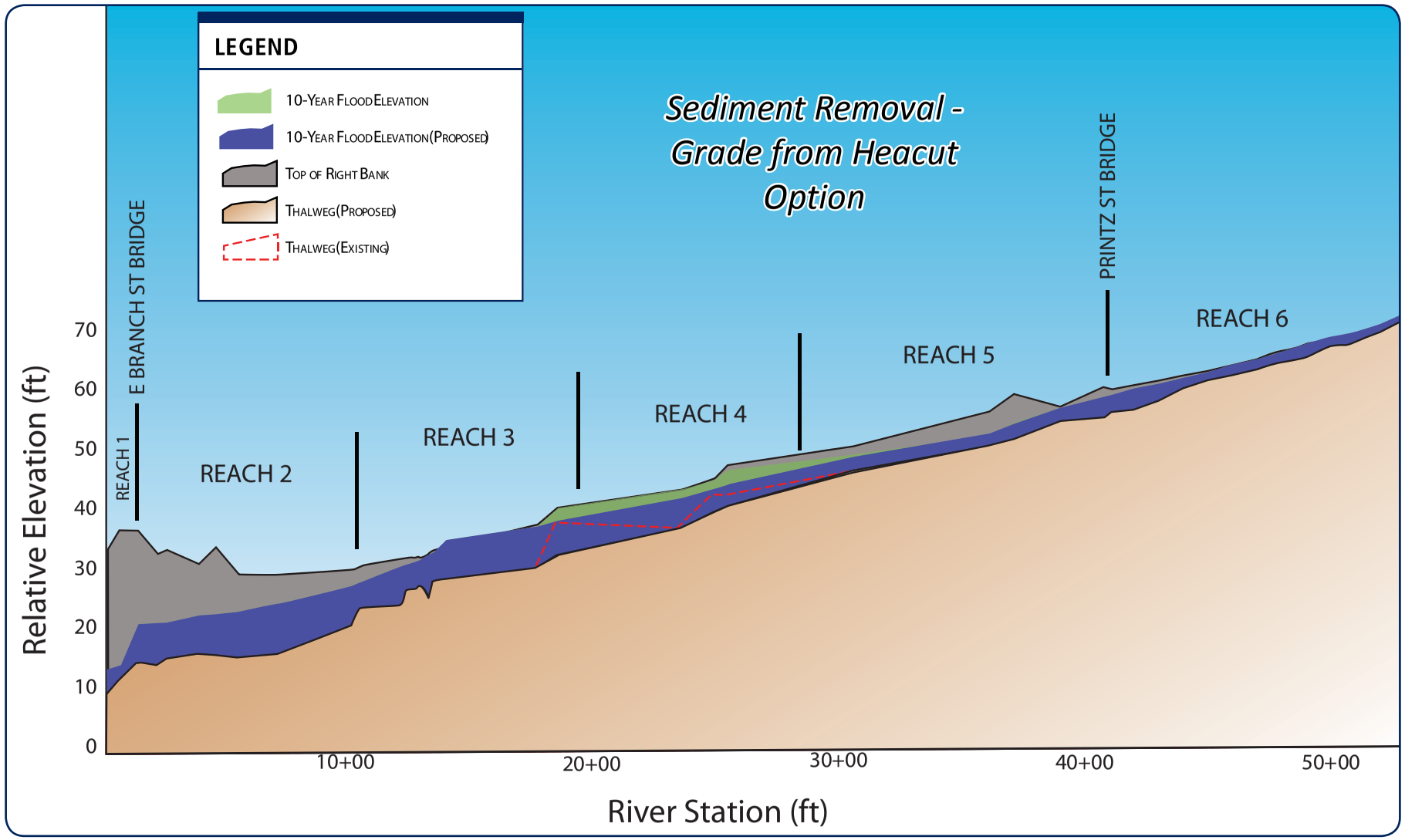


**FIGURE 18**

Longitudinal profile and water surface elevations for existing and proposed conditions with the sediment removal - grade from headcut enhancement option.

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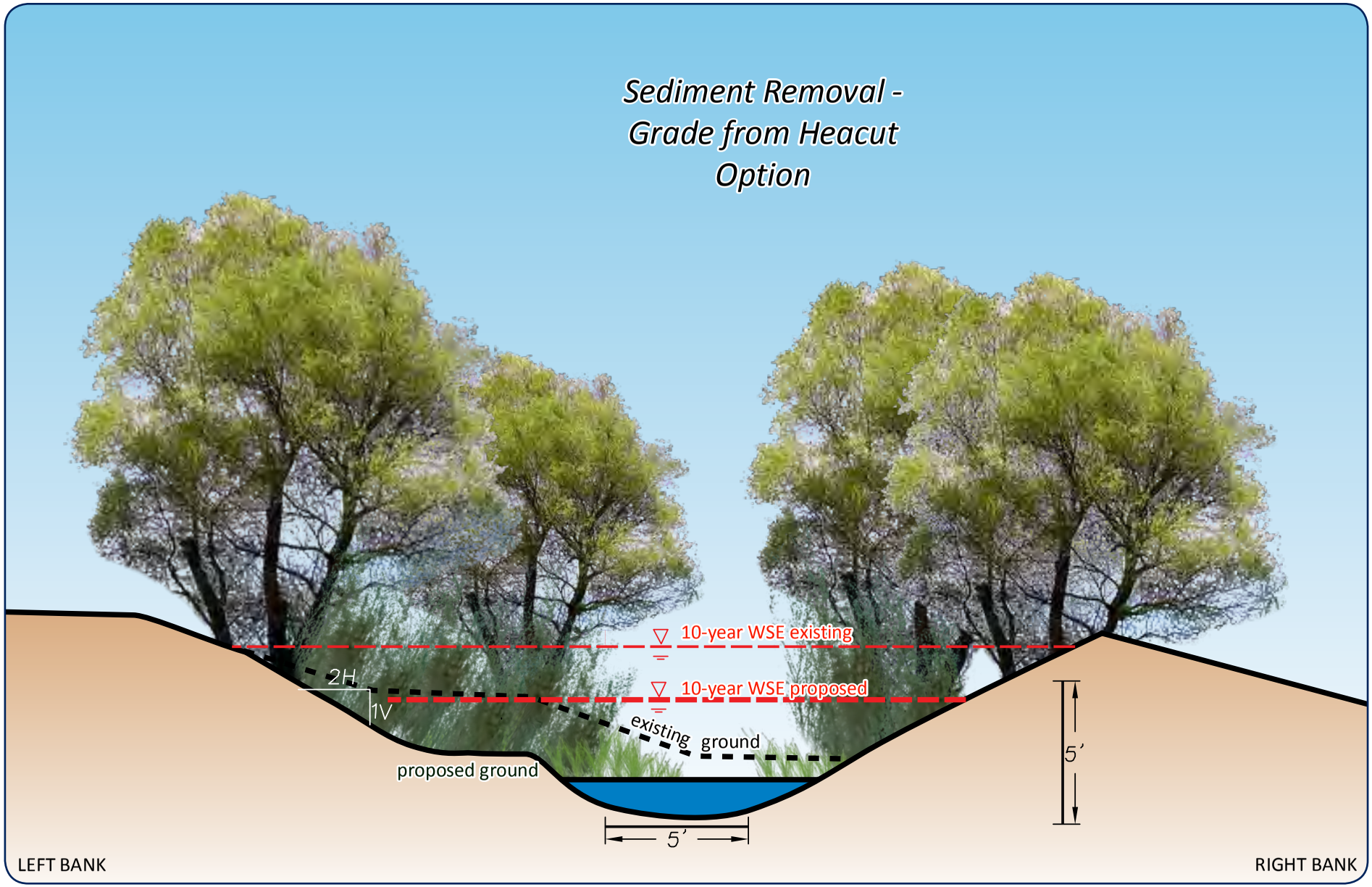


**FIGURE 19**

Conceptual cross section for the sediment removal - grade from headcut option at River Station 25+53 (See Figure 17b for grading extents)

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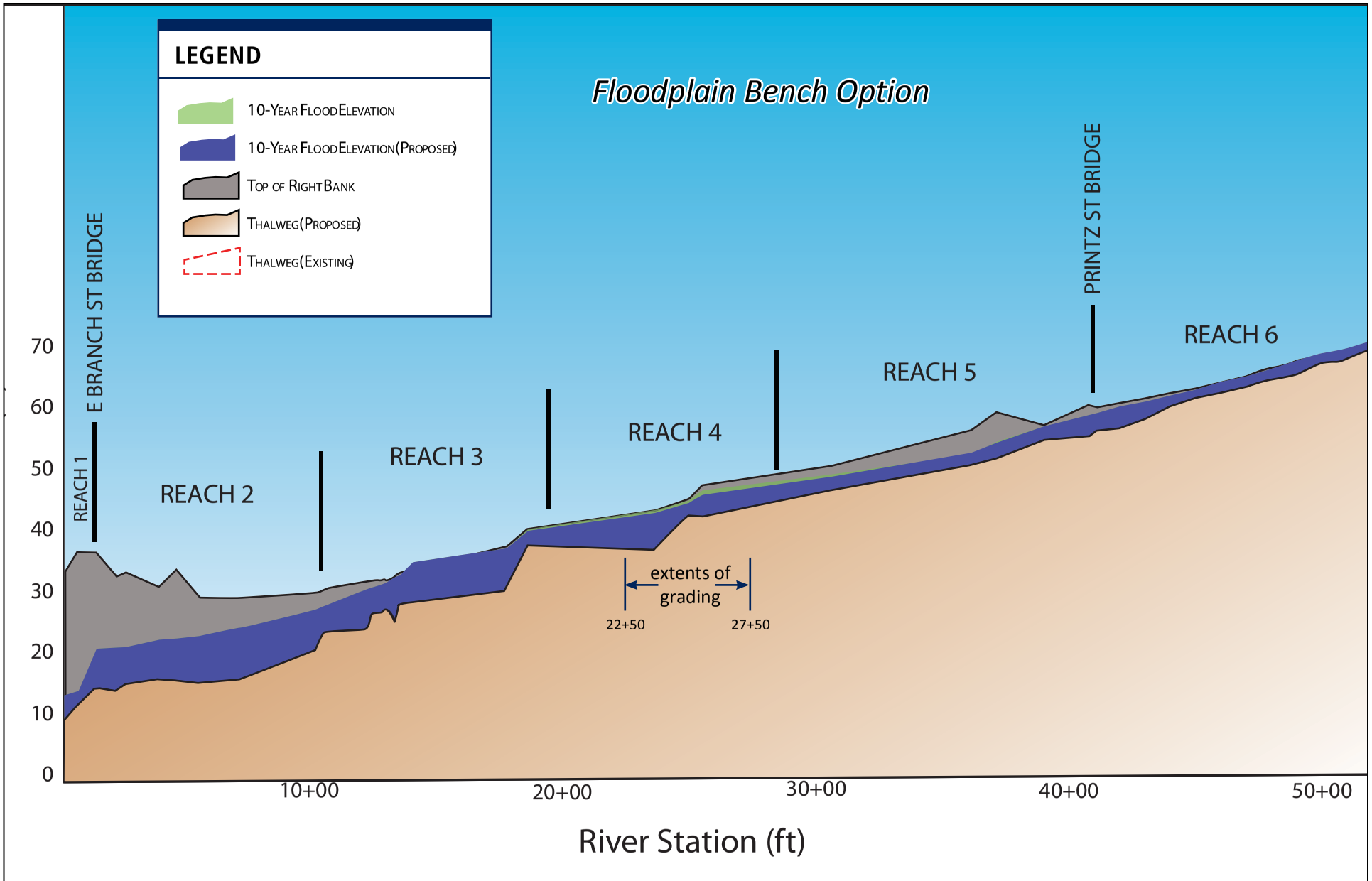


