Arana Gulch Habitat Management Plan
City of Santa Cruz

Year 5 (2018) Annual Report
Appendices

CDFW Permit No. 2081 (a)-13-013-RP
CDFW Permit No. 2081 (a)-18-016-RP
Coastal Development Permit No. 3-11-074 (Arana Gulch)

February 15, 2019

Appendix A AMWG Meeting Minutes, 2018

A-1: AMWG Meeting Minutes for:

February 2018
August 2018

Minutes

Arana Gulch Adaptive Management Working Group Meeting

Frederick/Broadway Entrance to Arana Gulch (Near Santa Cruz Bible Church)

9:00 a.m. – 1:30 p.m. on Friday, February 23, 2018

PARTICIPANTS:
Noah Downing, Planner, City of SC Dept. of Parks and Recreation
Mike Ferry, Senior Planner, City of SC Dept. of Planning and Community Development
Kathy Lyons, Biotic Resources Group
Suzanne Schettler, CNPS
Monica Oey, CDFW
Mark Ogonowski, USFWS

Additional Attendees: Tommy Williams, Debbie Bulger, Richard Stover, Jean Brocklebank, Michael Lewis, Craig Dremann, Brad Berkhart, Brett Snider

Prairie View Trail: The group walked the Prairie View Trail and discussed status of weed control measures implemented in the prairie, noting significant reduction in thistles. City discussed stump grinding of oak tree stumps left over after oak tree removal was done along the edge of the prairie. The group looked at the area where cotoneaster and Himalaya berry were removed. Action: City to stump grind out stumps when equipment is available.

Grazing Areas: Kathy Lyons presented data from February canopy height measurements. On February 12th, after approx. 2 weeks of cattle grazing in Area A, canopy height averaged 5 cm. Area C averaged 6 cm.; this area was grazed for 2 weeks in early January. Area D averages 11 cm, with no grazing in this area to date. Target height is 5-8 cm., November through April. Field observations on February 23 indicate lower values in Area A. Tommy Williams indicated he plans to move the cattle to Area D next week. After approximately 2-3 weeks in Area D, he will move cattle back to Area C. The group concurred with this action. The group walked in Grazing Area A. The group looked at density of non-native clover and filaree in 2016 SCT colony and their potential effect on SCT germination and seedling growth. Tommy W. indicated these two plant species are typically favored by cattle; however, their growth is very low to date (due to low rainfall) and cattle cannot affectively eat and control them.

The group discussed when to remove cattle from the grazing areas after Santa Cruz Tarplant (SCT) flowers. All agreed cattle do not eat SCT, but may trample them or "taste" them.

SCT Recovery Actions: Group agreed that site disturbance after SCT flowering could be good to stimulate SCT seed expression, possibly by flail mowing areas to create bare areas or scraping. Tommy Williams suggested placement of a molasses bucket on site to create bare ground. He indicated in 2-3 weeks, cattle would create bare ground, with soil disturbance to 1-2". Group indicated support to try this management technique in summer 2018 (at end of grazing season). Molasses barrel would be placed in Area A, with limits of historic SCT population. Mark Ogonowski suggested marking the site with a permanent wooden stake, such that this management action can be permanently marked in the field. Mark also suggested that there be permanent fixed areas where site treatments occur (i.e., scraping, other actions) to minimize annual variability between actions/ areas.
Action: Proceed with Tommy putting out molasses barrel out at end of grazing season (i.e., June) to create new bare area within historic SCT population in Area A. City to confer with Tommy on exact location. Location to be marked in field with wooden post.

The group discussed SCT seeding on site from on-site seed and possibility of seed from other sites. Craig Dremann presented information on seed genetic testing from Waypoint Lab in South Dakota. Cost for DNA testing is approximately $40 per population. Group discussed potential and interest in genetic testing of all SCT populations. The group discussed soil sampling to understand soil chemistry relating to SCT growth, other prairie restoration actions, and weed control. Craig Dremann presented information on soil sampling techniques he has used with Waypoint Lab in San Jose. Cost for soil nutrient tests are approximately $50 per one-quart soil sample (using upper 2 inches of soil). The group discussed interest in soil sampling for all SCT populations as well as areas not supporting SCT. Group also discussed plant community/vegetation data that could be collected at each sample site. The group discussed opportunities for facilitating these studies with the land managers at other populations. CDFW and USFWS expressed interest in facilitating outreach to the other land managers. USFWS indicated grant monies may be available.

Action: CDFW and USFWS to reach out to other land managers about interest in genetic testing of SCT and soil nutrient analysis. USFWS to prepare grant funding request. AMWG members to check of any available Arana Gulch seed in storage for testing (i.e., UCSC Herbarium, Jepson Herbarium, Dudley Herbarium at Cal Academy). AMWG to create list of actions, questions and possible data collection guidelines to get feedback from land managers.

Native Plant Diversity. The group discussed out planting seed to increase native plant diversity on site. Group discussed on-site collection of available seed, such as purple needlegrass, California poppy, and lupine for hand broadcasting into prepared plots. If successful, plot could be used for seed bulking. A minimum 20'x20' plot would be used. Group discussed commercial

seed bulking; however, costs are high ($10,000 per species from Hedgerow Farms, as per Craig Dremann).

Craig Dremann suggested mowing Area B at various heights to encourage native plant growth. Heights could be 2", 4" and 6". Taller height would be appropriate for areas supporting purple needlegrass. Evaluate recruitment and growth of native at the various levels. AMWG concurred with this test.
Action: City to create mowing zones in Area B. Taller mowed areas should be in areas currently supporting purple needlegrass.

Volunteer Work Days: The Earth Stewards will be conducting four work days on site in March and April. Work will include invasive plant removal and other tasks. A City work day is also planned.

Trail Maintenance: The eroded, muddy section of Prairie View Trail on the hillside will be renovated this year. CA Coastal Commission staff has indicated to the City that a trail re-route will require an amendment to the City's permit; therefore, the City will renovate the existing trailed, despite the AMWG's earlier recommendation to redirect the trail through the woodland area.

A similar discussion occurred near the wetland. The trail route crosses a wetland and is covered in water during the winter months. A new ad-hoc path has been created to avoid the wetland area and uses higher ground to avoid the wetter areas. The AMWG agreed that a new ad-hoc path seems like a better long-term route and would increase the soil disturbance along the pathway; however, CA Coastal Commission staff has indicated to the City that a trail re-route will require an amendment to the City's permit; therefore, the City will renovate the existing trailed, using a raised walkway across the wetland.

Management Area Map: The draft map of the prairie/grassland sub-management zones was discussed. AMWG members discussed that reference sites are still needed.

Bird Nest Boxes: Bluebird boxes are available to put on site. The AMWG concurred that the boxes would be a good thing.
Action: City will confer with the SC Bird Club on where the bird boxes should be placed.

Off-Leash Dog Use: Jean Brocklebank inquired about the number of citations issued for off-leach dogs. Noah indicated that the rangers have issued a few citations for off-leash dogs.
Action: Noah Downing will inquire as the availability of citation information.

AMWG Membership: AMWG group still recruiting a wildlife biologist; Noah Downing will contact Lisa Sheridan of SC Bird Club. Gray Hayes, CNPS representative, can no longer attend daytime meetings. Suzanne Schettler, CNPS alternate, is being proposed as the new representative and a new alternative member will need to be identified.
Action: Coastal Commission will review and approve changes to AMWG membership

Next Meeting: June 2018.
Action: Noah Downing to send out a Doodle poll.

Minutes
Arana Gulch Adaptive Management Working Group Meeting
Frederick/Broadway Entrance to Arana Gulch (Near Santa Cruz Bible Church)
9:00 a.m. – 1:00 p.m. on Wednesday, August 29, 2018

PARTICIPANTS:
Noah Downing, Planner, City of SC Dept. of Parks and Recreation
Mike Ferry, Senior Planner, City of SC Dept. of Planning and Community Development
Kathy Lyons, Biotic Resources Group
Suzanne Schettler, CNPS
Mark Ogonowski, USFWS
Bill Davilla, EcoSystems West
Lauren Garske-Garcia, CA Coastal Commission

Additional Attendees: Tommy Williams, Debbie Bulger (CNPS), Richard Stover (CNPS), Craig Dremann, Nina Donna (Sierra Club)

Invasive Plant Control: The City presented information on the volunteer work days held by the Earth Stewards (students from Ponderosa High School) in March and April. Kathy Lyons described work that was performed, including control of passion vibe, ivy, and French broom. Kathy Lyons presented results on invasive plant removal done in June 2018 by Huerta Tree Services wherein invasive plant removal/control was implemented in the Arana Gulch Creek and Hagemann Gulch management areas. Crews worked for one week removing/controlling French broom, acacia, eucalyptus, cotoneaster, pyracantha, ivy, and *Prunus.* A map with a list of polygons and photos of work areas was presented.

Trail Maintenance: Noah Downing presented the work done on the eroded, muddy section of Prairie View Trail on the hillside. The trail was renovated this summer by the City's youth school trail program.

Grazing Areas: The group walked into grazing area A to discuss grassland conditions and Santa Cruz tarplant. Noah Downing and Kathy Lyons presented data from February and August 2018 canopy height measurements and the April grassland data collection/analysis by Alison Stanton.

