February 9, 2010

Los Angeles County Department of Regional Planning
Maria Masis, Supervising Regional Planner
320 W Temple Street
Los Angeles, CA 90012

Subject: County Sage Mitigation Area Status Report

Ms. Masis:

In response to your letter to Sunshine Canyon Landfill dated December 7, 2009, we have prepared this detailed update on the sage mitigation area located in the County portion of the landfill.

Background on Site Conditions

The sage mitigation area located on the county side of the landfill was proposed as part of the permitting process for the City side of the landfill. One of the cut slopes on the County side was specified as a sage mitigation site in the January 4, 2005 document "Venturan Coastal Sage Scrub Revegetation Mitigation Plan" by Pacific Southwest Biological Services.

The county slope had been seeded previously but had shown no success. In late 2007, SCL retained a restoration expert to recommended changes to better improve chances of growth. Dr Ted St. John of the Chambers Group was retained to study the site and prepare an updated planting plan.

Dr. St. John was chosen for his extensive work on restoration in difficult conditions. Dr. St. John has a research background in plant and ecosystem ecology, with numerous scholarly publications about mycorrhizal symbiosis, a factor that is often the key to successful restoration. He has helped introduce several of the methods that are now routine in restoration practice, He often works in difficult environments, including deserts, weed-infestations, and exposed subsoils. Portions of the planting area at on recent project of his, Prima Deshecha Landfill, were chemically very similar to the subsoil planting areas at Sunshine Canyon Landfill.

Chamber's update, entitled "Coastal Sage Scrub and Interim Cover Revegetation Plan for Sunshine Canyon County Landfill" was dated January 15, 2008. This document was previously submitted with the site's voluntary quarterly vegetation reports which are distributed to interested parties. Another copy is attached for your reference. All sage work has been done in conformance with the attached plan.

Pre-planting soil analysis done by Chambers indicated the presence of poor soil conditions on the unvegetated slopes designated for sage planting. The conditions making the site very difficult for plant growth were

- very acid pH; substantially lower than nearby native soils
- High electrical conductivity, a measure of salinity;
- a low calcium to magnesium ratio, causing excess magnesium to be taken up by plants;
- nitrate levels in some cases high enough to favor weed growth;
- potassium levels low enough to slow or prevent plant growth.

All together, these conditions make the soil a very difficult medium for plant growth. These severe limitations of soil chemistry were accompanied by very steep slopes, preventing ready penetration of water, and exposed bedrock over much of the slope, making it impossible for plants to take root.

The difficult soil chemistry is due in part to the lack of aeration before it was exposed to the atmosphere. Natural soil at the original land surface was exposed to weathering and became suitable for plant growth over geologic time, but the soil at the surface of the cut slope has been exposed only a few years. A level surface could be capped with soil that is suitable for plant growth, but on the existing steep slopes it would be difficult or impossible to hold an additional soil layer in place.

Installation Completed, Irrigation Challenges

SCL followed the approved written plan. A sage-specific seed mix specified by Chambers was used. Soil amendments designed to mitigate some of the soil problems were also applied. To attempt faster establishment on the difficult slope, container plants and supplemental irrigation were used. Installation was completed by May 2008.

SCL faced immediate difficulty with the installed irrigation. Due to the dry conditions, it was thought that repairing the irrigation would be most helpful to plant growth. The area was not served by any water or power lines and a custom built pump and rental generators had to be secured. The irrigation system was supplied by City Water pumped to nearby storage tanks.

Pressure differentials between the base of the hill and the top proved damaging to the irrigation lines, and when the original contractor who installed the system proved unresponsive to the fixes, a new contractor was hired in October 2008 to repair the system and monitor it to ensure it kept running.

Monitoring visits performed by Chambers Group during 2008 indicated that even when the irrigation system was working properly, the water was not soaking in sufficiently deep to help the plants. In July 2008 SCL requested approval of the Local Enforcement Agency (LEA) to run the diesel powered generator powering the irrigation pump at night, when water could infiltrate better That request was granted in October 2008 and nighttime irrigation began shortly thereafter.

Chamber's visits throughout the summer of 2009 continued to indicate poor infiltration even with nighttime irrigation, and the portable generator and water tanks proved problematic for continual operation. To fix this problem, and in light of the continued water shortage in California, SCL decided to water the sage area with reclaimed cutoff wall water (non-potable groundwater) instead of DWP City Water According to the site's water treatment consultant, changes to the site reclaim water system would allow the irrigation to run without the need for generators and tanks. These changes were made in the fall of 2009.

Nearly immediately it was noted that the reclaim water was clogging the irrigation heads. The system will be temporarily connected back onto DWP Water until the feasibility of further treating the reclaim water can be studied. The current connection to DWP water still eliminates the need for a portable generator and tanks, so maintenance and operational issues should still be reduced. SCL will also continue to retain an irrigation contractor to check the system during dry weather to ensure it is running properly As of February 2010, according to the restoration consultant, seasonal rainfall is negating the need for artificial irrigation, but that will be re-evaluated in the summer

Soil Quality Issues Going Forward

Despite the irrigation issues, vegetation did become established in multiple areas of the slope (see pictures, attached.) According to the restoration consultant, the primary difference in growth patterns is due to soil quality.

In November 2009, the original restoration consultant, Dr Ted St. John of the Chambers Group, Inc. moved to another consulting firm, AECOM. For continuity of expertise, SCL has now retained Dr St. John at his new firm. AECOM has proposed several test plots of soil treatments that may enhance growth in the difficult areas. These tests will be conducted throughout 2010 over the entire growing season to see which is most effective in improving the sage growth.

Our experimental objective will be to test methods that may locally ameliorate the unfavorable chemistry of the soil. These trials are based in part on the list of potential problems and solutions that was included as Table 10 in the January 2008 restoration and monitoring plan. All of the tests we are planning are based on methods known to work in agriculture, or conditions similar to those that have allowed plant growth in certain locally favorable spots on the slope. The list of trials will be finalized only after working through implementation procedures with a contractor who will install the trials, but the list includes:

- Soil amendments that can be used in agriculture to counteract milder forms of some of the same problems: gypsum for salinity, lime for low pH, and organic matter (compost from green waste) which is often able to reduce the ill effects of low pH and salinity;
- An erosion control blanket over a layer of mulch and seeds. This procedure allowed modest amounts of plant growth in similar soil at another landfill;
- Small scale terracing in the form of straw wattles, which are expected to accumulate soil washed downhill from above. The soil in local deposits on the existing slopes has provided the only locations on the slope where plants have been able to grow. This trial will attempt to reproduce those conditions over a wider portion of the slope;
- A variation on the furrow methods used in agriculture to counteract soil salinity. Salts wick upward to the top of the ridges and plants placed midway up the ridges are exposed to much less salinity.

When results have been analyzed, the consultants will formulate a combination of the most successful and practical methods, with the expectation that they will become the standard procedures for similar slopes.

These test design must satisfy multiple requirements.

- The need to preserve slope integrity and prevent landslides;
- practicality with manual labor, since the slopes are inaccessible to motorized equipment;
- The need to revert as soon as possible to natural rainfall irrigation

Future Maintenance and Monitoring

Along with the test plot work, maintenance and monitoring will continue per the written plan.

As this slope is intended to revert to natural status, erosion control will be limited to that which threatens to damage the slope integrity or that which harms the plantings. At the present time, plant growth is actually facilitated by some erosion which is bringing better and more permeable soil into gullies that then exhibit more vegetation. Care will be taken to prevent sediment flows that would leave the restoration area or impact offsite stormwater runoff. SCL will use temporary or permanent structures or implement best management practices to accomplish this.

Weed control will be at the direction of the restoration specialist. Currently the limited weeds are helping to hold some soil on the steep slope, and the restoration specialist has stated that the currently most common species are not invasive or aggressive enough to be hindering the native plants. Should weed abatement be needed it will be conducted using the methods specified in the plan.

Irrigation will continue to be used as directed by the restoration specialist. In light of winter rains and the statewide water shortage, it will be kept to a minimum. This will both reduce water demand and help plants naturalize. The site will also continue efforts to change over to reclaim water for slope irrigation if at all possible.

Remedial planting will be done if dictated by the restoration specialist. As stated previously, the most pressing need is addressing soil quality problems and as of February 2010 it is not anticipated that any supplemental planting will be done this season, except for in test plot areas.

The slope has been and will continue to be monitored by site staff for the presence of windblown trash or vandalism. These issues have not been a problem to date, but they will be corrected by SCL per the written plan if noted in the future.

Ted St. John and his associates at AECOM will continue their monitoring visits per the written plan throughout 2010, with a special focus on the test plot areas.

Expectations

For the upcoming year, work will focus on installing and monitoring the test plots designed to find a solution to the difficult onsite soils. Any findings and recommendations from those tests will be implemented over the winter season (2010-2011) so that plants can take advantage of winter rains. Irrigation use will continue to be minimized, but the goal is to have a more reliable system in place for when it might be needed.

