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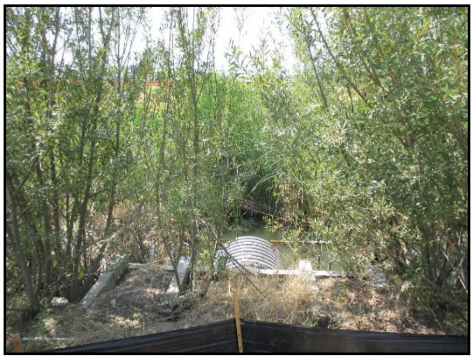

Wrigley Creek Improvement Project
Milpitas, California
Year 4 (2014) Monitoring Report

Project #2995-04

Prepared for

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March 2015

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Executive Summary

Permit Numbers

The following permits apply to the Wrigley Creek Improvement Project:

- 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 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). 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 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 site, 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).

The MMP includes native grassland percent performance criteria and a final success criterion, although the project did not impact native grassland habitat. Following Year 1 (2011) monitoring, a memorandum was produced that describes changes to the original native grassland percent cover success criterion (H. T. Harvey & Associates 2012a). Specifically, it broadens the interpretation of native grasses to include all native grasses and forbs both naturally recruiting as well as those species included in the original native seed mix installed at the site. The memorandum also states that percent vegetation cover should be measured in spring and fall of 2012 to help establish which season is more appropriate to sample for this metric. The Year 2 (2012) monitoring report determined that fall is the most appropriate season to collect percent cover data for herbaceous species because plants have had more time to develop and reach their maximum cover for the year (H. T. Harvey & Associates 2013).

Results

The table below presents the Year 4 (2014) monitoring results and management recommendations relative to the project's Year 4 success criteria. The survival rate of woody plants in good or fair condition was 81%, exceeding the 70% criterion.

The final success criterion for Congdon's tarplant was met in Year 3. Nonetheless, Congdon's tarplant monitoring was conducted in Year 4 to provide additional information on population dynamics at the site. One hundred and five (105) Congdon's tarplant individuals were tallied in Year 4, exceeding the minimum 100 individuals. Greater than 100 Congdon's tarplant individuals have been observed in 3 of the 4 monitoring years meeting the MMP's final success criterion of a minimum of 100 individuals in at least 2 of the 5 monitoring years. The site had 23.2% cover of native grassland species, which is below the Year 4 cover criterion of 40% cover, but above the Year 3 result of 16.1%. Hydrologic and geomorphic observations indicate the constructed channel and floodplain are stable. These results indicate that the site is on a trajectory towards meeting its long-term success criteria.

The average percent cover of native grassland species was 23.2%, below the Year 4 performance criterion of 40%. However, the native grass/forb cover on the site is high compared with what would typically be found in the local grassland habitats. The project did not impact native grassland habitat and this habitat type is not common in the immediate vicinity of the project site, and there is a disconnect between the native grassland success criteria and the project impacts and mitigation requirements. The grassland habitat that is being provided at the site contains relatively high native cover compared what would typically be found in local grassland habitat, and is providing habitat for Congdon's tarplant as well as providing erosion control functions. Therefore, the native grassland habitat Year 4 performance criterion is considered to have been met.

The project hydrologist estimated that floodplain soils were continuously inundated or saturated for at least 68 days between 7 December 2013 and 8 April 2014. This exceeds the minimum requirement of 31 days of continuous inundation or saturation. Due to drought conditions and the flashy hydrology of the drainage, the project hydrologist had few opportunities to observe flow on the floodplain and was not able to make flow measurements in Year 4. However, water level/depth observations from Year 4 continue to support prior observations of backwatering of the channel. It appears that the source of this backwatering is flow modification caused by normal operations of the City of Milpitas Wrigley-Ford Creek pump station located approximately 4500 feet downstream of the project site. During storm events, water likely accumulates within the channel until the station pumps flows into Berryessa Creek. Regardless of this backwatering, the mitigation project is establishing well and sedimentation rates on the floodplain are minimal. Sedimentation rates will continue to be closely monitored to determine if accumulation rates increase substantially.

Wrigley Creek Improvement Project Habitat Mitigation Performance and Success Criteria Summary

Indicator	Year 4 Success Criteria	Year 1 Success Criteria Met?	Year 2 Success Criteria Met?	Year 3 Success Criteria Met?	Year 4 Success Criteria Met?	Management Recommendations*
Woody Plant Percent Survival	70% in good or fair condition	Yes (97% survival in good or fair condition)	Yes (92% survival in good or fair condition)	Yes (84% survival in good or fair condition)	Yes (81% survival in good or fair condition)	Continue irrigation only if needed to prevent visible signs of drought stress
Native Grass Average Percent Cover	40% cover of native herbaceous species	No (35% cover of native herbaceous species)	No (21.5% cover of native herbaceous species)	No (16.1% cover of native herbaceous species)	No (23.2% cover of native herbaceous species)	Continue weed control
Congdon's Tarplant Survival	Final Success Criterion ≥ 100 individuals in ≥2 monitoring years	Yes (5600 individuals)	No (6 individuals)	Yes (150-250 individuals)	Yes (105 individuals)	None-Final Success Criterion met
Hydrology and Geomorphology	Stable channel; continuous floodplain soil saturation for 12.5% of growing season (31 days)	Yes (stable channel; at least 31 days continuous saturation)	Yes (stable channel; 39 days continuous saturation)	Yes (stable channel; 81 days continuous saturation)	Yes (stable channel; 68 days continuous saturation)	Continue monitoring channel stability soil and saturation

* See Management Recommendations Section for details

Management Recommendations

Year 5 (2015) Vegetation Maintenance

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). A small patch of the invasive species perennial pepperweed (*Lepidium latifolium*) was observed during annual vegetation monitoring near Transect 2. A maintenance worker was onsite during monitoring activities and mechanically removed this small population; however, due to its aggressive nature, this location should be closely monitored for re-establishment in the future and spot herbicide treatments may be required. Care should be taken to avoid damaging naturally recruiting native plants and woody plantings during weeding activities. The woody plant irrigation basins no longer require weeding because the herbaceous vegetation will not compete substantially with the relatively mature woody plantings.

2. **Irrigation.** The plantings should be irrigated in 2015 only if necessary to prevent the visible signs of drought stress. If continued irrigation is recommended it will likely occur one time per month (10

gallons per event) during the growing season (April – October). However, if plantings begin to exhibit widespread signs of drought stress during 2015, irrigation frequency will be increased to avoid large-scale mortality. The irrigation infrastructure should remain in working order for of the entire 2015 calendar year.

Agency Actions

The VTA requests a meeting with representatives of the California Department of Fish and Wildlife and the Regional Water Quality Control Board to discuss the native grassland final success criterion.

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List of Preparers

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Section 1.0 Introduction

1.1 Permit Numbers

The following permits apply to the Wrigley Creek Improvement Project:

- U. S. Army Corps of Engineers Section 404 Permit File No. 26644S
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- Regional Water Quality Control Board Site No. 02-43-C0589

1.2 Overview

The Santa Clara Valley Transportation Authority's (VTA) Freight Railroad Relocation/Lower Berryessa Creek Project (FRR/LBC) 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 (mitigation project) in accordance with the project's regulatory agency permits and associated Mitigation and Monitoring Plan (MMP) (ICF Jones & Stokes 2009). 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 requirements in the regulatory agency permits and includes an additional 60 ln ft of channel restoration and 0.04 ac of floodplain wetland habitat (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). Following Year 1 (2011) monitoring, a memorandum was produced that describes changes to the MMP's native grassland percent cover success criterion based upon guidance from the California Department of Fish and Wildlife (CDFW) and Regional Water Quality Control Board (RWQCB) staff (H. T. Harvey & Associates 2012a). It broadens the interpretation of native grasses to include all native grasses and forbs both naturally recruiting as well as those species included in the original native seed mix installed at the site. The memorandum also states that percent vegetation cover should be measured in spring and fall of 2012 to help establish which season is more appropriate to sample for this metric. The Year 2 (2012) monitoring report determined that fall is the most appropriate season to collect percent cover data for herbaceous species because plants have had more time to develop and reach their maximum cover for the year (H. T. Harvey & Associates 2013).

Results of annual monitoring of the mitigation site 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. This report presents the results of Year 4 monitoring and characterizes the biological conditions of the site.