- Canopy height in Areas A and C was within target in February
- April canopy heights of 4 to 6 inches (11-16 cm) in Areas A and C were significantly reduced compared to last year, but were slightly higher than target

- Cattle may need to be confined to Area D (no access to Area C) for some period to reduce canopy height to within target. Non-native species cover has not been reduced, although the proportions of certain species has shifted during the sampling period
- Measurable native species cover has only been detected in Area A and has not increased
- Average native species richness has increased by less than one species
- Construction of the multi-use trail resulted in a flush of coast tarplant (*Deinandra corymbosa)* that has persisted and was detected in Area C in sampling in 2017 and 2018. This is the only new native species that has been detected in the sample plots since 2015
- Very small occurrences of native species have been observed outside of the sampling plots
- Average cover of bare ground in Area A increased significantly from the 2015 baseline across the sampling years
- Measured bare ground cover in Area C increased significantly in 2017, but otherwise has not changed significantly, likely due to small sample size and large standard deviations
- Measured bare ground cover in Area D has also not changed, likely due to small sample size and large standard deviations
- Consider collecting bare ground measurements in November -December during potential SCT germination period

SCT Recovery Actions: Group looked at Santa Cruz tarplant (SCT) at five areas within Area A, the only area where SCT were found in 2018. Current census is 267 plants, with 499 flower heads.

Group discussed site disturbance and a mechanism to move SCT seed around after SCT flowering could be good. Group discussed placement of molasses buckets in Area A and Area D to create bare ground. Group indicated support for this in November 2018. Group discussed strategy to create four bucket areas in Area A and apply site-collected SCT seed in two area. In Area D, 2 buckets would be placed and site-collected SCT seed would be placed in one area. Craig Dremann discussed need for soil sampling and need to test soils before and after management actions. He suggested looking at soils where coast tarweed is growing as well as where SCT is and is not growing. He expressed concern that soil is too acidic and other nutrient levels may be adversely affecting plant growth. The group discussed SCT seed collection from on-site seed and seed storage and out planting. Craig Dremann suggested collecting plant cover data at each SCT site. Bill Davilla expressed interest in having cattle back on site in November to vector SCT seeds around site (and possible scarify the ray seeds), as per previous study done by Kim Hayes.

Noah presented information that City Fire Department may be interested in doing a prescribed fire. Group discussed potential use of prescribed fire and the effects of previous fires on SCT. General consensus was fire can be used to stimulate SCT seed germination when fires were in the fall. Concern was expressed on a spring "green" fire could "parboil SCT seeds if there is too much moisture in the soil. Group agreed that previous data from other fires should be gathered and reviewed. Suzanne Schettler suggested waiting to see census of SCT in 2019 before having a prescribed fire in Area A. Group discussed the possibility of plant propagation for harvesting seeds.

> Action: Develop management action plan for putting molasses barrels out, collecting and broadcasting SCT seed and soil sampling, for review and approval by AMWG, USFWS, and CDFW. City will collect plant cover data at each SCT site in September 2018. Suzanne Schettler will try to reach Kim Hayes about her cattle study. Look into the possibility for growing tarplants off-site for seed production.

Tarplant Recovery Workshop: Mark Ogonowski (USFWS) and City expressed interest in facilitating outreach to the other land managers for another tarplant recovery workshop and pursuing soil sampling studies across the SCT range. USFWS indicated grant monies may be available for some studies.

> Action: USFWS to reach out to other land managers about interest in another recovery workshop (in spring 2019) and soil nutrient analysis. USFWS and AMWG members to check if any available Arana Gulch seed in storage for testing (i.e., UCSC Herbarium, Jepson Herbarium, Dudley Herbarium at Cal Academy).

Native Plant Diversity. Kathy Lyons reported that purple needlegrass seed was collected in summer 2018. As per direction from the February AMWG meeting, a minimum 20'x20' plot would be created in fall 2018 for out planting of this seed. Group discussed location and Bill Davilla suggested having the plot be in close proximity to other needlegrass areas to expand the native grassland area. Craig Dremann suggested soil testing of the revegetation area and the existing needlegrass area.

Craig Dremann asked why mowing was not done in Area B to encourage native plant growth, as discussed at the February AMWG meeting. City indicated a change in staffing occurred. New park personal (Matt) will begin work on site in August 2018 and will pick up tasks previously done by Brett Snider. Tasks will include weed whipping Area B, seasonal mowing, and continued weed control.

Next Meeting: Winter or Spring 2019, TBD.
Action: Noah Downing to send out a Doodle poll for next meeting.

Appendix B Restoration Maintenance Activity Log

B-1. Arana Gulch Restoration Maintenance and Activity Log

Appendix C Coastal Prairie/Santa Cruz Tarplant Management Area

C-1. SCT Survey Route Map

C-2. Pre-mow Plant and Breeding Bird Survey

C-3. Plant Cover Data, SCT Sites

C-4. Transect Photos

C-5. Photo Monitoring

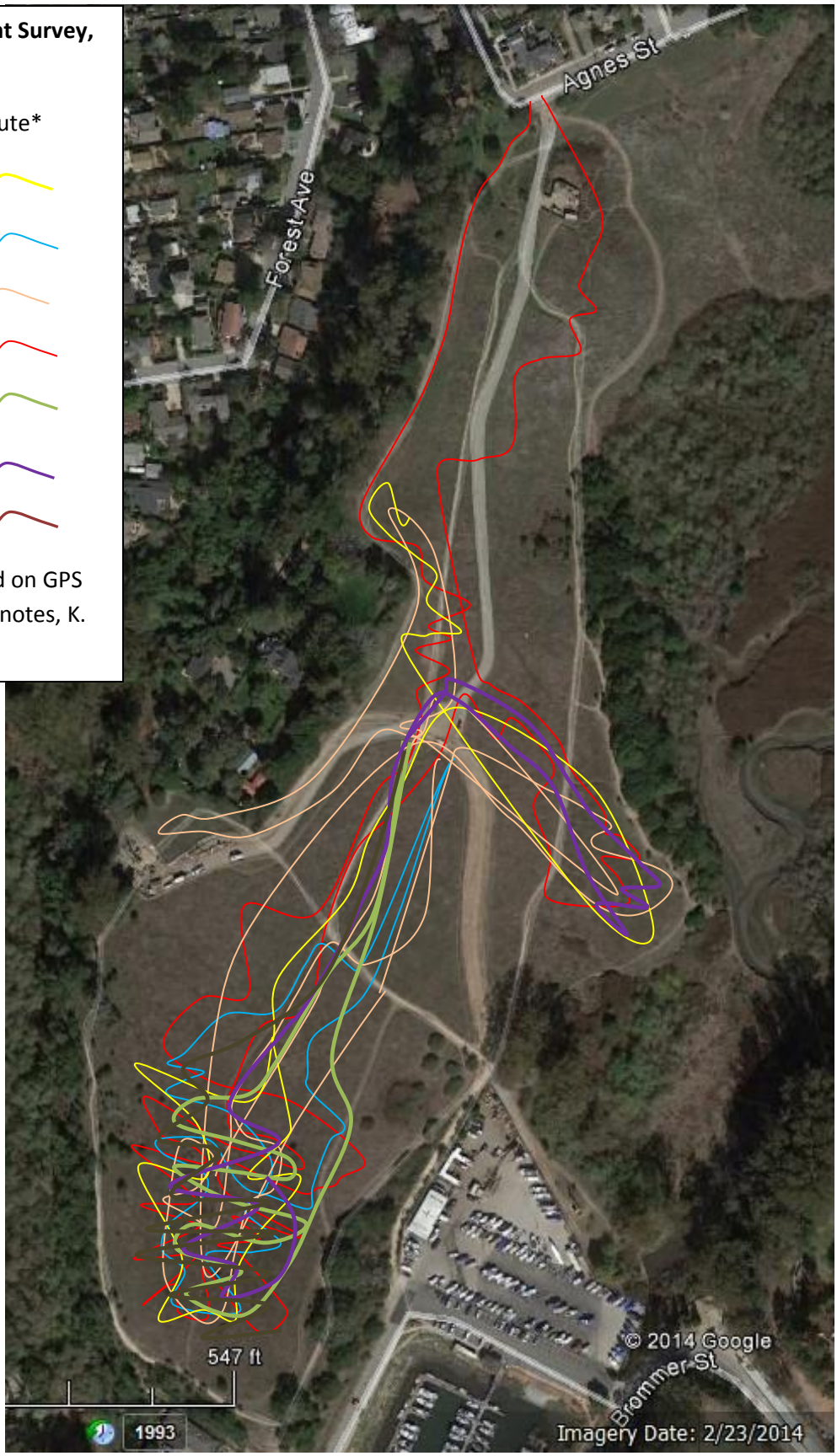
C-6. Soil Sampling Data

SCT Census Survey Routes and Dates, 2018

Santa Cruz Tarplant Survey, 2018

Date	Survey Route*
6/5/1	
6/15/18	
7/2/18	
7/24/18	
8/17/18	
9/10/18	
9/24/18	

*Survey route based on GPS track data and field notes, K. Lyons 2018;



5 Jun 2018

Pre-Mowing Nesting Bird Survey

Arana Gulch

Santa Cruz CA 95060

Garv Hoefler, wildlife biologist

Introduction: The purpose of this survey was to search all areas and possible niches for the presence of nesting birds, nests, or courtship behavior, any of which could identify and quantify possible species of special concern prior to the annual mowing of the grassland areas.