The long term goal and mark of success would be that this slope become unirrigated and replicate as closely as possible a native coastal sage scrub slope that would be present in similar soils and a similar climate nearby. In the wild, dense sage cover may take two to five years if conditions are favorable and weeds remain manageable. According to the restoration specialist, the steep slope, exposed bedrock, and poor soils, the timeline will be lengthened at Sunshine Canyon. Once methods are found to permit reliable plant growth, we have estimated that development of natural-appearing coastal sage scrub is likely to require four to eight years.

SCL will provide an update to this focused report on the County Sage Slope annually until our long term goal for the mitigation is met. If you have any further questions, please feel free to contact me.

Sincerely,

Susan Jennings
Environmental Manager

cc. Linda Lee, LACo DPW
Cindy Chen, SCL LEA
Gerry Villalobos, SCL LEA
Dave Thompson, SCL LEA
Ly Lam, City of Los Angeles Department of City Planning

Attachment 1

Coastal Sage Scrub and Interim Cover Revegetation Plan for Sunshine Canyon County Landfill

COASTAL SAGE SCRUB AND INTERIM COVER REVEGETATION PLAN FOR SUNSHINE CANYON COUNTY LANDFILL

Prepared for:

BROWNING FERRIS INDUSTRIES OF CALIFORNIA, INC.
14747 San Fernando Road
Sylmar, California 91342
(818) 833-6500

Prepared by:

CHAMBERS GROUP, INC.
17671 Cowan Avenue, Suite 100
Irvine, California 92614
(949) 261-5414

January 15, 2008

Revision Date	Person Revising	Reason For Revision
10/8/2007	Chambers Group Inc	Initial Plan
1/15/2008	Chambers Group Inc	Final Plan

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

SECTION 1 - INTRODUCTION

Section 1 provides project background, permit information, required mitigation acreage, and responsible parties for implementing the Coastal Sage Scrub and Interim Cover Revegetation (Plan).

1.1 PROJECT BACKGROUND

Sunshine Canyon Landfill consists of contiguous operations in both City of Los Angeles (City) and County of Los Angeles (County) jurisdictions. Existing approved vegetation plans (Osterling 2004, Pacific Southwest Biological Services, Inc. 2005) are in place for the City of Los Angeles portion of the landfill. These plans are provided in Appendix A.

This document is designed to supplement those existing plans. It provides recommendations for Coastal Sage Scrub (CSS) restoration and interim erosion control planting on the County landfill areas. The specific procedures for planting in each type of revegetation are given in separate sections of this Plan.

CSS restoration was mandated by permits for the City portion of the landfill, however it included acreage on both the City and County landfill portions. The CSS area in the County is shown on the map in Appendix B. This is a slope at final grade that will not be disturbed in the future.

Interim revegetation in the County landfill area is mandated by County conditional use permit (CUP) Condition #44 B for any non-final grade area that will not be disturbed for more than 180 days. Interim work area will be mapped and updated regularly.

Revegetation planning for final landfill slopes is also required by County CUP Condition #44 B. This planning will take the form of an Interim Reclamation and Revegetation Plan, which will be submitted to the County local enforcement agency (LEA) and the Director of the Department of Public Works for review and approval prior to disposing of any solid waste within ten feet of the boundary of the limits of fill. Sunshine Canyon Landfill does not have any slopes within that category at this time, and a separate vegetation plan for final closure will be prepared when required.

Initial test plots for this plan consist of approximately 20 acres of sage and 21 acres of interim revegetation.

1.2 LOCATION

The project site is located at 14747 San Fernando Road, Sylmar, west of the junction of State Route 14 and Interstate 5, northern Los Angeles County, California (Figure 1). Vegetation installation locations are collectively referred to as "the site." The project vicinity map is shown on Figure 2.

1.3 RESPONSIBLE PARTIES

This Plan has been prepared by Chambers Group on behalf of the landfill operator, Browning Ferris Industries of California, Inc. (BFI). The Plan is based on site visits, soil analyses, literature reviews, and previous documents prepared for the site (Pacific Southwest Biological Services, Inc. 2005, Osterling Consultants 2004).

Implementation of the Plan consists of installation of plants, installation of irrigation systems, and for CSS only, a three-year maintenance program including regular maintenance monitoring. The responsibility of each participating organization in the Plan is summarized in Table 1. BFI or its designated contractor will be responsible for initial site planting, irrigation installation, and site maintenance. A restoration specialist or qualified biologist designated by BFI or its designated contractor will oversee the implementation of the Plan, supervise maintenance and performance monitoring surveys, and provide maintenance and performance updates to BFI.

Table 1. Parties Responsible for Implementing the Plan

Responsibility	Organization	Contact
Restoration site planting, irrigation installation, site maintenance	BFI or designated contractor	Dave Hauser General Manager Sunshine Canyon Landfill 14747 San Fernando Road Sylmar, California 90342 (818) 833-6511
Preparation of revegetation plan	Chambers Group	Ted St. John, Ph.D. Project Manager 17671 Cowan Avenue, Suite 100 Irvine, California 92614 (949) 261-5414
Maintenance and performance monitoring	BFI designated contractor	

Figure 1. Project Vicinity Map

Figure 2. Project Site Map

SECTION 2 - OBJECTIVES AND RATIONALE

The purpose of the Plan is to supplement the two existing plans (Pacific Southwest Biological Services, Inc. 2005; Osterling Consultants 2004) for installation of interim erosion control vegetation and installation of native CSS vegetation. This Plan includes the results of site evaluation and soil analyses for representative areas of the landfill and appropriate site preparation, plant installation, and plant maintenance procedures for both types of vegetation. Though the two existing City Plans remain in force for City Landfill areas, this supplement is intended to improve upon the original recommendations, where needed, to better ensure success in the County Landfill portion. Ultimately, if successful, this Plan will be considered for implementation on the entire landfill footprint.

2.1 RATIONALE FOR SUCCESS

Success of the Plan for native coastal sage scrub revegetation is expected based on the following criteria:

- The most important limiting conditions of this site are known, and measures are presented for mitigating the most difficult of the soil and environmental conditions.
- All plant material (except certain erosion control species) will be from local sources and thus adapted to local climatic conditions.
- Plant density, soil conditions, and soil microbiology will be modified where necessary to favor plant growth.
- A maintenance and monitoring program will be implemented to ensure the success of the plantings.

Success of the Plan for interim cover revegetation is expected based on the following criteria:

- The most important limiting conditions of this site are known, and measures are presented for mitigating the most difficult of the soil and environmental conditions.
- Plants will blend with species indigenous to the area, be drought-tolerant, and be capable of rapid growth.
- Plant density, soil conditions, and soil microbiology will be modified where necessary to favor plant growth.
- The selected plants will not include non-indigenous species that are likely to invade adjacent natural areas.
- A strict maintenance and monitoring plan will be implemented to ensure the success of the plantings.

SECTION 3 - SITE EVALUATION

3.1 CLIMATE AND HYDROLOGIC CONDITIONS

The site is located at about 34.19°N, 118.30°W. Elevation is between approximately 1,300 and 2,000 feet above mean sea level. Annual precipitation averages 22 inches, and the rainy season is mainly from November to April (Table 2).

Table 2. Precipitation at the ARROYO SECO RS Weather Station, Los Angeles County (34.21°N 118.16°W)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
mm	113.9	122.5	77.3	46.5	9.3	4.1	0.5	1.9	8.5	18.2	65	96.6	565.2
inches	4.5	4.8	3	1.8	0.4	0.2	0	0.1	0.3	0.7	2.6	3.8	22.3

3.2 SOIL CONDITIONS

3.2.1 Soil Sampling

Chambers Group restoration specialists Drs. Ted St. John and Kun Liu visited the site on September 13, 2007 and collected soil samples on cut slopes that correspond to areas that will be planted with native or interim erosion control vegetation. The objective of soil analysis was to identify potentially problematic soil conditions and to aid in planning of remedial measures. The current revegetation sites are grouped into six polygons for sampling according to soil characteristics and site locations (Figures 3 and 4).

A total of eight composite soil samples were taken from Sunshine Canyon Landfill. Each composite soil sample consisted of 15 to 20 individual soil samples that were combined for analysis. Samples 1 through 6 were taken from current revegetation sites. The six composite samples came from six polygons that enclosed patches of visually similar soil. A sample of native soil was taken from an area of native CSS near Polygon 1; the native soil was designated sample 7 (Figure 5). Analysis of native soil samples will help define the target properties of the soils after any amendment or other modification. A final sample was taken from an existing revegetation site on an interim slope in the City of Los Angeles portion of the landfill. The site was previously hydroseeded, but vegetation growth has been limited.

Upland planting areas are expected to be dry, but soil moisture was evident in a portion of the cut slope where Chambers Group took soil samples. Riparian species such as poison oak (*Toxicodendron diversilobum*), California walnut (*Juglans californica*), and arroyo willow (*Salix lasiolepis*) indicate seepage at some spots. Based on this observation, some moisture-loving plant species will be added to the plant list for those areas.

Sampling areas were selected on the basis of geography and identifiable field characteristics. For example, Polygon 1 had obvious soil moisture, and Polygon 4 had a distinctive blue-gray color. All cut slopes were dense or compacted subsoil, often very rocky. Thus physical as well as chemical properties may influence plant performance.

Immediately after returning from the field, composite soil samples were sent to a soil laboratory for salinity and fertility analysis.