**FIGURE 20**

Longitudinal profile and water surface elevations for existing and proposed conditions with the floodplain bench enhancement option

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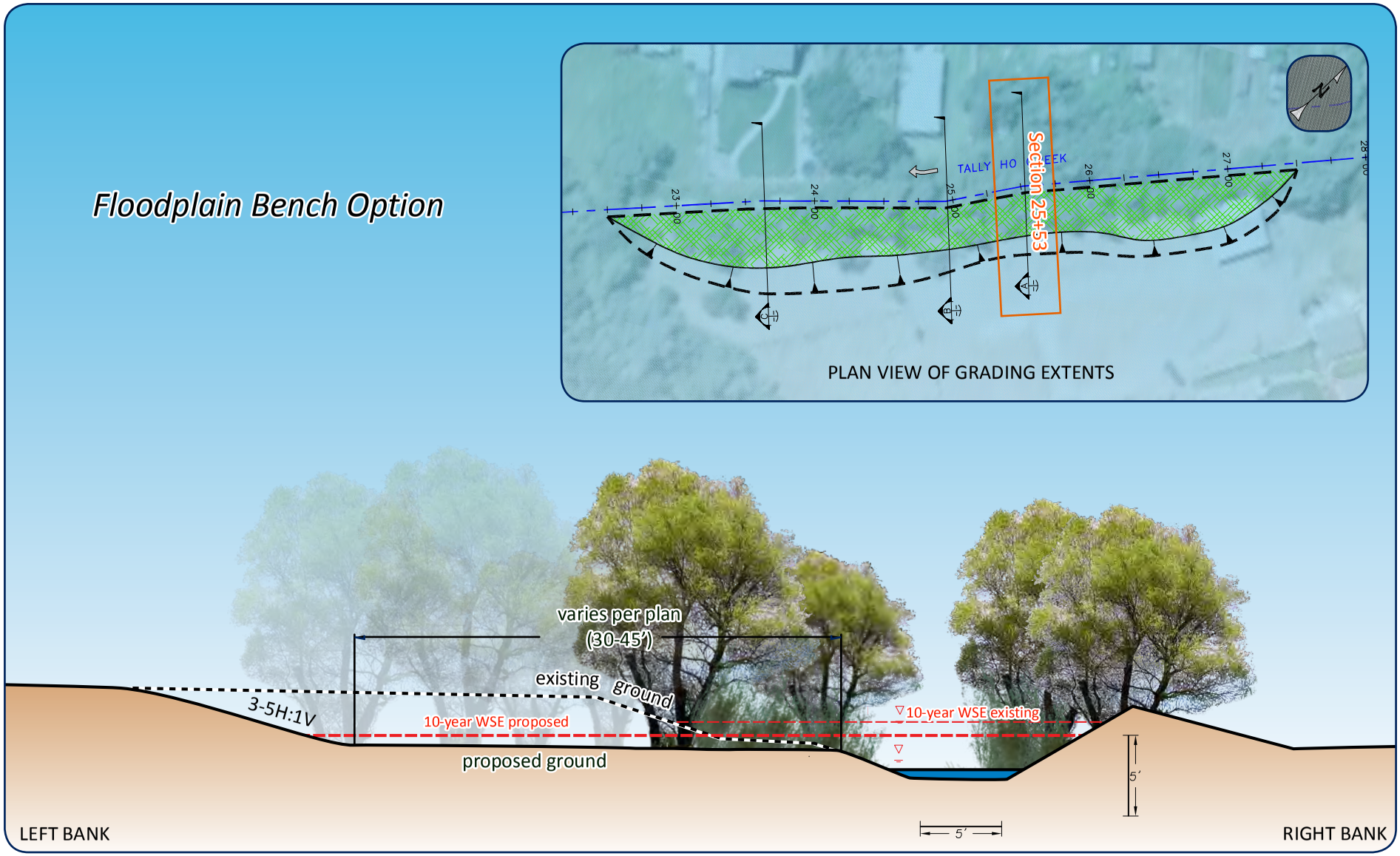


**FIGURE 21**

Conceptual cross section for floodplain bench option at River Station 25+53 (See Figure 19 for grading extents)

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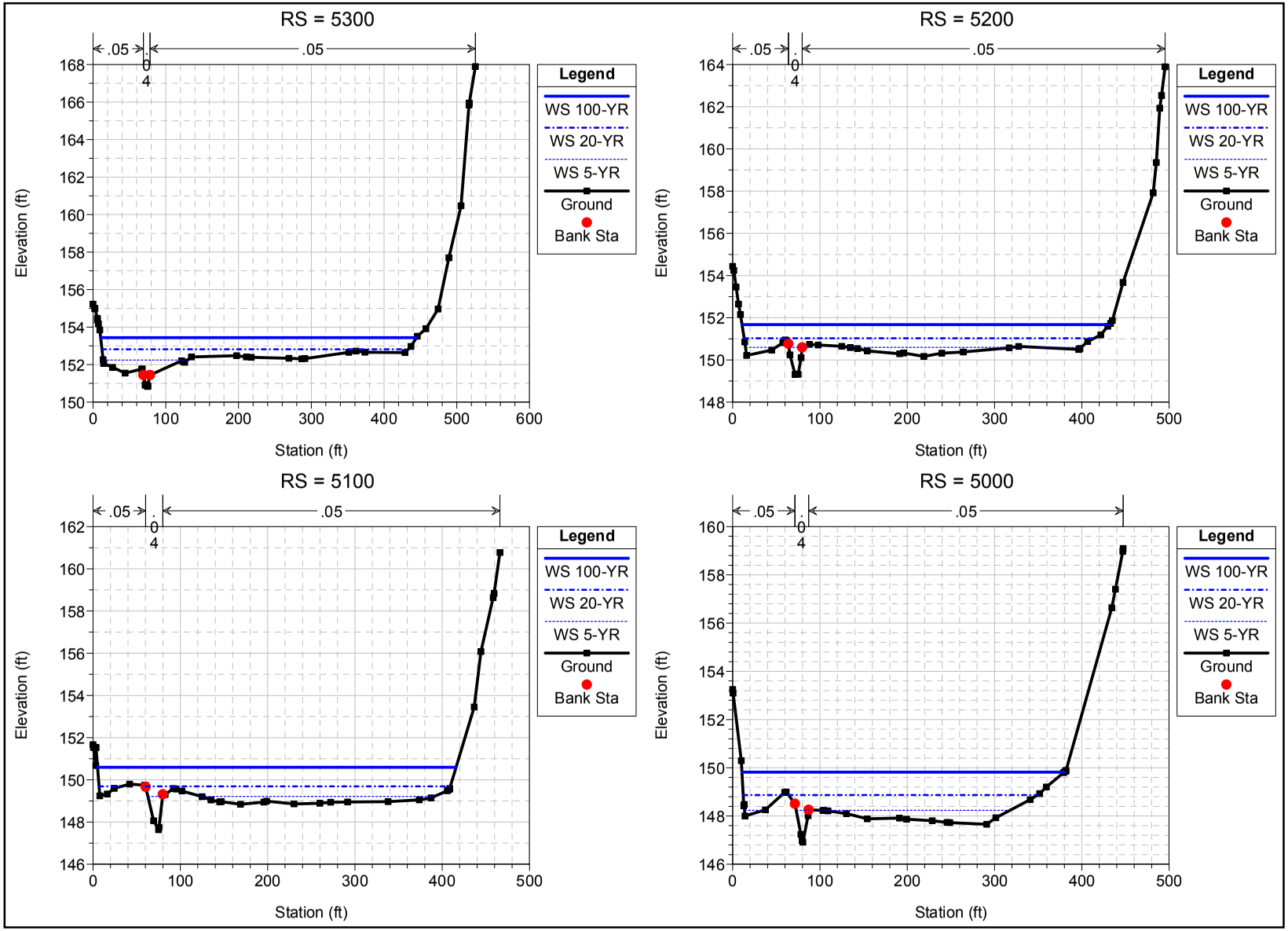
# TALLY HO CREEK
# PLANNING PROJECT

