H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

WRIGLEY CREEK IMPROVEMENT PROJECT
MILPITAS, CALIFORNIA
YEAR-1 (2011) MONITORING REPORT

U. S. Army Corps of Engineers Section 404 Permit File No. 26644S
California Department of Fish and Game Streambed Alteration Notification No.1600-2008-0266-3
Regional Water Quality Control Board Site No. 02-43-C0589

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EXECUTIVE SUMMARY

PERMIT NUMBERS

The following permits were obtained per the Project requirements: U. S. Army Corps of Engineers Section 404 Permit File No. 26644S; California Department of Fish & Game Streambed Alteration Notification No.1600-2008-0266-3; Regional Water Quality Control Board Site No. 02-43-C0589.

BACKGROUND

The Santa Clara Valley Transportation Authority's (VTA) Freight Railroad Relocation/Lower Berryessa Creek (FRR/LBC) project is located within the Union Pacific Railroad (UPRR) corridor from UPRR Milpitas yard, just south of Calaveras Boulevard in Milpitas, to an unnamed creek in Fremont (designated as Line B by the Alameda County Flood Control and Water Conservation District) (Figure 1). The project includes track relocation and construction, modifications to roadway crossings, drainage improvements, and culvert replacement and/or extension where the rail line crosses Line B, Scott Creek, Calera Creek, Berryessa Creek, and Wrigley Creek. The project's Mitigation and Monitoring Plan (MMP) describes mitigation for FRR/LBC project related impacts, which include 0.48 acre (ac) of permanent impacts to wetlands, 288 linear feet (ln ft) of permanent impacts to other State and Federal waters, and permanent removal of approximately 100 Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*) individuals (ICF Jones & Stokes 2009).

All FRR/LBC impacts are mitigated within the Wrigley Creek Improvement Project, which was completed in February 2011 and included the installation of a total of 1.04 ac of seasonal floodplain wetlands, 1.96 ac of riparian woodland habitat, 1985 ln ft of channel (including channel meanders and backwater alcoves) and seeding of 0.23 ac with Congdon's tarplant (H. T. Harvey & Associates 2011).

RESULTS

Table 1 presents the Year-1 monitoring results and management recommendations relative to the project's Year-1 success criteria. The Year-1 (2011) monitoring results of the Wrigley Creek Improvement Project indicate the site met the Year-1 performance criteria for survival of woody plantings and Congdon's tarplant. The overall survival rate of woody plants was 97% in good or fair condition. Approximately 5600 Congdon's tarplant individuals were counted, which far exceeded the minimum 100 individuals required in 2 of 5 monitoring years. The site had 15.3% cover of native grasses, which did not meet the Year-1 survival criterion of 75% cover; however, the coverage of native herbaceous vegetation was 50.6% relative to the overall percent cover of vegetation at the site (69.3%). Hydrologic and geomorphic observations indicate the constructed channel and floodplain are stable and functioning as intended. These results suggest that, with the exception of native grass cover, the site is on a trajectory towards meeting its long-term success criteria.

Table 1. Wrigley Creek Improvement Project Habitat Mitigation Performance and Success Criteria

INDICATOR	YEAR-1 SUCCESS CRITERIA	YEAR-5 FINAL SUCCESS CRITERIA	YEAR-1 SUCCESS CRITERION MET? (YES/NO) (YEAR-1 RESULT)	COMMENTS/ MANAGEMENT RECOMMENDATIONS
Woody Plant Percent Survival	90% in good or fair condition	70% in good or fair condition	Yes (97% survival in good or fair condition)	None
Native Grass Average Percent Cover	75% cover of species in native seed mix	35% cover of species in native seed mix	No (15.3%)	Increase weed control level of effort and install native grass plugs and seed (see below Management Recommendations Section for details)
Congdon's Tarplant Survival	NA	≥100 individuals in 2 of 5 monitoring years	NA (5600 individuals)	None

MANAGEMENT RECOMMENDATIONS SUMMARY

Native Grass Cover Success Criterion

As noted above, the native grass percent cover success criterion was not met in Year-1. However, the site supported a very high abundance of Congdon's tarplant and a relatively high percent cover of native herbaceous vegetation in Year-1; grasses and forbs combined provided 35.1% absolute native vegetation cover, which accounted for over 50% relative cover of all vegetation on the site. In our professional opinion, the VTA has expended a high level of maintenance effort in Year-1 in an attempt to meet the success criteria, and with continued comparable maintenance effort, native vegetation cover should continue to increase in Years 2 through 5. However, the MMP's native grass cover criterion is not likely to be achievable due both to interspecific competition between native grasses and desirable native forbs (e.g., Congdon's tarplant), as well as competition between native grasses and non-native grasses/forbs whose seed is continually dispersing to the site from the surrounding highly disturbed landscape. The MMP recognizes that Congdon's tarplant thrives in non-native grassland and states that the project's native grass criterion could be adjusted if Congdon's tarplant is present and meets its success criterion (≥100 individuals in 2 of 5 monitoring years). Given the high abundance of Congdon's tarplant in Year-1, the final success criterion for Congdon's tarplant will likely be met in Year-2.

We recommend that the regulatory agencies and VTA consider revising the native grass cover success criterion to a vegetation metric and criterion that is more closely linked to the overall target habitat goals of the project's revegetation design. For example, a metric such as native vegetation cover of grasses, forbs, and woody plants combined would reflect the design intent to restore a mosaic of native riparian, wetland, and Congdon's tarplant habitat.

Year-2 Vegetation Maintenance

We recommend that the level of effort expended for weed control in Year-2 should be comparable to that expended in Year-1. In addition, we recommend supplemental native grass revegetation in Year-2 to increase the likelihood that native grass cover will continue to be a major component of the total native vegetation cover onsite. Maintenance recommendations for the Wrigley Creek Improvement Project include:

1. **Weeding.** General weeding and non-native species removal should continue throughout the site as outlined in the MMP (ICF Jones & Stokes 2009). Particular attention should be paid to stinkwort (*Dittrichia graveolens*), which occurs adjacent to the site along the rail line.

   Hand weeding, hoeing, or spot herbicide treatments may be considered for many of the dominant weed species including wild beet (*Beta vulgaris*), bristly ox tongue (*Helminthotheca echioides*), bindweed (*Convolvulus arvensis*), curly dock (*Rumex crispus*), and barnyard grass (*Echinochloa crus-galli*). Care should be taken to avoid damaging naturally recruiting native plants and woody plantings during weeding activities. Particular care should be taken to avoid Congdon's tarplant.

2. **Supplemental Plug Installation and Seeding.** It is recommended that additional plugs of beardless wild rye (*Elymus triticoides*) be installed and supplemental native grass seed be broadcast to encourage greater cover of native grasses. Plant plugs should be installed on 1 ft centers in patches at select locations throughout the floodplain zone. Native seed should be broadcast by hand in areas disturbed during weed control using native grass seed from the native seed mix originally installed at the site (H. T. Harvey & Associates 2011). The grass plugs should be installed as soon as possible between January and March 2012, and the grass seed should be installed in September 2012 prior to the onset of the next rainy season. If grass plugs cannot be installed during this time period then it is recommend that the planting be postponed until fall 2012. It is also recommended that H. T. Harvey & Associates work closely with VTA and the maintenance contractor to determine the most appropriate planting locations and the number of plugs to be installed.

3. **Irrigation**. Continue to irrigate woody plantings at a frequency similar to or less than that of Year-1 and at a minimum amount such that the plantings show no obvious signs of drought stress.

REQUESTED AGENCY ACTION

The VTA would like to discuss revising the native grass cover success criterion with the regulatory agencies prior to initiation of Year-2 monitoring.

INTRODUCTION

The Wrigley Creek Improvement Project provides mitigation for the Santa Clara Valley Transportation Authority's (VTA) Freight Railroad Relocation/Lower Berryessa Creek Project (FRR/LBC).