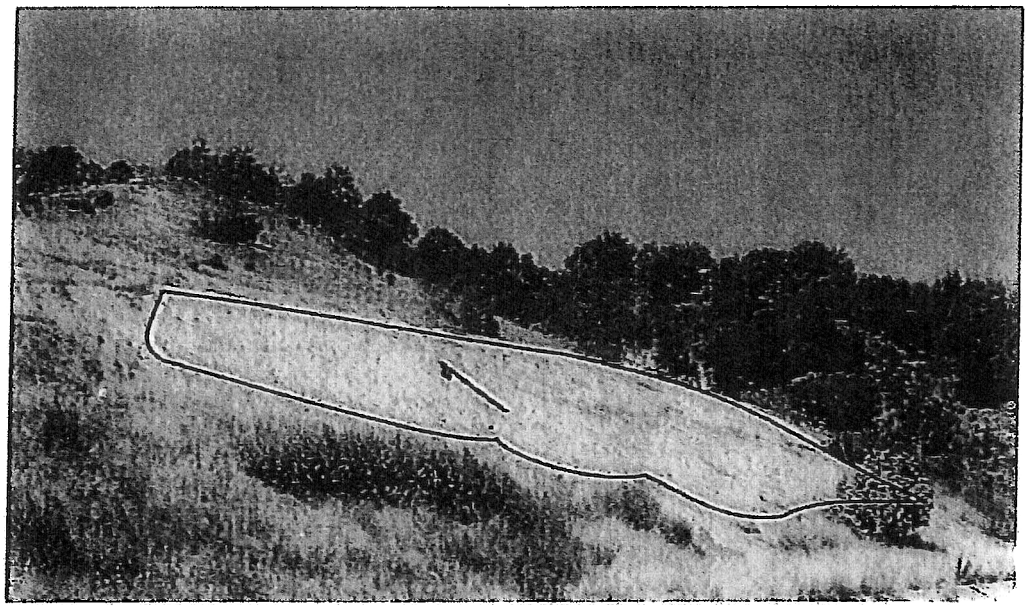


Figure 3. Soil Sampling Map, Polygon 1

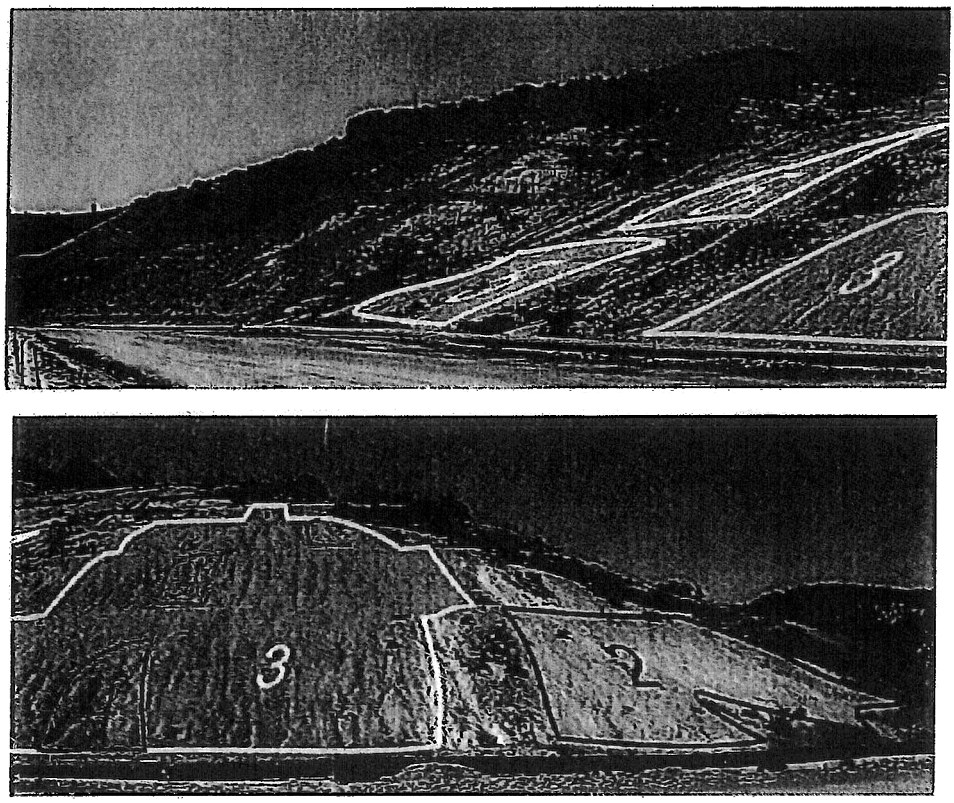


Figure 4. Soil Sampling Map, Polygons 2 through 6 (East of Polygon 1)

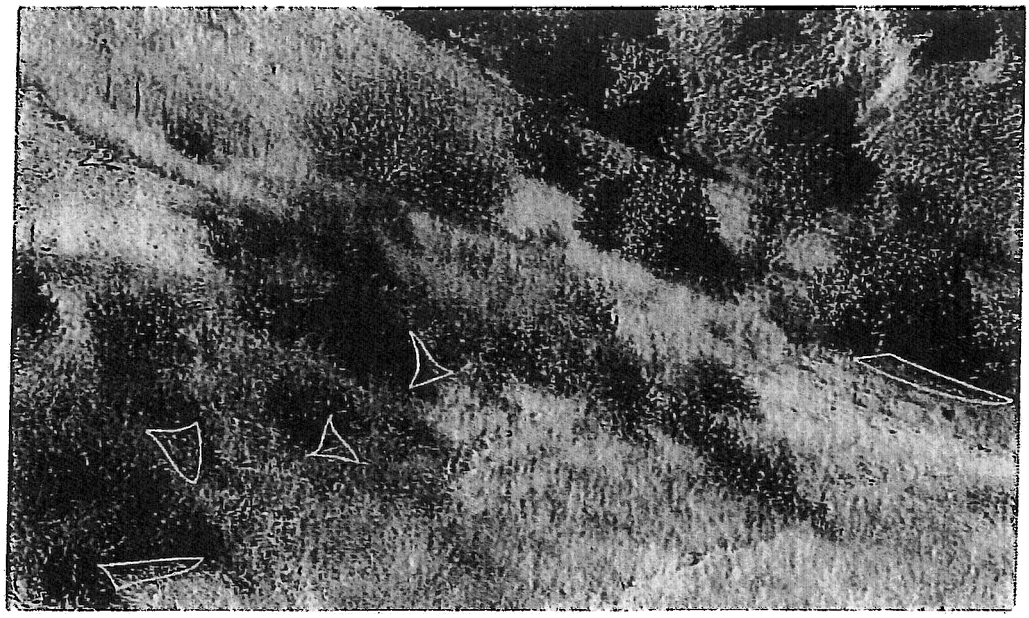


Figure 5. Soil Sampling Map, Native CSS Soil (Sample 7)

3.2.2 Soil Analysis

3.2.2.1 Soil Acidity and Boron Toxicity

Test results show that the soil texture is sandy loam on all sites in Sunshine Canyon Landfill (Table 3). The soils from the cut slopes are very acidic, about one pH unit below native CSS soil. This severe acidity can release high amounts of metals, such as nickel, creating levels that are toxic to plants. Soil acidity will have to be reduced to improve plant growth.

All the cut slope sites except Polygon 5 have high boron levels. However, the boron concentration in the existing revegetation site is within the normal range. It is most likely that boron was leached out of the topsoils by irrigation that occurred during past revegetation activities.

Table 3. Sunshine Canyon Landfill Cut Slope Soil Texture, Available Cations, and Nutrients*

Sample Site	SP	pH	EC	Ca	Mg	Na	B	NO_3-N	PO_4-P	K	Zn
	%		dS/m	meq/l			mg/l	mg/kg			
Polygon 1	**38**	**4.0**	**19.62**	**19.7**	**194**	**5.9**	**0.8**	**10**	24	**72**	1.3
Polygon 2	**36**	**3.6**	**26.78**	**16.0**	**220**	2.1	**0.8**	**8**	20	**44**	1.1
Polygon 3	**46**	**3.5**	**21.73**	**17.3**	**224**	1.0	**1.3**	12	26	**35**	1.7
Polygon 4	**45**	**6.0**	**17.36**	**28.8**	**149**	**15.6**	**1.1**	**55**	13	182	2.6
Polygon 5	**35**	**3.6**	**19.15**	**21.0**	**146**	1.4	0.4	**10**	15	**18**	1.6
Polygon 6	**41**	**3.5**	**28.50**	**15.0**	**259**	**5.0**	**1.1**	**15**	19	**25**	1.2
Native CSS Soil	43	4.7	6.86	28.3	26.2	3.3	0.4	3	37	228	1.1
Existing Revegetation	37	3.7	21.63	19.8	210	14.4	0.6	5	20	59	1.7

*Boldface numbers indicate properties outside the beneficial range for native plant growth.

3.2.2.2 High EC_e and Low Ca: Mg ratio

The electrical conductivity of the soil extracts (EC_e), a measure of soil salinity, was more than triple that of native soil in most of the soil samples. This high EC_e will make less water available to plants in these soils and is expected to slow or prevent growth of most plant species. At this low pH the salinity is attributable to sulfates rather than chlorides. The calcium:magnesium ratios are extremely low. The extreme excess of magnesium over calcium decreases the bioavailability of calcium by chemical antagonism, thus causing calcium deficiency.