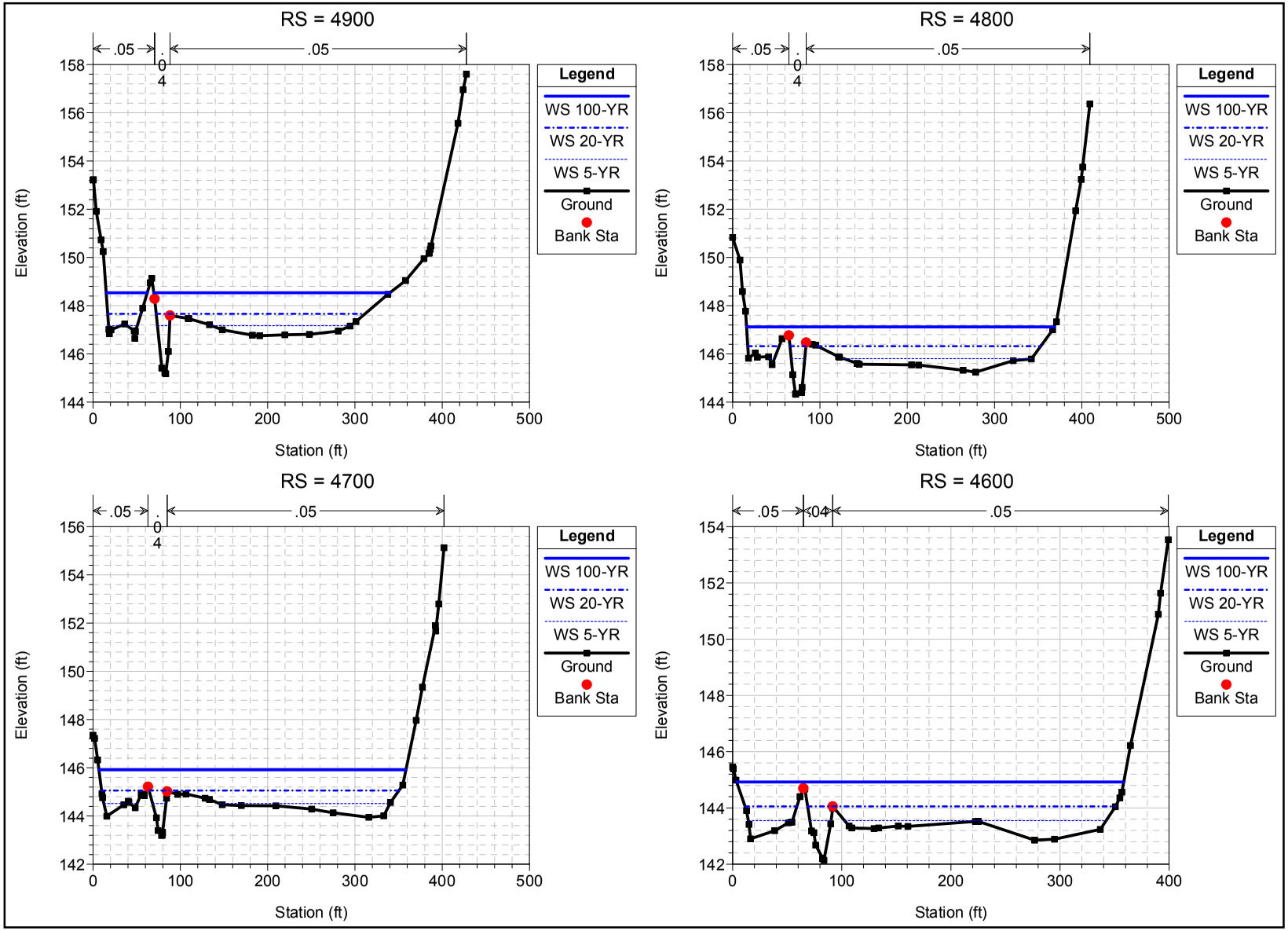
## APPENDIX A

## EXISTING CONDITIONS HEC-RAS OUTPUT



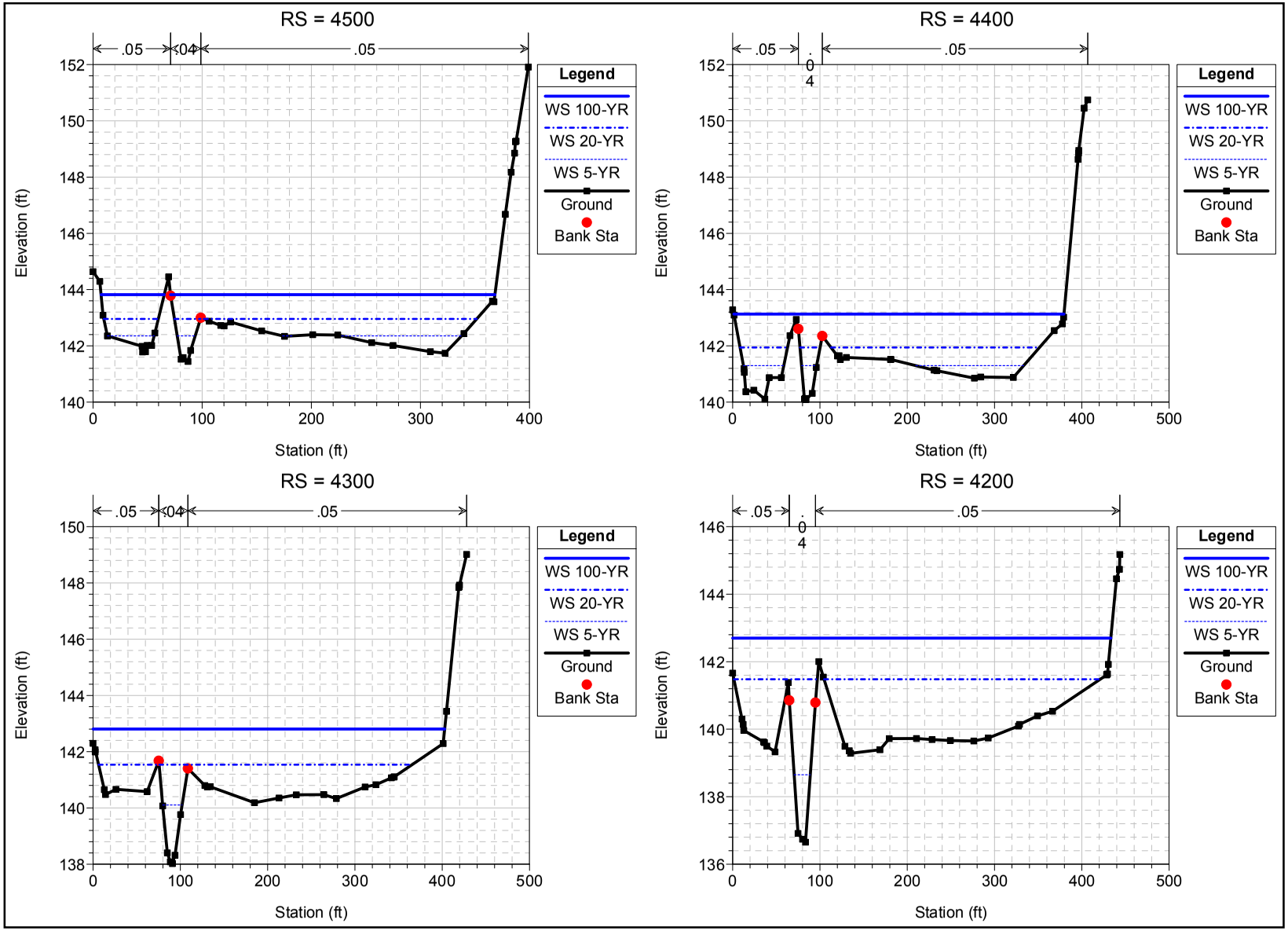

**APPENDIX A**

Existing conditions HEC-RAS cross-sections



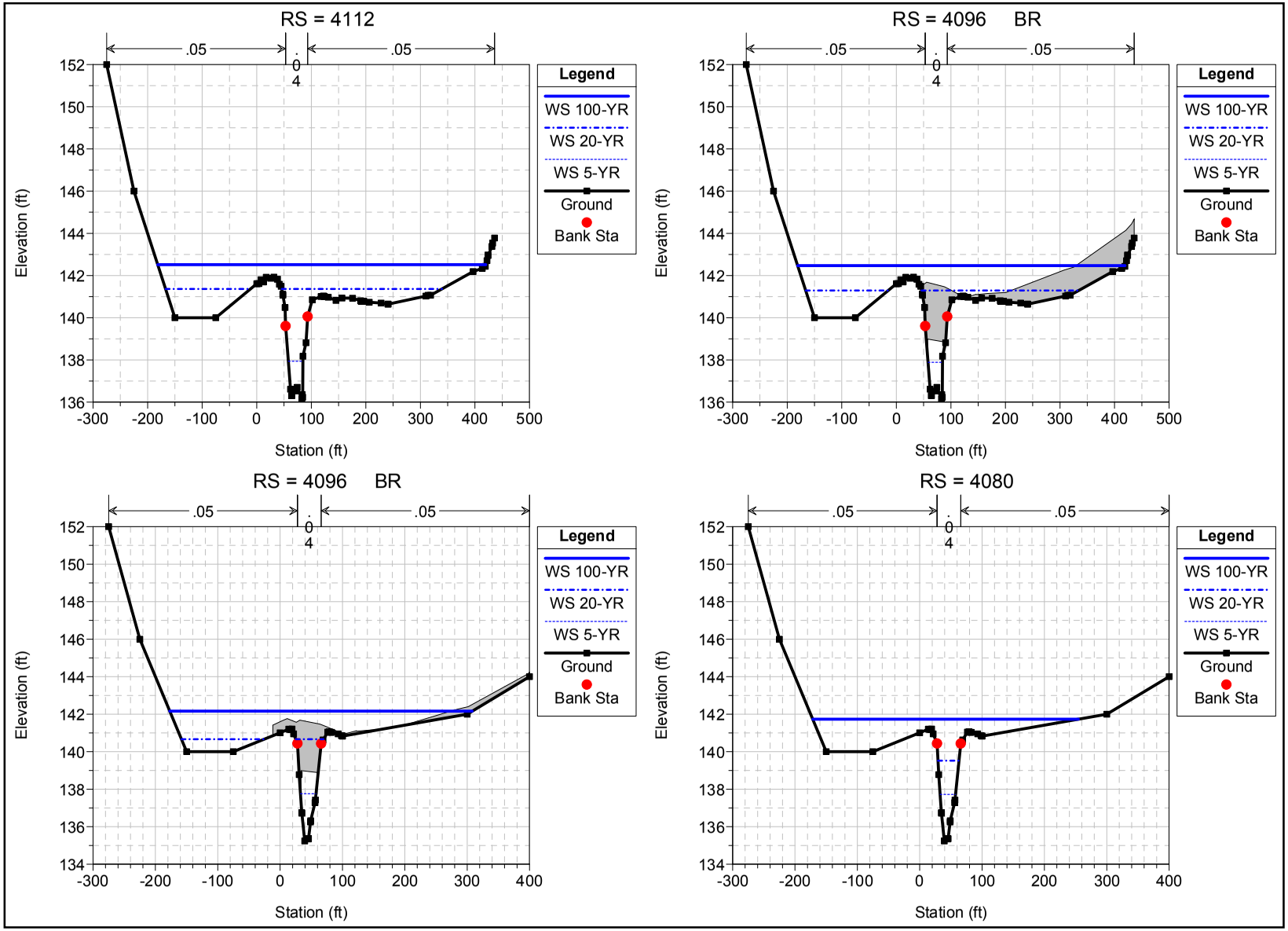

**APPENDIX A**

Existing conditions HEC-RAS cross-sections



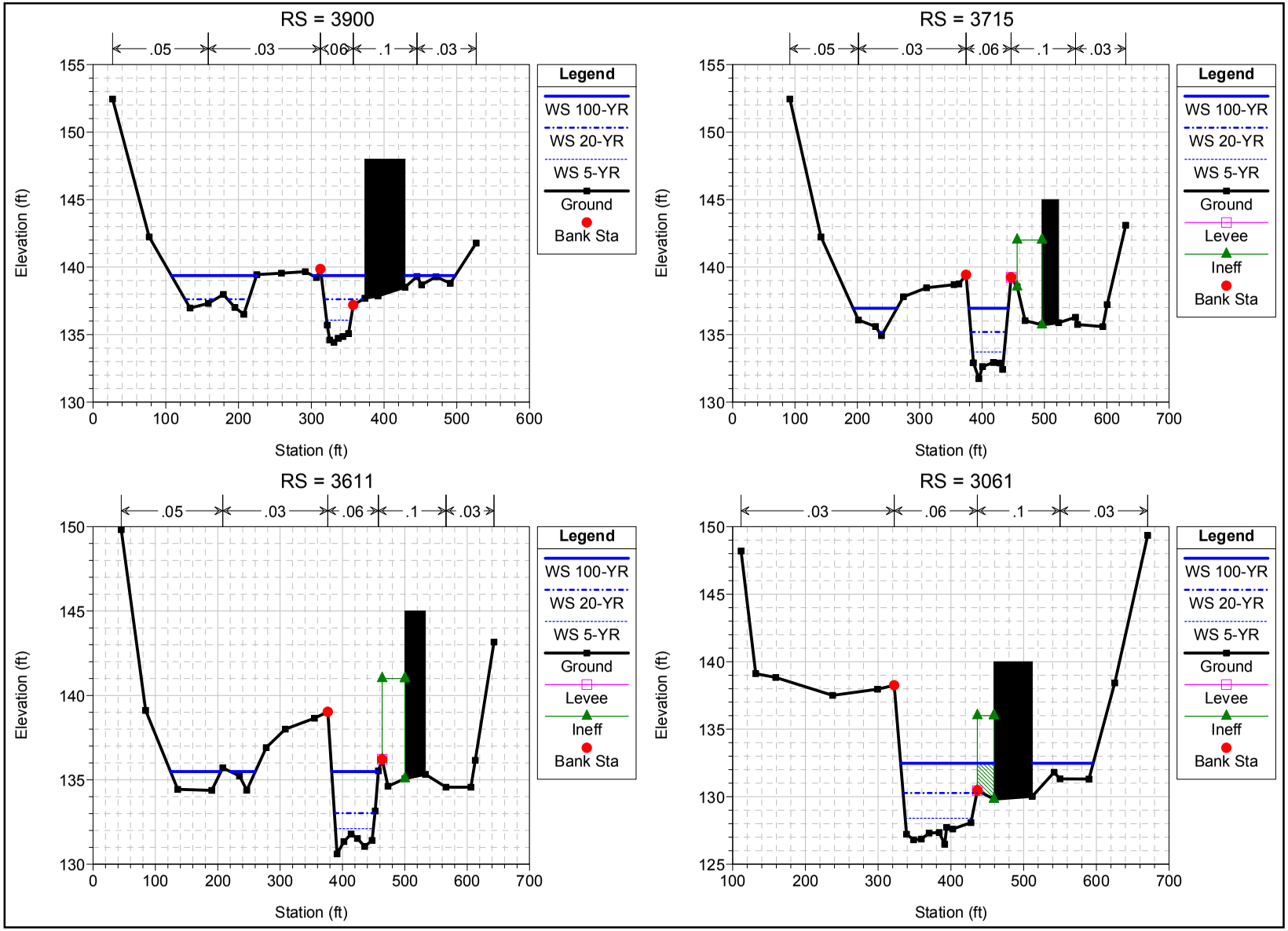