The FRR/LBC project is located within the Union Pacific Railroad (UPRR) corridor from the UPRR Milpitas yard, just south of Calaveras Boulevard in Milpitas, to an unnamed creek in Fremont (designated as Line B by the Alameda County Flood Control and Water Conservation District) (Figure 1). The project includes track relocation and construction, modifications to roadway crossings, drainage improvements, and culvert replacement and/or extension where the rail line crosses Line B, Scott Creek, Calera Creek, Berryessa Creek, and Wrigley Creek. The FRR/LBC project resulted in 0.48 acre (ac) of permanent impacts to wetlands, 288 linear feet (ln ft) of permanent impacts to other State and Federal waters, and permanent removal of approximately 100 Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*) individuals (ICF Jones & Stokes 2009).

All FRR/LBC impacts are mitigated within the Wrigley Creek Improvement Project in accordance with the project's regulatory agency permits and associated Mitigation and Monitoring Plan (MMP) (ICF Jones & Stokes 2009). The mitigation project includes the relocation and revegetation of 1580 ln ft of existing channel and creation of additional channel habitat via the restoration of channel meanders and backwater alcoves. The Wrigley Creek Improvement Project site is located within the larger FRR/LBC project area, on a reach of Wrigley Creek between Yosemite Drive and Calaveras Boulevard in Milpitas, California (Figure 1). Construction of the Wrigley Creek Improvement Project began in August 2010 and was completed in February 2011. The mitigation project included the construction of 1.04 ac of seasonal floodplain wetlands, 1.96 ac of riparian woodland habitat, 1985 ln ft of channel (including channel meanders and backwater alcoves), and seeding of 0.23 ac with Congdon's tarplant. The project meets the habitat mitigation construction requirements in the regulatory agency permits and includes an additional 60 ln ft of channel restoration, 0.04 ac of floodplain wetland habitat, and 1.96 ac of riparian woodland habitat (Table 2) (H. T. Harvey & Associates 2011).

The MMP includes quantifiable performance and final success criteria and calls for a minimum 5-year monitoring period (Years 1-5). Annual monitoring of the mitigation site by a qualified biologist will determine if the project has met the performance and final success criteria. By the final year of monitoring, the site should be sufficiently established to determine if it would eventually achieve the long-term habitat mitigation goals with little chance of failure. The results of the final year of monitoring will be compared to the success criteria to determine if they have been met. If the success criteria of the mitigation project have not been met, monitoring will continue until they are achieved. This report fulfills the requirement for Year-1 monitoring and characterizes the biological conditions of the site.

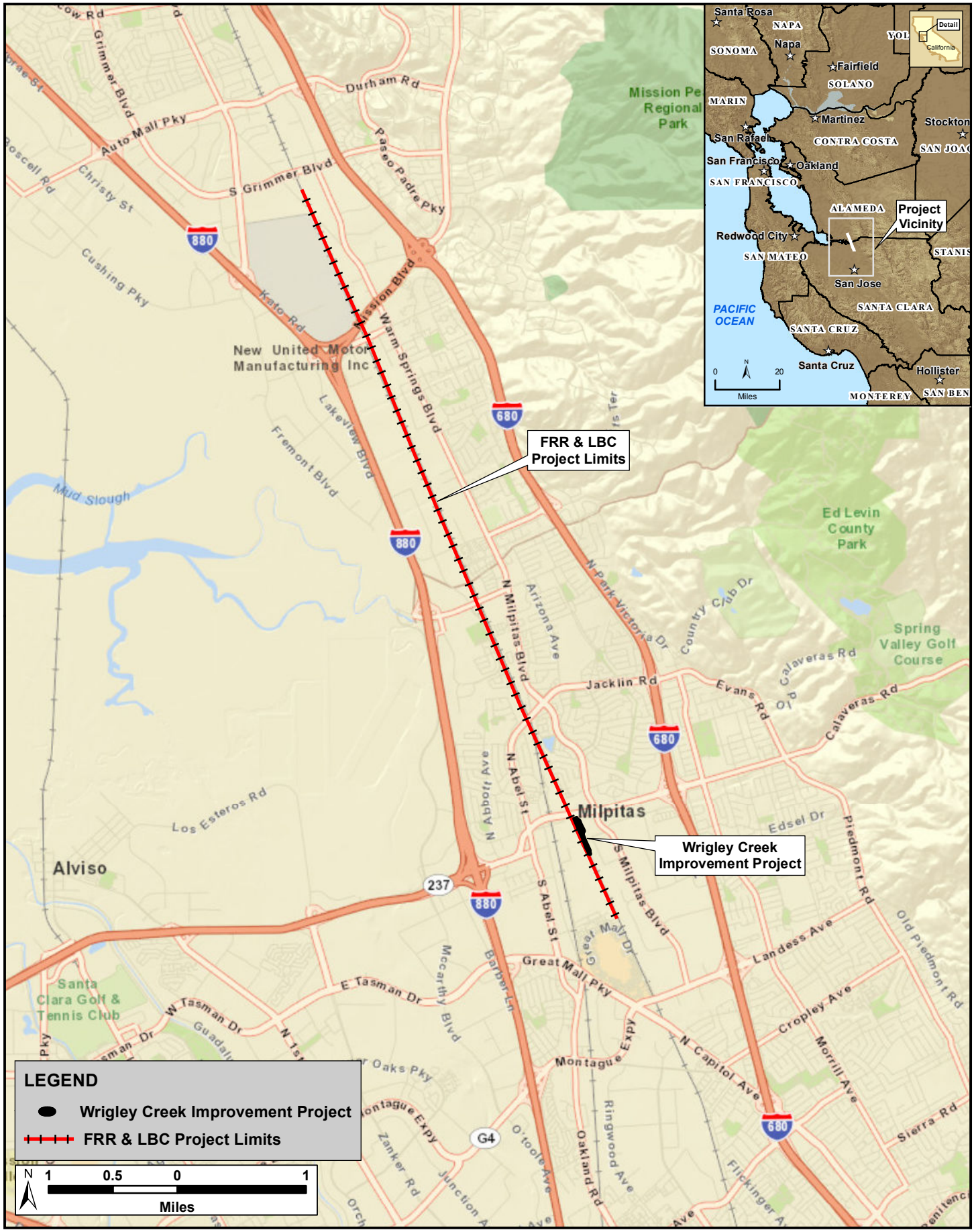

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Figure 1: Vicinity Map

Wrigley Creek Improvement Project (2995-04)

February 2012

MONITORING METHODS

H. T. Harvey & Associates' restoration ecologists C. Jensen, B.A. and C. McClain, M.S. conducted field surveys of the vegetation at the Wrigley Creek mitigation site on 22 September and 11 October 2011. Vegetation surveys were conducted in accordance with the methods outlined in the MMP. Vegetation characteristics measured in the field included plant survival, plant health and vigor, and natural recruitment. In addition, vegetation maintenance observations were noted throughout the year and photographs were taken from fixed locations to document habitat establishment. The following is a description of the methods employed during these field surveys and the methods used to analyze the data. The methods employed by Balance Hydrologics to assess on-site hydrology and geomorphology and detailed results of their assessment are provided in Appendix B.

PLANT SURVIVAL

Plant survival monitoring was focused on survival of woody plantings, percent cover of native grasses, and number of Congdon's tarplant present.