3.2.2.3 Soil Fertility

The soil nitrate content of most soil samples is higher than that of the native CSS soil. The most likely explanation is deposition from the nearby freeway traffic, plus a lack of vegetation to incorporate nitrogen into plant biomass. The sample from Polygon 4 in particular has an extremely high level of nitrate. Excess nitrate is generally considered a problem rather than an asset since high levels typically encourage the growth of weeds more than natives. The available phosphorus levels are lower in the cut slope soils than in native CSS soil. Available potassium in all samples except Polygon 4 is about one-third that of native CSS soil. Potassium application may be necessary to improve plant growth in these areas.

3.3 EXISTING VEGETATION

Sunshine Canyon Landfill consists of 494 acres, including undeveloped woodland and shrubland habitats and non-native grassland. Sensitive habitats in the form of Venturan CSS, Riparian Woodland, and Oak Woodland occur on the property.

The native vegetation in the planting area is composed of CSS. Some plant species observed nearby are listed in Table 4.

Table 4. Plant Species Observed by Chambers Group in Sunshine Canyon Landfill Undisturbed Area

Common Name	Scientific Name	Abundance
deerweed	*Lotus scoparius*	Dominant
California sagebrush	*Artemisia californica*	Dominant
California buckwheat	*Eriogonum fasciculatum*	Dominant
sticky monkeyflower	*Mimulus auranticus*	Common
laurel sumac	*Malosma laurina*	Common
white sage	*Salvia apiana*	Common
longstem buckwheat	*Eriogonum elongatum*	Common
California walnut	*Juglans californica*	Occasional
poison oak	*Toxicodendron diversilobum*	Occasional

The designated CSS and Interim Cover test plots are largely bare of vegetation as of September 13, 2007. The two types of plantings will be installed at various locations. One type will be interim erosion control planting, and the other will be permanent stands of Venturan CSS. The plant lists are similar, but differ in respect to certain species that have different functional values.

SECTION 4 - NATIVE COASTAL SAGE SCRUB INSTALLATION

This section contains guidelines for native CSS installation based on literature reviews, site visits, past professional experience, and soil testing. However, conditions experienced during field installation work may dictate modification to ensure better likelihood of success, as will be determined by the Restoration Specialist.

4.1 SITE PREPARATION

Site preparation is recommended to facilitate native plant establishment based on the site evaluation.

4.1.1 Soil Amendments

Based on soil analyses, limestone application is recommended to neutralize soil pH and provide calcium nutrition to plants. About 1,600 pounds per acre is needed to increase the plow layer soil (0-6 inches) from pH 4.0 to 5.0 (Soil Improvement Committee, California Fertilizer Association, 1985). However, the Restoration Specialist may alter the target soil depth for limestone application according to site topography.

Potassium chloride (0-0-60) fertilization will address the potassium deficiency on the site. Compost amendment is appropriate to improve soil structure, prevent erosion, and deplete excess nitrogen in the topsoil. Generally 100 pounds per acre of potassium chloride (0-0-60) and 6 percent compost by volume is recommended. However, the Restoration Specialist may modify the application rate depending on application methods and cost-benefit considerations for each situation.

4.1.2 Procedure

The amendments will be applied in a manner directed by the Restoration Specialist. Generally for best results, limestone should be applied prior to planting to allow time for it to neutralize the acidity. The most important factor determining the effectiveness of lime is placement. Maximum contact of lime with the soil is essential. Most liming materials are only slightly soluble in water, so incorporation in the soil is desirable for the lime reaction. Even when properly mixed with the soil, lime will have little effect on pH if the soil is dry. Moisture is essential for the lime-soil reaction to occur. In the case of lawns, it can only be surface-applied and watered into the soil. Because of the difficulty of incorporation on steep, compacted slopes, Chambers Group suggests trial surface applications. Section 4.3 provides a three-pass hydroseeding procedure for application of soil amendments along with seeds and other components.

4.2 PLANT MATERIAL

Plant material will be from local sources, and where possible, from within Sunshine Canyon.

4.2.1 Seed Mix

The seed mix for CSS is provided in Table 5. The species list comes from the previous restoration plans (Osterling Consultants 2004, Pacific Southwest Biological Services, Inc. 2005) and from direct observations of nearby undisturbed habitat vegetation by Chambers Group (Table 4).

Some of the plant species have been cut from the previous lists because they are not common or do not naturally occur in the vicinity of Sunshine Canyon Landfill. At least one species (*Vulpia microstachys*) has been added since it is a well-tested erosion control species with the added benefit of propagation of mycorrhizal fungi. Some wildflower species have been added because they may help remove some of the excess soil nitrate that could encourage growth of weeds.

Seed will be collected locally or will be supplied by a qualified commercial seed vendor with experience in native seed collections. Seed (per species) is specified as pure live seed (PLS). PLS is defined as the product of the percentage of tested purity and the percentage of tested germination of the specified seed (PLS = % purity x % germination). Seed amounts may be modified by the Restoration Specialist if the specified amounts are not available. The application rate for seed will be the weight of the seed, exclusive of inoculating materials.

Table 5. Venturan CSS Seed Mix

Common Name	Scientific Name	PLS Lbs/ Acre
longstem buckwheat	*Eriogonum elongatum*	0.1
deerweed	*Lotus scoparius*	0.5
California sagebrush	*Artemisia californica*	1
sticky monkeyflower	*Mimulus auranticus*	0.05
California poppy	*Eschscholzia californica*	0.25
goldfields	*Lasthenia californica*	0.1
small fescue	*Vulpia microstachys*	2
miniature lupine	*Lupinus bicolor*	0.25
California encelia	*Encelia californica*	0.25
black sage	*Salvia mellifera*	0.25
California buckwheat	*Eriogonum fasciculatum*	0.25
California goldenbush	*Isocoma menziesii*	0.25
coyote brush	*Baccharis pilularis*	0.25
purple needlegrass	*Nassella pulchra*	0.5
white sage	*Salvia apiana*	0.25
California brome	*Bromus carinatus*	1.5
Total		7.75

4.2.2 Container Plants

Container plants, all liners, are shown in Table 6. Container plants are specified for CSS planting to add species that have complex germination requirements and are thus unlikely to perform well from seed.

Mycorrhizal fungi are missing from subsoils and severely disturbed sites but can be reintroduced by providing granular inoculum in the two-pass hydroseed procedure. Container plants that have been inoculated with mycorrhizae will supplement seed mix inoculation as specified in Section 4.3.2.

Table 6. Venturan CSS Container Planting Palette

Common Name	Scientific Name	Number per acre
longstem buckwheat	*Eriogonum elongatum*	100
laurel sumac	*Malosma laurina*	50
sticky monkey flower	*Mimulus auranticus*	50
purple needlegrass	*Nassella pulchra*	200
Total		400

Container plants will be obtained from a local supplier or commercial nursery experienced in the propagation of native plant species. The list of container plants is shown in Table 6. Prior to delivery, the root systems of the plants will be inspected by the Restoration Specialist to ensure that roots are straight and well established. Root-bound plants (those with coiled roots) will not be accepted.

The following specifications are required for the commercial suppliers growing container plants for this project:

- All plants will be hardened to frost/drought.
- All plant species that would normally host mycorrhizal fungi will be inoculated.
- Plants will not be grown with excessive fertilization.
- Plant root systems must fill the containers but not be root-bound at time of delivery.
- Plant materials will be properly labeled as to genus, species, subspecies, and source.
- Plant materials will be provided in the quantities and sizes specified.
- Plants will be ready for planting early in the specified planting period.
- No plants showing signs of serious pest infestation or disease will be accepted.
- All plant substitutions will require written approval from the Restoration Specialist.
- Plants will not be subjected to breakage or desiccation during transport. Any broken or desiccated plants will be rejected and replaced.
- Plant materials will be inspected and approved at the nursery by the Restoration Specialist prior to delivery.

BFI or its designated contractor will be responsible for the protection and proper maintenance of all plants from the time the Restoration Specialist accepts them from the plant supplier.

4.3 PLANTING SCHEDULE AND METHOD

4.3.1 Seed Mix

The seed mix will be sown between October and February by hydroseeding on tested area. The Restoration Specialist may specify other suitable application methods according to site conditions in the future.

Three passes of hydroseeding are expected for the initial test. The first pass will include soil amendments as described in Section 4.1.1. The Restoration Specialist will recommend application rates.

The second pass will include the components shown in Table 7. Where hydroseeded slopes have a ratio steeper than 2:1, bonded fiber matrix will be included in the hydroseed mix. The mixture will be applied with hydroseeding equipment within 60 minutes after the seed has been added to the mixture.

Table 7. Components in the Second Hydroseed Pass

Material	Pounds per Acre (Slope measurement)
Fiber	268
Seed	Per Table 5
Compost	1,071
Endomycorrhizal Inoculum	To give 3,600,00 propagules per acre per supplier guarantee

A third hydroseeding pass will be used to stabilize and seal the slope. Stabilizing emulsion will be a processed organic adhesive used as a soil binder. This emulsion will be in a dry powder form and may be re-emulsifiable. The components in the third pass are shown in Table 8. The ratio of total water to total stabilizing emulsion in the mixture will be as recommended by the manufacturer.