Methodology: Survey conducted on morning of June 5, 2018. Weather calm and clear. Initiated surveys in northwestern corner via a gate on the westerly side. Survey was done in and around the trees. The grassland areas were searched in a stochastic fashion; thereby wandering back and forth so as to flush any ground nesting birds. The stands of trees and understory vegetation along the grassland edge – mostly Coast Live Oak *(Quercus agrifolia)* and Willows *(Salix sp.)*– were scanned with unaided eyes and with binoculars. Where the willows abut the grassland, the Willows were searched in the same manner to make sure any nests near the proposed mowing areas were found. The remainder of the survey area consists of grassland and these areas were surveyed in a wandering, roaming style to maximize coverage. Shrubs and trees along the grazing/fenced areas were also searched.

Observations: No birds were flushed from the grassland, so there were no active nests in those sections. Although many scraped out areas were observed, which might have served as previous nests, yet there was no diagnostic evidence in or around those such as bird droppings or eggshell remnants. Most likely they were scrapings by mammals after prey. There were also gopher mounds and rodent burrows. No nests were found in any of the trees that were inspected, and there was no obvious courtship behavior by any of the birds encountered in the area, nor any nest building activities. One dead Rat – possibly *(Rattus rattus)* was seen along the trail; however, it's head was missing, so accurate ID via the design of the molars could not be done.

Conclusion: There are presently no signs of active bird nesting within the proposed mowing areas. The proposed mowing may proceed as planned.

Birds seen or heard this year: Turkey Vulture, Red-tailed Hawk, Rock Pigeon, Eurasian Collard Dove, Willow Flycatcher, Black Phoebe, Hutton's Vireo, Western Scrub Jay, American Crow, Purple Martin, Violet-green Swallow, Bank Swallow, Chestnut-backed Chickadee, Oak Titmouse, Bushtit, Bewick's Wren, Swainson's Thrush, American Robin, Northern Mockingbird, Common Yellowthroat, Wilson's Warbler, California Towhee, Song Sparrow, and American Goldfinch. **Note:** The list is arranged in the order of the newest edition of Stokes Field Guide BIRDS western region – 2013.

Photographs of surveyed Area

Grassland along willow edge

Rodent burrow amid grassland

Velvet grass dominated grassland

Wild oat dominated grassland

RESULTS OF PRE-MOWING BIRD NESTING AND PLANT SURVEY - JUNE 5, 2018

Location: Arana Gulch Greenbelt, Santa cruz Tarplant Plant Cover Plots **Area: A**
Date: 9/10/18 **Observers: K. Lyons**
1-meter square quadrats

	Percent Cover (absolute)									
	Area C1	Area C1	Area C1	Area C3	Area C3	Area C4	Area C2			
	GPS #89	GPS #90	GPS #91	GPS #92	GPS #93	GPS #94	GPS #95			
	1	2	3	4	5	6	7	Total	Absolute	Relative Cover
									Cover/Species	
Holocarpha macradenia	40	30	7	10	10	25	5	127	18.14	8.29%
Hypochaeris spp.	15	5	45	15	0	30	20	130	18.57	8.49%
Lotus corniculatus	20	0	0	0	0	0	0	20	2.86	1.31%
Festuca perennis	80	70	25	60	60	60	45	400	57.14	26.11%
Festuca myuros	20	5	20	2	20	25	10	102	14.57	6.66%
Convolulus arvensis	0	20	0	0	0	0	2	22	3.14	1.44%
Avena sp.	0	10	15	2	7	0	8	42	6.00	2.74%
Erodium botrys	0	20	60	50	30	50	60	270	38.57	17.62%
Trifolium subterraneum	0	2	5	0	10	7	15	39	5.57	2.55%
Plantago lanceolata	0	0	20	2	0	0	20	42	6.00	2.74%
Bromus hordeacous	0	0	10	5	10	5	5	35	5.00	2.28%
Briza minor	0	0	2	0	0	0	0	2	0.29	0.13%
Juncus bufonius	0	0	2	0	0	0	0	2	0.29	0.13%
Sisyrinchium bellum	0	0	2	0	0	0	0	2	0.29	0.13%
Rumex acetosella	0	0	0	0	20	0	0	20	2.86	1.31%
Rosa californica	0	0	0	0	0	12	0	12	1.71	0.78%
Anagalis arvensis	0	0	0	0	0	2	0	2	0.29	0.13%
								0	0.00	0.00%
								0	0.00	0.00%
								0	0.00	0.00%
								0	0.00	0.00%
Total Plant Cover								**1269**		**82.83%**
Litter	10	0	5	15	0	12	12	54	7.71	3.52%
Cow Dung	10	0	5	15	0	12	12	54	7.71	3.52%
Bare	20	15	20	30	5	25	40	155	22.14	10.12%
Total Litter/Bare Ground								**263**		**17.17%**
Total								**1532**		**100.0%**