Woody Plant Survival

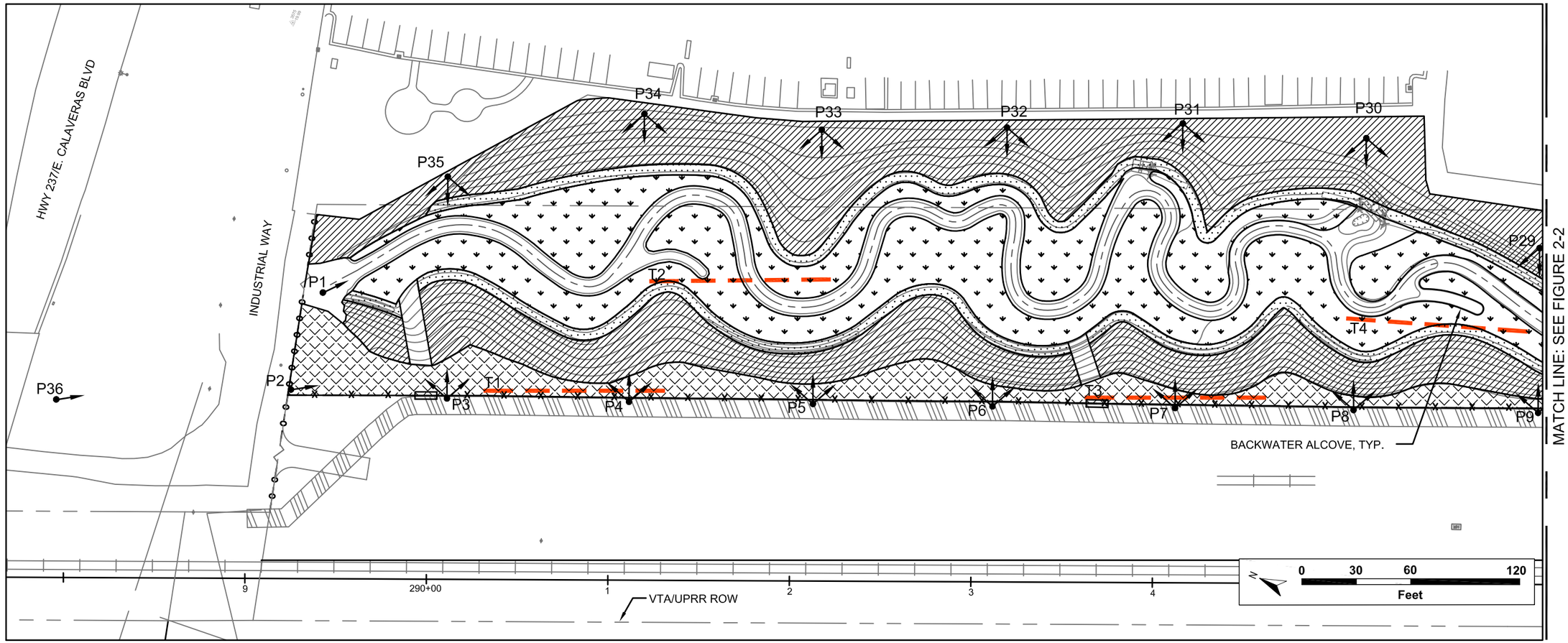
Plant survivorship was determined by counting 100% of the installed woody plants. The total number of living and dead individuals of each planted species was counted in the field. The overall percent survival was calculated and the percent survival for each species was calculated as follows:

> Percent Survival Species A = (Total Number Alive in 2011/Total Number Required per the MMP) * 100

The success criterion for woody plant survival in Year-1 is 90% survival in good or fair condition. The methods for assessing the condition of the woody plantings are described in the Plant Health and Vigor section below.

Native Grass Percent Cover

In accordance with the MMP, native grass percent cover was estimated by conducting a survey along 5 randomly located transects. Two transects were located in the Congdon's Tarplant Mitigation Area and 3 were located in the Floodplain Planting Zone (Figures 2-1 & 2-2). Two of the 3 transects in the Floodplain Planting Zone cross Wrigley Creek. Each transect is 100 ft in length and endpoints of each transect are marked with metal u-posts and labeled with aluminum tags. Percent cover monitoring in subsequent years will occur along these same transects. Percent herbaceous plant cover was estimated using the quadrat method (Bonham 1989). Cover data were collected in 5 randomly located 1 m^2 quadrats along each of the 5 transects (n=25). Within each quadrat, the dominant plant species were identified and percent cover was estimated to the nearest 1 percent. Plant species were identified in accordance with Baldwin et al. (2012). Average percent cover was calculated for the overall species mix (i.e., total cover of native grasses in native seed mix) and for each species. The adequacy of the sample size was



Legend

- FLOODPLAIN PLANTING ZONE
- STREAMSIDE PLANTING ZONE
- UPLAND PLANTING ZONE
- CONGDON'S TARPLANT MITIGATION AREA
- CHEVRON PIPELINE PROTECTION ZONE (NO PLANTING)
- BIOENGINEERED OUTFALL STRUCTURE
- P1 PHOTO DOCUMENTATION POINT
- SPLIT RAIL FENCE
- SPLIT RAIL GATE
- CHAIN LINK FENCE
- CHANNEL CENTERLINE
- T1 TRANSECT LOCATION

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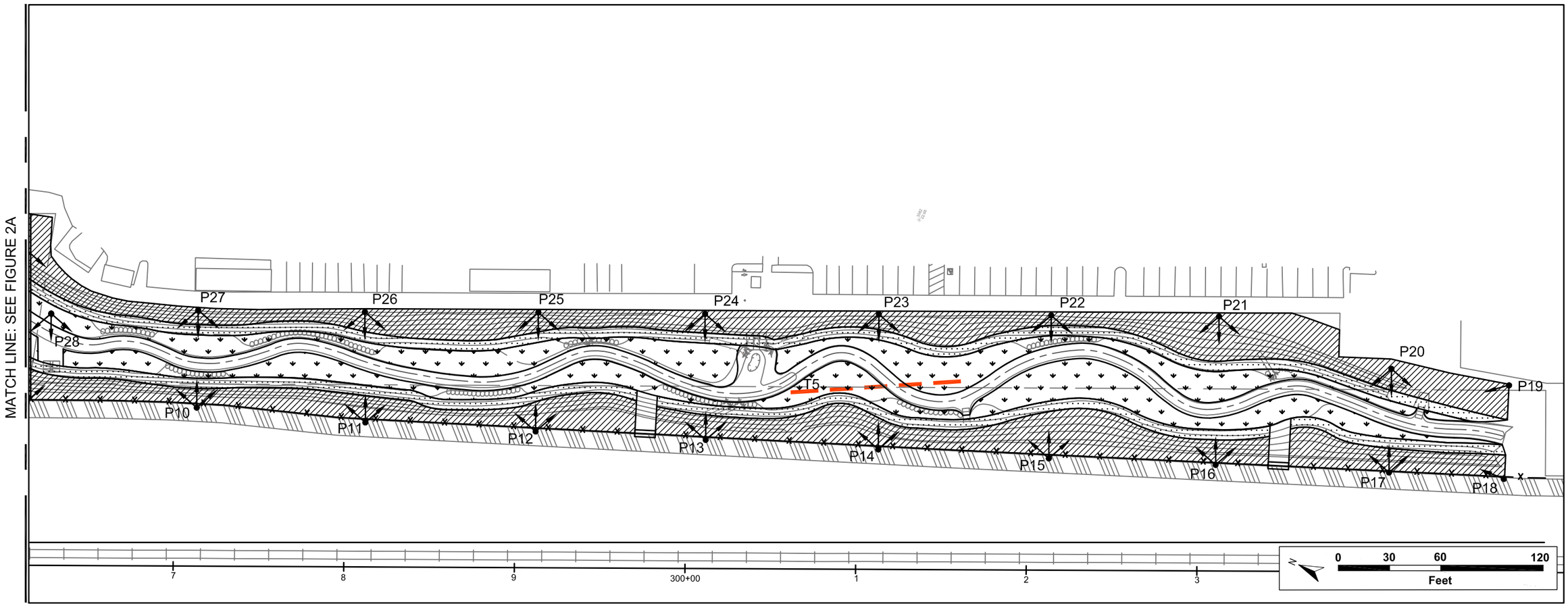
Figure 2-1: Site Map
Wrigley Creek Improvement Project (2995-04)
February 2012



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- FLOODPLAIN PLANTING ZONE
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Figure 2-2: Site Map
Wrigley Creek Improvement Project (2995-04)
February 2012

determined by graphing the cumulative average percent native grass cover as a function of sample size to determine whether the variability in average cover declined to an acceptable level (Elzinga et al. 1998).