Table 8. Components in the Third Hydroseed Pass

Material	Pounds per Acre (Slope measurement)
Fiber	400
Compost	1,600
Stabilizing emulsion (solids)	134

4.3.2 Container Plants

Container plants will be installed only between November 1 and March 1 and when natural rainfall or irrigation has moistened the soil. In all planting areas the soil surface will contain residual moisture within the root zone of the container plants to be installed. If the soil does not contain sufficient moisture, then prior to installation the planting area will be watered for three consecutive days to adequately saturate the soil to a minimum depth of one and one-half times the depth of the containers to be planted. When the soil has drained to field capacity (full moisture content after drainage of soil pore space), and when the soil is dry enough to support foot traffic, the plants indicated for the site will be planted using the following procedure:

1) With a standard excavation device (shovel, auger, etc.) excavate a hole somewhat wider than the container and one inch less than the depth of the container to the crown of the root ball.

2) Each planting hole will be filled with water and allowed to drain until no free moisture remains in the hole.

3) Immediately after draining, the plant will be removed carefully from its container and the root volume loosened somewhat with gentle pressure on the sides of the root mass.

4) The plant will immediately be placed in the planting hole so that the top of the container surface will be slightly higher than the soil surface after refilling.

5) Backfill the hole with native soil, minimizing large organic and rock matter that may inhibit root growth.

6) Firmly press down soil around the root-ball to eliminate air space within the soil and to ensure good root to soil contact

7) Make sure that the crown of the root mass is at or slightly above grade.

8) Create a structural basin at the outside edge of the root ball to sequester rainwater in a

9) Do not create a depression that will cause water to pond in direct contact with the stem of the plant.

4.4 IRRIGATION

BFI or its designated contractor will be responsible for installation, operation, maintenance, and final removal of the irrigation system under the direction of the Restoration Specialist. Construction of the irrigation system will be per plans provided by BFI.

Supplemental irrigation of plantings will be necessary only during the establishment period. During the first winter and spring, all plantings will be irrigated to supplement natural precipitation. Irrigation will be provided for as long as necessary to saturate the root zones of container plants, or to saturate six inches deep for seeded areas if precipitation does not occur for more than a seven day period. The irrigation system will consist of above-grade temporary overhead systems. Following plant establishment, irrigation systems will be removed. The volume and frequency of irrigation will be determined through monitoring during the initial irrigation period. The duration of watering cycles will require repeated applications over short time periods to achieve the required watering depth while minimizing surface runoff. At no time will the revegetated areas be watered excessively or more frequently than needed to sustain the plants in a natural condition.

Supplemental irrigation will be discontinued at the end of the first rainy season, but resumed if the plants show signs of water stress.

BFI may at its option rely on natural rainfall as the only source of irrigation. If timing and procedures are as specified in this Plan, then planting with no irrigation system may produce a successful stand of plants. However, there is a higher probability of delayed development than with irrigation. If BFI elects to plant without an irrigation system, it may become necessary to replant part of the project in the subsequent year.

SECTION 5 - INTERIM EROSION CONTROL PLANTING

This section contains guidelines for interim erosion control planting based on literature reviews, site visits, past professional experience, and soil testing. However, conditions experienced during field installation work may dictate modification to ensure better likelihood of success, as determined by the Restoration Specialist. The procedures are as given for CSS planting except that container plants are not used and the seed list differs somewhat.

5.1 Soil Amendments

Soils are expected to resemble those found during the surveys discussed in an earlier section, and the procedures will be as described in that section except as noted here.

BFI may elect to reduce or eliminate compost from the hydroseed components shown in Tables 7 and 8 but should do so initially as a field test of an alternative method. Elimination of compost will introduce an increased risk of failure due to toxic or saline soil.

5.2 PLANT MATERIAL

Plant materials for interim planting need not be from local sources. Erosion control species that are not expected to persist more than one or a few growing seasons may be from commercially grown sources.

5.2.1 Seed Mix

Seed mixes recommended by Osterling (2004) were considered, but the seed mix provided in Table 9 was selected to provide dust and erosion control on interim slopes. The species were selected for availability, suitability for the site, potential for soil improvement, relative drought tolerance, rapid establishment, and the ability to grow at any time of year when interim slope hydroseeding may be dictated by operating conditions. One or more of the following species may be eliminated if not available, in which case other species from the list should be increased proportionately to compensate.

Table 9. Sunshine Canyon Landfill Erosion Control Final Seed Mix

Common Name	Scientific Name	PLS Lbs/ Acre
small fescue	*Vulpia microstachys*	2
California brome	*Bromus carinatus*	1.5
rose clover	*Torifolium hirtum, Hykon*	1.5
crimson clover	*Trifolium incamatum*	0.5
fourwing saltbush	*Atriplex canescans*	1
California buckwheat	*Eriogonum fasciculatum*	0.5
mixed sub-clovers	*Trifolium subterrain*	1.5
Total		**8.5**

Seed will be collected locally or will be supplied by a qualified commercial seed vendor. Seed (per species) is specified as pure live seed (PLS). Seed mix amounts or composition may be revised by the Restoration Specialist if the specified material is not available. The application rate for seed will be the weight of the seed, exclusive of inoculating materials.

5.2.2 Soil Amendments and Mycorrhizal Inoculation

Due to the difficulty of the soils at Sunshine Canyon Landfill, the limestone, compost, and mycorrhizal inoculum specified in an earlier section for CSS are highly recommended for interim planting. One or more components may be eliminated or reduced on an experimental basis, but the overall methodology should be retained until the success of alternatives has been established. Some, but not all, of the plant species are likely to succeed without mycorrhizal inoculation, but compost and especially limestone are likely to be essential for most species. Trials of alternative methods should test reduction of the components one at a time and only on limited areas.

5.3 PLANTING SCHEDULE AND METHOD

The ideal time for hydroseeding is between October and March; however, BFI or its designated contractor will do interim cover installation as necessary to meet the requirement to vegetate slopes that will be inactive for more than 180 days. As an initial test, three approaches of applying soil amendment and seed will be tested in approximately 7 acre plots. These three approaches are listed below:

a. Soil amendment will be applied by hydroseeder and seeds will be applied by imprinting. Specific imprinting procedures are detailed in section 5.3.1.

b. Three pass application of soil amendment and seeds. The first pass will include soil amendment. Restoration specialist will specify the type and quantity of soil amendment according to soil analysis. The second pass will include seeds in Table 9, compost (1071 pounds per acre), and endomycorrhizal inoculum to give about 3,600,00 propagules per acre. Where hydroseeded slopes have a ratio steeper than 2:1, bonded fiber matrix will be included with the hydroseed mix. The mixture, in the proportions indicated, will be applied with hydroseeding equipment within 60 minutes after the seed has been added to the mixture: A third hydroseeding pass will be used to stabilize and seal the slope. Stabilizing emulsion will be a processed organic adhesive used as a soil binder. The proportions of the binder mixture are showed in Table 8. This emulsion will be in a dry powder form and may be re-emulsifiable. The ratio of total water to total stabilizing emulsion in the mixture will be as recommended by the manufacturer.

c. Three pass application of soil amendment and seeds and spreading of wood chips. The application of soil amendment and seeds are following the same procedure of approach b. The third hydroseeding pass will only include compost and stabilizing emulsion in Table 8 without fibers. A layer of wood chip will be spread over the top mechanically.

The field trial will test the most successful application methods for planting remaining interim cover in the future.

5.3.1 Imprinting

Land imprinting will be one of the application methods tested. It can be used on interim cover sections with a grade less steep than 2:1, and when soil conditions are such that the land imprinter leaves an impression the full depth of the imprinter tooth. Land imprinting is used to create "safe sites" for seeds that collect water and shade seedlings to promote establishment.

5.3.1.1 Characteristics of Imprinting Teeth

The height of the imprinting teeth shall be a minimum of 10 centimeters (4 inches). Imprinting teeth shall be V-shaped in transverse section, and may be rectangular or triangular in longitudinal section.

Any imprinter used on a slope steeper than 4:1 shall have teeth 25 centimeters (10 inches) or less in length, with a gap of 5 centimeters (2 inches) or more between the end of one segment and the beginning of the next. If the imprinting teeth are longer than 25 centimeters (10 inches), the machine shall be operated at all times with the long dimension in a horizontal [illegible]

The crest-to-crest spacing between teeth shall be less than 61 centimeters (2 feet), with 30 centimeters (1 foot) often optimum for land restoration.

The apical angle of the triangular cross section of the imprinting teeth shall be ninety degrees or less, with acute teeth preferred for the steepest slopes.

5.3.1.2 Weight Per Unit Area on Teeth

The static pressure on the soil surface is measured by dividing the total weight of the imprinter, including any ballast, by the total area of tooth contact when the teeth have penetrated half way into the soil.

The static pressure on the soil surface shall be at least 12 pounds per square inch and less than 48 pounds per square inch. The lower weights are for softer soils and the higher weights for harder or drier soils.

No more pressure shall be used than that required to obtain a full-tooth imprint.