Photo-documentation of SCT at Plots, 9-10-18

Plot C-1, N colony, 9-10-18

Plot C-1, SE colony, 9-10-18

Plot C-1, SW colony, 9-10-18

Photo-documentation of SCT at Plots, 9-10-18

Plot C-2, 9-10-18

Plot C-3, W colony, 9-10-18

Plot C-3, E colony, 9-10-18

Photo-documentation of SCT at Plots, 9-10-18

Plot C-4, 9-10-18

Location of SCT at Plot C-1, 9-10-18

SCT at Plot C-1, 9-10-18

Arana Gulch
Photo monitoring 2015-2018

PP1 1 2015

PP1 1 2016

PP1 1 2017

PP1 1 2018

PP1 2 2015

PP1 2 2016

PP1 2 2017

PP1 2 2018

PP1 3 2015

PP1 3 2016

PP1 3 2017

PP1 3 2018

PP1 4 2015

PP1 4 2016

PP1 4 2017

PP1 4 2018

PP2 1 2015

PP2 1 2016

PP2 1 2017

PP2 1 2018

PP2 2 2015

PP2 2 2016

PP2 2 2017

PP2 2 2018

PP2 3 2015

PP2 3 2016

PP2 3 2017

PP2 3 2018

PP2 4 2015

PP2 4 2016

PP2 4 2017

PP2 4 2018

PP3 1 2015

PP3 1 2016

PP3 1 2018

PP3 1 20147

PP3 2 2015

PP3 2 2016

PP3 2 2017

PP3 2 2018

PP3 3 2015

PP3 3 2016

PP3 3 2017

PP3 3 2018

PP3 4 2015

PP3 4 2016

PP3 4 2017

PP3 4 2018

PP4 1 2015

PP4 1 2016

PP4 1 2017

PP4 1 2018

PP4 2 2015

PP4 2 2016

PP4 2 2017

PP4 2 2018

PP4 3 2015

PP4 3 2016

PP4 3 2017

PP4 3 2018

PP4 4 2015

PP4 4 2016

PP4 4 2017

PP4 4 2018

PP5 1 2015

PP5 1 2016

PP5 1 2017

PP5 1 2018

PP5 2 2015

PP5 2 2016

PP5 2 2017

PP5 2 2018

PP5 3 2015

PP5 3 2016

PP5 3 2017

PP5 3 2018

PP5 4 2015

PP5 4 2016

PP5 4 2017

PP5 4 2018

PP6 1 2015

PP6 1 2016

PP6 1 2017

PP6 1 2018

PP6 2 2015

PP6 2 2016

PP6 2 2017

PP6 2 2018

PP6 3 2015

PP6 3 2016

PP6 3 2017

PP6 3 2018

PP6 4 2015

PP6 4 2016

PP6 4 2017

PP6 4 2018

PP7 1 2015

PP7 1 2016

PP7 1 2017

PP7 1 2018

PP7 2 2015

PP7 2 2016

PP7 2 2017

PP7 2 2018

PP7 3 2015

PP7 3 2016

PP7 3 2017

PP7 3 2018

PP7 4 2015

PP7 4 2016

PP7 4 2017

PP7 4 2018

PP8 1 2015

PP8 1 2016

PP8 1 2017

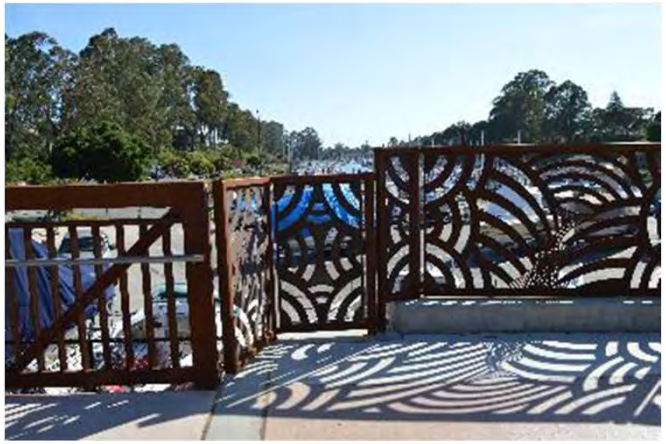
PP8 1 2018

PP8 2 2015

PP8 2 2016

PP8 2 2017

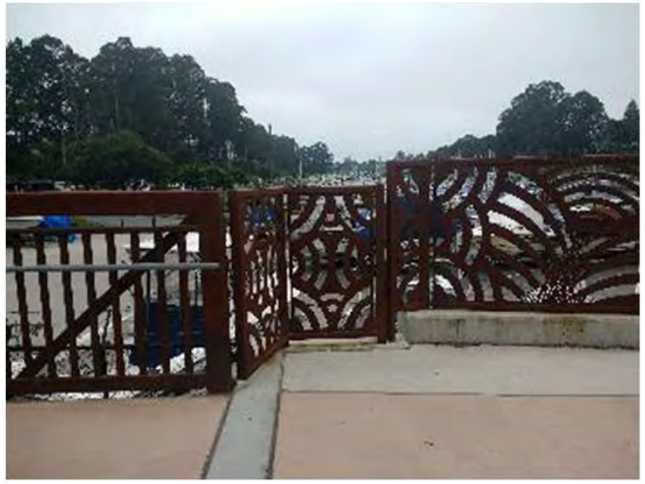
PP8 2 2018



PP8 3 2015

PP8 3 2016

PP8 3 2017



PP8 3 2018

PP8 4 2015

PP8 4 2016

PP8 4 2017

PP9 1 2015

PP9 1 2016

PP9 1 2017

PP9 1 2018

PP9 2 2015

PP9 2 2016

PP9 2 2017

PP9 2 2018

PP9 3 2015

PP9 3 2016

PP9 3 2017

PP9 3 2018

PP9 4 2015

PP9 4 2016

PP9 4 2017

PP9 4 2018

PP10 1 2015

PP10 1 2016

PP10 1 2017

PP10 1 2018

PP10 2 2015

PP10 2 2016

PP10 2 2017

PP10 2 2018

PP10 3 2015

PP10 3 2016

PP10 3 2017

PP10 3 2018

PP10 4 2015

PP10 4 2016

PP10 4 2017

PP10 4 2018

PP11 1 2015

PP11 1 2017

PP11 1 2018

PP11 2 2015

PP11 2 2017

PP11 2 2018

PP11 4 2015

PP11 4 2017

PP11 4 2018

PP11 3 2015

PP11 3 2017

PP11 3 2018

PP12 1 2015

PP12 1 2016

PP12 1 2017

PP12 1 2018

PP12 2 2015

PP12 2 2016

PP12 2 2017

PP12 2 2018

PP12 3 2015

PP12 3 2016

PP12 3 2017

PP12 3 2018

PP12 4 2015

PP12 4 2016

PP12 4 2017

PP12 4 2018

PP13 1 2015

PP13 1 2016

PP13 1 2017

PP13 1 2018

PP13 2 2015

PP13 2 2016

PP13 2 2017

PP13 2 2018

PP13 3 2015

PP13 3 2016

PP13 3 2017

PP13 3 2018

PP13 4 2015

PP13 4 2016

PP13 4 2017

PP13 4 2018

PP14 1 2015

PP14 1 2016

PP14 1 2017

PP14 1 2018

PP14 2 2015

PP14 2 2016

PP14 2 2017

PP14 2 2018

PP14 3 2015

PP14 3 2016

PP14 3 2017

PP14 3 2018

PP14 4 2015

PP14 4 2016

PP14 4 2017

PP14 4 2018

PP15 1 2015

PP15 1 2016

PP15 1 2017

PP15 1 2018

PP15 2 2015

PP15 2 2016

PP15 2 2017

PP15 2 2018

PP15 3 2015

PP15 3 2016

PP15 3 2017

PP15 3 2018

PP15 4 2015

PP15 4 2016

PP15 4 2017

PP15 4 2018

PP16 1 2015

PP16 1 2016

PP16 1 2017

PP16 1 2018

PP16 2 2015

PP16 2 2016

PP16 2 2017

PP16 2 2018

PP16 3 2015

PP16 3 2016

PP16 3 2017

PP16 3 2018

PP16 4 2015

PP16 4 2016

PP16 4 2017

PP16 4 2018

PP17 1 2015

PP17 1 2016

PP17 1 2017

PP17 1 2018

PP17 2 2015

PP17 2 2016

PP17 2 2017

PP17 2 2018

PP17 3 2015

PP17 3 2016

PP17 3 2017

PP17 3 2018

PP17 4 2015

PP17 4 2016

PP17 4 2017

PP17 4 2018

PP23 2015

PP23 2016

PP23 2017

PP23 2018

Arana Gulch – Soil Sampling

Date: December 20, 2018				By: K. Lyons, N. Downing, M. Haber	
Sample No.	**Area**	**GSP Data Point**	**Soil Depth Collected 0-2", 3-8"**	**Notes**	
A 1.a	A	123	0-2"	Central 2018 SCT Colony	
A 1.b	A	123	2-6"	Central 2018 SCT Colony	
A 2.a	A	122	0-2"	SW 2018 SCT colony	
A 2.b	A	122	2-6"	SW 2018 SCT Colony	
A 3.a	A	124	0-2"	SE 2018 SCT Colony	
A 3.b	A	124	2-6"	SE 2018 SCT Colony	
A 4.a	A	125	0-2"	Needlegrass grassland, historic SCT	
A 4.b	A	125	2-6"	Needlegrass grassland, historic SCT	
A 5.a	A	126	0-2"	Grassland, outside historic SCT, by cattle rubbing post	
A 5.b	A	126	2-6"	Grassland, outside historic SCT, by cattle rubbing post	
B 1.a	B	133	0-2"	Historic SCT with oatgrass and rush	
B 1.b	B	133	2-6"	Historic SCT with oatgrass and rush	
B 2.a	B	134	0-2"	Grassland, historic SCT	
B 2.b	B	134	2-6"	Grassland, historic SCT	
C 1.a	C	130	0-2"	Historic SCT, Deiandra patch	
C 1.b	C	130	2-6"	Historic SCT, Deiandra patch	
C 2.a	C	131	0-2"	SCT Salvage Site at trail bend	
C 2.b	C	131	2-6"	SCT Salvage Site at trail bend	
C 3.a	C	132	0-2"	S SCT Salvage Site near fence	
C 3.b	C	132	2-6"	S SCT Salvage Site near fence	
D 1.a	D	127	0-2"	Historic SCT	
D 1.b	D	127	2-6"	Historic SCT	
D 2.a	D	128	0-2"	Historic SCT; near southern Bainbridge seedbank site	
D 2.b	D	128	2-6"	Historic SCT; near southern Bainbridge seedbank site	
D 3.a	D	129	0-2"	Historic SCT; near northern Bainbridge seedbank site	
D 3. b	D	129	2-6"	Historic SCT; near northern Bainbridge seedbank site	

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	1 of 26
Lab Number :	00531

Sample Id : **A1.a - 2"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible	Sensitive Crops Restricted	Many Crops Restricted	Only Tolerant Crops Satisfactory	Few Crops Survive
Salinity (ECe)	0.5 dS/m					
Sodium Adsorption Ratio (SAR) *	1.12					
Boron (B)	0.16 ppm					
Sodium (Na)	1.3 meq/L					
Chloride (Cl)						
Carbonate (CO3)						
Bicarbonate (HCO3)						
Fluoride (F)						

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.8 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor
Available-N	20 ppm	0.4
Phosphorus (P) - Olsen	7 ppm	0.2
Potassium (K)	211 ppm	2.1
Potassium - sat. ext.	0.5 meq/L	
Calcium (Ca)	786 ppm	0.7
Calcium - sat. ext.	1.8 meq/L	
Magnesium (Mg)	209 ppm	1.3
Magnesium - sat. ext.	1.1 meq/L	
Copper (Cu)	1.5 ppm	1.7
Zinc (Zn)	7 ppm	2.2
Manganese (Mn)	26 ppm	3.5
Iron (Fe)	183 ppm	5.6
Boron (B) - sat. ext.	0.16 ppm	0.5
Sulfate - sat. ext.	0.8 meq/L	0.3
Exch Aluminum		

SOIL TEST RATINGS: Very Low | Low | Medium | Optimum | Very High

NO3-N	2 ppm
NH4-N	18 ppm
Total Exchangeable Cations(TEC)	62 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel: Coarse 5-12	Gravel: Fine 2-5	Weight Percent of Sample Passing 2mm Screen: Sand: Very Coarse 1-2	Sand: Coarse 0.5-1	Sand: Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
23 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	2 of 26
Lab Number :	00532

Sample Id : **A1.b - 6"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.3 dS/m	
Sodium Adsorption Ratio (SAR) *	0.85	
Boron (B)	0.12 ppm	
Sodium (Na)	0.9 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.5 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	13 ppm	0.3	
Phosphorus (P) - Olsen	5 ppm	0.2	
Potassium (K)	137 ppm	1.6	
Potassium - sat. ext.	0.2 meq/L		
Calcium (Ca)	724 ppm	0.7	
Calcium - sat. ext.	1.4 meq/L		
Magnesium (Mg)	175 ppm	1.2	
Magnesium - sat. ext.	0.8 meq/L		
Copper (Cu)	1.3 ppm	1.7	
Zinc (Zn)	3 ppm	1.1	
Manganese (Mn)	24 ppm	3.6	
Iron (Fe)	151 ppm	5.1	
Boron (B) - sat. ext.	0.12 ppm	0.4	
Sulfate - sat. ext.	0.6 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
5 ppm	8 ppm	54 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Weight Percent of Sample Passing 2mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
19 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	3 of 26
Lab Number :	00533

Sample Id : **A2.a - 2"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible	Sensitive Crops Restricted	Many Crops Restricted	Only Tolerant Crops Satisfactory	Few Crops Survive
Salinity (ECe)	0.4 dS/m					
Sodium Adsorption Ratio (SAR) *	0.65					
Boron (B)	0.12 ppm					
Sodium (Na)	0.8 meq/L					
Chloride (Cl)						
Carbonate (CO3)						
Bicarbonate (HCO3)						
Fluoride (F)						