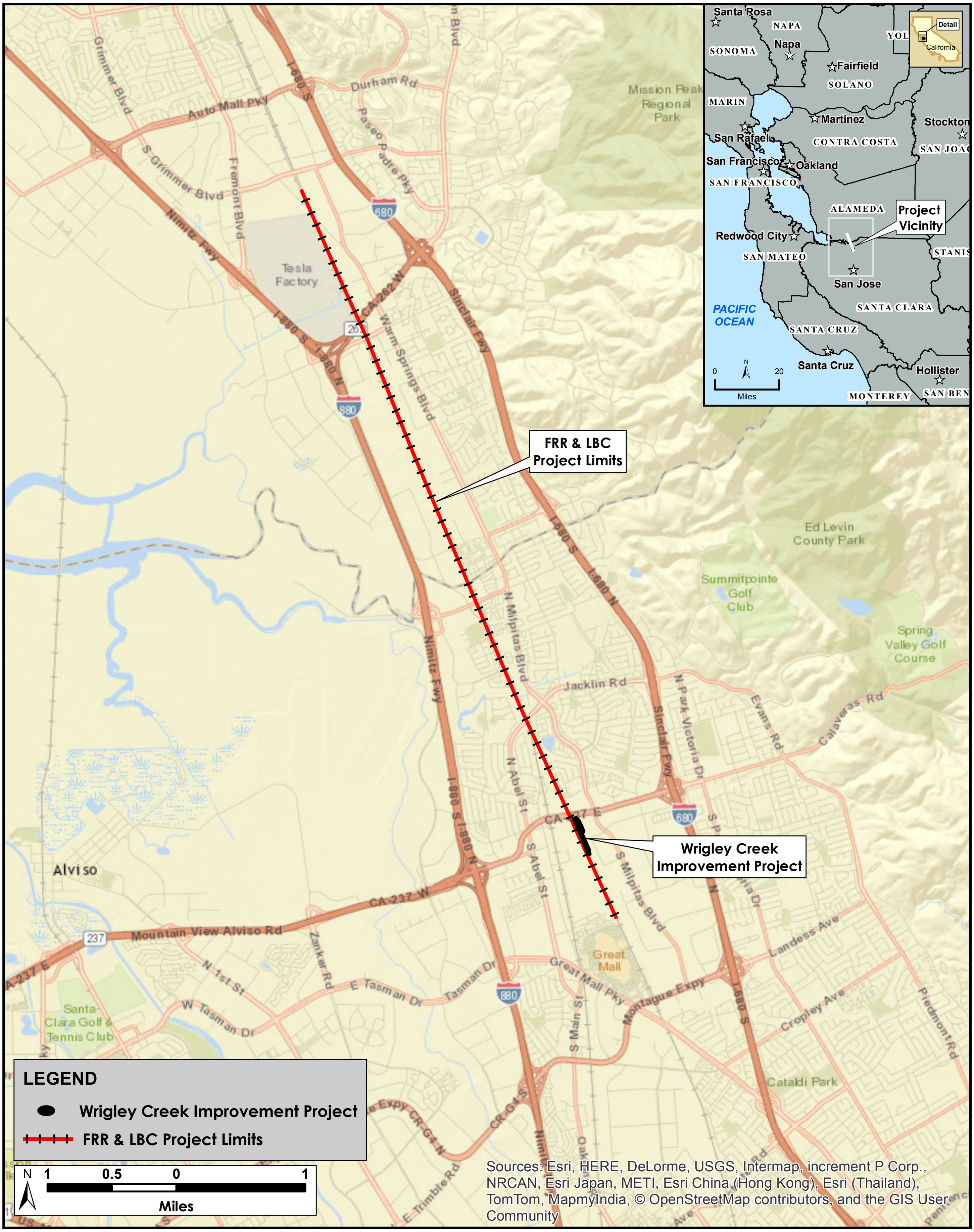

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Figure 1: Vicinity Map

Wrigley Creek Improvement Project (2995-04)
March 2015

Section 2.0 Methods

H. T. Harvey & Associates' restoration ecologists M. Parsons, M.S. and M. Granato, M.S. conducted vegetation surveys at the Wrigley Creek mitigation site on 5 and 6 August 2014. Vegetation surveys were conducted in accordance with the methods outlined in the MMP (ICF Jones & Stokes 2009). Vegetation characteristics measured in the field included woody plant survival, percent cover of native grassland species, Congdon's tarplant survival, woody plant health and vigor, and woody plant natural recruitment. In addition, vegetation maintenance observations were noted 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, Inc. to assess on-site hydrology and geomorphology and detailed results of their assessment are provided in Appendix A.

2.1 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 percent survival of individuals in good or fair condition was calculated and the percent survival for each species was calculated as follows:

Percent Survival Species A = (Total Number Alive in Good or Fair Condition in 2014/Total Number Required per the MMP) * 100

The success criterion for woody plant survival in Year 4 is 70% 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.

2.2 Percent Cover of Native Grassland Species

Native grassland species percent cover was estimated by conducting a survey along nine randomly located transects (ICF Jones & Stokes 2009; H. T. Harvey & Associates 2012a). Two transects were located in the Congdon's Tarplant Mitigation Area and seven were located in the Floodplain Planting Zone (Figures 2-1 & 2-2). Each transect is 100 feet in length and endpoints of each transect are marked with metal u-posts and labeled with aluminum tags. Percent cover of herbaceous species was estimated using the quadrat method (Bonham 1989). Cover data were collected in five randomly located 1 m^2 quadrats along each of the nine transects. Within each quadrat, all species were identified and percent cover was estimated to the nearest 1 percent. Plant species were identified in accordance with the Jepson Manual (Baldwin et al. 2012). Average percent cover was calculated for each species, native species, non-native species, and total average cover of all species. Sample size was determined adequate (H. T. Harvey & Associates 2012b) 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 and forbs in 2014 was compared to results from previous years and the Year 4 performance criterion of 40% cover (ICF Jones & Stokes 2009).

2.3 Congdon's Tarplant Survival

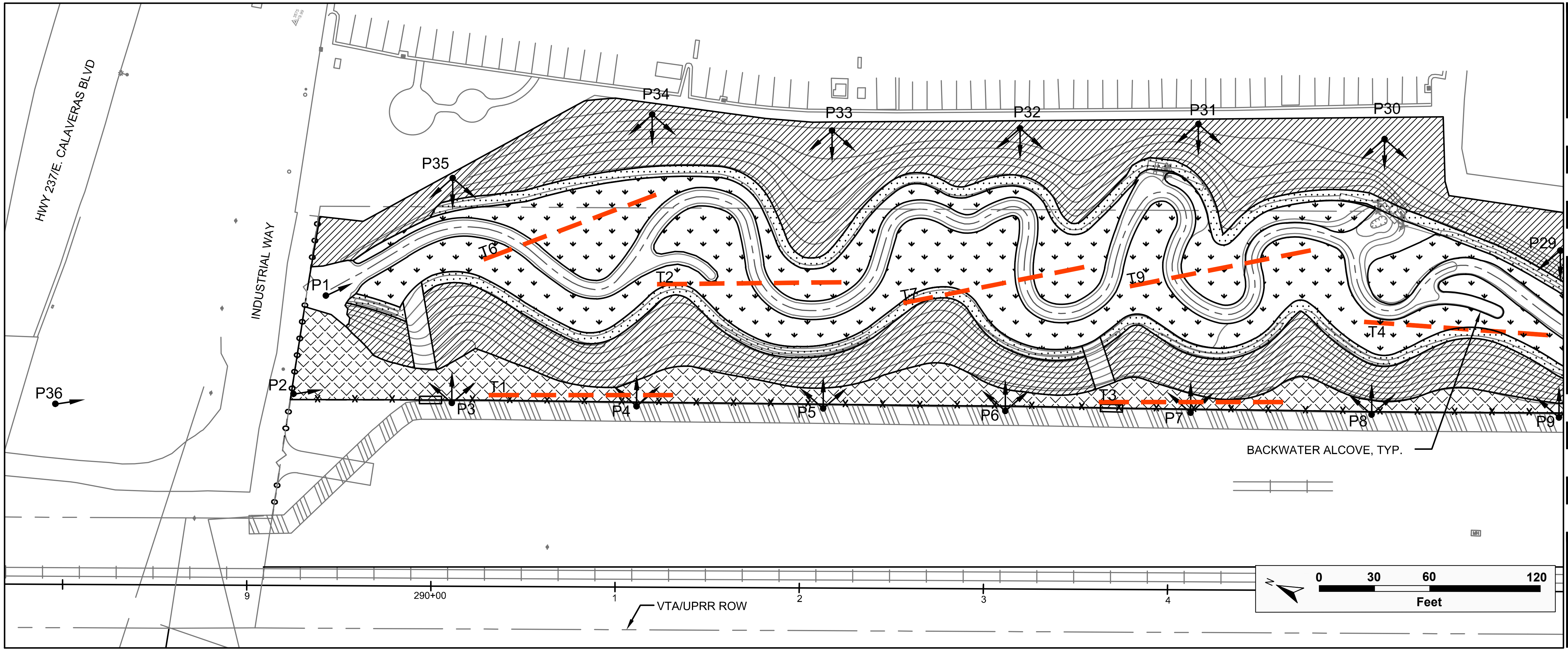
The number of surviving Congdon's tarplant was determined by surveying the entire site and counting each live individual encountered. The survey was conducted on 15 July 2014 during the flowering period for this species. The performance criterion for survival of Congdon's tarplant is a minimum of 100 individuals in 2 of 5 years (ICF Jones & Stokes 2009).

2.4 Woody Plant Health and Vigor

The health and vigor of all of the woody plantings was assessed by considering such factors as internode length, leaf color, leaf size, presence of browse damage, disease symptoms, and insect infestation. Numerical health and vigor ratings were assigned to each woody planting as described in Table 1.

Table 1. 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.