The average percent cover of native grasses was compared to the Year-1 performance criterion of 75% cover (ICF Jones & Stokes 2009).

Congdon's Tarplant Survival

The number of surviving Congdon's tarplant was determined by counting numbers of individuals in a given area and then extrapolating the total population based on density estimates across the project site. The performance criterion for survival of Congdon's tarplant is a minimum of 100 individuals in 2 of 5 years (ICF Jones & Stokes 2009).

WOODY PLANT HEALTH AND VIGOR

A qualitative assessment of the overall plant health and vigor was made on all of the woody container plantings by considering such factors as internode length, leaf color, leaf size, presence of browse damage, disease symptoms, and insect infestation. The overall health and vigor was measured for all plants as good, fair, and poor as described in Table 2.

Table 2. Plant Health and Vigor Categories

CATEGORIES	NUMERICAL VALUES	OBSERVATIONS
Good Condition	1	Plant has relatively long internode lengths and most or all leaves show healthy color and size, and/or <25% of plant's aboveground growth is affected by browse damage, disease, or insect infestation.
Fair Condition	2	Plant has medium to long internode lengths and most leaves show healthy color and size, and/or 25-50% of plant's aboveground growth is affected by browse damage, disease, or insect infestation.
Poor Condition	3	Plant has short internode lengths and few or some leaves show healthy color and size, and/or >75% of plant's aboveground growth is affected by browse damage, disease, or insect infestation.

Mean health and vigor ratings were calculated for each planted woody species by dividing the total health and vigor points by the number of individuals of that species sampled. The percentage of individuals who fall into the 3 general health and vigor categories was calculated by dividing the number of individuals within each category by the total number of individuals.

NATURAL RECRUITMENT

The number of stems of naturally recruiting native and non-native woody plant species was counted along the 5 native grass transects within 5 ft of both sides of each transect. Recruitment densities will be compared between years in future monitoring reports.

PHOTO-DOCUMENTATION

Photographs of the Wrigley Creek Improvement Project site were taken at 36 fixed photo-documentation points. The photo-documentation point locations are indicated on Figures 2-1 and 2-2.

RESULTS AND DISCUSSION

Overall, the vegetation data indicates that the mitigation site is developing towards providing high quality habitat.

PLANT SURVIVAL

Woody Plant Survival

The overall survival rate of woody riparian container plants was 97%. The percent survival for each planted woody species is provided in Table 3.

Table 3. Percent Survival of Planted Woody Species

SCIENTIFIC NAME	COMMON NAME	NUMBER OF PLANTS SPECIFIED IN PLANTING PLAN	TOTAL ALIVE IN YEAR-1 (FALL 2011)	PERCENT SURVIVAL IN 2011
Acer negundo	box elder	176	177	101%[1]
Baccharis pilularis	coyote brush	129	125	97%
Quercus agrifolia	coast live oak	89	79	89%
Rosa californica	California rose	343	329	96%
Salix laevigata	red willow	154	160	104%[1]
Salix lasiolepis	arroyo willow	254	257	101%[1]
Sambucus nigra ssp. *caerulea*	blue elderberry	206	182	88%
	Total	**1351**	**1178**	**97%**

[1] Percent survival for box elder, red willow, and arroyo willow was greater than 100% because additional plants from the nursery order were installed but not required by the MMP.

The MMP performance criterion requires a 90% survival of woody plantings in good or fair condition in Year-1 (ICF Jones & Stokes 2009). The 97% survival rate in Year-1 exceeds this performance criterion and demonstrates that the mitigation site is successfully establishing (Table 4).

Table 4. Comparison of Woody Plant Survival to the Success Criteria

YEAR	SUCCESS CRITERION	RESULTS
1	90% survival in good or fair condition	97% survival in good or fair condition
2	80% survival in good or fair condition	NA
3	75% survival in good or fair condition	NA
4	70% survival in good or fair condition	NA
5	70% survival in good or fair condition	NA

Native Grass Percent Cover

A total of 25 quadrats were determined to provide an adequate sample size for measuring native grasses within the site as additional quadrats did not substantially change the average cover value after 20 samples (Figure 3). The first 10 quadrats were located within the Congdon's planting area where native grass cover was low compared to the floodplain planting area. Native grass cover was likely lower in the Congdon's planting area due to the high abundance of Congdon's tarplant.

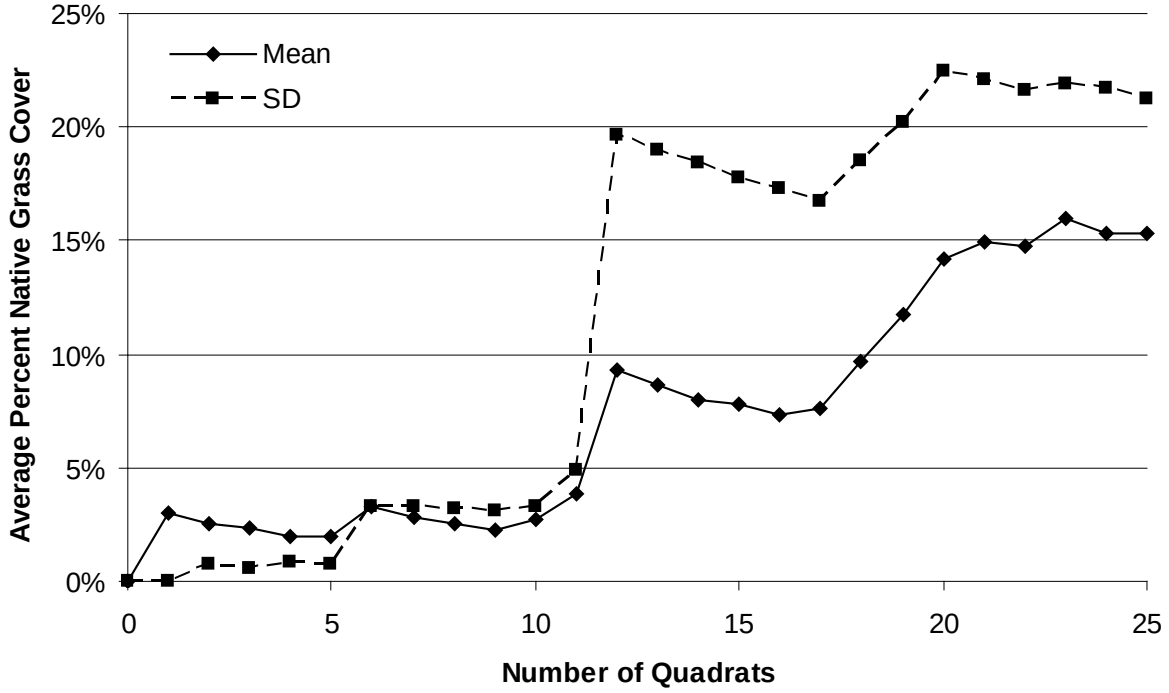

Figure 3. Sequential Sampling Graph for Determining Appropriate Number of Transects

The average percent cover of native grass species in the native seed mix was 15.3% (Table 5). The native grass cover was comprised of 97% meadow barley (*Hordeum brachyantherum*) and 3% small fescue (*Vulpia microstachys*). Total average percent cover for all native seed mix species was 17.2%. The average percent cover of all native herbaceous vegetation was 35.1%, which is 50.6% of total vegetation cover at the site (69.3%) (Table 5).