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.9 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	14 ppm	0.3	
Phosphorus (P) - Olsen	4 ppm	0.1	
Potassium (K)	191 ppm	1.8	
Potassium - sat. ext.	0.6 meq/L		
Calcium (Ca)	778 ppm	0.7	
Calcium - sat. ext.	2.0 meq/L		
Magnesium (Mg)	172 ppm	1.2	
Magnesium - sat. ext.	1.1 meq/L		
Copper (Cu)	1.3 ppm	1.6	
Zinc (Zn)	5 ppm	1.7	
Manganese (Mn)	30 ppm	4.5	
Iron (Fe)	193 ppm	6.5	
Boron (B) - sat. ext.	0.12 ppm	0.4	
Sulfate - sat. ext.	0.7 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
1 ppm	13 ppm	57 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel: Coarse 5-12	Gravel: Fine 2-5	Weight Percent of Sample Passing 2mm Screen: Sand: Very Coarse 1-2	Sand: Coarse 0.5-1	Sand: Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
24 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	4 of 26
Lab Number :	00534

Sample Id : **A2.b - 6"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible	Sensitive Crops Restricted	Many Crops Restricted	Only Tolerant Crops Satisfactory	Few Crops Survive
Salinity (ECe)	0.3 dS/m					
Sodium Adsorption Ratio (SAR) *	0.72					
Boron (B)	0.11 ppm					
Sodium (Na)	0.8 meq/L					
Chloride (Cl)						
Carbonate (CO3)						
Bicarbonate (HCO3)						
Fluoride (F)						

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.4 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	7 ppm	0.2	
Phosphorus (P) - Olsen	3 ppm	0.2	
Potassium (K)	121 ppm	1.7	
Potassium - sat. ext.	0.2 meq/L		
Calcium (Ca)	587 ppm	0.7	
Calcium - sat. ext.	1.5 meq/L		
Magnesium (Mg)	136 ppm	1.2	
Magnesium - sat. ext.	0.7 meq/L		
Copper (Cu)	1.1 ppm	1.7	
Zinc (Zn)	2 ppm	0.8	
Manganese (Mn)	20 ppm	3.7	
Iron (Fe)	109 ppm	4.5	
Boron (B) - sat. ext.	0.11 ppm	0.4	
Sulfate - sat. ext.	0.5 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
1 ppm	6 ppm	43 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel: Coarse 5-12	Gravel: Fine 2-5	Weight Percent of Sample Passing 2mm Screen: Sand: Very Coarse 1-2	Sand: Coarse 0.5-1	Sand: Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
18 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	5 of 26
Lab Number :	00535

Sample Id : **A3.a - 2"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible	Sensitive Crops Restricted	Many Crops Restricted	Only Tolerant Crops Satisfactory	Few Crops Survive
Salinity (ECe)	0.4 dS/m					
Sodium Adsorption Ratio (SAR) *	0.81					
Boron (B)	0.12 ppm					
Sodium (Na)	1.1 meq/L					
Chloride (Cl)						
Carbonate (CO3)						
Bicarbonate (HCO3)						
Fluoride (F)						

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.9 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	14 ppm	0.3	
Phosphorus (P) - Olsen	6 ppm	0.2	
Potassium (K)	181 ppm	1.7	
Potassium - sat. ext.	0.4 meq/L		
Calcium (Ca)	986 ppm	0.8	
Calcium - sat. ext.	2.4 meq/L		
Magnesium (Mg)	180 ppm	1.1	
Magnesium - sat. ext.	1.1 meq/L		
Copper (Cu)	1.9 ppm	2.0	
Zinc (Zn)	8 ppm	2.1	
Manganese (Mn)	35 ppm	4.4	
Iron (Fe)	253 ppm	7.1	
Boron (B) - sat. ext.	0.12 ppm	0.4	
Sulfate - sat. ext.	0.7 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
1 ppm	13 ppm	68 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel: Coarse 5-12	Gravel: Fine 2-5	Weight Percent of Sample Passing 2mm Screen: Sand: Very Coarse 1-2	Sand: Coarse 0.5-1	Sand: Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
25 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	6 of 26
Lab Number :	00536

Sample Id : **A3.b - 6"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.4 dS/m	
Sodium Adsorption Ratio (SAR) *	0.85	
Boron (B)	0.12 ppm	
Sodium (Na)	1.0 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.5 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	13 ppm	0.4	
Phosphorus (P) - Olsen	4 ppm	0.2	
Potassium (K)	60 ppm	0.8	
Potassium - sat. ext.	0.3 meq/L		
Calcium (Ca)	696 ppm	0.8	
Calcium - sat. ext.	1.8 meq/L		
Magnesium (Mg)	146 ppm	1.2	
Magnesium - sat. ext.	1.0 meq/L		
Copper (Cu)	1.5 ppm	2.2	
Zinc (Zn)	3 ppm	1.2	
Manganese (Mn)	22 ppm	3.8	
Iron (Fe)	159 ppm	6.3	
Boron (B) - sat. ext.	0.12 ppm	0.4	
Sulfate - sat. ext.	0.8 meq/L	0.3	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
4 ppm	9 ppm	48 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Weight Percent of Sample Passing 2mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
17 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	7 of 26
Lab Number :	00537

Sample Id : **A4.a - 2"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.2 dS/m	
Sodium Adsorption Ratio (SAR) *	0.4	
Boron (B)	0.09 ppm	
Sodium (Na)	0.4 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	5.0 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	12 ppm	0.2	
Phosphorus (P) - Olsen	4 ppm	0.1	
Potassium (K)	112 ppm	0.7	
Potassium - sat. ext.	0.3 meq/L		
Calcium (Ca)	756 ppm	0.8	
Calcium - sat. ext.	1.4 meq/L		
Magnesium (Mg)	169 ppm	1.2	
Magnesium - sat. ext.	0.7 meq/L		
Copper (Cu)	1.0 ppm	1.4	
Zinc (Zn)	4 ppm	1.3	
Manganese (Mn)	22 ppm	3.5	
Iron (Fe)	123 ppm	4.4	
Boron (B) - sat. ext.	0.09 ppm	0.3	
Sulfate - sat. ext.	0.4 meq/L	0.1	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
1 ppm	11 ppm	53 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel: Coarse 5-12	Gravel: Fine 2-5	Weight Percent of Sample Passing 2mm Screen — Sand: Very Coarse 1-2	Sand: Coarse 0.5-1	Sand: Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
33 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	8 of 26
Lab Number :	00538

Sample Id : **A4.b - 6"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.3 dS/m	
Sodium Adsorption Ratio (SAR) *	0.49	
Boron (B)	0.08 ppm	
Sodium (Na)	0.5 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.6 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	13 ppm	0.4	
Phosphorus (P) - Olsen	3 ppm	0.1	
Potassium (K)	42 ppm	0.5	
Potassium - sat. ext.	0.3 meq/L		
Calcium (Ca)	748 ppm	0.8	
Calcium - sat. ext.	1.5 meq/L		
Magnesium (Mg)	155 ppm	1.2	
Magnesium - sat. ext.	0.8 meq/L		
Copper (Cu)	1.0 ppm	1.3	
Zinc (Zn)	3 ppm	1.1	
Manganese (Mn)	16 ppm	2.6	
Iron (Fe)	124 ppm	4.5	
Boron (B) - sat. ext.	0.08 ppm	0.3	
Sulfate - sat. ext.	0.6 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
1 ppm	12 ppm	51 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Weight Percent of Sample Passing 2mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
18 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	9 of 26
Lab Number :	00539

Sample Id : **A5.a - 2"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.3 dS/m	
Sodium Adsorption Ratio (SAR) *	0.59	
Boron (B)	0.13 ppm	
Sodium (Na)	0.6 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.9 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	15 ppm	0.4	
Phosphorus (P) - Olsen	3 ppm	0.2	
Potassium (K)	119 ppm	1.6	
Potassium - sat. ext.	0.8 meq/L		
Calcium (Ca)	600 ppm	0.8	
Calcium - sat. ext.	1.3 meq/L		
Magnesium (Mg)	109 ppm	1.0	
Magnesium - sat. ext.	0.7 meq/L		
Copper (Cu)	0.8 ppm	1.3	
Zinc (Zn)	4 ppm	1.8	
Manganese (Mn)	24 ppm	4.9	
Iron (Fe)	72 ppm	3.3	
Boron (B) - sat. ext.	0.13 ppm	0.4	
Sulfate - sat. ext.	0.8 meq/L	0.3	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
3 ppm	12 ppm	42 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Weight Percent of Sample Passing 2mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
18 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	10 of 26
Lab Number :	00540

Sample Id : **A5.b - 6"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.2 dS/m	
Sodium Adsorption Ratio (SAR) *	0.52	
Boron (B)	0.09 ppm	
Sodium (Na)	0.5 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.5 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	14 ppm	0.4	
Phosphorus (P) - Olsen	4 ppm	0.2	
Potassium (K)	436 ppm	4.9	
Potassium - sat. ext.	0.4 meq/L		
Calcium (Ca)	772 ppm	0.7	
Calcium - sat. ext.	1.1 meq/L		
Magnesium (Mg)	119 ppm	0.8	
Magnesium - sat. ext.	0.5 meq/L		
Copper (Cu)	1.0 ppm	1.1	
Zinc (Zn)	3 ppm	0.9	
Manganese (Mn)	19 ppm	2.5	
Iron (Fe)	85 ppm	2.6	
Boron (B) - sat. ext.	0.09 ppm	0.3	
Sulfate - sat. ext.	0.6 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
6 ppm	8 ppm	59 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel: Coarse 5-12	Gravel: Fine 2-5	Weight Percent of Sample Passing 2mm Screen: Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
19 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	11 of 26
Lab Number :	00541