Legend

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

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Figure 2-1: Site Map
Wrigley Creek Improvement Project (2995-04)
March 2015

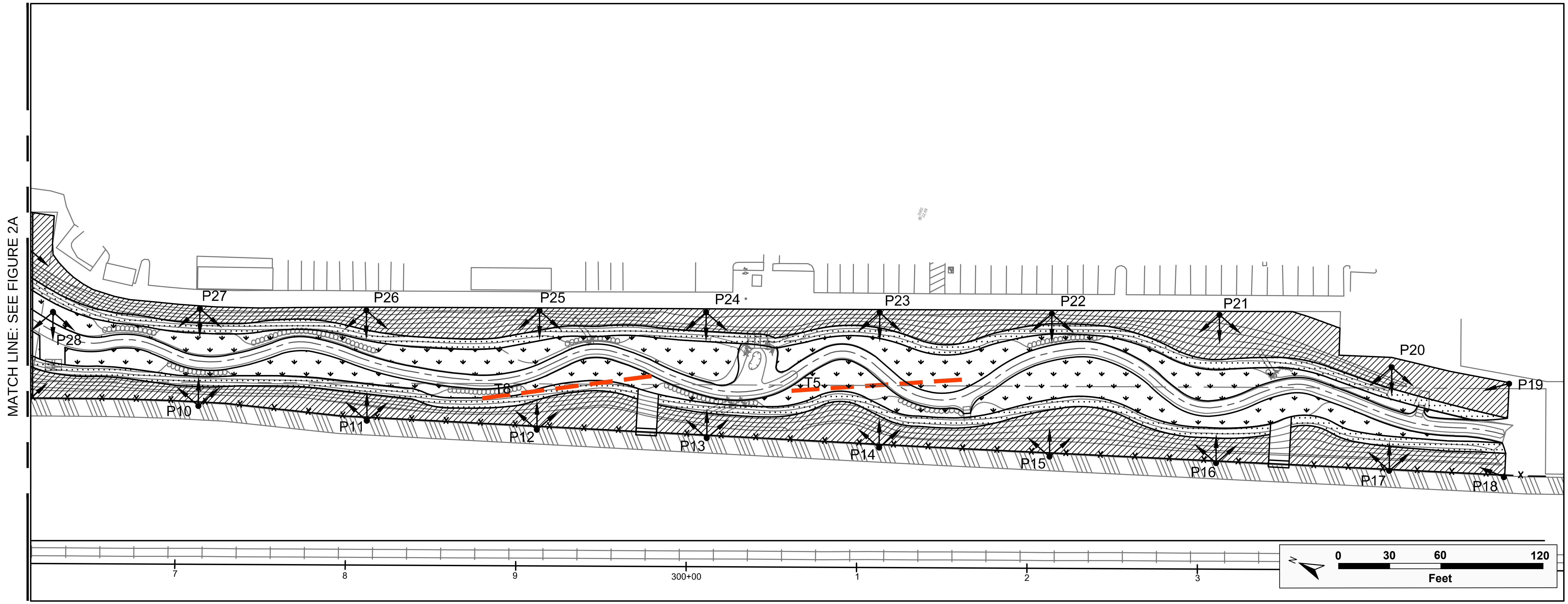

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Figure 2-2: Site Map

Wrigley Creek Improvement Project (2995-04)
March 2015

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

2.5 Natural Recruitment

The number of stems of naturally recruiting native and non-native woody plant species within 5 feet on each side of the nine native grassland cover monitoring transects was recorded. Recruitment densities were compared between each monitoring year.

2.6 Hydrology and Geomorphology

Hydrology and geomorphology monitoring was conducted by the project hydrologist (Balance Hydrologics, Inc). Monitoring included visual observations of stormflows and geomorphic stability, floodplain sedimentation using sedimentation plates, floodplain soil moisture monitoring using water level data loggers and graduated staff plates, and photo-documentation. A more detailed description of monitoring methods is presented in the Year 4 (water year 2014) Hydrologic and Geomorphic Monitoring Letter Report by Balance Hydrologics, Inc. (Appendix A).

2.7 Photo-documentation

Photographs of the mitigation site were taken at 36 fixed photo-documentation points on 6 August 2014. These photo-documentation point locations are indicated on Figures 2-1 and 2-2. Photographs from additional locations were also taken to document general site conditions.

Section 3.0 Results and Discussion

3.1 Woody Plant Survival

The overall survival rate of woody riparian plantings in good or fair condition decreased slightly from 84% in Year 3 to 81% in Year 4 (Table 2). Percent survival ranged from 50% for blue elderberry (*Sambucus nigra* ssp. *caerulea*) to 102% for coyote brush (*Baccharis pilularis*).

Table 2. Percent Survival of Planted Woody Species in Good or Fair Condition

Scientific Name	Common Name	No. of Plants Specified in MMP Planting Plan	% Survival			
			Year 1	Year 2	Year 3	Year 4
Acer negundo	box elder	176	101%	97%	92%	88%
Baccharis pilularis	coyote brush	129	97%	105%	104%	102%
Quercus agrifolia	coast live oak	89	89%	83%	82%	76%
Rosa californica	California rose	343	96%	91%	85%	80%
Salix laevigata	red willow	154	104%	95%	90%	94%
Salix lasiolepis	arroyo willow	254	101%	98%	87%	86%
Sambucus nigra ssp. *caerulea*	blue elderberry	206	88%	78%	54%	50%
	Total	**1351**	**97%**	**92%**	**84%**	**81%**

Note: Percent survival is occasionally greater than 100% or increases between years because either additional plants were installed in excess of the number required by the MMP, or individuals that were dead aboveground resprouted in subsequent years.

The 81% survival rate in Year 4 exceeds the performance criterion of 70% (Table 3).

Table 3. Comparison of Woody Plant Survival to the Success Criteria

Year	Success Criterion	Results
1	90% survival in good or fair condition	97% in good or fair condition
2	80% survival in good or fair condition	92% in good or fair condition
3	75% survival in good or fair condition	84% in good or fair condition
4	70% survival in good or fair condition	81% in good or fair condition
5	70% survival in good or fair condition	NA

3.2 Percent Cover of Native Grassland Species

The average percent cover of native grassland species (grasses and forbs) increased from 16.1% in 2013 to 23.2 % in 2014 (Table 4). The increased percent cover from 2013 to 2014 was due primarily to a substantial increase in the percent cover of meadow barley (*Hordeum brachyantherum*). The most abundant native species were meadow barley (10.9%), yarrow (*Achillea millefolium*) (3.8%), and mugwort (*Artemisia douglasiana*) (2.7%). All three species were included in the original native seed mix installed at the mitigation site (H. T. Harvey & Associates 2011).

Table 4. Average Percent Cover of Herbaceous Vegetation

Native/Non-native Status	Scientific Name	Common Name	Average % Cover			
			Year 1	Year 2	Year 3	Year 4
Native	*Achillea millefolium**	yarrow	1.64	8.29	5.93	3.84
	*Artemisia douglasiana**	mugwort	0.20	1.53	1.56	2.71
	Bolboschoenus robustus	sturdy bulrush	0.00	0.09	1.07	0.53
	Centromadia parryi ssp. *congdonii**	Congdon's tarplant	17.00	0.04	1.09	0.00
	Cressa truxillensis	spreading alkaliweed	0.32	0.07	0.00	0.24
	Cyperus eragrostis	tall flatsedge	0.16	0.11	0.13	0.04
	Distichlis spicata	saltgrass	0.00	0.49	<1	0.09
	Eleocharis macrostachya	common spikerush	0.00	0.00	0.84	0.00
	*Elymus triticoides**	beardless wildrye	0.00	0.31	0.00	0.00
	*Eschscholzia californica**	California poppy	0.08	0.02	0.11	0.18
	*Festuca microstachys**	small fescue	0.48	1.44	0.00	0.04
	*Hordeum brachyantherum**	meadow barley	14.8	6.98	0.44	10.87
	Lythrum californicum	California loosestrife	0.36	0.33	0.38	0.04
	Persicaria amphibia	water smartweed	0.00	0.00	0.44	0.20
	*Stipa pulchra**	purple needle grass	0.00	0.36	0.18	0.80
	Typha latifolia	broadleaf cattail	0.00	0.04	0.67	1.49
	Symphyotrichum subulatum	eastern annual saltmarsh aster	0.00	1.40	3.27	1.49
Non-native	*Atriplex prostrata*	fat-hen	11.64	2.91	1.09	0.76

Native/Non-native Status	Scientific Name	Common Name	Average % Cover			
			Year 1	Year 2	Year 3	Year 4
	Avena fatua	common wild oats	0.32	1.02	3.13	5.49
	Beta vulgaris	common beet	4.12	0.04	0.18	0.33
	Bromus diandrus	ripgut brome	0.00	0.00	0.00	0.09
	Crypsis schoenoides	swamp grass	0.05	0.00	0.00	0.00
	Dittrichia graveolens	stinkwort	0.56	0.00	0.00	0.00
	Echinochloa crus-galli	barnyard grass	0.76	0.24	0.00	0.07
	Festuca perennis	Italian rye grass	14.32	22.93	26.38	8.51
	Foeniculum vulgare	sweet fennel	0.00	0.04	0.09	0.00
	Helminthotheca echioides	bristly ox-tongue	2.08	1.58	2.67	3.51
	Hordeum sp.	barley	0.00	0.00	12.27	0.02
	Lactuca serriola	prickly lettuce	0.16	0.87	0.78	8.22
	Ludwigia peploides ssp. *peploides*	floating water primrose	0.00	7.78	6.93	7.36
	Malva parviflora	cheeseweed	0.00	0.04	0.04	0.13
	Medicago polymorpha	bur clover	0.00	0.04	0.31	0.00
	Melilotus indicus	annual yellow sweetclover	0.00	<1	0.00	0.00
	Paspalum dilatatum	dallis grass	0.00	0.00	1.93	0.00
	Plantago coronopus	cut leaf plantain	0.00	0.00	0.04	0.07
	Polypogon monspeliensis	rabbitsfoot grass	0.60	0.87	0.00	2.24
	Raphanus sativus	wild radish	0.00	0.04	0.04	0.00
	Rumex crispus	curly leaved dock	0.08	0.73	0.18	1.02
	Salsola tragus	Russian thistle	0.00	1.00	0.00	0.00
	Sonchus asper ssp. *asper*	prickly sow thistle	0.00	0.02	0.00	0.00
	Stipa miliacea var. *miliacea*	smilo grass	0.00	0.02	0.24	0.04
	Taraxacum officinale	common dandelion	0.00	0.00	0.00	0.02
	Trifolium repens	white clover	0.00	0.00	0.00	0.24
	Vicia sativa ssp. *nigra*	common vetch	0.00	0.00	<1	0.04
	Total Average Percent Native Species Cover^		**35.0**	**21.5**	**16.1**	**23.2**

Native/Non-native Status	Scientific Name	Common Name	Average % Cover			
			Year 1	Year 2	Year 3	Year 4
	Total Average Percent Non-native Species Cover^		**34.7**	**40.2**	**56.3**	**38.2**
	Total Average Percent Cover		**69.7**	**61.7**	**72.4**	**61.4**

* Indicates species that were included in the original native grassland seed mix.
^ The total average cover values vary slightly from the sum of average cover values across species due to rounding assumptions.
Note: Table 4 only includes native species found along monitoring transects. Congdon's tarplant was encountered elsewhere on the site and was not found along the transects.
Note:

The average percent cover of native grassland species in Year 4 (23.2%) is below the Year 4 performance criterion of 40% (Table 5, Figure 3). However, the native grass/forb cover (23.2%) on the site is high compared with what would typically be found in the local grassland habitats. Dense stands of two native grass species were observed outside of the transect sampling locations and are not reflected in the percent cover data. Purple needlegrass (*Stipa pulchra*) has established on the upper slope of the west creek bank (Figure 4, Photo 11). Visual percent cover estimates of purple needlegrass in this area ranged from 50-60%. Dense stands of meadow barley have also established in the vicinity of Transect 6 (Figure 4, Photo 12). Invasive weeds are being controlled in an effort to encourage a continued increase in native cover.