Table 5. Average Percent Cover of Herbaceous Vegetation

STATUS	SCIENTIFIC NAME	COMMON NAME	AVERAGE % COVER
Native	*Achillea millefolium* [1]	yarrow	1.6%
	Artemisia douglasiana [1]	mugwort	0.2%
	Centromadia parryi ssp. *congdonii*	Congdon's tarplant	17.0%
	Cressa truxillensis	alkali weed	0.3%
	Cyperus eragrostis	tall flatsedge	0.2%
	Eschscholzia californica [1]	California poppy	0.1%
	Hordeum brachyantherum [1,2]	meadow barley	14.8%
	Lythrum californicum	common loosestrife	0.4%
	Vulpia microstachys [1,2]	small fescue	0.5%
Non-Native	*Atriplex prostrata*	fat-hen	11.6%
	Avena sp.	wild oat	0.3%
	Beta vulgaris	wild beet	4.1%
	Crypsis schoenoides	swamp grass	0.1%
	Dittrichia graveolens	stinkwort	0.6%
	Echinochloa crus-galli	barnyard grass	0.8%
	Festuca perennis	Italian ryegrass	14.3%
	Helminthotheca echioides	bristly ox tongue	2.1%
	Lactuca serriola	prickly lettuce	0.2%
	Polypogon monspeliensis	rabbitsfoot grass	0.6%
	Rumex crispus	curly dock	0.1%
Total Average Percent Native Grass Cover			**15.3%**
Total Average Percent Cover of Species in the Native Seed Mix			**17.2%**
Total Average Percent Native Cover			**35.1%**
Total Average Percent Cover			**69.3%**

[1] Species in the native grass seed mix
[2] Native grass species

The average percent cover of native grass species that have established from the originally seeded native mix (15.3%) was well short of the Year-1 performance criterion of 75% (Table 6). Competition from weed species was the primary limiting factor for meeting this criterion. There were many weedy species present within the mitigation site. The current weed control and noxious/invasive plant control measures are consistent with industry standards for restoration site weed management; however, given this site's high native grass percent cover criterion, a higher level of effort may be warranted.

Table 6. Comparison of Percent Cover of Native Grasses to the Success Criteria

YEAR	SUCCESS CRITERION	RESULTS
1	75% cover of species in native seed mix	15% cover of grass species from originally seeded native grass species
2	60% cover of species in native seed mix	NA
3	50% cover of species in native seed mix	NA
4	40% cover of species in native seed mix	NA
5	35% cover of species in native seed mix	NA

The cover of native grasses was higher in the Floodplain Zone (23.7%) than in the Congdon's Zone (2.7%). The MMP recognizes that Congdon's tarplant thrives in non-native grassland and states that the project's native grass survival criterion could be adjusted if Congdon's tarplant is present and meets its success criterion. Native herbaceous species comprised 50.6% cover relative to the total 69.3% cover of vegetation across the site suggesting that a mosaic of native and non-native grassland habitat is establishing at the site.

Congdon's Tarplant Survival

The MMP performance criterion requires a minimum of 100 Congdon's tarplant individuals in 2 of 5 monitoring years. The Year-1 census estimated a population of approximately 5600 individuals, which far exceeds the requirement of 100 individuals (Table 7). This initial result suggests that Congdon's tarplant will likely meet its final success criterion in Year-2 (2012). This also supports the rationale for reducing the native grass survival success criterion.

Table 7. Comparison of Congdon's Tarplant Survival to the Success Criteria

YEAR	SUCCESS CRITERION	RESULTS
1	Minimum 100 individuals in 2 of 5 years	5600 individuals
2	Minimum 100 individuals in 2 of 5 years	NA
3	Minimum 100 individuals in 2 of 5 years	NA
4	Minimum 100 individuals in 2 of 5 years	NA
5	Minimum 100 individuals in 2 of 5 years	NA

PLANT HEALTH AND VIGOR

The average health and vigor of the container plantings was 1.2 (good) (Table 8). The average health and vigor rating for each species ranged from 1.0 (good) to 1.6 (fair). Table 9 lists the percentage of individuals who fall into the 3 general health and vigor categories. Less than 3% of the individuals were rated as being in poor condition.

Table 8. Mean Health and Vigor Ratings

SCIENTIFIC NAME	COMMON NAME	AVERAGE HEALTH AND VIGOR RATING
Acer negundo	box elder	1.2
Baccharis pilularis	coyote brush	1.0
Quercus agrifolia	coast live oak	1.2
Rosa californica	California rose	1.3
Salix laevigata	red willow	1.1
Salix lasiolepis	arroyo willow	1.1
Sambucus nigra ssp. *caerulea*	blue elderberry	1.6
	Total	**1.2**

(1 = good condition, 2 = fair condition, 3 = poor condition).

Table 9. Percentage of Individuals within Each of the Plant Health and Vigor Categories

PLANT HEALTH AND VIGOR CATEGORIES	PERCENTAGE OF INDIVIDUALS[1]
Good Condition	80.73%
Fair Condition	16.72%
Poor Condition	2.55%

[1] Rounded to the nearest hundredth of a percent so that the total sum was 100%.

The MMP performance criterion requires 90% survival in good or fair condition. In Year-1, plant survival was 97% in good or fair condition. Plant health and vigor will continue to be evaluated over time and documented in subsequent monitoring reports.

NATURAL RECRUITMENT

No stems of naturally recruiting native and non-native woody plant species were observed along the transects within the planting areas; however, it is anticipated that over time native woody riparian species will colonize the mitigation site. Natural recruit densities will continue to be monitored and compared in future monitoring reports.

PHOTO-DOCUMENTATION

Photos were taken from the 36 photo-documentation points on 11 October 2011. A selection of these photos is presented in Appendix A.

HYDROLOLOGY AND GEOMORPHOLOGY

Observations made by Balance Hydrologics indicate that the constructed channel and floodplain functioned as intended and are in good condition. The success criterion for hydrology is saturated soils on the floodplain wetlands for at least 12.5% of the annual growing season. However, hydrologic and geomorphic monitoring follows each "Water Year", which is defined as follows:

> "A Water Year (WY) is defined as that period from October 1st of a preceding year through September 30th of the following year, and is named according to the following year. For example, WY 2011 occurred from October 1, 2010 through September 30, 2011."

Balance Hydrologics did make general site observations throughout part of WY 2011 and collected rainfall data from nearby publicly accessible stations, but were not contracted to deploy monitoring equipment until after the end of WY2011. Balance Hydrologics did conduct a site assessment on 18 November 2011 as part of Year-2 monitoring (WY2012) and speculated that based on site conditions at that time, rainfall data collected, and general site observations in WY2011, the site likely was saturated for at least 12.5% of the 2011 growing season. No remedial management actions are recommended at this time as the channel, floodplain, and banks are functioning as intended. Please refer to Appendix B for Balance Hydrologics' detailed methods and results.

MANAGEMENT RECOMMENDATIONS

NATIVE GRASS COVER SUCCESS CRITERION

As noted above, the native grass percent cover success criterion was not met in Year-1. However, the site supported a very high abundance of Congdon's tarplant and a relatively high percent cover of native herbaceous vegetation in Year-1; grasses and forbs combined provided 35.1% absolute native vegetation cover, which accounted for over 50% relative cover of all vegetation on the site. In our professional opinion, the VTA has expended a high level of maintenance effort in Year-1 in an attempt to meet the success criteria, and with continued comparable maintenance effort, native vegetation cover should continue to increase in Years 2 through 5. However, the MMP's native grass cover criterion is not likely to be achievable due both to interspecific competition between native grasses and desirable native forbs (e.g., Congdon's tarplant), as well as competition between native grasses and non-native grasses/forbs whose seed is continually dispersing to the site from the surrounding highly disturbed landscape. The MMP recognizes that Congdon's tarplant thrives in non-native grassland and states that the project's native grass criterion could be adjusted if Congdon's tarplant is present and meets its success criterion (≥100 individuals in 2 of 5 monitoring years). Given the high abundance of Congdon's tarplant in Year-1, the final success criterion for Congdon's tarplant will likely be met in Year-2.