5.3.1.3 Maximum Length of Roller

No individual roller shall be more than 2.5 meters (8 feet) in length, except in the case of level, rock-free land that will not cause a long roller to leave unimprinted areas. More than one roller may be attached to a single imprinting device as long as each roller swivels independently over surface obstructions. In this case, the combined rollers may be any practical width.

5.3.1.4 Effects and Type of Tractor

The tracks or wheels of the moving tractor shall produce less pressure on the soil than the properly-weighted imprinter. If the slope is too steep to safely operate a tractor-drawn imprinter, the imprinter may be pulled up and down by means of a winch.

5.3.1.5 Condition of Soil

The soil may be imprinted when dry if it is soft enough to allow penetration of the imprinting teeth to their full depth, and firm enough to permit the formation of smooth-walled, firm impressions. If the dry soil does not allow formation of quality impressions, it shall not be imprinted until rainfall or irrigation leave it in a suitable condition.

Soil that is too hard to accept a pattern that conforms to performance specifications with a properly weighted imprinter shall be ripped before imprinting. Adjustment of the imprinter ballast is preferred over ripping where feasible.

Clay soil shall not be imprinted while it is so wet that substantial quantities of soil stick to the roller.

5.3.1.6 Form of Impressions

Impressions shall be of V-shaped cross section and 25 centimeters (10 inches) or less in length if used on a slope steeper than 4:1. A pyramidal shape is acceptable as long as the apical angles between all faces are ninety degrees or less. The imprinting pattern shall provide a raised soil ridge that prevents continuous movement of drainage water between impressions.

A minimum of 70 percent of the soil surface shall bear impressions, apart from any peripheral turn-around area and areas rendered untreatable by rocks or other natural features.

A minimum of 70 percent of the impressions shall reach 90 percent of the full tooth depth.

A minimum of 70 percent of the impressions shall have smooth and firm soil for more than 70 percent of their surface area.

5.3.1.7 Compaction of Finished Impressions

Bulk density is defined as the oven-dry weight of soil per unit of original field volume and shall be calculated per standard soil testing methods. No portion of the imprinted soil profile shall exceed the maximum bulk density that allows root growth in the soil type present.

5.3.1.8 Vegetative Cover

The imprinting operation shall be carried out on bare earth or on land that has only a minimal vegetative cover, except as specified below. If the amount and nature of vegetative cover is sufficient to interfere with soil contact and the formation of quality impressions, such vegetation shall be removed prior to imprinting by burning, raking, or other suitable means.

5.3.1.9 Operating Procedures

The optimum operating speed is three to four miles per hour. The imprinter shall be pulled at a speed low enough to ensure that the full weight of the roller bears upon the soil at all times.

If the impressions are longer than 25 centimeters (10 inches), the long dimension of each imprint shall lie parallel to the contour of the slope. If imprint length is 25 centimeters (10 inches) or less, the imprinter may be used in any orientation to the slope.

5.3.1.10 Proximity to Edges of Seeded Area

The imprinting pattern shall extend fully to the boundaries of the mitigation site. The area at the PROJECT boundary may serve as a turn-around area and normally will be imprinted by a final pass along the PROJECT perimeter. If conditions do not permit imprinting the perimeter, a turn-around area within the PROJECT need not be fully imprinted. Any unimprinted turn-around area on the PROJECT boundary shall be no wider than the smallest turning radius allowed by the equipment.

5.3.1.11 Timing

The date of imprinting shall fall shortly before or within the early portion of the annual rainy season (November or December).

5.3.1.12 Track Walking

Track walking may be used as an alternative to land imprinting if approved by the restoration specialist. All surfaces to be seeded shall be track walked with a dozer to develop divots, or depressions, in the surface for seeds that will collect water and shade seedlings to promote establishment.

5.3.1.13 Seed Distribution

Seed dispensed by the imprinting device or from track walking shall be in firm contact with the soil. The seed bin shall contain no residual seed from previous uses. Wheat bran or approved substitute shall be mixed with seed to appropriate dilution ratio to prevent seed segregation. The optimum-mixing ratio is usually 1:1.

5.4 IRRIGATION

Interim areas will typically only be irrigated by natural rainfall. If artificial irrigation is used, it will be selected with the advice of the Restoration Specialist. If irrigation is required, BFI or its designated contractor will be responsible for installation, operation, maintenance, and final removal of the irrigation system.

If artificial irrigation is used, supplemental irrigation of plantings will be necessary only during the establishment period. The irrigation system will consist of above-grade temporary overhead systems. Following plant establishment, irrigation systems will be removed. The volume and frequency of irrigation will be determined through monitoring during the initial irrigation period. The duration of watering cycles will be chosen to achieve the required watering depth while minimizing surface runoff. At no time will the revegetated areas be watered excessively or more frequently than needed to sustain the plants in a natural condition.

If artificial irrigation is used, all plantings will be irrigated to supplement natural precipitation during the first winter and spring. Irrigation will be provided for as long as necessary to saturate the root zones of container plant or six inches deep for seeded areas if precipitation does not occur for more than a seven day period.

If artificial irrigation is used, supplemental irrigation will be discontinued at the end of the first rainy season, but resumed if the plants show signs of water stress.

SECTION 6 - COASTAL SAGE SCRUB MAINTENANCE AND MONITORING

6.1 SITE MAINTENANCE

Maintenance of the site during the three-year monitoring period will be the responsibility of BFI or its designated contractor. The maintenance period will begin as soon as installation begins.

6.1.1 Erosion Control

BFI or its designated contractor will install erosion control devices where site preparation or other restoration activities cause soil disturbance and routinely clean, maintain, and inspect such devices. Once sufficient vegetative cover has developed, the erosion control devices will be removed and Best Management Practices implemented as required to prevent movement of sediment into wetlands or off the restoration site.

6.1.2 Weed Control

Weeds will be controlled in the restoration area for a minimum of three years or until native plantings are fully established. Weed species will be removed by cutting as with a string trimmer. Pulling or hoeing is undesirable due to the additional weed growth encouraged by soil disturbance. At the option of BFI, herbicides may be employed as an alternative method of weed control. Application will be done by certified pesticide applicators observing all applicable regulations.

6.1.3 Irrigation

BFI or its designated contractor will be responsible for irrigating the plantings as directed by the Restoration Specialist BFI or its designated contractor will also be responsible for maintaining all components of the temporary irrigation system installed at the site throughout the installation and maintenance periods and for the final removal of the irrigation system after the plantings have become established.

6.1.4 Remediation Planting

BFI or its designated contractor will be responsible for remedial planting if deemed necessary by the Restoration Specialist.

6.1.5 Trash and Debris Removal

Trash or other debris may enter the site during rain or wind events. BFI or its designated contractor will remove any accumulated trash and debris during maintenance activities. Dead or downed wood from native species will not be removed except as required for safety reasons or flood control purposes. All garbage, debris, or weed biomass will be removed from all areas of the site and disposed of at an appropriate offsite location.

6.1.6 Vandalism

BFI or its designated contractor will be responsible for preventing any instance of vandalism and the replacing of damaged plants. Should it become necessary to install fencing, signage, or other measures to protect the site from vandalism, it will be BFI's responsibility to do so under the direction of the Restoration Specialist.

6.2 MAINTENANCE MONITORING

Regular site performance monitoring by the Restoration Specialist is important for the success of native plant installation. The individual conducting maintenance monitoring inspections will be a professional with expertise in native vegetation communities and experience in installation and maintenance of restored native habitats. Interim erosion control plantings will be inspected with sufficient frequency to identify and remediate any developing problems.

6.2.1 Schedule of Maintenance Monitoring Inspections

The Restoration Specialist will schedule regular site inspections and provide recommendations to BFI for any necessary changes in the maintenance program. The following schedule of maintenance inspections for all plantings areas will be implemented:

- Inspections at two-week intervals for the first six months.
- Monthly inspections for the following six months during the first year.
- Quarterly inspections during the second through third year following planting.

After each inspection the Restoration Specialist will inform BFI by email of the success, problems, or any recommended measures to improve success.

6.3 METHODS OF TESTING PROBLEM CAUSES AND SOLUTIONS

We will monitor plant performance per the schedule given in Section 6. At each monitoring visit we will determine whether plant growth could be subject to any of the effects given in Table 10. As soon as potential problems are discovered we will initiate small-scale testing of potential corrective actions. The corrective actions and the outcome of the small-scale tests will become the basis of revised procedures during the next planting season.