Sample Id : **B1.a - 2"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.3 dS/m	
Sodium Adsorption Ratio (SAR) *	0.36	
Boron (B)	0.08 ppm	
Sodium (Na)	0.3 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	5.1 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	13 ppm	0.3	
Phosphorus (P) - Olsen	12 ppm	0.4	
Potassium (K)	392 ppm	3.8	
Potassium - sat. ext.	0.8 meq/L		
Calcium (Ca)	607 ppm	0.7	
Calcium - sat. ext.	1.2 meq/L		
Magnesium (Mg)	143 ppm	1.1	
Magnesium - sat. ext.	0.6 meq/L		
Copper (Cu)	0.9 ppm	1.2	
Zinc (Zn)	4 ppm	1.6	
Manganese (Mn)	19 ppm	3.2	
Iron (Fe)	83 ppm	3.2	
Boron (B) - sat. ext.	0.08 ppm	0.3	
Sulfate - sat. ext.	0.5 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
1 ppm	12 ppm	51 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel: Coarse 5-12	Gravel: Fine 2-5	Weight Percent of Sample Passing 2mm Screen: Sand: Very Coarse 1-2	Sand: Coarse 0.5-1	Sand: Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
24 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	12 of 26
Lab Number :	00542

Sample Id : **B1.b - 6"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible	Sensitive Crops Restricted	Many Crops Restricted	Only Tolerant Crops Satisfactory	Few Crops Survive
Salinity (ECe)	0.3 dS/m					
Sodium Adsorption Ratio (SAR) *	0.4					
Boron (B)	0.07 ppm					
Sodium (Na)	0.4 meq/L					
Chloride (Cl)						
Carbonate (CO3)						
Bicarbonate (HCO3)						
Fluoride (F)						

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.6 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	13 ppm	0.4	
Phosphorus (P) - Olsen	10 ppm	0.5	
Potassium (K)	237 ppm	3.1	
Potassium - sat. ext.	0.5 meq/L		
Calcium (Ca)	622 ppm	0.7	
Calcium - sat. ext.	1.3 meq/L		
Magnesium (Mg)	143 ppm	1.1	
Magnesium - sat. ext.	0.7 meq/L		
Copper (Cu)	0.7 ppm	1.0	
Zinc (Zn)	3 ppm	1.1	
Manganese (Mn)	12 ppm	2.0	
Iron (Fe)	75 ppm	2.9	
Boron (B) - sat. ext.	0.07 ppm	0.2	
Sulfate - sat. ext.	0.5 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
3 ppm	10 ppm	48 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel: Coarse 5-12	Gravel: Fine 2-5	Weight Percent of Sample Passing 2mm Screen: Sand: Very Coarse 1-2	Sand: Coarse 0.5-1	Sand: Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
18 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:	Project :	
City of Santa Cruz - Parks & Rec 323 Church Street Santa Cruz, CA 95060	City of Santa Cruz - Parks & Rec Job #: 3114	Report No : **18-360-0003** Cust No : 10377 Date Printed : 12/31/2018 Date Received : 12/26/2018 Page : 13 of 26 Lab Number : 00543

Sample Id : **B2.a - 2"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.4 dS/m	
Sodium Adsorption Ratio (SAR) *	0.49	
Boron (B)	0.08 ppm	
Sodium (Na)	0.5 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	5.3 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	9 ppm	0.2	
Phosphorus (P) - Olsen	18 ppm	0.6	
Potassium (K)	381 ppm	3.4	
Potassium - sat. ext.	1.3 meq/L		
Calcium (Ca)	532 ppm	0.7	
Calcium - sat. ext.	1.4 meq/L		
Magnesium (Mg)	115 ppm	1.0	
Magnesium - sat. ext.	0.7 meq/L		
Copper (Cu)	0.9 ppm	1.6	
Zinc (Zn)	5 ppm	2.3	
Manganese (Mn)	16 ppm	3.1	
Iron (Fe)	104 ppm	4.7	
Boron (B) - sat. ext.	0.08 ppm	0.3	
Sulfate - sat. ext.	0.7 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
1 ppm	8 ppm	45 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel (Weight Percent of Sample Passing 2mm Screen)		Sand (Weight Percent of Sample Passing 2mm Screen)			Silt	Clay	USDA Soil Classification
		Coarse 5-12	Fine 2-5	Very Coarse 1-2	Coarse 0.5-1	Med. to Very Fine 0.05-0.5	.002-.05	0-.002	
24 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	14 of 26
Lab Number :	00544

Sample Id : **B2.b - 6"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible	Sensitive Crops Restricted	Many Crops Restricted	Only Tolerant Crops Satisfactory	Few Crops Survive
Salinity (ECe)	0.3 dS/m					
Sodium Adsorption Ratio (SAR) *	0.5					
Boron (B)	0.09 ppm					
Sodium (Na)	0.5 meq/L					
Chloride (Cl)						
Carbonate (CO3)						
Bicarbonate (HCO3)						
Fluoride (F)						

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.8 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	11 ppm	0.3	
Phosphorus (P) - Olsen	19 ppm	0.8	
Potassium (K)	318 ppm	3.7	
Potassium - sat. ext.	0.9 meq/L		
Calcium (Ca)	603 ppm	0.7	
Calcium - sat. ext.	1.5 meq/L		
Magnesium (Mg)	116 ppm	1.0	
Magnesium - sat. ext.	0.7 meq/L		
Copper (Cu)	0.9 ppm	1.4	
Zinc (Zn)	4 ppm	1.7	
Manganese (Mn)	13 ppm	2.3	
Iron (Fe)	108 ppm	4.3	
Boron (B) - sat. ext.	0.09 ppm	0.3	
Sulfate - sat. ext.	0.8 meq/L	0.3	
Exch Aluminum			

NO3-N	1 ppm
NH4-N	10 ppm
Total Exchangeable Cations(TEC)	47 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel: Coarse 5-12	Gravel: Fine 2-5	Weight Percent of Sample Passing 2mm Screen: Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
21 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	15 of 26
Lab Number :	00545

Sample Id : **C1.a - 2"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.3 dS/m	
Sodium Adsorption Ratio (SAR) *	0.76	
Boron (B)	0.11 ppm	
Sodium (Na)	0.8 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	5.0 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	10 ppm	0.2	
Phosphorus (P) - Olsen	4 ppm	0.2	
Potassium (K)	166 ppm	1.8	
Potassium - sat. ext.	0.4 meq/L		
Calcium (Ca)	553 ppm	0.7	
Calcium - sat. ext.	1.4 meq/L		
Magnesium (Mg)	123 ppm	1.1	
Magnesium - sat. ext.	0.8 meq/L		
Copper (Cu)	1.0 ppm	1.8	
Zinc (Zn)	4 ppm	1.8	
Manganese (Mn)	24 ppm	5.1	
Iron (Fe)	94 ppm	4.4	
Boron (B) - sat. ext.	0.11 ppm	0.4	
Sulfate - sat. ext.	0.8 meq/L	0.3	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
3 ppm	7 ppm	41 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel: Coarse 5-12	Gravel: Fine 2-5	Weight Percent of Sample Passing 2mm Screen: Sand: Very Coarse 1-2	Sand: Coarse 0.5-1	Sand: Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
21 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	16 of 26
Lab Number :	00546

Sample Id : **C1.b - 6"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.3 dS/m	
Sodium Adsorption Ratio (SAR) *	0.75	
Boron (B)	0.10 ppm	
Sodium (Na)	0.8 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.5 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	14 ppm	0.4	
Phosphorus (P) - Olsen	4 ppm	0.2	
Potassium (K)	201 ppm	2.7	
Potassium - sat. ext.	0.3 meq/L		
Calcium (Ca)	616 ppm	0.7	
Calcium - sat. ext.	1.6 meq/L		
Magnesium (Mg)	128 ppm	1.1	
Magnesium - sat. ext.	0.8 meq/L		
Copper (Cu)	0.9 ppm	1.4	
Zinc (Zn)	3 ppm	1.0	
Manganese (Mn)	19 ppm	3.4	
Iron (Fe)	78 ppm	3.1	
Boron (B) - sat. ext.	0.10 ppm	0.3	
Sulfate - sat. ext.	0.7 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
7 ppm	7 ppm	46 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Weight Percent of Sample Passing 2mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
17 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	17 of 26
Lab Number :	00547

Sample Id : **C2.a - 2"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.3 dS/m	
Sodium Adsorption Ratio (SAR) *	0.46	
Boron (B)	0.08 ppm	
Sodium (Na)	0.5 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	5.0 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	15 ppm	0.3	
Phosphorus (P) - Olsen	8 ppm	0.3	
Potassium (K)	254 ppm	2.6	
Potassium - sat. ext.	0.5 meq/L		
Calcium (Ca)	769 ppm	0.8	
Calcium - sat. ext.	1.4 meq/L		
Magnesium (Mg)	128 ppm	0.9	
Magnesium - sat. ext.	0.7 meq/L		
Copper (Cu)	1.5 ppm	1.9	
Zinc (Zn)	4 ppm	1.5	
Manganese (Mn)	27 ppm	4.2	
Iron (Fe)	184 ppm	6.5	
Boron (B) - sat. ext.	0.08 ppm	0.3	
Sulfate - sat. ext.	0.5 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
1 ppm	14 ppm	55 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel: Coarse 5-12	Gravel: Fine 2-5	Weight Percent of Sample Passing 2mm Screen: Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
22 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	18 of 26
Lab Number :	00548