We recommend that the regulatory agencies and VTA consider revising the native grass cover success criterion to a vegetation metric and criterion that is more closely linked to the overall target habitat goals of the project's revegetation design. For example, a metric such as native vegetation cover of grasses, forbs, and woody plants combined would reflect the design intent to restore a mosaic of native riparian, wetland, and Congdon's tarplant habitat.

YEAR-2 VEGETATION MAINTENANCE

We recommend that the level of effort expended for weed control in Year-2 should be comparable to that expended in Year-1. In addition, we recommend supplemental native grass revegetation in Year-2 to increase the likelihood that native grass cover will continue to be a major component of the total native vegetation cover onsite. Maintenance recommendations for the Wrigley Creek Improvement Project include:

1. **Weeding.** General weeding and non-native species removal should continue throughout the site as outlined in the MMP (ICF Jones & Stokes 2009). Particular attention should be paid to stinkwort (*Dittrichia graveolens*), which occurs adjacent to the site along the rail line.

   Hand weeding, hoeing, or spot herbicide treatments may be considered for many of the dominant weed species including wild beet (*Beta vulgaris*), bristly ox tongue (*Helminthotheca echioides*), bindweed (*Convolvulus arvensis*), curly dock (*Rumex crispus*), and barnyard grass (*Echinochloa crus-galli*). Care should be taken to avoid damaging naturally recruiting native plants and woody plantings during weeding activities. Particular care should be taken to avoid Congdon's tarplant.

2. **Supplemental Plug Installation and Seeding.** It is recommended that additional plugs of beardless wild rye (*Elymus triticoides*) be installed and supplemental native grass seed be broadcast to encourage greater cover of native grasses. Plant plugs should be installed on 1 ft centers in patches at select locations throughout the floodplain zone. Native seed should be broadcast by hand in areas disturbed during weed control using native grass seed from the native seed mix originally installed at the site (H. T. Harvey & Associates 2011). The grass plugs should be installed as soon as possible between January and March 2012, and the grass seed should be installed in September 2012 prior to the onset of the next rainy season. If grass plugs cannot be installed during this time period then it is recommend that the planting be postponed until fall 2012. It is also recommended that H. T. Harvey & Associates work closely with VTA and the maintenance contractor to determine the most appropriate planting locations and the number of plugs to be installed.

3. **Irrigation**. Continue to irrigate woody plantings at a frequency similar to or less than that of Year-1 and at a minimum amount such that the plantings show no obvious signs of drought stress.

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APPENDIX A.
Wrigley Creek Improvement Project
Photo-Documentation

Figure A-1. Photopoint 1, looking upstream from the culvert at the downstream project extents (October 2011).

Figure A-2. Photopoint 2, looking at the Condgdon's tarplant planting area (October 2011).

Figure A-3. Photopoint 7, looking downstream from the east bank (October 2011).

Figure A-4. Photopoint 7, looking across the channel from the east bank to the west bank (October 2011).

Figure A-5. Photopoint 7, looking upstream from the east bank (October 2011).

Figure A-6. Photopoint 18, looking downstream from the project's upstream extents (October 2011).

Figure A-7. Photopoint 23, looking upstream from the west bank (October 2011).

Figure A-8. Photopoint 23, looking across the channel from the west bank to the east bank (October 2011).

Figure A-9. Photopoint 23, looking downstream from the west bank (October 2011).

Figure A-10. Photopoint 36, looking over the site from the Hwy 237 embankment located north of the site (October 2011).

APPENDIX B.
Wrigley Creek Improvement Project Hydrologic Monitoring

Balance Hydrologics, Inc.®

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January 12, 2012

Mr. Matt Quinn
Senior Restoration Ecologist
H. T. Harvey and Associates
983 University Avenue, Building D
San Jose, California 95032

Submitted Via Email

Dear Mr. Quinn:

We are pleased to furnish you with the memo report for abbreviated Year 1 (Water Year[1] 2011) post-construction monitoring of the Wrigley Creek Mitigation Project. Construction of the Mitigation site was completed in summer and fall 2010. **Figure 1** illustrates the general design features of the site and importantly the location of hydrologic monitoring and photo-documentation points which serve as the basis for our monitoring work.

Per the project Mitigation and Monitoring Plan (MMP), the Wrigley Creek mitigation project has one numeric performance criteria, whereas other measures of success are characterized by the development of post-construction conditions that can be assessed visually. The numeric criteria stipulate that the constructed floodplain wetland soils must be saturated for at least 12.5% of the annual growing season. Specific monitoring of soil saturation conditions has already begun for Year 2, but because monitoring began late we cannot report soil saturation conditions for Year 1. Our Year 1 monitoring is limited to observations gathered during the first site visit during Year 2 monitoring on November 18, 2011 to identify conditions that may need immediate remediation; we have also supplemented these recent observations with those made last winter during brief visits to the site in concert with storm events. For clarity, the schedule for monitoring during years 2 through 5 are presented in **Table 1** (attached).

Hydrology

Observations at the site on November 18, 2011 indicate that water levels during WY 2011 inundated the designed floodplain within the site. We estimate that the floodplain was likely inundated to a maximum

[1] A Water Year (WY) is defined as that period from October 1st of a preceding year through September 30th of the following year, and is named according to the following year. For example, WY 2011 occurred from October 1, 2010 through September 30, 2011.

depth of 0.75-1.5 feet of water based on observations of wrack lines and displaced mulch from plantings (referred to as high-water marks – HWM's). To assess when the highest flows of WY 2011 likely occurred at the site, rainfall data were downloaded from the California Data Exchange Center (CDEC) and the California Irrigation Management Information System (CIMIS). For analysis we used the CDEC station at the San Jose Airport (SJE) and the CIMIS station in Union City (station 171) in Union City. The San Jose International Airport is approximately 4.25 miles south-southwest of the Wrigley Creek mitigation site and the Union City CIMIS station is approximately 14.5 miles northwest of the mitigation site. For all intents and purposes, the San Jose Airport and Union City rainfall station locations are characterized by a similar mean annual rainfall total to that at the Wrigley Creek mitigation site.

During WY 2011, the San Jose International Airport Received 9.2 inches of rainfall (**Figure 2**) equating to roughly 5.0 inches less than the long-term average for SJE, whereas the Union City station received 16.4 inches of rainfall (**Figure 3**) or roughly equivalent to the long-term average for that site. The largest daily rainfall totals for the Union City station[2] were recorded on December 10, 2010 (1.21 inches), December 28, 2010 (0.68 inches), February 17, 2011 (0.64 inches), March 19, 2011 (0.77 inches), and March 24, 2011 (1.13 inches). Given these rainfall totals and the highly urbanized drainage basin of Wrigley Creek, we would estimate that peak flows at the site occurred on December 10, 2010 and March 24, 2011.

Geomorphic Observations

Our observations of general channel conditions on November 18, 2011 indicate that the constructed channel and floodplain are in good condition, and functioned and are functioning as hoped (**Figures 4** through **8**). Close inspection of the project reach indicates that overbank flows during WY 2011 resulted in a small amount of fine sediment deposition within the low-flow channel, and on the floodplain. Topographic surveys performed by H.T. Harvey should help to quantify the depth of deposited fine sediment. We note that the sediment deposited in the low-flow channel is unconsolidated, and will very likely be mobilized at moderate flows through the project site. Fine sediment deposited in the low-flow channel does not presently threaten the performance of the site and was anticipated as per the design basis report for the project. We will nonetheless keep a close eye on future sedimentation trends within the low-flow channel.

[2] Based on our QA/QC review of the SJE station record we have chosen to use the Union City record for basic analysis because the SJE station record appears to have some anomalies with regards to rainfall timing as compared to the Union City station record, and several other station records managed by Balance Hydrologics.