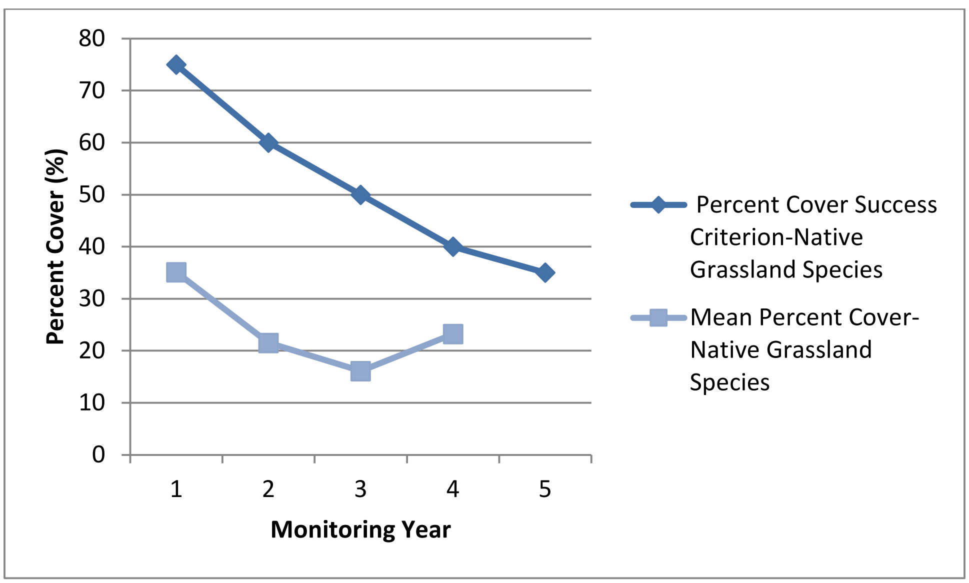


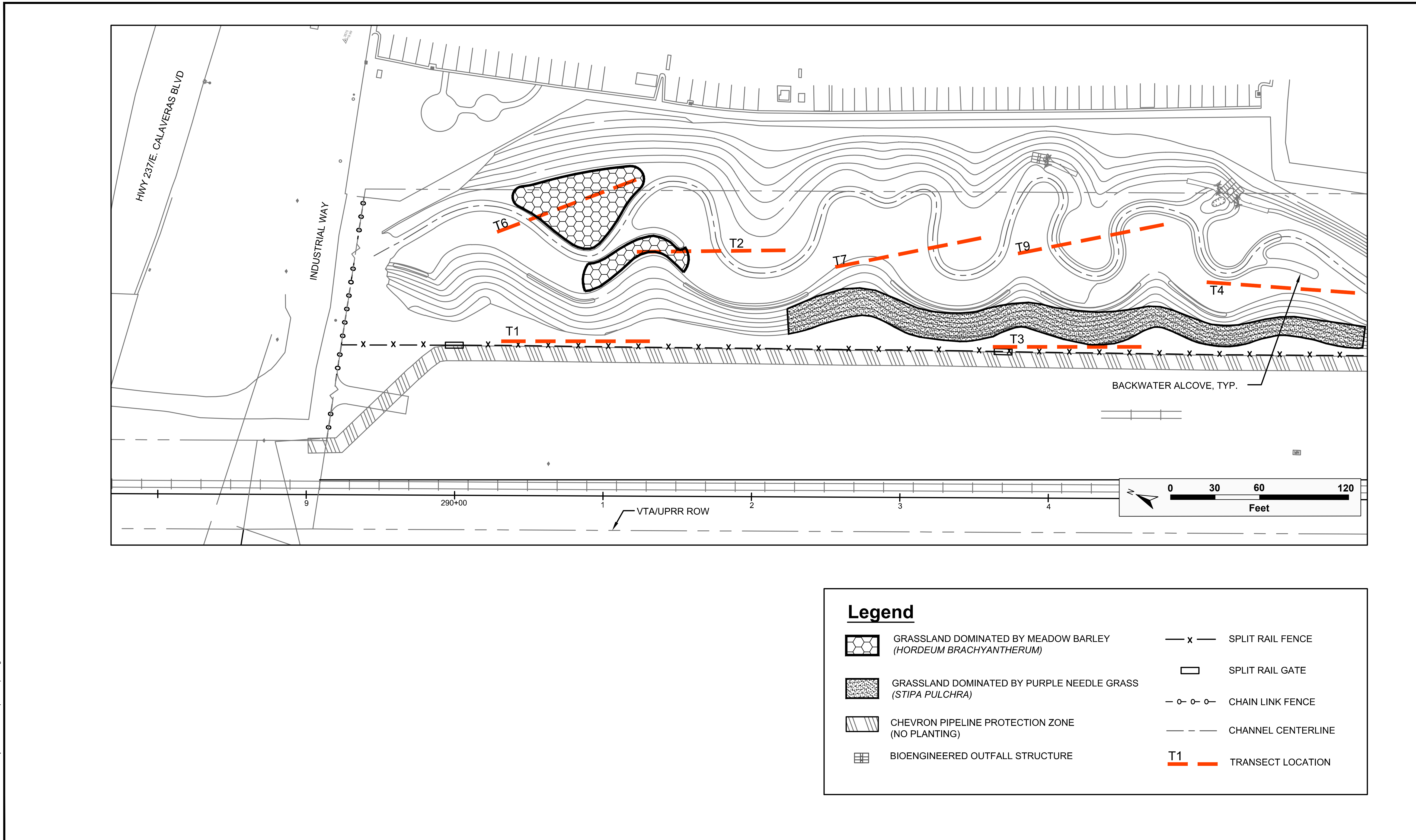
Figure 3. Mean Percent Cover of Native Grassland Species Compared to Success Criteria.

Table 5. Comparison of Percent Cover of Native Grassland Species to the Success Criteria

Year	Success Criterion[1]	Results[2]
1	75% cover of native grassland species	35.0% cover of native grassland species
2	60% cover of native grassland species	21.5% cover of native grassland species
3	50% cover of native grassland species	16.1% cover of native grassland species
4	40% cover of native grassland species	23.2% cover of native grassland species
5	35% cover of native grassland species	NA

[1] The interpretation of "native grasses" was broadened to include all native grassland species (grasses and forbs), not just those native grasses that were included in the seed mix.
[2] The Year 1 percent cover result was re-calculated to account for the broadened interpretation of the success criterion.

There is a disconnect between the native grassland success criteria and the project impacts and mitigation requirements. The project did not impact native grassland habitat and this habitat type is not common in the immediate vicinity of the project site. Non-native annual grassland which contains low cover of native species is typical in the region and is described in the MMP as the dominant vegetation type in the floodplain and upland portions of the site prior to project implementation. Furthermore, the MMP states that, "Overall success of the site may require accepting a mosaic balance of native and non-native vegetation, as Congdon's tarplant commonly thrives in non-native grasslands." In addition to providing habitat for Congdon's tarplant, a primary function of the grassland vegetation at the site is to stabilize the creek banks and prevent erosion, and that function is being fulfilled as no erosional features were observed throughout the mitigation site. The grassland habitat that is being provided at the site contains relatively high native cover compared what would typically be found in local grassland habitat, and is providing habitat for Congdon's tarplant as well as providing erosion control functions. Therefore, the native grassland habitat Year 4 performance criterion is considered to have been met.



G:\Active Projects\2995-04\Graphics\Report Figures\Year-4

H.T. HARVEY & ASSOCIATES
Ecological Consultants

Figure 4: Locations of Dense Native Grass Stands

Wrigley Creek Improvement Project (2995-04)

March 2015

3.3 Congdon's Tarplant Survival

The MMP performance criterion requires a minimum of 100 Congdon's tarplant individuals in 2 of 5 monitoring years. One hundred and five (105) Congdon's tarplant individuals were counted throughout the mitigation area in Year 4 (Table 6) (Photo 13). Only 2 individuals were located in the Congdon's tarplant seeding area and the remaining 103 were observed in the western floodplain area. The population size of Congdon's tarplant has exceeded 100 individuals in 3 of the 4 years of monitoring and has therefore met the final success criterion.

Table 6. 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	6 individuals
3	Minimum 100 individuals in 2 of 5 years	150-250
4	Minimum 100 individuals in 2 of 5 years	105
5	Minimum 100 individuals in 2 of 5 years	NA

3.4 Plant Health and Vigor

The overall average health and vigor of the woody plantings was 1.3 (good) in Year 4 (Table 7). The average health and vigor rating for each species ranged from 1.1 (good) for coyote brush to 1.6 (fair) for blue elderberry. Table 8 lists the percentage of individuals that fall into the three general health and vigor categories by monitoring year. The percentage of individuals in good condition decreased from 81.5% in Year 3 to 72.6% in Year 4. The percentage of individuals in fair condition increased from 15.8% in Year 3 to 23.9% in Year 4. The percentage of individuals in poor condition increased from 2.7% in Year 3 to 3.5% in Year 4.