Sample Id : **C2.b - 6"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.3 dS/m	
Sodium Adsorption Ratio (SAR) *	0.51	
Boron (B)	0.10 ppm	
Sodium (Na)	0.6 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.6 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	11 ppm	0.3	
Phosphorus (P) - Olsen	7 ppm	0.3	
Potassium (K)	181 ppm	2.5	
Potassium - sat. ext.	0.6 meq/L		
Calcium (Ca)	618 ppm	0.8	
Calcium - sat. ext.	1.6 meq/L		
Magnesium (Mg)	101 ppm	0.9	
Magnesium - sat. ext.	0.8 meq/L		
Copper (Cu)	1.6 ppm	2.7	
Zinc (Zn)	3 ppm	1.3	
Manganese (Mn)	19 ppm	3.6	
Iron (Fe)	151 ppm	6.5	
Boron (B) - sat. ext.	0.10 ppm	0.3	
Sulfate - sat. ext.	0.6 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
1 ppm	10 ppm	43 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel: Coarse 5-12	Gravel: Fine 2-5	Weight Percent of Sample Passing 2mm Screen: Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
18 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	19 of 26
Lab Number :	00549

Sample Id : **C3.a - 2"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.4 dS/m	
Sodium Adsorption Ratio (SAR) *	0.4	
Boron (B)	0.10 ppm	
Sodium (Na)	0.4 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	5.5 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	12 ppm	0.3	
Phosphorus (P) - Olsen	5 ppm	0.2	
Potassium (K)	353 ppm	3.7	
Potassium - sat. ext.	1.4 meq/L		
Calcium (Ca)	703 ppm	0.8	
Calcium - sat. ext.	1.7 meq/L		
Magnesium (Mg)	99 ppm	0.8	
Magnesium - sat. ext.	0.7 meq/L		
Copper (Cu)	1.0 ppm	1.5	
Zinc (Zn)	10 ppm	4.0	
Manganese (Mn)	18 ppm	3.3	
Iron (Fe)	52 ppm	2.1	
Boron (B) - sat. ext.	0.10 ppm	0.3	
Sulfate - sat. ext.	0.7 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
1 ppm	11 ppm	51 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Weight Percent of Sample Passing 2mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
20 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	20 of 26
Lab Number :	00550

Sample Id : **C3.b - 6"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.3 dS/m	
Sodium Adsorption Ratio (SAR) *	0.41	
Boron (B)	0.13 ppm	
Sodium (Na)	0.5 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	5.0 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	7 ppm	0.2	
Phosphorus (P) - Olsen	5 ppm	0.2	
Potassium (K)	267 ppm	3.6	
Potassium - sat. ext.	0.9 meq/L		
Calcium (Ca)	599 ppm	0.8	
Calcium - sat. ext.	1.7 meq/L		
Magnesium (Mg)	77 ppm	0.7	
Magnesium - sat. ext.	0.8 meq/L		
Copper (Cu)	1.2 ppm	2.0	
Zinc (Zn)	5 ppm	2.3	
Manganese (Mn)	20 ppm	4.2	
Iron (Fe)	68 ppm	3.1	
Boron (B) - sat. ext.	0.13 ppm	0.4	
Sulfate - sat. ext.	0.7 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
1 ppm	6 ppm	42 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Weight Percent of Sample Passing 2mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
17 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	21 of 26
Lab Number :	00551

Sample Id : **D1.a - 2"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.3 dS/m	
Sodium Adsorption Ratio (SAR) *	0.44	
Boron (B)	0.10 ppm	
Sodium (Na)	0.5 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	5.2 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	21 ppm	0.6	
Phosphorus (P) - Olsen	5 ppm	0.2	
Potassium (K)	180 ppm	2.2	
Potassium - sat. ext.	0.8 meq/L		
Calcium (Ca)	620 ppm	0.8	
Calcium - sat. ext.	1.5 meq/L		
Magnesium (Mg)	100 ppm	0.9	
Magnesium - sat. ext.	0.8 meq/L		
Copper (Cu)	0.8 ppm	1.5	
Zinc (Zn)	3 ppm	1.4	
Manganese (Mn)	22 ppm	4.4	
Iron (Fe)	146 ppm	6.7	
Boron (B) - sat. ext.	0.10 ppm	0.3	
Sulfate - sat. ext.	0.5 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
8 ppm	13 ppm	43 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Weight Percent of Sample Passing 2mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
18 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	22 of 26
Lab Number :	00552

Sample Id : **D1.b - 6"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.2 dS/m	
Sodium Adsorption Ratio (SAR) *	0.54	
Boron (B)	0.08 ppm	
Sodium (Na)	0.4 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.7 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	19 ppm	0.5	
Phosphorus (P) - Olsen	4 ppm	0.2	
Potassium (K)	96 ppm	1.3	
Potassium - sat. ext.	0.3 meq/L		
Calcium (Ca)	534 ppm	0.8	
Calcium - sat. ext.	0.9 meq/L		
Magnesium (Mg)	79 ppm	0.8	
Magnesium - sat. ext.	0.4 meq/L		
Copper (Cu)	0.7 ppm	1.4	
Zinc (Zn)	2 ppm	0.9	
Manganese (Mn)	15 ppm	3.4	
Iron (Fe)	86 ppm	4.5	
Boron (B) - sat. ext.	0.08 ppm	0.3	
Sulfate - sat. ext.	0.4 meq/L	0.1	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
10 ppm	9 ppm	35 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Weight Percent of Sample Passing 2mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
18 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	23 of 26
Lab Number :	00553

Sample Id : **D2.a - 2"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.3 dS/m	
Sodium Adsorption Ratio (SAR) *	0.39	
Boron (B)	0.10 ppm	
Sodium (Na)	0.4 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	5.0 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	8 ppm	0.2	
Phosphorus (P) - Olsen	4 ppm	0.2	
Potassium (K)	141 ppm	1.4	
Potassium - sat. ext.	0.7 meq/L		
Calcium (Ca)	535 ppm	0.8	
Calcium - sat. ext.	1.6 meq/L		
Magnesium (Mg)	79 ppm	0.8	
Magnesium - sat. ext.	0.7 meq/L		
Copper (Cu)	0.9 ppm	1.9	
Zinc (Zn)	3 ppm	1.5	
Manganese (Mn)	22 ppm	5.2	
Iron (Fe)	105 ppm	5.7	
Boron (B) - sat. ext.	0.10 ppm	0.3	
Sulfate - sat. ext.	0.5 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
1 ppm	7 ppm	36 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel (Weight Percent of Sample Passing 2mm Screen): Coarse 5-12 / Fine 2-5	Sand: Very Coarse 1-2 / Coarse 0.5-1 / Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
21 %						

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	24 of 26
Lab Number :	00554

Sample Id : **D2.b - 6"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.2 dS/m	
Sodium Adsorption Ratio (SAR) *	0.53	
Boron (B)	0.07 ppm	
Sodium (Na)	0.5 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.4 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	11 ppm	0.3	
Phosphorus (P) - Olsen	4 ppm	0.2	
Potassium (K)	53 ppm	0.7	
Potassium - sat. ext.	0.2 meq/L		
Calcium (Ca)	459 ppm	0.8	
Calcium - sat. ext.	1.1 meq/L		
Magnesium (Mg)	75 ppm	0.9	
Magnesium - sat. ext.	0.5 meq/L		
Copper (Cu)	1.0 ppm	2.2	
Zinc (Zn)	2 ppm	1.4	
Manganese (Mn)	17 ppm	4.5	
Iron (Fe)	89 ppm	5.3	
Boron (B) - sat. ext.	0.07 ppm	0.2	
Sulfate - sat. ext.	0.5 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
4 ppm	7 ppm	30 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel: Coarse 5-12	Gravel: Fine 2-5	Weight Percent of Sample Passing 2mm Screen: Sand: Very Coarse 1-2	Sand: Coarse 0.5-1	Sand: Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
18 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	25 of 26
Lab Number :	00555

Sample Id : **D3.a - 2"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible	Sensitive Crops Restricted	Many Crops Restricted	Only Tolerant Crops Satisfactory	Few Crops Survive
Salinity (ECe)	0.2 dS/m					
Sodium Adsorption Ratio (SAR) *	0.55					
Boron (B)	0.08 ppm					
Sodium (Na)	0.5 meq/L					
Chloride (Cl)						
Carbonate (CO3)						
Bicarbonate (HCO3)						
Fluoride (F)						

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.8 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	10 ppm	0.2	
Phosphorus (P) - Olsen	4 ppm	0.2	
Potassium (K)	100 ppm	1.1	
Potassium - sat. ext.	0.4 meq/L		
Calcium (Ca)	529 ppm	0.8	
Calcium - sat. ext.	1.2 meq/L		
Magnesium (Mg)	103 ppm	1.0	
Magnesium - sat. ext.	0.6 meq/L		
Copper (Cu)	1.0 ppm	1.9	
Zinc (Zn)	3 ppm	1.7	
Manganese (Mn)	23 ppm	5.1	
Iron (Fe)	114 ppm	5.8	
Boron (B) - sat. ext.	0.08 ppm	0.3	
Sulfate - sat. ext.	0.5 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
1 ppm	9 ppm	37 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Gravel: Coarse 5-12	Gravel: Fine 2-5	Weight Percent of Sample Passing 2mm Screen: Sand: Very Coarse 1-2	Sand: Coarse 0.5-1	Sand: Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
21 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Waypoint ANALYTICAL