**APPENDIX A**

Existing conditions HEC-RAS cross-sections




**APPENDIX A**

Existing conditions HEC-RAS cross-sections




**APPENDIX A**

Existing conditions HEC-RAS cross-sections

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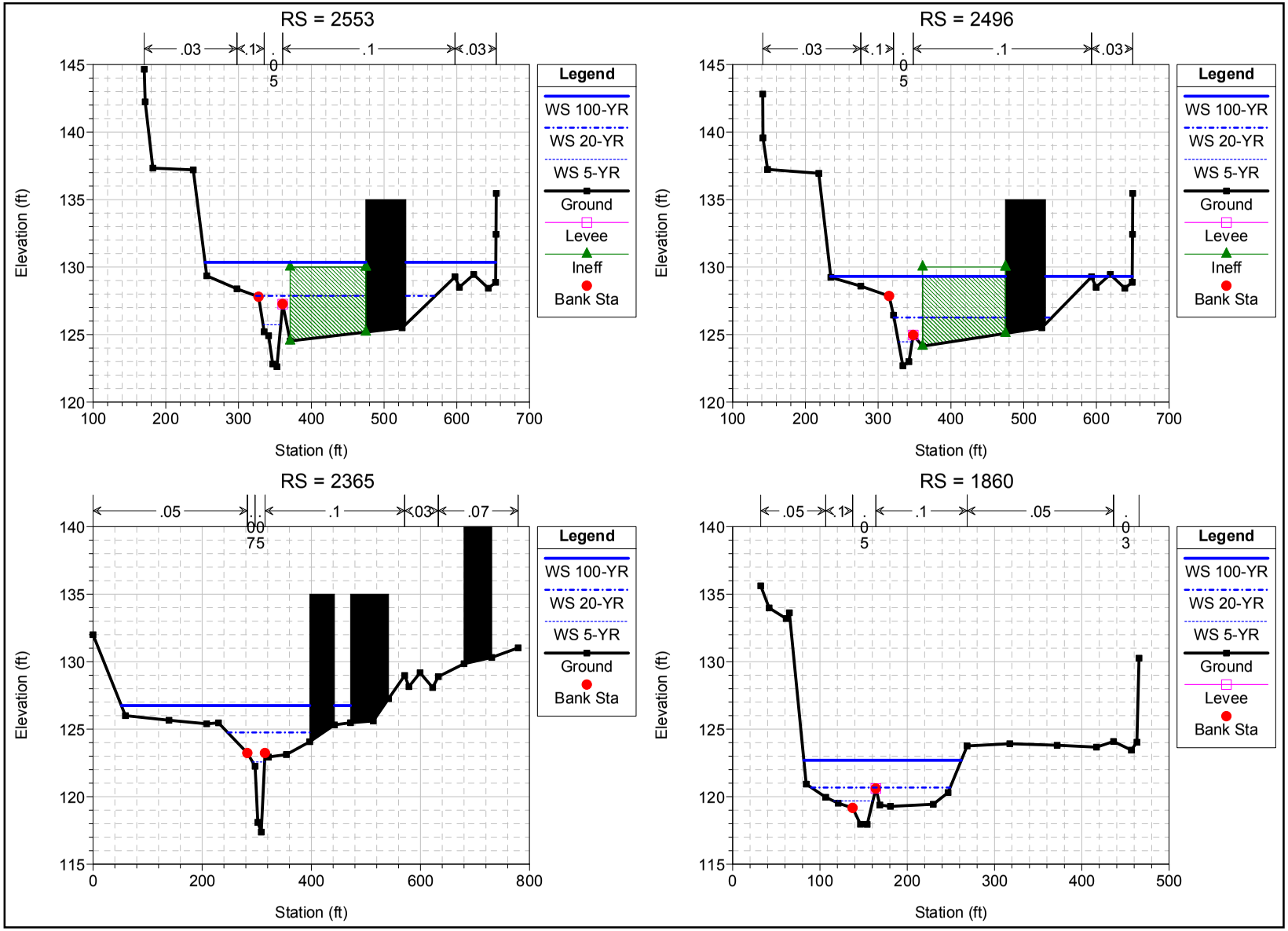
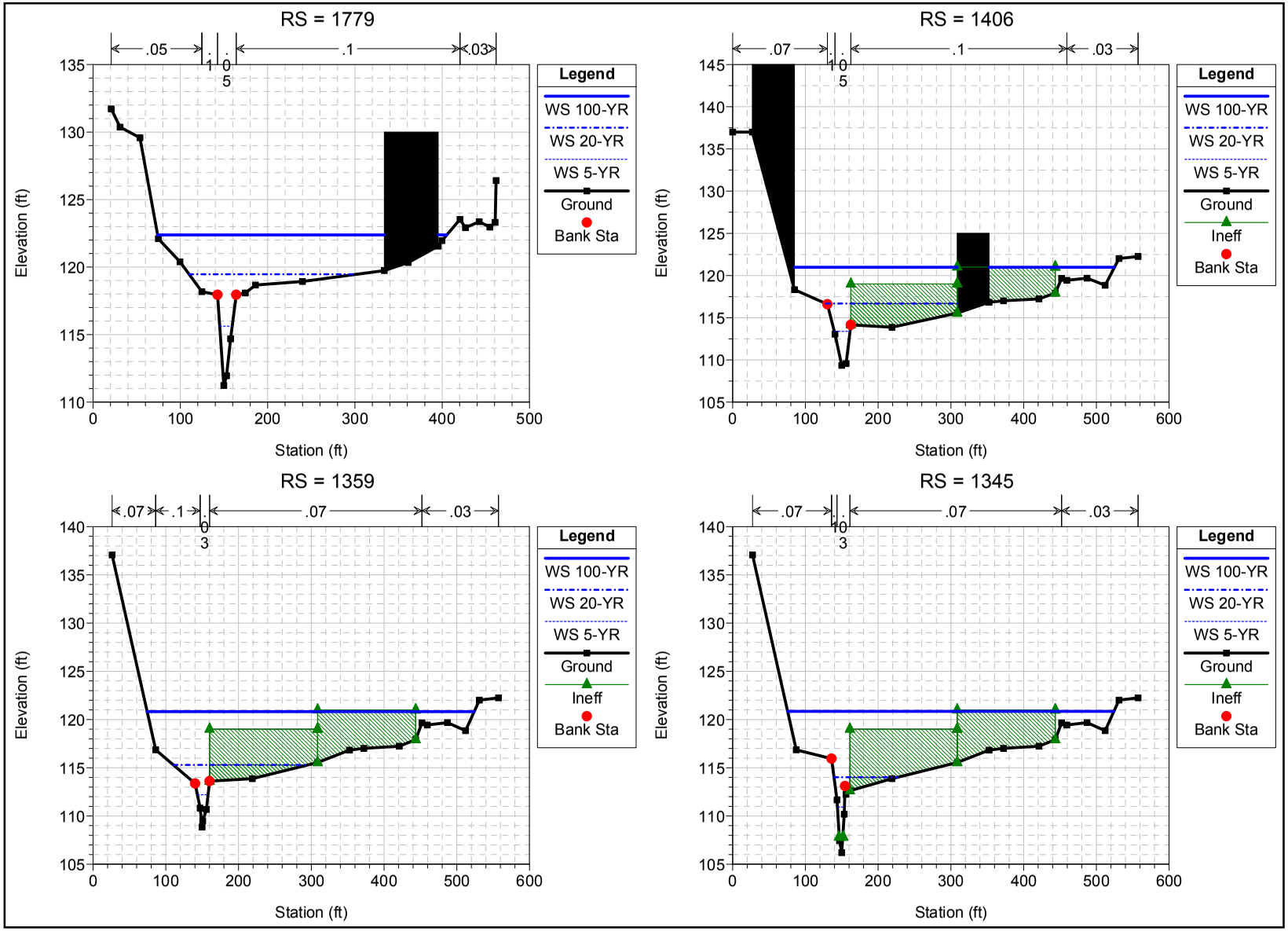