Table 7. Mean Health and Vigor Ratings

Scientific Name	Common Name	Average Health and Vigor Rating			
		Year 1	Year 2	Year 3	Year 4
Acer negundo	box elder	1.2	1.1	1.2	1.3
Baccharis pilularis	coyote brush	1.0	1.0	1.0	1.1
Quercus agrifolia	coast live oak	1.2	1.2	1.1	1.3
Rosa californica	California rose	1.3	1.2	1.2	1.4

Scientific Name	Common Name	Average Health and Vigor Rating			
		Year 1	Year 2	Year 3	Year 4
Salix laevigata	red willow	1.1	1.3	1.2	1.3
Salix lasiolepis	arroyo willow	1.1	1.1	1.1	1.2
Sambucus nigra ssp. *caerulea*	blue elderberry	1.6	1.4	1.7	1.6
	Average	**1.2**	**1.2**	**1.2**	**1.3**

Table 8. Percentage of Individuals within Each of the Plant Health and Vigor Categories

Plant Health and Vigor Categories	Year 1 % of Individuals	Year 2 % of Individuals	Year 3 % of Individuals	Year 4 % of Individuals
Good Condition	80.7%	80.2%	81.5%	72.6%
Fair Condition	16.7%	12.1%	15.8%	23.9%
Poor Condition	2.6%	2.0%	2.7%	3.5%

3.5 Natural Recruitment

No stems of naturally recruiting native and non-native woody plant species were observed along monitoring transects within the planting areas. However, coyote brush and California rose (*Rosa californica*) were qualitatively observed to be recruiting in large numbers throughout the mitigation area outside of the transects. It is anticipated that over time native woody riparian species will continue to spread throughout the mitigation site. Natural recruit will continue to be qualitatively monitored in future monitoring reports.

3.6 Hydrology and Geomorphology

Observations made by Balance Hydrologics, Inc. indicate that the constructed channel and floodplain are stable. No major or minor erosion was observed throughout the project site.

The quantitative hydrologic success criterion requires continuous inundation or saturation of floodplain soils for at least 12.5% (31 days) of the annual growing season. The project hydrologist estimated that floodplain soils were continuously inundated or saturated for at least 68 days between 7 December 2013 and 8 April 2014. This exceeds the minimum requirement of 31 days of continuous inundation or saturation.

Due to drought conditions and the flashy hydrology of the drainage, the project hydrologist had few opportunities to observe flow on the floodplain and was not able to make flow measurements in Year 4. However, water level/depth observations from Year 4 continue to support prior observations of backwatering of the channel. It appears that the source of this backwatering is flow modification caused by the City of Milpitas' Wrigley-Ford Creek Pump Station located approximately 4500 feet downstream of the project site. During storm events, water likely accumulates within the channel until the station pumps flows into Berryessa Creek. Regardless of this backwatering, the mitigation project is establishing well and sedimentation rates on the floodplain are minimal. Minor sediment deposition (<5 mm) was observed on the floodplain, which was anticipated and poses no threat to the geomorphic functioning of the site. Sedimentation rates will continue to be closely monitored to determine if accumulation rates increase substantially.

Please refer to Appendix A for Balance Hydrologics' detailed results.

3.7 Photo-documentation

Photos were taken from the 36 photo-documentation points. A representative selection of these photos is presented in Appendix B.

3.8 Trail Construction Effects on the Mitigation Site

Construction of an adjacent redevelopment project (by others) began in 2013 and affected VTA's mitigation project. Redevelopment included construction of a trail bordering the eastern side of the mitigation site that resulted in the removal of approximately 20 trees and shrubs including some mitigation plantings within the upland planting zone of the mitigation site, which accounted for no more than 1.4% of the total quantity of installed plants (Calnan 2015, pers. comm.). VTA replaced the plants in December 2014 with 20 native riparian trees and shrubs of the same species as the original planting palette (Table 9). Plantings were installed in gaps in the riparian woodland canopy within the upland planting zone.

Table 9. Trail Construction Replanting Palette

Scientific Name	Common Name	Source County	Container Size	Quantity
Acer negundo	Box elder	Santa Clara	TP4	2
Baccharis pilularis	Coyote brush	Santa Clara	1-Gal	5
Quercus agrifolia	Coast live oak	Santa Clara	5-Gal	4
Sambucus nigra ssp. *caerulea*	Blue elderberry	Santa Clara	TP4	1
Rosa californica	California rose	Santa Clara	1-Gal	8
			Total	**20**

Management Recommendations

Year 5 (2015) Vegetation Maintenance

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). A small patch of the invasive species perennial pepperweed (*Lepidium latifolium*) was observed during annual vegetation monitoring near Transect 2 (Figure 4). A maintenance worker was onsite during monitoring activities and mechanically removed this small population; however, due to its aggressive nature, this location should be closely monitored for re-establishment in the future and spot herbicide treatments may be required. Care should be taken to avoid damaging naturally recruiting native plants and woody plantings during weeding activities. The woody plant irrigation basins no longer require weeding because the herbaceous vegetation will not compete substantially with the relatively mature woody plantings.

2. **Irrigation.** The plantings should be irrigated in 2015 only if necessary to prevent the visible signs of drought stress. If continued irrigation is recommended it will likely occur one time per month (10 gallons per event) during the growing season (April – October). However, if plantings begin to exhibit widespread signs of drought stress during 2015, irrigation frequency will be increased to avoid large-scale mortality. The irrigation infrastructure should remain in working order for of the entire 2015 calendar year.

Agency Actions

The VTA requests a meeting with representatives of the California Department of Fish and Wildlife and Regional Water Quality Control Board to discuss the native grassland final success criterion.

Section 4.0 References

4.1 Literature Cited

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H. T. Harvey & Associates. 2014. Wrigley Creek Improvement Project Milpitas, California Year 3 (2013) Monitoring Report. Dated 4 March 2014.

ICF Jones & Stokes. 2009. Wrigley Creek Improvement Project Mitigation and Monitoring Plan. June 2009. (ICF/JS 00099.09) San Jose, CA.

4.2 Personal Communications

Calnan, A. 2015. Phone communications between Max Busnardo (H. T. Harvey & Associates) and Ann Calnan (VTA) regarding trail construction impacts and replacement planting.

Appendix A. Hydrology and Geomorphology Monitoring Memorandum

Balance Hydrologics, Inc.®

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March 9, 2015

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

Submitted Via Email

Year-4 (Water Year 2014) Hydrologic and Geomorphic Monitoring Letter Report, Wrigley Creek, Santa Clara County, California

Dear Mr. Quinn:

We are pleased to furnish you with this memo report for abbreviated Year 4 (Water Year[1] 2014, or WY14, hereafter) post-construction monitoring of the Wrigley Creek Mitigation Project (project, hereafter). Construction of the mitigation site was completed in summer and fall 2010. The geomorphic and hydrologic monitoring program is designed to assess whether the numeric success criterion for soil saturation is met and identify whether the site is functioning as intended hydrologically and geomorphically. We visited the site numerous times during WY14 including storm responses, at other times during the winter months, dry season visits, and most recently at the end of the dry summer season, on September 23, 2014 to perform the geomorphic site walk. This memorandum summarizes the findings of those visits.

Per the project Mitigation and Monitoring Plan (MMP), the project has one numeric performance criterion, whereas other measures of success are characterized by the development of post-construction conditions that can be assessed visually. The success criterion for inundation/saturation in the MMP mandates that floodplain soils should be inundated or saturated within the uppermost 6 inches of the soil profile continually for 12.5% of the growing season. Utilizing a growing season of 250 days for neighboring Santa Clara County based on data from the NRCS Soil Survey of Santa Clara County (M. Parsons, H. T. Harvey and Associates, pers. comm.), we surmise that to meet the success criterion outlined in the MMP, the site must be continually inundated or saturated for at least 31.25 days.

[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, WY14 occurred from October 1, 2013 through September 30, 2014.

Figure 1 illustrates the general design features of the site and importantly the location of hydrologic monitoring and photo-documentation points that serve as the basis for our monitoring work. The schedule for monitoring during years 2 through 5 is presented in **Table 1**.

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	Oct. 2012	Oct. 2013	Oct. 2014	Oct. 2015
Task 4	Photo-documentation Points	Oct. 2011	Oct. 2012	Oct. 2013	Oct. 2014	Oct. 2015

Monitoring Methods

Winter Storm Observations

To assess the fundamental assumptions and basis for channel design, Balance Hydrologics (Balance, hereafter) observed conditions during or immediately after winter storm events where we looked for marked headcutting, marked channel incision or downcutting, substantial bank erosion or lateral channel migration, and excessive sedimentation or aggradation, and whether sediment is sourced from within the site or upstream. In addition, we documented the general floodplain inundation during storm observations to assess project hydraulic performance. We documented floodplain inundation levels via the staff plates and recording water level loggers, which we periodically downloaded.

Floodplain Soil Moisture Monitoring

Our approach provided for the monitoring of surficial hydrologic conditions at two different locations along the project reach (**Figure 1**); monitoring instrumentation included graduated staff plates and water level loggers. At each monitoring location, a staff plate was installed next to a water level logger set-up. The water level logger set-ups consist of a fence post driven into the ground 3 to 4 feet, with a perforated pipe secured to the fence post above ground. The perforated pipe houses the water level logger and is installed in a position with the water level logger slightly beneath the surrounding floodplain in order to document the depth and duration of ponding on the floodplain. Manual monitoring consisted of observations of stage (water depth as measured against the staff plate), soil moisture conditions, and downloading of the water level loggers. We utilized the record of inundation in tandem with visual observations of soil moisture to determine whether or not the soils were saturated for the required 12.5% of the growing season, as outlined in the MMP.