Table 10. Potential Problems on the CSS Slopes and their Causes Solutions to Potential Plant Growth Problems

Symptom	Cause	Solution
Plant death	1. Soil acidity 2. Soil Toxicity: boron, magnesium, Magnesium/calcium ratio, or toxic metals in an acid environment. 3. High salinity	1 & 2. Raise the soil pH with lime. 3. Leach soil or use various agricultural methods to reduce effects of salinity; Use salt-tolerant plants
Lack of germination	1. Soil toxicity: boron is most likely if low germination is the only symptom.	1. Organic matter addition with irrigation
Wilting	1. Soil Compaction 2. Lack of water 3. Root rot	1. Loosen soil, apply compost or cover with mulch. 2. Increase irrigation 3. Introduce pathogen antagonistic microorganisms
Slow growth	1. Lack of beneficial microorganisms 2. Nutrient Deficiency: caused by low potassium, low calcium/magnesium ratio, or low phosphorus.	1. Inoculate with mycorrhizal fungi or other organisms as appropriate; add compost. 2. Supplement likely deficient elements by top dressing or foliar fertilization.
Weed invasion	1. Excess nitrate in soil 2. Frequent soil disturbance	1. Use organic matter or nitrogen-hungry annuals to remove nitrate 2. Control weeds with herbicide rather than pulling
Animal damage	1. High population of rabbits, squirrels, and deer	1. Protect vulnerable species with cages; control animals

SECTION 7 - REFERENCES

Miller, R. M.
1985 *Overview Mycorrhizae.* Restoration and Management Notes 3:14-20.

Osterling, Ralph Consultants, Inc.
2004 Revegetation Plans for Sunshine Canyon Landfill City Expansion.

Pacific Southwest Biological Services, Inc.
2005 Sunshine Canyon City Landfill Extension Sylmar Area, Los Angeles County, California. Venturan Coastal Sage Scrub Revegetation Mitigation Plan.

Sawyer, J.O., and T Keeler-Wolf
1995 *A Manual of California Vegetation.* California Native Plant Society. Sacramento, California. 471 pp.

Soil Improvement Committee, California Fertilizer Association.
1985 *Western Fertilizer Handbook.* Danville, Illinois. 271 pp.

APPENDIX A

Revegetation plans to which the current plan is a supplement

REVEGETATION PLANS
FOR
SUNSHINE CANYON LANDFILL CITY EXPANSION

Prepared for:

Browning-Ferris Industries of California, Inc.
14747 San Fernando Road
Sylmar, CA

Prepared by:

Ralph Osterling Consultants, Inc.
1650 Borel Place, Suite 204
San Mateo, CA 94402

July 26, 2004

INTRODUCTION

The following Revegetation Plan fulfills Condition Q-C.8 and is for the disturbed and unvegetated slopes and benches on the City portion of the Sunshine Canyon Landfill, City of Los Angeles.

Given the site conditions a the scientific approach, including soil analysis and proper amendment application is required in addition to the specified seed and mulch. When properly completed, the resulting grass and broadleaf cover crop will provide for erosion control, soil stabilization and dust control on these areas. All barren land will be treated within 180 days as specified in Condition Q-C.8.

THE PLAN

Soil Analysis

Soil samples will be gathered from representative locations from throughout the areas scheduled for final closure treatment. Soil samples will be analyzed for pH, texture and general agricultural values to determine the amendment quantities and types. Past experience at Sunshine Canyon has shown that soil pH may be problematic and suitable amendments are required for a successful revegetation program. The attached "*Changing pH in Soil*" should be utilized to adjust the pH within the normal 6.0 to 6.5 range. Standard agricultural soil analysis available from Harris Laboratories (www.aq.mdharris.com) by submitting two cup full size samples from representative areas on the landfill. It is recommended that a minimum of one sample per acre where soils color or texture variability is noted should be included for analysis.

Seed Specification

All specified revegetation species are adapted to the conditions found at Sunshine Canyon. The below mix includes annuals, perennials, broadleafs and grasses, all of which will reseed and remain on the site.

FINAL SEED MIX

Species		Pounds/Acre (Pure Live Seed)
Bromus carinatus,	Cucamonga Brome	8
Hordeum californicum,	California Barley	8
Trifolium hirtum, Hykon	Rose Clover	12
Agrostis alba,	Red Top	3
Deschampsia caespitosa,	Tufted Hairgrass	2
Trifolium incarnatum,	Crimson Clover	6
Vulpia myuros,	Zorro Fescue	6
Atriplex canescans,	Marana Fourwing Saltbush	4
Eriogonum fasciculatum,	California Buckwheat	3
Trifolium subterrain,	Mixed sub-clovers	10
Sarguisorba minor,	Burnett	5
Medicago lupulina,	Black medic	5
	TOTAL:	72

TEMPORARY SEED MIX

Species		Pounds/Acre (Pure Live Seed)
Bromus carinatus,	Cucamonga Brome	20
Hordeum californicum,	California Barley	30
Aveno fatulum	Field Oats	30

All lugumes shall be 'Cel Pril' innoculate coated as available from Kamprath Seed (800-466-9959). All seed shall not remain in the hydro-seeder tank for more than 15 minutes. All seed will be delivered pre-mixed to the site with proper bag labeling directly from the seed supplier.

Fertilizer

The fertilizer shall be 300 lbs per acre of 14-14-14 or equivalent with low ammonic nitrogen formulation. The blend, 16-16-20-0 shall not be used.

Mulch

The hydromulch shall be derived from natural ground wood fiber and applied at 1500 lbs per acre. AzTac Tacifier will be applied at 120 lbs per acre.

Procedure

All specified ingredients except for the seed shall be thoroughly mixed in the hydroseeder tank. Immediately prior to application, the pre-mixed seed shall be added, mixed and then immediately applied. The application shall be even over the area and left undisturbed following application.

Timing

Erosion control applications shall be completed in late October or early November and prior to a predicted rainfall of 2" of more.

Maintenance

Following 6" of precipitation, the seeded areas shall be inspected for wash-outs or gullying. All gullies shall be shovel-packed with straw to prevent further accelerated erosion.

Changing pH in Soil

Soil pH directly affects the life and growth of plants because it affects the availability of *all* plant nutrients. Between pH 6.0 and 6.5, most plant nutrients are in their most available state. A nutrient must be soluble and remain soluble long enough to successfully travel through the soil solution into the roots. Nitrogen, for example, has its greatest solubility between soil pH 4 and soil pH 8. Above or below that range, its solubility is seriously restricted.

Soil acidity or alkalinity (pH) is extremely important because it has an effect on the decomposition of mineral rock into essential elements that plants can use. It also changes fertilizers from their form in the bag to a form that plants can easily uptake. Soil microorganisms that change organic nitrogen (amino acids) to the ammonium form of nitrogen to the nitrate form that plant can use also depends on the soil pH. Soil pH should be checked periodically and consistent testing will indicate whether your pH-control program is working.

Raising pH

The ideal pH range for soil is from 6.0 to 6.5 because *most* plant nutrients are in their most available state. If a soil test indicates a pH below 6.5, the usual recommendation is for the application of ground limestone. In addition to having the ability to raise pH, limestone contains calcium. Some prefer dolomitic limestone because it contains both calcium and magnesium, however soils high in magnesium (serpentine) do not need more magnesium. Table 1 indicates the number of tons per acre of ground limestone required to raise the pH of a given soil to based on the original pH, desired pH, and soil type.

In order to select the correct application rate use a soil test to determine both the soil texture group and the current pH. As the percentage of clay in a soil increases, it requires proportionately more limestone to raise the pH. This means it is much harder to change the pH of clay soil than sandy soil. Consider that limestone moves *very slowly*, taking years to move down a few inches in the soil. This is why it is so important to test soil early in the planning process. Limestone should be tilled into the soil root zone (top 7 inches).

Table 1. Approximate Amount of Finely Ground Limestone Needed to Raise the pH of a 7-inch Layer of Soil

	Lime Requirements (Tons per Acre)	
Soil Texture	**From pH 4.5 to 5.5**	**From pH 5.5 to 6.5**
Sand and loamy sand	0.5	0.6
Sandy loam	0.8	1.3
Loam	1.2	1.7
Silt loam	1.5	2.0
Clay loam	1.9	2.3
Muck	3.8	4.3

Table 2. Common Liming Materials

Name	Chemical Formula	Equivalent % $CaCO_3$	Source
Shell meal	$CaCo_3$	95	Natural shell deposits
Limestone	$CaCO_3$	100	Pure form, finely ground
Hydrated lime	$Ca(OH)_2$	120-135	Steam burned
Burned lime	CaO	150-175	Kiln burned
Dolomite	$CaCO_3 - M_gCO_3$	110	Natural deposit
Sugar beet lime	$CaCO_3$	80-90	Sugar beet by-product lime
Calcium silicate	$CaSiO_3$	60-80	Slag

Lowering pH

Some soils are alkaline and have a pH above 6.5. Some fertilizers (ammonium sulfate, urea, and ammonium nitrate) create an acid reaction in the soil, so they aid in lowering or maintaining a specific pH. Certain acidifying organic materials such as pine needles or peat moss can lower soil pH gradually over many years. In nature this takes thousands of years. For more rapid results in lowering pH, sulfur is used. Sulfuric acid forms when sulfur is added to the soil, the smaller the particles of sulfur, the faster the reaction. Lowering the pH is a *slow* process and will take 1-2 years to see a reaction.