**APPENDIX A**

Existing conditions HEC-RAS cross-sections




**APPENDIX A**

Existing conditions HEC-RAS cross-sections

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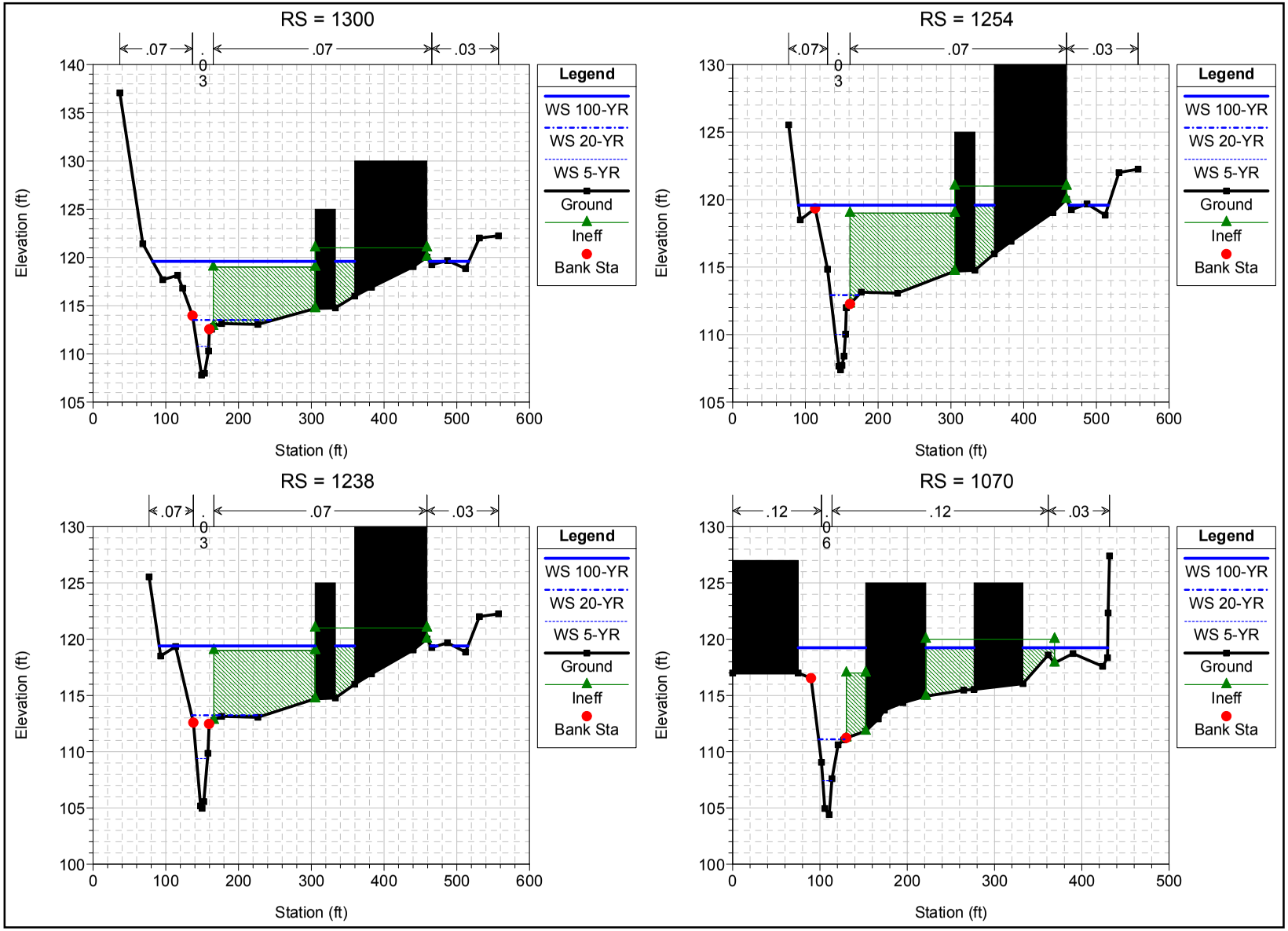
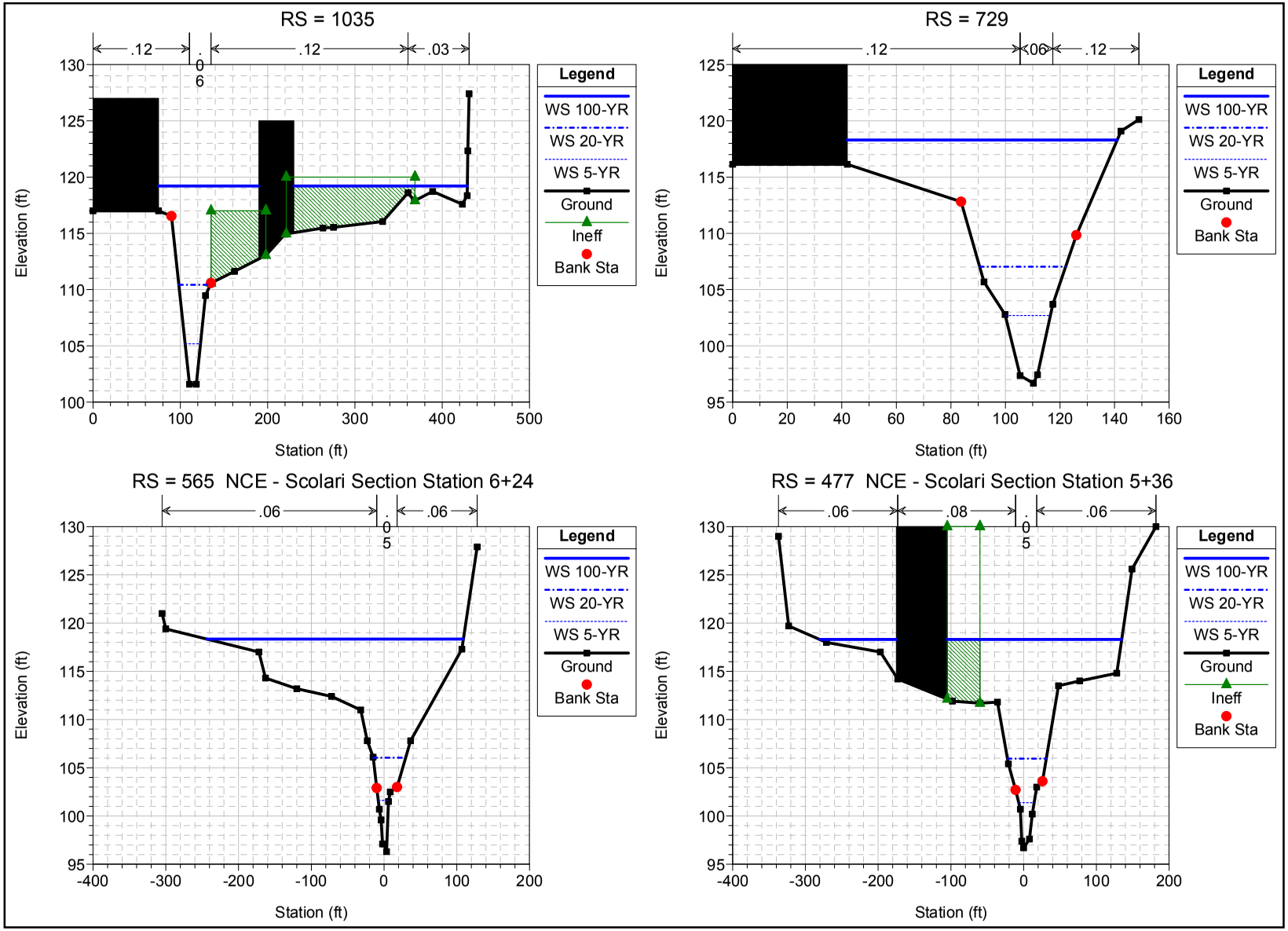