Floodplain deposition within the lower 1,000 feet or so of the project site during WY 2011 is estimated at less than one-half inch at a maximum, and much less on average. As with deposition along the low-flow channel, floodplain deposition was anticipated and identified as a project goal by the Balance Hydrologics design team. Looking carefully at **Figure 6** one can see a thin veneer of sediment that deposited between vegetation root stalks, as is typical for floodplains.

Balance staff observed cattails (*Typha*) in the low-flow channel along the narrower upstream reach. These stands of cattail do not currently hinder the ability of the low flow channel to convey low flows, however they should be monitored to identify potential areas where flow may be diverted. We also observed a channel wide mat of aquatic vegetation (watercress perhaps) near the downstream culvert inlets, this mat should be monitored and action taken if it begins to impair flow through the lower reach of the site, or blocks the culverts, however no action is necessary at this time.

Wrapping things up we are happy to report that no major or minor erosion was observed along the project reach, at the inlet structures, within the backwater channels, the floodplains, or the upland slopes. This bodes well for the coming years as WY 2011 while locally average in terms of rainfall totals, brought numerous good rainfall events to a very young project site. To provide a visual for how the site looked during the middle of the WY 2011 rainy period we provide the following image taken on March 8, 2011.

We believe the image illustrates nicely that at least some of the floodplain soils were likely (speculation) saturated at the project site during the period from mid-February to late-March – future monitoring of floodplain saturation will help to assess this more robustly.

Recommendations for Adaptive Management

We are pleased to report that channel, floodplain and banks are performing well and no remediation is necessary at this time.

Closing

We greatly appreciate the opportunity to assist you with this monitoring effort and look forward to reporting on the complete Year-2 hydrologic monitoring effort a year from now.

Respectfully submitted,

Balance Hydrologics Inc.

Eric Donaldson, M.S.
Project Manager

Shawn Chartrand, M.S., P.G., CEG
Principal-in-charge

Encl. Table 1
Figures 1 through 8

Table 1. Schedule of Hydrologic and Geomorphic Monitoring Activities

		Year 1 (WY2011)	Year 2 (WY2012)	Year 3 (WY2013)	Year 4 (WY2014)	Year 5 (WY2015)
Task 1	Stormflow Observation	n/a	Oct. 2011-June 2012	Oct. 2012-June 2013	Oct. 2013-June 2014	Oct. 2014-June 2015
Task 2	Floodplain Soil Moisture Monitoring	n/a	Oct. 2011-June 2012	Oct. 2012-June 2013	Oct. 2013-June 2014	Oct. 2014-June 2015
Task 3	End of Water Year Geomorphic Monitoring	Oct. 2011	Sept. 2012	Sept. 2013	Sept. 2014	Sept. 2015
Task 4	Photo-documentation Points	Oct. 2011	Sept. 2012	Sept. 2013	Sept. 2014	Sept. 2015