4741 East Hunter Ave. Suite A
Anaheim, CA 92807
Main 714-282-8777 º Fax 714-282-8575
www.waypointanalytical.com

SOIL ANALYSIS

Send To:
City of Santa Cruz - Parks & Rec
323 Church Street
Santa Cruz, CA 95060

Project :
City of Santa Cruz - Parks & Rec
Job #: 3114

Report No :	**18-360-0003**
Cust No :	10377
Date Printed :	12/31/2018
Date Received :	12/26/2018
Page :	26 of 26
Lab Number :	00556

Sample Id : **D3.b - 6"**

SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth: Negligible / Sensitive Crops Restricted / Many Crops Restricted / Only Tolerant Crops Satisfactory / Few Crops Survive
Salinity (ECe)	0.2 dS/m	
Sodium Adsorption Ratio (SAR) *	0.61	
Boron (B)	0.08 ppm	
Sodium (Na)	0.6 meq/L	
Chloride (Cl)		
Carbonate (CO3)		
Bicarbonate (HCO3)		
Fluoride (F)		

* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	4.6 s.u.								None

EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS: Very Low / Low / Medium / Optimum / Very High
Available-N	13 ppm	0.2	
Phosphorus (P) - Olsen	3 ppm	0.1	
Potassium (K)	74 ppm	0.6	
Potassium - sat. ext.	0.3 meq/L		
Calcium (Ca)	543 ppm	0.8	
Calcium - sat. ext.	1.2 meq/L		
Magnesium (Mg)	86 ppm	0.8	
Magnesium - sat. ext.	0.6 meq/L		
Copper (Cu)	1.0 ppm	2.0	
Zinc (Zn)	3 ppm	1.3	
Manganese (Mn)	15 ppm	3.4	
Iron (Fe)	119 ppm	6.2	
Boron (B) - sat. ext.	0.08 ppm	0.3	
Sulfate - sat. ext.	0.5 meq/L	0.2	
Exch Aluminum			

NO3-N	NH4-N	Total Exchangeable Cations(TEC)
3 ppm	10 ppm	35 meq/kg

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Weight Percent of Sample Passing 2mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to Very Fine 0.05-0.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
30 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.

Appendix D Arana Gulch Creek Riparian Woodland and Wetland Management Area and Hagemann Gulch Riparian Woodland Management Area

D-1: Arana Creek Revegetation Areas: Revegetation Monitoring Results: CNPS and CDFG Combined Vegetation Rapid Assessment and Releve Field Forms

CNPS and CDFG Combined Vegetation Rapid Assessment and Relevé Field Form

Relevé or ~~Rapid~~ Assessment (Circle One) (Revised Sept 10, 2009)

For Office Use:	Final database #:	Final vegetation type name:	Alliance Year 4 monitoring Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION

Polygon/Stand #:	Air photo:	Date:	Name(s) of surveyors (circle recorder):
Arana A		12/18	KLyons

GPS wypt #: _____ GPS name: _____ Datum: _____ or NAD83. Bearing, left axis at SW pt_____ (degrees) of Long / Short side

UTME ___ ___ ___ ___ ___ ___ UTMN ___ ___ ___ ___ ___ ___ ___ Zone: 10 / 11 (circle one) Error: ±_____ ft / m / pdop

GPS within stand? Yes / No If No, cite from waypoint to stand, distance _____(meters) & bearing _____(degrees)

Elevation: ft / m Camera Name/Photograph #'s:

Stand Size (acres): (<1,) 1-5, >5 | Plot Size (m^2): 10 / 100 / 400 / 1000 | Plot Shape ___ x___ ft / m or Circle Radius____ft / m

Exposure, Actual °: W NE NW SE SW Flat Variable /All | Steepness, Actual °: _____ 0° 1-5° 5-25° > 25°

Topography: Macro: top (upper) mid (lower) bottom | Micro: convex flat concave undulating

Geology code: _____ Soil Texture code: _____ | Upland or (Wetland/Riparian) (circle one)

% Surface cover

H20:____ BA Stems:____ Litter: ____ Bedrock:____ Boulder:____ Stone:____ Cobble: _____ Gravel:____ Fines:_____ =100%
(Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

% Current year bioturbation _____ Past bioturbation present? Y / N | % Hoof punch _____

Site history, stand age, comments:

Slope adjacent to trail & toe of Arana Creek - Year 4

Type/ Level of disturbance codes: ____/___ ____/___ ____/___ ____/___ ____/___ "Other"

II. HABITAT AND VEGETATION DESCRIPTION

Tree DBH (T1) (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: (S1) seedling (<3 yr. old), S2 young (<1% dead), S3 mature (1-25% dead), S4 decadent (>25% dead)

Herbaceous: (H1) <12" plant ht.), H2 (>12" ht.) % Non-Vasc cover: _____ Total % Vasc Veg cover: _____

% Cover -Overstory Tree Conifer/Hardwood: ____/____ Low-Medium Tree: 5 Shrub: 60 Herbaceous: 10

Height Class - Overstory Conifer/Hardwood: ____/____ Low-Medium Tree: _____ Shrub: _____ Herbaceous: _____

Height classes: 01=<1/2m 02=1/2-1m 03=1-2m 04=2-5m 05=5-10m 06=10-15m 07=15-20m 08=20-35m 09=35-50m 10=>50m

Species, Stratum, and % cover. Stratum categories: T= Overstory tree, U= Understory Tree, S = Shrub, H= Herb, N= Non-vascular.
% cover intervals for reference: <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, 75%.

Strata	Species	% cover	C	Strata	Species	% cover	C
T	Salix lasiolepis	15					
S	Rubus armeniacus	60					
S	Toxicodendron diversilobum	5					
H	Elymus glaucus	5					

Unusual species: _____

III. INTERPRETATION OF STAND

Field-assessed vegetation alliance name: _____

Field-assessed association name (optional): _____

Adjacent alliances: _____

Confidence in alliance identification: L M H Explain: _____

Phenology (E,P,L): Herb___ Shrub___ Tree___ Other identification or mapping information: _____

CNPS and CDFG Combined Vegetation Rapid Assessment and Relevé Field Form

Relevé or Rapid Assessment (Circle One) (Revised Sept 10, 2009)

For Office Use:	Final database #:	Final vegetation type name:	Alliance Year 4 monitoring Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION

Polygon/Stand #:	Air photo:	Date:	Name(s) of surveyors (circle recorder):
Arana C		12/18	K. Lyons

GPS wypt #: ____ GPS name: ____ Datum: ____ or NAD83. Bearing, left axis at SW pt____ (degrees) of Long / Short side

UTME ____ UTMN ____ Zone: 10 / 11 (circle one) Error: ±____ ft / m / pdop

GPS within stand? Yes / No If No, cite from waypoint to stand, distance ____(meters) & bearing ____(degrees)

Elevation: ft / m Camera Name/Photograph #'s:

Stand Size (acres): (<1, 1-5, >5 | Plot Size (m^2): 10 / 100 / 400 / 1000 | Plot Shape ___ x___ ft / m or Circle Radius____ft / m

Exposure, Actual °: ____ NE (NW) SE SW Flat Variable /All | Steepness, Actual °: ____ (0°) 1-5° 5-25° > 25°

Topography: Macro: top upper mid lower bottom | Micro: convex flat concave undulating

Geology code: ____ Soil Texture code: ____ | (Upland) or Wetland/Riparian (circle one)

% Surface cover

H20:____ BA Stems:____ Litter: ____ Bedrock:____ (Incl. outcrops) Boulder:____ (>60cm diam) Stone:____ (25-60cm) Cobble: ____ (7.5-25cm) Gravel:____ (2mm-7.5cm) Fines:____ (Incl sand, mud) =100%

% Current year bioturbation ____ Past bioturbation present? Y / N | % Hoof punch ____

Site history, stand age, comments:

Revegtation area NW of Arana Creek causeway
Year 4

Type/ Level of disturbance codes: ____/____ ____/____ ____/____ ____/____ ____/____ "Other"

II. HABITAT AND VEGETATION DESCRIPTION

Tree DBH: (T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: S1 seedling (<3 yr. old), (S2) young (<1% dead), S3 mature (1-25% dead), S4 decadent (>25% dead)

Herbaceous: (H1) (<12" plant ht.), H2 (>12" ht.) % Non-Vasc cover: ____ Total % Vasc Veg cover: ____

% Cover -Overstory Tree Conifer/Hardwood: ____/____ Low-Medium Tree: 3 Shrub: 30 Herbaceous: 80

Height Class - Overstory Conifer/Hardwood: ____/____ Low-Medium Tree: ____ Shrub: ____ Herbaceous: ____

Height classes: 01=<1/2m 02=1/2-1m 03=1-2m 04=2-5m 05=5-10m 06=10-15m 07=15-20m 08=20-35m 09=35-50m 10=>50m

Species, Stratum, and % cover. Stratum categories: T= Overstory tree, U= Understory Tree, S = Shrub, H= Herb, N= Non-vascular.
% cover interval, for reference: <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, 75%.

Strata	Species	% cover	C	Strata	Species	% cover	C
T	Cupressus macrocarpa	2					
T	Quercus agrifolia	1					
S	Rosa californica	15					
S	Artemisica douglasiana	15					
H	grassd - mixed annual	60					
H	Elymus glaucus	20					

Unusual species: ____

III. INTERPRETATION OF STAND

Field-assessed vegetation alliance name: ____

Field-assessed association name (optional): ____

Adjacent alliances: ____

Confidence in alliance identification: L M H Explain: ____

Phenology (E,P,-): Herb ____ Shrub ____ Tree ____ Other identification or mapping information: ____