**APPENDIX A**

Existing conditions HEC-RAS cross-sections




**APPENDIX A**

Existing conditions HEC-RAS cross-sections

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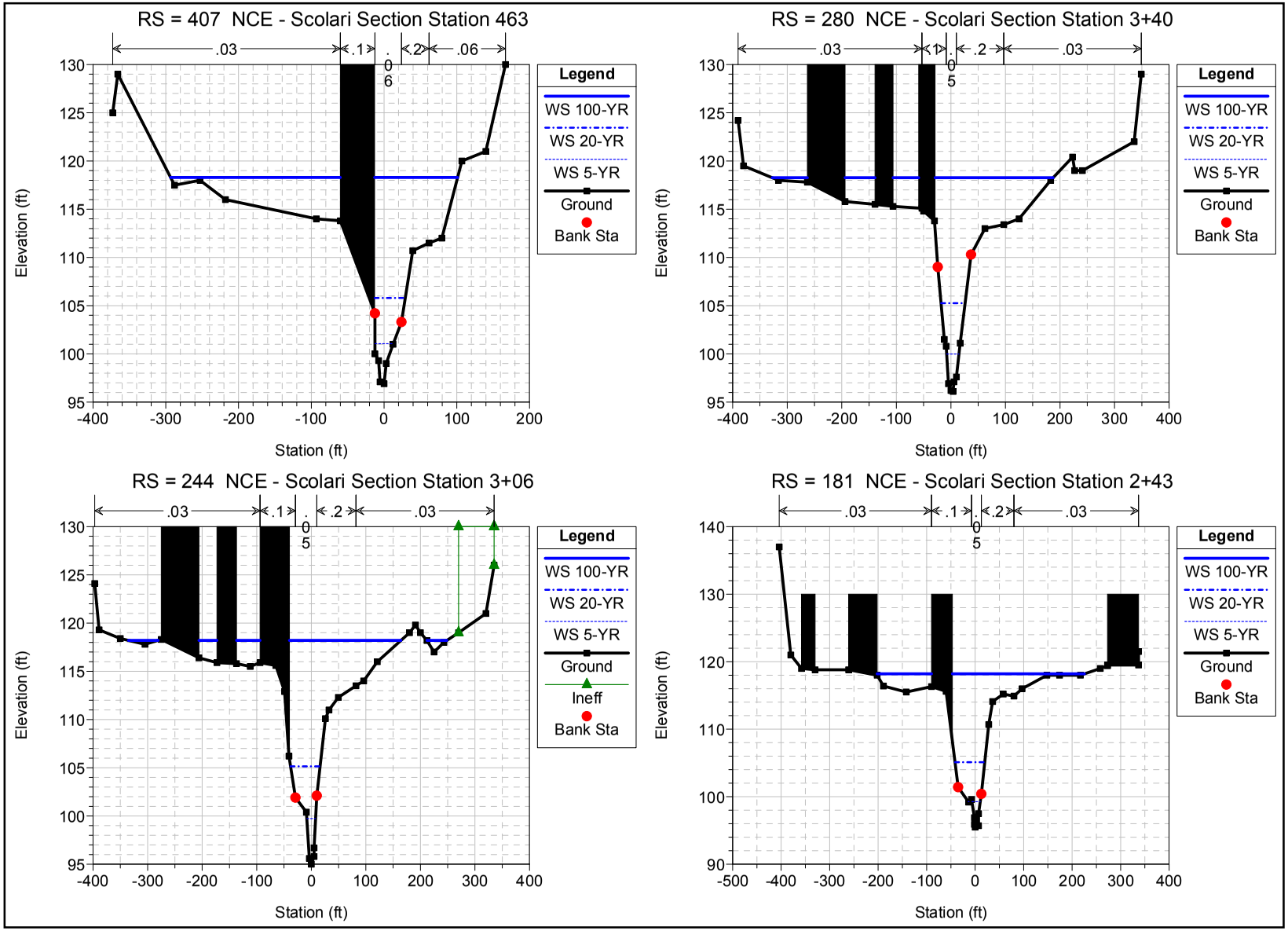


**APPENDIX A**

Existing conditions HEC-RAS cross-sections

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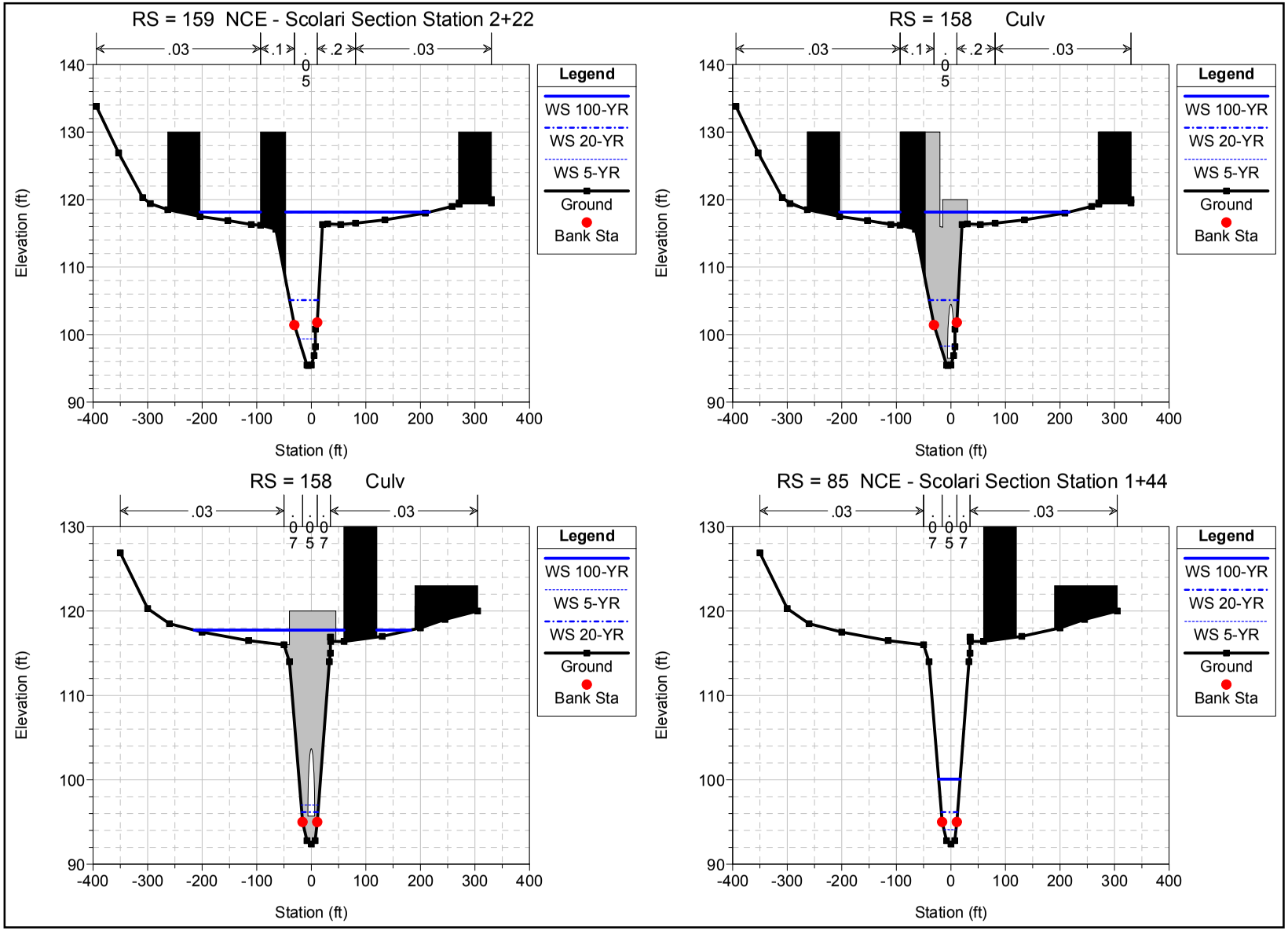
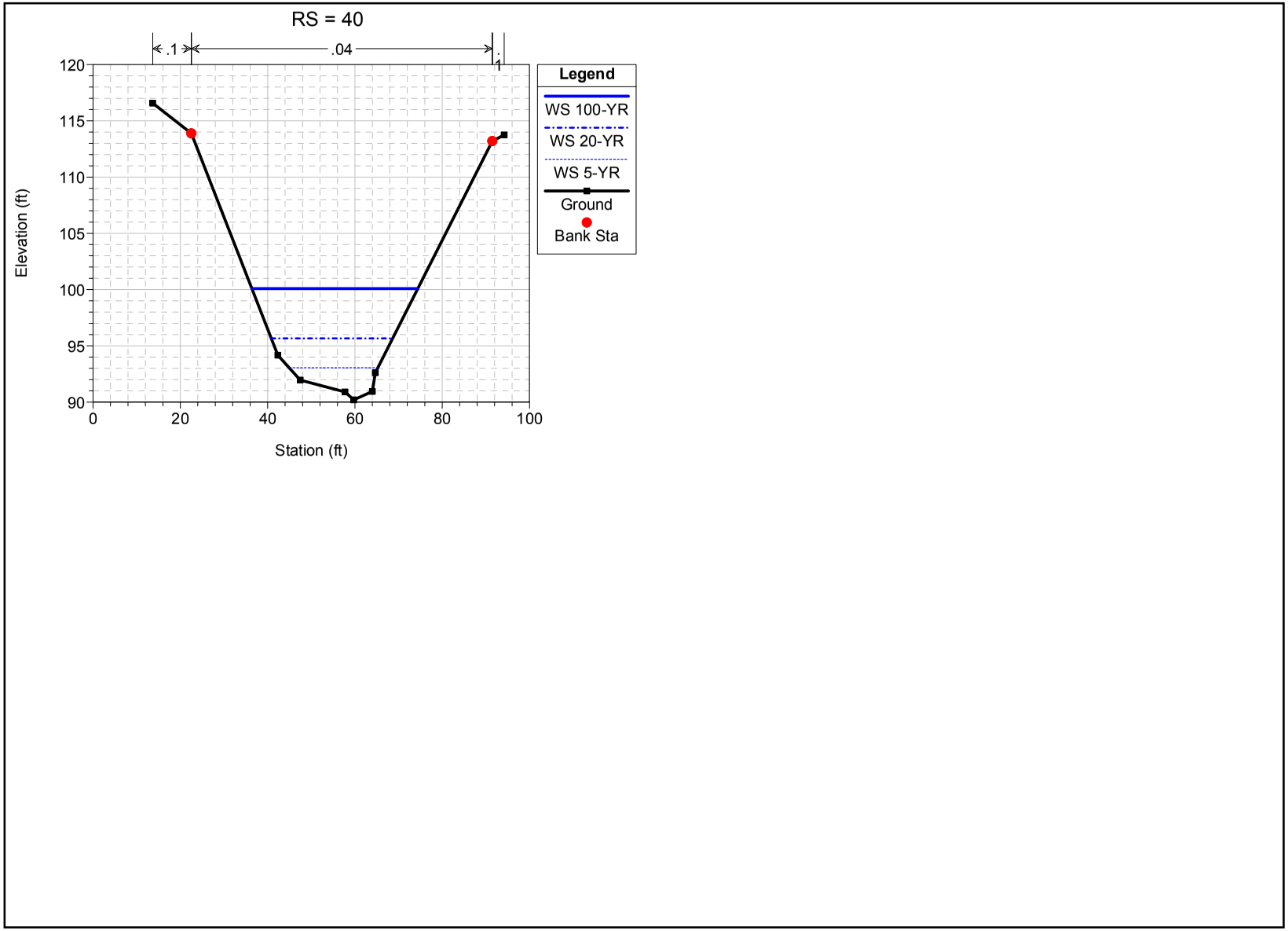