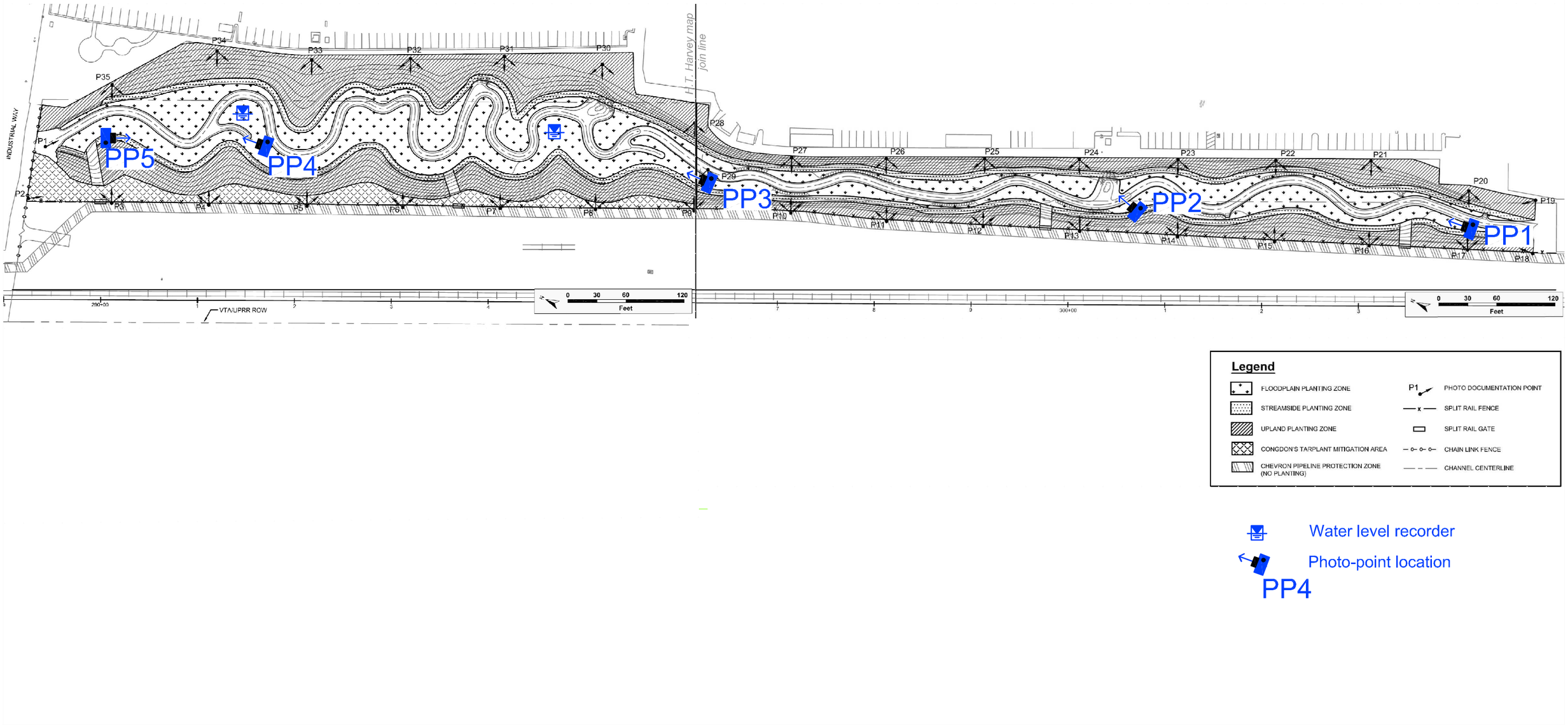

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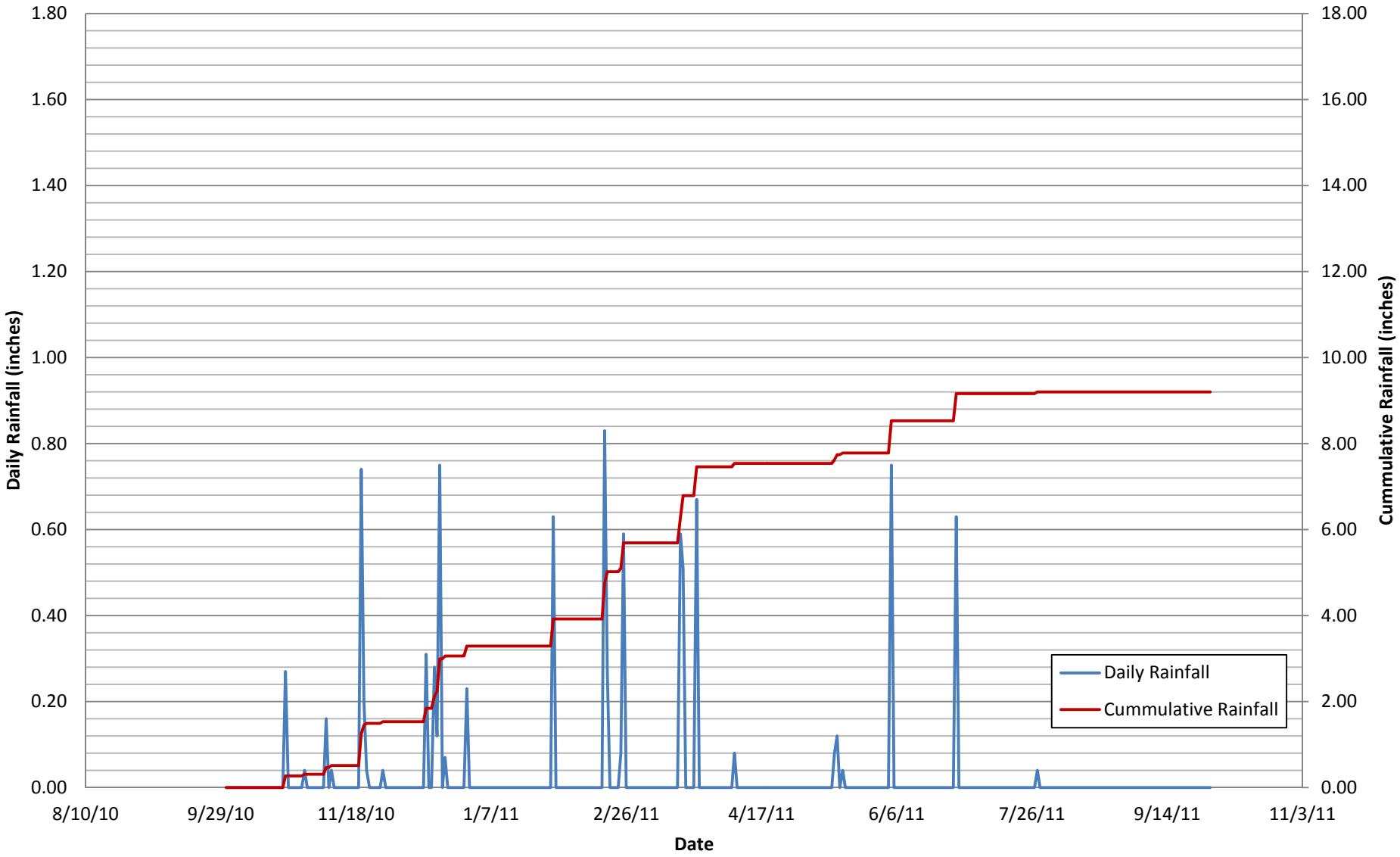
Figure 1. Monitoring map.
Basemap Source, H.T. Harvey and Associates, 2011.



Source: CDEC, downloaded on 12/7/11

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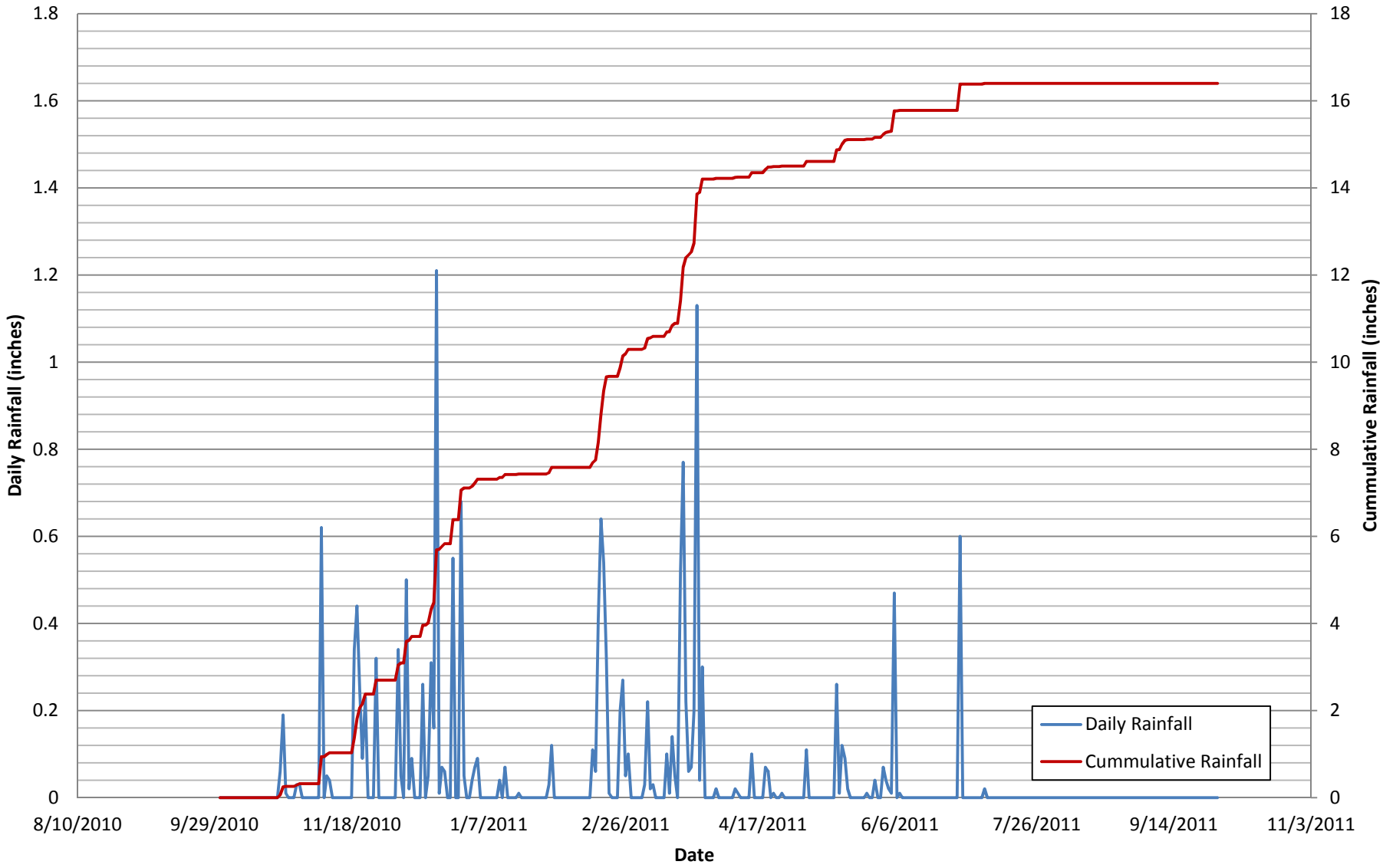
Figure 2. Daily Rainfall and Cummulative Rainfall, San Jose International Airport (CDEC Station SJE) Water Year 2011
Wrigley Creek Hydrologic Performance Monitoring, Santa Clara County, California

Rainfall_WY2011.xlsx



Source: CDEC, downloaded on 12/7/11

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Figure 3. Daily Rainfall and Cummulative Rainfall, Union City (CIMIS 171), Water Year 2011 Wrigley Creek Hydrologic Performance Monitoring, Santa Clara County, California

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Figure 4. **Photo point 1. Looking downstream, approximately 0° azimuth. November 18, 2011. Wrigley Creek Mitigation Performance Monitoring, Santa Clara County, California.**

211138 photo pt

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Figure 5. **Photo point 2. Looking downstream, approximately 8° azimuth. November 18, 2011. Wrigley Creek Mitigation Performance Monitoring, Santa Clara County, California.**

211138 photo pt

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Figure 6. **Photo point 3. Looking downstream, approximately 0° azimuth. November 18, 2011. Wrigley Creek Mitigation Performance Monitoring, Santa Clara County, California.**

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Figure 7. **Photo point 4. Looking downstream, approximately 8° azimuth. November 18, 2011. Wrigley Creek Mitigation Performance Monitoring, Santa Clara County, California.**

Balance Hydrologics, Inc.

Figure 8. **Photo point 5. Looking upstream, approximately 164° azimuth. November 18, 2011. Wrigley Creek Mitigation Performance Monitoring, Santa Clara County, California.**