End of Water Year Geomorphic Monitoring

On September 23, 2014 Balance conducted a geomorphic assessment of the channel and floodplain to identify areas of erosion or aggradation within the site over the past year, as specified in the MMP. During the end of water year monitoring visit, Balance supplemented photo-documentation points scoped to be collected by H. T. Harvey and Associates with five photo-documentation points at places of hydrologic and geomorphic significance (**Figure 1**). On November 30, 2012 Balance staff installed four sedimentation plates (~square-foot plates mounted at the ground surface on a shaft driven into the floodplain) at the site on the floodplain (**Figure 1**). On September 23, 2014 Balance staff measured the depth of accumulated sediment (not including organic litter) at four locations on each plate, one at each of the four cardinal directions. The average depth of accumulated sediment for each sedimentation plate location is presented in the results.

Hydrology Monitoring Results

To provide context for data collected at Wrigley Creek, we present precipitation data from two nearby stations: the California Irrigation Management Information System (CIMIS) station in Union City (Station 171), and Weather Underground Station KCANSANJO17 (Berryessa, hereafter). These are the same stations used since WY12. The Berryessa rainfall station is located approximately 3 miles southeast 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 Berryessa and Union City rainfall station locations are characterized by a mean annual rainfall total similar to that for the Wrigley Creek mitigation site. The San Jose Airport station (KSJC) was found to have missing values in WY12 and WY13, so only long-term averages are used from this station.

WY14 was characterized by dry conditions in the Wrigley Creek area, with only about half of the average annual precipitation falling at nearby stations. Berryessa station received 8.68 inches of rainfall (**Figure 2**) equating to 6.41 inches less than the long-term average of 15.09 inches for the San Jose Airport (KSJC), the closest long-term station. The Union City CIMIS station received 8.62 inches of rainfall (**Figure 3**) or 6.47 inches less than the long-term average for that location. The largest daily rainfall totals for the Union City station[2] were recorded on November 20, 2013 (0.74 inches), February 28, 2014 (1.17 inches), and March 26, 2014 (0.62 inches). The Berryessa station's largest storms were on November 20, 2013 (0.53 inches), February 28, 2014

[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.

(1.48 inches), and March 29, 2014 (0.66 inches). Each of these days was associated with larger multi-day storm events. Smaller late-season storms occurred on April 25th, 2014 and September 25th, 2014.

Balance made a total of five site visits during WY14 to take staff plate readings, measure the depth to soil moisture, and download water-level recording instruments. In the discussion that follows, records of water level (stage) and soil moisture (shown in **Figure 4**) are used to deduce the period of inundation/saturation on the floodplain. Precipitation over time is also shown in **Figure 4.**

Criteria for the site are met when the floodplain is either inundated or saturated for a required amount of time. Inundation is defined here as having standing or flowing water on top of the floodplain, and is represented in **Figure 4** as spikes in stage that extend above the ground surface. Saturation is defined as the presence of moisture a minimum of 2 inches beneath the ground surface, and is represented as points at the depth to moisture in **Figure 4**. Saturation is assumed whenever these samples confirm it, or when inundation is observed on the floodplain.

As in previous years, at both the north and south gages, we observed that inundation tracked closely to rainfall events. At the beginning of the water year (October 1, 2013), the soils were not saturated within the upper 6 inches of the soil profile, as is reflected in the November 5th, 2013 soil moisture observations (Figure 4). Saturation conditions are assumed to be established with the onset of precipitation on November 20; saturation is first documented in the soils on January 21st, 2014. A series of clustered rainy days, from late January to early April, correlate with the longest periods of saturation and inundation. The storms with the highest intensity rainfall yielded the highest stage levels; for example, the season peak in one-day rainfall (February 28, 2014, 1.48 inches) correlates with the highest stage of the year at both the north and south gages, 3.69 and 3.99 feet above the ground surface, respectively. The high water levels rise quickly with the onset of rain, and recede quickly as precipitation ceases, hinting at the flashy nature of the site. Following the recession of high water, levels remain elevated a few inches above the floodplain for several days following these events. The smaller late-season storms (April 25 and September 25, 2014) produced only brief spikes in stage. A stage spike also occurred at both sites on May 15, 2014; however, no precipitation was observed at this time. The cause of this spike remains unknown, but is likely due to water operations at the pumping plant owned by the City of Milptas immediately upstream of the project. This site periodically discharges flows to Wrigley Creek.

As discussed in our WY2013 report, the modeling performed for the site as the basis for design by the Balance design team predicted near bankfull discharge to occur with a discharge of approximately 20 cubic feet per second (cfs), and a 100-year flow of 325 cfs would be required to inundate the floodplain to a depth of 4 feet. This year’s stage observations continue to support the theory that the site is backwatered, which likely results from flow modifications caused by a pump station located approximately 4500 feet downstream of the project site. Again, pump operations are not understood, but we presume that during storm events, stream flow accumulates within the channel until the station pumps flows up and over the levee into Berryessa Creek.

Throughout the wet season, there were approximately 54 days (discontinuous) during which the north gage site was inundated (**Figure 4**). The longest continuous period of inundation was about 15 days, from January 30 to February 13, 2014. The stage record and field observations show that between January 30 and April 8, 2014, soils near the gage were either inundated or saturated at a depth of approximately 2 inches, a period of continuous inundation/saturation lasting 68 days. Based on the stage record and field observations, a 76-day period of soil saturation is assumed starting from November 20, 2013, the date of an early season storm, to April 8, when water levels receded after the multi-day storm event spanning March 25 to April 5, 2014. Soil observations confirm saturation between inundation events during this time period. Saturation is also confirmed by field photographs taken on the January 21st site visit that show ponding and standing water in areas just upstream of the gage (**Figure 5**). In the 44 preceding days, from December 8, 2013 to Jan 21, 2014, only 0.02 inches of rain were recorded at the Berryessa station. It is assumed that the ponded water observed is a remnant of the December 7 rain event.

The south gage is located on a section of floodplain that ponds during and after storm events. Inundation again tracked with the clustered rain events from late January to early April. The longest period of continuous ponding/inundation lasted 23 days, from January 30 to February 22, 2014. The stage record and field observations show that between January 30 and April 8, 2014, soils near the gage were either inundated or saturated at a depth of approximately 2 inches, a period of continuous inundation/saturation lasting 68 days. The same 76-day period of soil saturation described at the north gage is assumed at this gage, based on stage, saturated soil observations and site photographs taken on January 21 (**Figure 6**).

To estimate a minimum period of soil saturation/inundation, we combined our observations of the continuous water level records at the north and south gages (**Figure 4**) and field observations of soil saturation at or very near the surface (**Figures 4 and 5**). The data suggest that soils were either inundated or saturated continually for a minimum of 68 days between December 7, 2013 and April 8, 2014. The 68 day period of inundation and soil saturation exceeds the stated success criterion outlined in the MMP. Therefore, the site has met the numeric success criterion for inundation/saturation in the MMP, which is particularly notable because WY14 was the third consecutive year with below average precipitation.

Due to the dry year and the flashy nature of the site, Balance had few opportunities to observe flow on the floodplain, and therefore we were not able to make flow measurements during WY14. These observations will be a priority during WY15 monitoring.

Geomorphic Observations

On September 23, 2014, Balance conducted an end-of water geomorphic walk at the site to make observations. There had been no rain for five months preceding the visit. Overall, the site was deemed to be in good condition and functioning geomorphically (**Figures 7 and 8**).

Table 2 shows the accumulation of sediment on the four sediment plates. Plates 1 and 2, located in the upstream portion of the site, showed a slight increase in sediment. At Plate 2, 50% to 70%

of the accumulated sediment is attributed to dead grass and plant litter, leaving only a trace of actual sediment accumulation. At the downstream sites, Plate 3 saw a slight scouring from WY13 to the present, and a slight accumulation was observed at Plate 4. Overall, the transport of sediment on the floodplain is in very small amounts and is not expected to affect the geomorphic or biologic functionality of the site for some time.

Table 2. Summary of sediment accumulation on sedimentation plates 1-4.

	Sedimentation Plate 1 *mm of accumulation*	**Sedimentation Plate 2** *mm of accumulation*	**Sedimentation Plate 3** *mm of accumulation*	**Sedimentation Plate 4** *mm of accumulation*
Year 1 - WY11	n/a	n/a	n/a	n/a
Year 2 - WY12	n/a	n/a	n/a	n/a
Year 3 - WY13*	1	1	5	<1
Year 4 - WY14	3	3	3	3

*Sediment plates installed on November 30, 2012, and therefore the WY13 sediment accumulations do not reflect the complete water year.

During the September 23 site walk, 1.5 feet-deep desiccation cracks were observed on the floodplain adjacent to the downstream (north) gage with moisture at the bottom of these cracks. At the upstream site, flow was estimated at 0.1 to 0.2 cfs, and there was standing water on the floodplain. Soils were visibly saturated. Vigorous willow growth was observed here as well.

As noted in our WY2013 report, substantial cattail growth had occurred along 85-90% of the low-flow channel length, a condition that remains unchanged in recent visits. Our observations of water levels (**Figure 4**) and physical bank features suggest these stands of cattail do not currently hinder the ability of the low-flow channel to convey low flows; however they very likely reduce velocities within the channel during high flows. Our observations suggest that elevated water levels are most likely caused by flow modifications from the downstream pump station in combination with the downstream channel conditions, and do not currently threaten the success of the mitigation project.

Recommendations for Adaptive Management

We are happy to report that we observed no major or minor erosion along the project reach, at the inlet structures, within the backwater channels, the floodplains, or the upland slopes. WY14 was drier than average, however there were major regional runoff events, and the soil moisture criterion from the MMP was met. Therefore, no adaptive management strategies are needed at this time.

Closing

We greatly appreciate the opportunity to assist you with this monitoring effort and look forward to reporting on the Year-5 geomorphic and hydrologic monitoring efforts one year from now.

Respectfully submitted,

BALANCE HYDROLOGICS, Inc.