**APPENDIX A**

Existing conditions HEC-RAS cross-sections




**APPENDIX A**

Existing conditions HEC-RAS cross-sections

WATERWAYS CONSULTING

# TALLY HO CREEK
# PLANNING PROJECT

## APPENDIX B

## CNDDB SPECIAL STATUS SPECIES LIST

# APPENDIX B

| Table B-1. Special status plant species and their potential to occur in the study area. | | | |
|---|---|---|---|
| **Species** | **Status[1]** | **Habitat** | **Potential Habitat Within Project Area** |
| Hoover's bent grass<br>*Agrostis hooveri* | CNPS 1B | Chaparral woodland and foothill grassland. | Moderate. Potential to occur in Oak Woodland understory and adjacent grasslands. |
| Arroyo de la Cruz Manzanita<br>*Arctostaphylos cruzensis* | CNPS 1B | Broadleafed upland forest, coastal bluff scrub, closed-cone coniferous forest, chaparral, coastal scrub, & grassland | Low. No suitable habitat present. |
| Santa Lucia Manzanita<br>*Arctostaphylos luciana* | CNPS 1B | Chaparral, on shale outcrops, on slopes. | Low. No suitable habitat present. |
| Morro manzanita<br>*Arctostaphylos morroensis* | FT, CNPS 1B | Chaparral, cismontane woodland, coastal dunes (pre-flandrian), coastal scrub, on baywood sands. | Low. No suitable habitat present. |
| Pecho manzanita<br>*Arctostaphylos pechoensis* | CNPS 1B | Closed-cone coniferous forest, chaparral, coastal scrub. Grows on siliceous shale. | Low. No suitable habitat present. |
| Santa Margarita Manzanita<br>*Arctostaphylos pilosula* | CNPS 1B | Closed-cone coniferous forest, chaparral. Shale outcrops & slopes; reported growing on decomposed granite or sandstone. | Low. No suitable habitat present. |
| sand mesa Manzanita<br>*Arctostaphylos rudis* | CNPS 1B | Chaparral and coastal scrub in sandy soils | Low. No suitable habitat present. |
| Wells' Manzanita<br>*Arctostaphylos wellsii* | CNPS 1B | Chaparral, pine woodlands, coastal scrub | Low. No suitable habitat present. |
| marsh sandwort<br>*Arenaria paludicola* | FE, SE, CNPS 1B | Marshes, growing amid cattail and bulrush, peat marshes | Low. Species is very rare with limited distribution. Distribution of the species is well documented. |
| Miles' milk-vetch<br>*Astragalus didymocarpus var. milesianus* | CNPS 1B | Coastal scrub in clay soils. | Low. No suitable habitat present. |
| La Panza mariposa-lily<br>*Calochortus obispoensis* | CNPS 1B | Chaparral, coastal scrub, valley and foothill grassland. | Low. Marginal habitat present; species generally occurs in central to eastern portions o San Luis Obispo County. |

# APPENDIX B

| Table B-1. Special status plant species and their potential to occur in the study area. | | | |
|---|---|---|---|
| **Species** | **Status[1]** | **Habitat** | **Potential Habitat Within Project Area** |
| San Luis Obispo mariposa-lily *Calochortus simulans* | CNPS 1B | Chaparral, coastal scrub and grassland, often in serpentine. | Low. Marginal habitat present; species generally occurs in central to eastern portions o San Luis Obispo County. |
| Cambria morning-glory *Calystegia subacaulis* ssp. *episcopalis* | CNPS 1B | Chaparral, cismontane woodland. | Low. Marginal habitat present. |
| San Luis Obispo sedge *Carex obispoensis* | CNPS 1B | Closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, valley and foothill grassland. | Low. Marginal habitat present. |
| San Luis Obispo owl's-clover *Castilleja densiflora ssp. Obispoensis* | CNPS 1B | Valley and foothill grassland. | Low. No suitable habitat present. |
| Congdon's tarplant *Centromadia parryi ssp. congdonii* | CNPS 1B | Valley and foothill grassland in alkaline soils, sometimes described as heavy white clay. | Low. No suitable habitat present. |
| dwarf soaproot *Chlorogalum pomeridianum var. minus* | CNPS 1B | Chaparral, valley and foothill grassland. | Low. No suitable habitat present. |
| Brewer's spineflower *Chorizanthe breweri* | CNPS 1B | Chaparral woodland and coastal scrub, rocky serpentine | Low. No suitable habitat present. |
| straight-awned spineflower *Chorizanthe rectispina* | CNPS 1B | Chaparral, cismontane woodland, coastal scrub. | Low. Marginal habitat present. |
| San Luis Obispo fountain thistle *Cirsium fontinale* var. *obispoens* | FE, SE, CNPS 1B | Chaparral, cismontane woodland. | Low. Marginal habitat present. |
| La Graciosa thistle *Cirsium loncholepis* | FE, ST, CNPS 1B | Coastal Dunes, brackish marshes, riparian scrub | Low. Species is known to along the low reaches of Arroyo Grande Creek (west of Highway 101), but habitat in the study area is marginal. Study area not within designated critical habitat for the species. |
| Surf thistle *Cirsium rhothophilum* | ST, CNPS 1B | Coastal dunes, coastal bluff scrub | Low. No suitable habitat present. |

# APPENDIX B

| Table B-1. Special status plant species and their potential to occur in the study area. | | | |
|---|---|---|---|
| **Species** | **Status[1]** | **Habitat** | **Potential Habitat Within Project Area** |
| California saw-grass *Cladium californicum* | CNPS 2 | Freshwater and alkali marshes, seeps. | Low. Suitable habitat is present, but species distribution is limited and is thought to be extripated from San Luis Obispo County (pers comm. David Keil, 2009) |
| Pismo clarkia *Clarkia speciosa* ssp. *immaculata* | FE, SR, CNPS 1B | Chaparral woodland and foothill grassland on ancient sand dunes | Low. No suitable habitat present. |
| leafy tarplant *Deinandra increscens* ssp. *foliosa* | CNPS 1B | Valley and foothill grassland | Low. No suitable habitat present. |
| dune larkspur *Delphinium parryi* ssp. *blochmaniae* | CNPS 1B | Chaparral and coastal dunes; rocky areas and dunes | Low. No suitable habitat present. |
| umbrella larkspur *Delphinium umbraculorum* | CNPS 1B | cismontane woodland. | Low. Marginal habitat present. |
| beach spectaclepod *Dithyrea maritima* | ST, CNPS 1B | Coastal dunes, coastal scrub on sand dunes and sandy areas | Low. No suitable habitat present. |
| Betty's dudleya *Dudleya abramsii* ssp. *bettinae* | CNPS 1B | Coastal scrub, valley and foothill grassland, chaparral. | Low. No suitable habitat present. |
| mouse-gray dudleya *Dudleya abramsii* ssp. *murina* | CNPS 1B | Chaparral, cismontane woodland. | Low. Marginal habitat present. |
| Blochman's dudleya *Dudleya blochmaniae* ssp. *blochmaniae* | CNPS 1B | Coastal scrub, coastal bluff scrub, valley and foothill grassland. | Not likely to occur. No suitable habitat present. |
| yellow-flowered eriastrum *Eriastrum luteum* | CNPS 1B | Broadleafed upland forest, cismontane woodland, chaparral, on bare sandy decomposed granite slopes. | Low. Marginal habitat present. |
| Blochman's leafy daisy *Erigeron blochmaniae* | CNPS 1B | Coastal sand dunes and hills. | Low. Marginal habitat present. |
| Indian Knob mountainbalm *Eriodictyon altissimum* | FE, SE, CNPS 1B | Chaparral (maritime), cismontane woodland. Ridges in open, disturbed areas | Low. Marginal habitat present. |

# APPENDIX B

**Table B-1. Special status plant species and their potential to occur in the study area.**

| Species | Status[1] | Habitat | Potential Habitat Within Project Area |
|---|---|---|---|
| | | within chaparral on pismo sandstone. | |
| Hoover's button-celery *Eryngium aristulatum* var. *hooveri* | CNPS 1B | Alkaline depressions, vernal pools, roadside ditches and other wet places near the coast | Low. Species is associated with alkaline environments or vernal pool habitat. |
| Ojai fritillary *Fritillaria ojaiensis* | CNPS 1B | Broadleaved upland forest (mesic), chaparral, lower montane coniferous forest. | Low. No suitable habitat present. |
| San Benito fritillary *Fritillaria viridea* | CNPS 1B | Chaparral serpentine slopes. | Low. No suitable habitat present. |
| mesa horkelia *Horkelia cuneata* ssp. *puberula* | CNPS 1B | Chaparral woodland and coastal scrub, sandy or gravelly sites | Low. No suitable habitat present. |
| Kellogg's horkelia *Horkelia cuneata* ssp. *sericea* | CNPS 1B | Chaparral, pine forest, coastal scrub, old dunes and sandhills | Low. No suitable habitat present. |
| Jones' layia *Layia jonesii* | CNPS 1B | Chaparral, valley and foothill grassland. | Low. No suitable habitat present. |
| San Luis Obispo County lupine *Lupinus ludovicianus* | CNPS 1B | Chaparral and woodland in sandy soil | Low. Marginal habitat present. |
| Nipomo Mesa lupine *Lupinus nipomensis* | FE, SE, CNPS 1B | Coastal dunes | No potential to occur. No suitable habitat present. |
| crisp monardella *Monardella crispa* | CNPS 1B | Coastal dunes, coastal scrub | No potential to occur. No suitable habitat present. |
| San Luis Obispo monardella *Monardella frutescens* | CNPS 1B | Coastal dunes, coastal scrub | No potential to occur. No suitable habitat present. |
| Palmer's monardella *Monardella palmeri* | CNPS 1B | Cismontane woodland, chaparral on serpentine, often found associated with sargent cypress forests. | Low. Marginal habitat present. |
| Gambel's water cress *Nasturtium gambelii* | FE, ST, CNPS 1B | Freshwater and brackish water marshes along lakes and streams | Low. Species is very rare with limited distribution. Distribution of the species is well documented. |

# APPENDIX B

**Table B-1. Special status plant species and their potential to occur in the study area.**

| Species | Status[1] | Habitat | Potential Habitat Within Project Area |
|---|---|---|---|
| short-lobed broomrape *Orobanche parishii* ssp. *brachyloba* | CNPS 1B | Coastal bluff scrub, coastal dunes, coastal scrub. | No potential to occur. No suitable habitat present. |
| hooked popcorn-flower *Plagiobothrys uncinatus* | CNPS 1B | Chaparral, cismontane woodland, valley and foothill grassland, coastal bluff scrub. | Low. Marginal habitat present. |
| adobe sanicle *Sanicula maritima* | CNPS 1B | Meadows and seeps, valley and foothill grassland, chaparral, coastal prairie. | Low. Marginal habitat present. |
| black-flowered figwort *Scrophularia atrata* | CNPS 1B | Closed-cone coniferous forest, chaparral, coastal dunes, coastal scrub, riparian scrub. | Moderate. Potential to occur in riparian areas. |
| chaparral ragwort *Senecio aphanactis* | CNPS 2 | Cismontane woodland, coastal scrub. | Low. Marginal habitat present. |
| Cuesta Pass checkerbloom *Sidalcea hickmanii* ssp. *anomala* | CNPS 1B | Closed-cone coniferous forest | Low. No suitable habitat present. |
| most beautiful jewel-flower *Streptanthus albidus* ssp. *peramoenus* | CNPS 1B | Chaparral, valley and foothill grassland, cismontane woodland. | Low. Marginal habitat present. |
| San Bernardino aster *Symphyotrichum defoliatum* | CNPS 1B | Meadows and seeps, coastal scrub, woodland, mesic areas near ditches and streams | Moderate. Potential to occur along margins of Tally Ho Creek. |
| saline clover *Trifolium depauperatum* var. *hydrophilum* | CNPS 1B | Marshes and swamps, valley and foothill grassland, vernal pools. | Low. Species is associated with saline and alkaline environments, or vernal pool habitat. |
| caper-fruited tropidocarpum *Tropidocarpum capparideum* | CNPS 1B | Valley and foothill grassland. | Low. Marginal habitat present. |

[1]**KEY TO STATUS**

**CNPS Status:**

**List 1B:** These plants (predominately endemic) are rare through their range and are currently vulnerable or have a high potential for vulnerability due to limited or threatened habitat, few individuals per population, or a limited number of populations. List 1B plants meet the definitions of Section 1901, Chapter 10 of the CDFG Code.

**Federal and State Status:**

# APPENDIX B

| Table B-1. Special status plant species and their potential to occur in the study area. | | | |
|---|---|---|---|
| **Species** | **Status[1]** | **Habitat** | **Potential Habitat Within Project Area** |
| **T:** Designated as a threatened species by the federal government or the California Fish and Game Commission<br>**E:** Designated as an endangered species by the federal government or the California Fish and Game Commission<br>**R:** Designated as a rare species by the federal government or the California Fish and Game Commission<br>**SSC:** Species of Special Concern | | | |

| Table B-2. Special status wildlife species and their potential to occur in the study area. | | | |
|---|---|---|---|
| **Species** | **Status[1]** | **Habitat** | **Potential Habitat Within Project Area** |
| **Fish** | | | |
| Steelhead – south/central California coast ESU<br>*Oncorhynchus mykiss irideus* | FT | Perennial creeks and rivers with gravels for spawning. | Low. Tally Ho Creek does not support steelhead; Potential to occur near the confluence with Arroyo Grande Creek. |
| Tidewater goby<br>*Eucyclogobius newberryi* | FE, CSC | Coastal lagoons and up to 1 mile upstream in creeks and rivers | No potential to occur. No suitable habitat present. |
| **Invertebrates** | | | |
| Vernal pool fairy shrimp<br>*Branchinecta lynchi* | FT | Inhabit small, clear-water sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools. | No potential to occur. No suitable habitat present. |
| **Amphibians** | | | |
| California tiger salamander<br>*Ambystoma californiense* | FT, CSC | Ponds, vernal pools for breeding, grasslands with burrows for upland habitat | Low. Tally Ho Creek may provide suitable aquatic habitat, but there is no suitable upland habitat adjacent to the creek. |
| California red-legged frog<br>*Rana aurora draytonii* | FT, CSC | Creeks, rivers, marshes, estuaries and ponds for foraging and dispersal; still water at least into June for breeding. | High. Suitable breeding habitat likely present. |
| Western spadefoot<br>*Spea hammondii* | CSC | Occurs primarily in grassland habitats, but can be found in valley-foothill hardwood woodlands. Vernal pools are essential for breeding and egg-laying. | Low. No suitable habitat for breeding is present. |

## APPENDIX B

| Table B-2. Special status wildlife species and their potential to occur in the study area. | | | |
|---|---|---|---|
| **Species** | **Status[1]** | **Habitat** | **Potential Habitat Within Project Area** |
| Coast Range newt *Taricha torosa torosa* | CSC | Lives in terrestrial habitats & will migrate over 1 km to breed in ponds, reservoirs & slow moving streams. | Low. Suitable habitat is present, but the species has not been observed in the general vicinity of the study area. Species is thought to be limited to waterways/areas above Lopez Lake (Pers. Comm. with Susan Christopher, Rincon Consultants, 2009) |
| **Reptiles** | | | |
| Silvery legless lizard *Anniella pulchra pulchra* | CSC | Sandy or loose loamy soils under sparse vegetation. Soil moisture is essential as they prefer soils with high moisture content. | Low. No suitable habitat present. |
| Southwestern pond turtle *Emys(=Clemmys) marmorata pallida* | CSC | Creeks and ponds with water of sufficient depth for escape cover, and structure for basking; grasslands or bare areas for nesting. | Moderate. Suitable aquatic habitat is present, but basking and nesting habitats are marginal. |
| Coast horned lizard *Phrynosoma coronatum* | CSC | Sandy washes and open loose soils with scattered bushes | Low. No suitable habitat present. |
| **Birds** | | | |
| Tricolored blackbird *Agelaius tricolor* | CSC | Dense bulrush and/or cattail vegetation adjacent to freshwater marshes | Low. Marginal habitat is present. |
| Burrowing owl *Athene cunicularia* | CSC | Nests and winters in grasslands with burrows and short vegetation | Low. Adjacent grasslands lack burrows. No suitable habitat present. |
| Western snowy plover *Charadrius alexandrinum nivosus* | FT, CSC | Nests on sandy beaches, salt pond levees, alkali lakeshores | Low. No suitable habitat present. |
| Western yellow billed cuckoo *Coccyzus americanus occidentalis* | SE, FC | Riparian forest nester, along the broad, lower flood-bottoms of larger river systems. Nests in riparian jungles of willow, often mixed with cottonwoods, w/ lower story of blackberry, nettles, or wild grape. | Low. Marginal habitat present. Species is rare and predominantly occurs in the Central Valley and Kern River drainage. Associated with larger river systems. |
| Yellow warbler *Dendroica petechia brewsteri* | CSC | Riparian forests with dense understory vegetation | Moderate. Study area provides suitable habitat. |
| California condor *Gymnogyps californianus* | SE, FE | Require vast expanses of open savannah, grasslands, and foothill | Low. The study area is within the species range, but provides limited foraging and |

## APPENDIX B

| Table B-2. Special status wildlife species and their potential to occur in the study area. | | | |
|---|---|---|---|
| **Species** | **Status[1]** | **Habitat** | **Potential Habitat Within Project Area** |
| | | chaparral in mountain ranges of moderate altitude. Deep canyons containing clefts in the rocky walls provide nesting sites. Forages up to 100 miles from roost/nest. | roosting habitat. |
| California black rail<br>*Laterallus jamaicensis coturniculus* | ST | Inhabits freshwater marshes, wet meadows & shallow margins of saltwater marshes bordering larger bays. Needs water depths of about 1 inch that does not fluctuate during the year & dense vegetation for nesting habitat. | No potential to occur. No suitable habitat present. |
| Purple martins<br>*Progne subis* | CSC | Inhabits woodlands, low elevation coniferous forest of Douglas-fir, ponderosa pine, & Monterey pine. Nests in old woodpecker cavities mostly, also in human-made structures. Nest often located in tall, isolated tree/snag. | Low. Not likely to occur. |
| California least tern<br>*Sterna antillarum browni* | SE, FE | Nests along coast on bare, flat substrates, sandy beaches, alkali flats, land fills | No potential to occur. No suitable habitat present. |
| Least Bell's vireo<br>*Vireo bellii pusillus* | SE, FE | Riparian with well developed overstory and understory, and low density of aquatic and herbaceous vegetation, with low human disturbance | Low. Marginal habitat present; moderate level of human disturbance limits the likelihood of occurence. |
| **Mammals** | | | |
| Pallid bat<br>*Antrozous pallidus* | CSC | Deserts, grasslands, shrublands, woodlands & forests. Most common in open, dry habitats with rocky areas for roosting. | Low. Oak Woodland in the study area provide suitable habitat, but species is sensitive to disturbance. Proximity to developed areas limits the likelihood of occurrence. |
| Townsend's big-eared bat<br>Corynorhinus townsendii | CSC | Humid coastal regions of northern & central California. Roost in limestone caves, lava tubes, mines, buildings etc. | Low. Marginal habitat present. Requires caves, mines buildings, etc. for roosting. Sensitive to disturbance. |