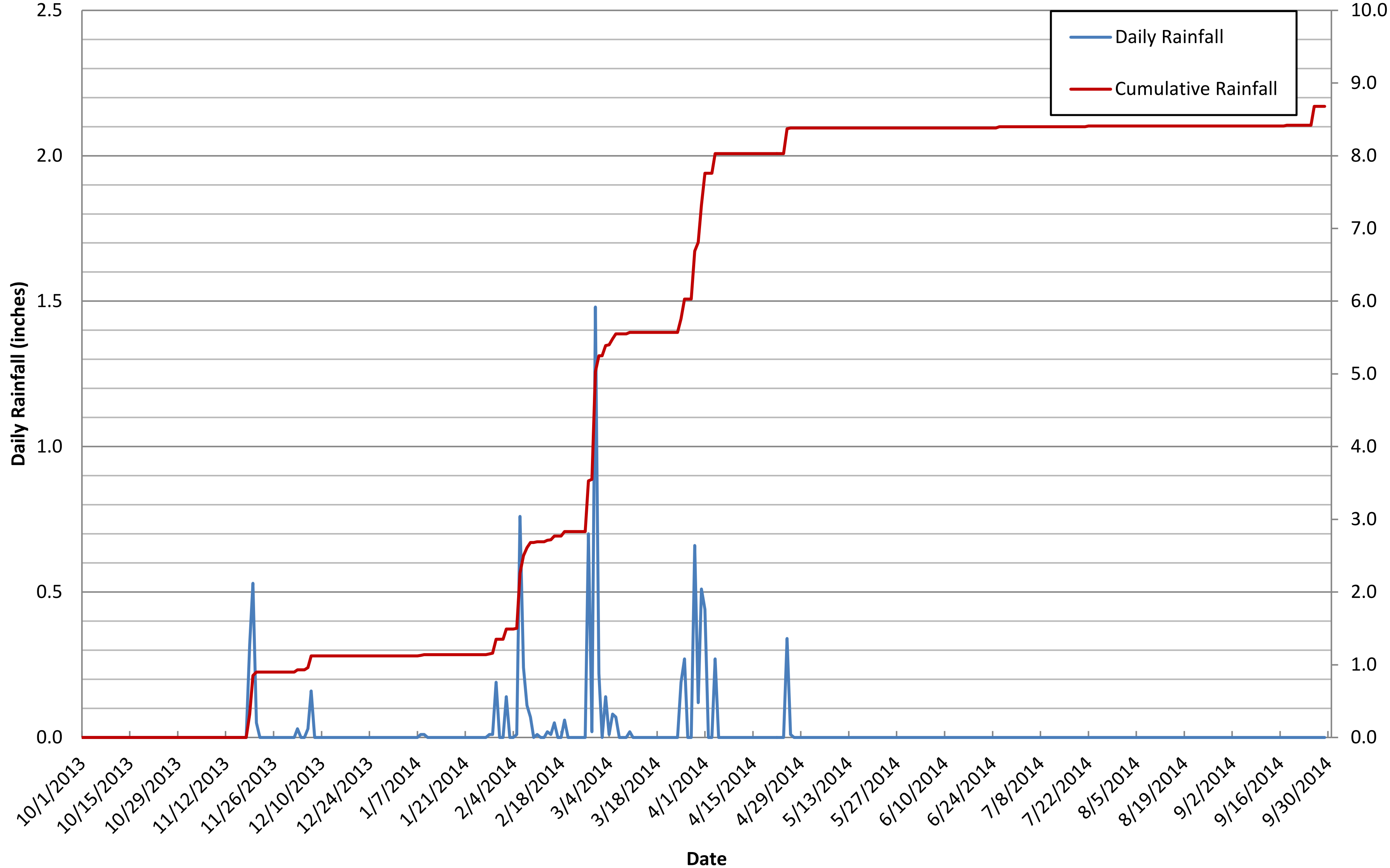
Eric Donaldson, M.S., P.G.
Project Manager

Krysia Skorko, M.S.
Geomorphologist

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

Encl. Figures 1 through 8

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

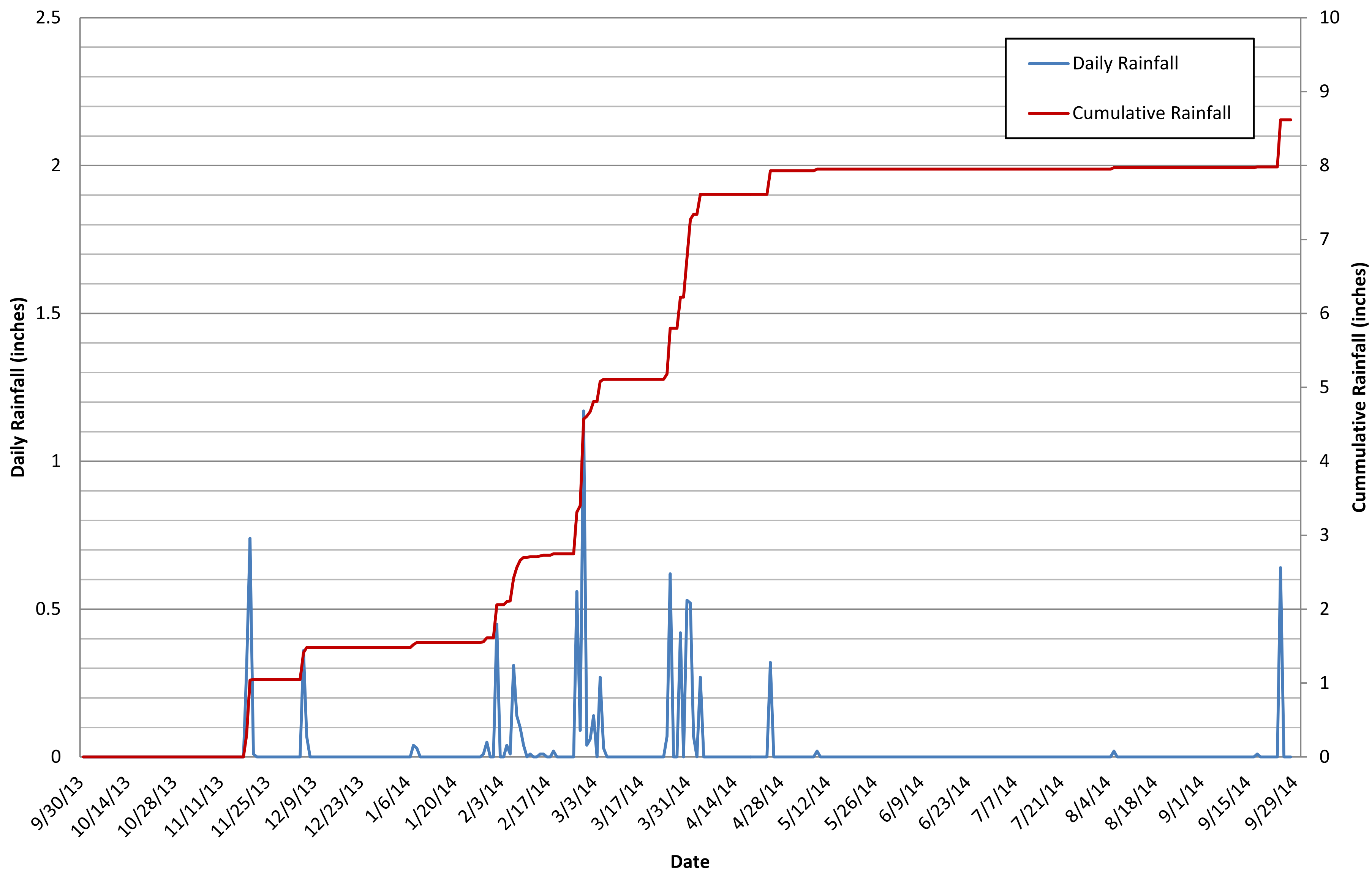


Source: Weather Underground, downloaded on 09/30/14

Balance Hydrologics, Inc.

Figure 2. **Daily Rainfall and Cumulative Rainfall, Berryessa, California (Weather Underground Station KCANSANJO17). Wrigley Creek Mitigation Performance Monitoring, Water Year 2014, Milpitas, California.**

Rainfall_WY2014.xls

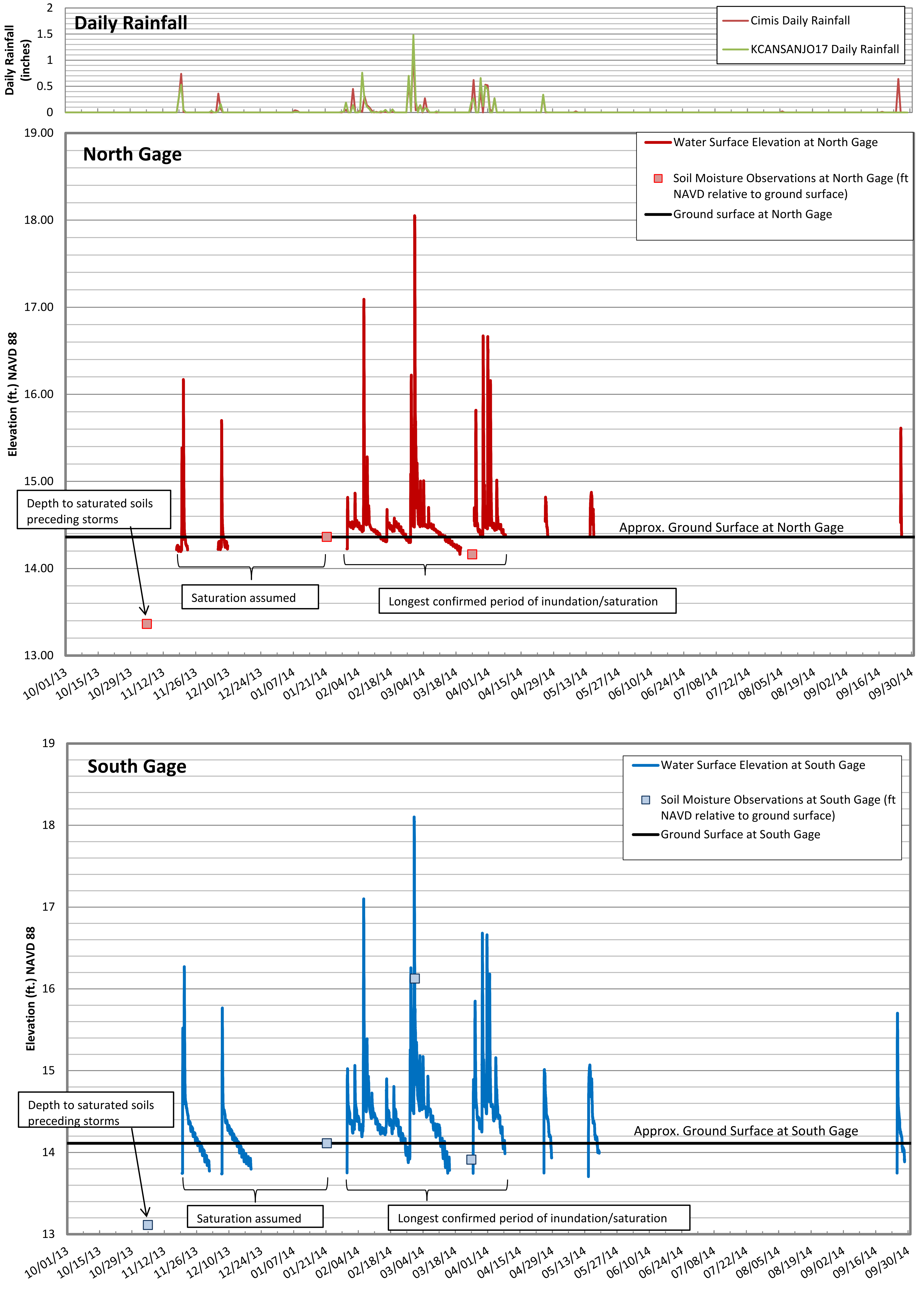


Source: CIMIS , downloaded on 09/30/14

Balance Hydrologics, Inc.

Figure 3. Daily Rainfall and Cumulative Rainfall, Union City (CIMIS 171), Water Year 2014. Wrigley Creek Mitigation Performance Monitoring, Water Year 2014, Milpitas, California.

Rainfall_WY2014



Source: Balance Hydrologics, Inc.

Balance Hydrologics, Inc.

WY14 Water Level Data

Figure 4. Annotated stage record - Wrigley Creek Mitigation Performance Monitoring, Water Year 2014, Milpitas, California Stage record for the north and south stations with storms shown by the steep spikes in stage followed by a gradual decline as the monitoring locations drain. The two stage records are presented in NAVD88. Note that the pressure transducers are installed below the ground surface. Soil moisture observations are elevations in NAVD and should be compared to the adjacent ground surface.

Balance Hydrologics, Inc.

Figure 5. **North gage field photos, January 21, 2014. Wrigley Creek Mitigation Performance Monitoring, Santa Clara County, California .** Photo A shows ponded water downstream of the north gage at the downstream culvert inlets, which supports continually saturated soil moisture during an inter-storm period. This moist soil was directly observed with a soil sampler (Photo B).

Balance Hydrologics, Inc.

Figure 6. South gage field photos, January 21, 2014. Wrigley Creek Mitigation Performance Monitoring, Santa Clara County, California . Photo A shows ponded water upstream of the south gage, suggesting continually saturated soil during an inter-storm period. This moist soil was directly observed with a soil sampler (Photo B).

Photo Point 1
Looking downstream, approximately 0˚ azimuth.

Photo Point 2
Looking downstream, approximately 8˚ azimuth.

Photo Point 3
Looking downstream, approximately 0˚ azimuth.

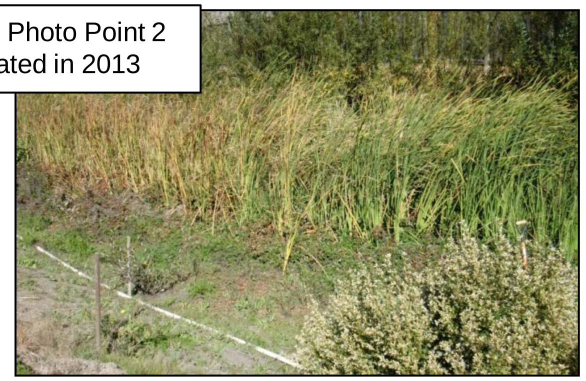


November 18, 2011



October 3, 2012

Note: Photo Point 2 relocated in 2013




November 5, 2013



September 23, 2014

Balance Hydrologics, Inc.

Figure 7 . **Photo points 1-3, Years 1-4. Wrigley Creek Mitigation Performance Monitoring, Santa Clara County, California .** Note that vegetation growth at Photo Point 2 obscured the view of the culvert outlet and channel, and in 2013, the photo point was relocated to a location higher on the left bank.

Source: Balance Hydrologics

Photo Point 4
Looking downstream, approximately 8˚ azimuth.

Photo Point 5
Looking upstream, approximately 164˚ azimuth.


November 18, 2011


October 3, 2012


November 5, 2013


September 23, 2014

Balance Hydrologics, Inc.

Year 4 Photodoc

Figure 8 . **Photo points 4 and 5, Years 1-4. Wrigley Creek Mitigation Performance Monitoring, Santa Clara County, California.**

Source: Balance Hydrologics

Appendix B. Photo-documentation

Photo 1. Photo-point 1, looking upstream from the culvert at the downstream project extent (October 2011)

Photo 2. Photo-point 1, looking upstream from the culvert at the downstream project extent (6 August 2014)

Photo 3. Photo-point 2, looking at Congdon's tarplant Planting Area (October 2011)

Photo 4. Photo-point 2, looking at Congdon's tarplant Planting Area (6 August 2014)

Photo 5. Photo-point 7, looking downstream from the west bank. (October 2011)

Photo 6. Photo-point 7, looking downstream from the west bank. (6 August 2014)

Photo 7. Photo-point 7, looking across the channel from the west bank to the east bank (October 2011)

Photo 8. Photo-point 7, looking across the channel from the west bank to the east bank (6 August 2014)

Photo 9. Photo-point 7, looking upstream from the west bank (October 2011)

Photo 10. Photo-point 7, looking upstream from the west bank (6 August 2014)

Photo 11. Photo-point 18, looking downstream from the Project's upstream extent (October 2011)

Photo 12. Photo-point 18, looking downstream from the Project's upstream extent (6 August 2014)

Photo 13. Photo-point 23, looking upstream from the east bank (October 2011)

Photo 14. Photo-point 23, looking upstream from the east bank (6 August 2014)

Photo 15. Photo-point 23, looking across the channel from the east bank to the west bank (October 2011)

Photo 16. Photo-point 23, looking across the channel from the east bank to the west bank (6 August 2014)

Photo 17. Photo-point 23, looking downstream from the east bank (October 2011)

Photo 18. Photo-point 23, looking downstream from the east bank (6 August 2014)

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

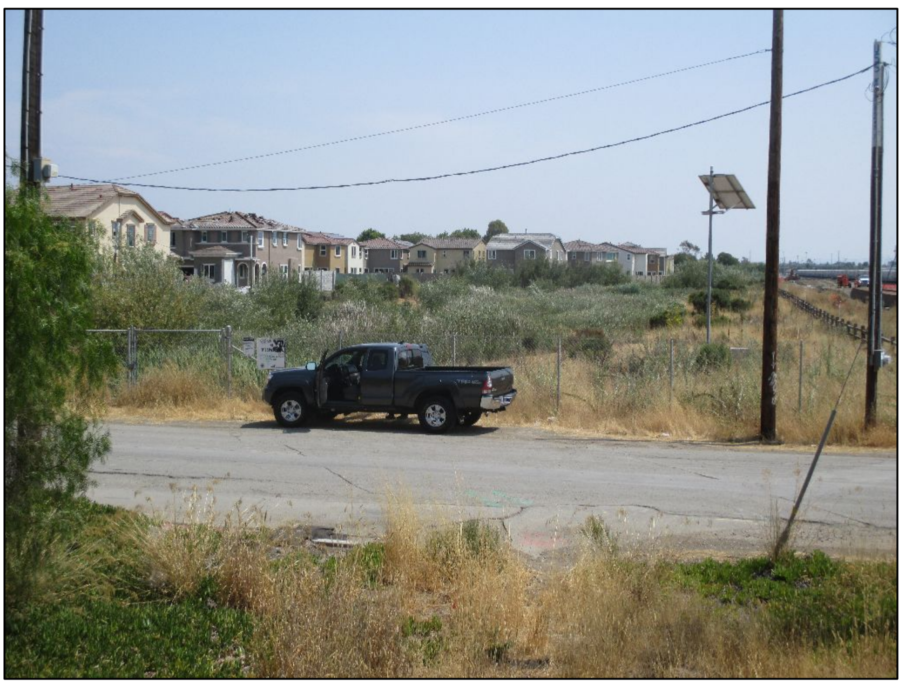


Photo 10. Photo-point 36, looking over the site from the Hwy 237 embankment located north of the site (6 August 2014)

Photo 11. Dense Stand of purple needlegrass on Western Creek Bank Slope in the Vicinity of Transect 3 (5 August 2014)

Photo 12. Dense Stand of meadow barley on Eastern Floodplain in the Vicinity of Transect 6 (5 August 2014)

Photo 13. Congdon's tarplant in Western Floodplain (15 July 2014)