Table 3. Tons of sulfur needed per acre to lower pH to 6.5

Original pH	Sandy Soil	Clay Soil
8.5	0.7 - 1.0	1.0 - 1.3
8.0	0.5 - 0.7	0.7 - 1.1
7.5	0.2 - 0.3	0.4 - 0.5

Table 4. Commonly Used Materials and Their Equivalent Amendment Values

		Tons of Amendment Equivalent to	
Material (100% Basis)*	Chemical Formula	1 Ton of Pure Gypsum	1 Ton of Soil Sulfur
Gypsum	$CaSO_4 \cdot 2H_2O$	1.00	5.38
Soil sulfur	S	0.19	1.00
Sulfuric acid (conc.)	H_2SO_4	0.61	3.20
Ferric sulfate	$Fe_2(SO_4)_3 \cdot 9H_2O$	1.09	5.85
Lime sulfur (22% S)	CaS	0.68	3.65
Calcium chloride	$CaCl_2 \cdot H_2O$	0.86	–
Aluminum sulfate	$Al_2(SO_4)_3$	–	6.34

* *The percent purity is given on the bag or identification tag*

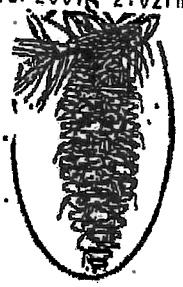
Common Amendment Reactions in Soil

- Gypsum (calcium sulfate) + sodic soil → calcium soil + sodium sulfate (leachable with water)
  Sodium sulfate is then leached out of the soil by rainfall or heavy irrigations. The removal of sodium lowers the sodium permeability hazard allowing for soil aggregation and improved drainage. Gypsum does not change pH nor improve drainage in non-sodic situations. Gypsum is used to add calcium to soils such as serpentine with very high or toxic Mg levels.

- Sulfur (elemental) + oxygen + water → sulfuric acid + soil calcium → gypsum
  Gypsum then acts as above. Sulfur and sulfuric acid also lower pH

- Lime (calcium or magnesium carbonate) + water → calcium soil + OH^-
  Lime neutralizes the (acidity) - H^+ ion concentration and adds calcium to soil

Paul Vossen
University of California
Cooperative Extension
2604 Ventura Ave.
Santa Rosa, CA 95403
(707) 565-2621



SUNSHINE CANYON CITY LANDFILL EXTENSION
SYLMAR AREA, LOS ANGELES COUNTY, CALIFORNIA

VENTURAN COASTAL SAGE SCRUB REVEGETATION MITIGATION PLAN

In accordance with

SEIR 91-0377-ZC/GPA

UTM: 11-S: 361,000mE; 3,798,500mN

Prepared for

Browning Ferris Industries
14747 San Fernando Road
Sylmar, CA 91342
Telephone: (818) 833-6500
Facsimile: (818) 362-5485

Prepared by

Pacific Southwest Biological Services, Inc.
Post Office Box 985
National City, CA 91951-0985
Telephone: (619) 477-5333
Facsimile: (619) 477-5380
bio@psbs.com

PSBS #U383

4 January 2005

R. Mitchel Beauchamp, M. Sc., President

TABLE OF CONTENTS

SUNSHINE CANYON CITY LANDFILL EXTENSION
SYLMAR AREA, LOS ANGELES COUNTY, CALIFORNIA

VENTURAN COASTAL SAGE SCRUB REVEGETATION MITIGATION PLAN

4 January 2005

1.0 INTRODUCTION

This revegetation plan for Venturan Coastal Sage Scrub upland habitat restoration and erosion control is provided as a Condition of Approval and in accordance with the Mitigation Reporting and Monitoring Program for SEIR 91-0377-ZC/GPA, a proposed expansion of the Sunshine Canyon Landfill along Interstate Route 5 in the community of Sylmar, northern Los Angeles County, California. The plan has been prepared on behalf of the owner, Browning Ferris Industries.

1.1 Purpose and Goals of the Revegetation Plan

The purpose of the revegetation is to restore native upland (Venturan Coastal Sage Scrub) vegetation and erosion control cover on stabilized and closed landfill areas as well as cut slopes associated with site recontouring and road and other infrastructure construction. This plan is in accordance with the following Mitigation Reporting and Monitoring Program Conditions of 14 January 2002 that relate to the restoration of Venturan Coastal Sage Scrub:

4.4.1 – 60
Requires a detailed conceptual mitigation plan to establish Venturan Coastal Sage Scrub for a greater than 1:1 compensation for on-site loss of habitat.

4.4.1 – 61
Requires soil salvage for use in revegetation areas

4.4.1 – 63
Requires placement of friable soil for suitable habitat for San Diego Horned Lizard

Soil salvage (Condition 4.4.1 – 61) of areas of grading in native Sage Scrub vegetation is an important aspect of the revegetation of the site. Overall, the Sage Scrub seeding plan will result in a restoration of the native floral and upland vegetation diversity on graded and degraded sites associated with roadways and the main landfill earthwork. Implementation of this plan will be phased as receptor sites are available in accordance with operation of the landfill. This plan accompanies revegetation graphics prepared by a Ralph Osterling Consultants, Inc. (Figure.1).

2.0 PROJECT SUMMARY

2.1 Project Site Location

The site address is 14747 San Fernando Road, Sylmar, west of the junction of State Route 14 and Interstate 5, northern Los Angeles County, California. The Thomas Brothers Map coordinates for the site are C2 on page 481.

2.2 Existing Site Conditions

The site consists of 494 acres, encompassing 194 acres within the City of Los Angeles, of a privately-owned, closed and active landfill operations, as well as undeveloped woodland and shrubland habitats and non-native grassland. The site lies on steeply sloping lands with minor interior canyons, which ultimately drain, into the Bull Creek, a tributary of the Sepulveda Flood Control System of the Los Angeles River. Sensitive vegetation in the form of Venturan Coastal Sage Scrub, Riparian and Oak Woodlands occur on the property.

2.3 Project Impacts

The proposed project is the expansion of the present landfill operation involving 62 acres of upland Sage Scrub habitat and 2.4 acres of jurisdictional drainages. Project impacts will involve the removal of Venturan Coastal Sage Scrub vegetation with preservation of large portions of the site in open space easements, which are linked to existing wildlife movement corridors in the region. The CEQA approval of the project was through an Environmental Impact Report in 2002.

3.0 AGENCY CONCERNS AND REQUIREMENTS

The principal need addressed in this revegetation plan is the restoration of sustainable native plant cover on closed landfill and cut and fill-slopes in accordance with the Mitigation Reporting and Monitoring Plan and California Department of Fish and Game requirements under the 1603 Streambed Alteration Agreement. It is the intent of the seeding and planting plan to restore native plant cover which will restore wildlife habitat and erosion control. The establishment of the seeded and planted areas will be through establishment in harmony with supplemental irrigation as well as the normal rainfall cycle.

4.0 REVEGETATION DESIGN CONCEPT

The Environmental Impact Report Mitigation Reporting and Monitoring Program required revegetation of disturbed areas. As stated above, the purpose of the seeding is to restore native upland (Venturan Coastal Sage Scrub) vegetation, provide for erosion control cover on closed landfill slopes and cut and fill slopes associated with road and other infrastructure construction.

5.0 PROJECT RESPONSIBILITY

5.1 Responsibilities of Project Owner

The project owner has the responsibility to carry out this revegetation plan as part of meeting the project conditions of approval. Implementation of this work will be through contracts with an experienced revegetation consultant contractor.

5.2 Responsibilities and Qualifications of the Project Designer, Installation Contractor and the Maintenance contractor

This revegetation plan was prepared by R. Mitchel Beauchamp. Mr. Beauchamp is the owner of Pacific Southwest Biological Services, Inc., Tierra Madre Consultants, Inc., and Gila Biological Services, Inc. He is the responsible corporate officer for the Company's Landscape C-27 Contractor's License (531247) and has been certified as a Consulting Arborist. He has prepared many wetland and upland revegetation plans for various areas in southern California and has been responsible for the implementation of the plantings. He also directed the operation of the firm's former nursery, Pacific Southwest Nursery, and is very familiar with the growth needs of

the various native plants and seeds specified in this plan. Mr. Beauchamp is a life member of the California Botanical Society and the California Native Plant Society. He also served as the editor of Herbertia, the international journal of bulbous plants, for 12 years.

Incorporated into this plan were elements of a draft plan prepared by Mr. Ralph Osterling of Ralph Osterling Consultants, Inc. Mr. Osterling examined suitable soil salvage areas as well as sampled soils chemistry at the receptor sites. Ralph Osterling Consultants has been involved with revegetation mitigation at the Sunshine Canyon Landfill for two decades.

6.0 ESTABLISHMENT OF REFERENCE SITE

A reference site to compare the outcome of the revegetation effort will be chosen prior to commencement of the final revegetation plan, based on further discussions with wildlife agency and City of Los Angeles staff.

7.0 REVEGETATION SITE SUITABILITY ANALYSIS

Site suitability analysis for areas to be revegetated was generally discussed in the Environmental Impact Report for the project. Suitable acreage onsite have been identified (Figure 1) for planting as well as soil salvage and the soil characteristics have been examined. Soil amendments will be prescribed and included in the soils preparation to soil placement and planting.

8.0 PROJECT IMPLEMENTATION

8.1 Equipment Used

Site preparation of the revegetation area can be accomplished with mechanical and manual soil preparation, depending on the local conditions. Normally large earth-moving equipment is necessary to relocate salvaged soil and organic matter; however salvageable soil at the expansion site is limited due to extensive slopes and prior disturbance there. In suitable areas of salvageable soil, all organic matter and two to four inches of the full depth of the topsoil will be stripped and salvaged for placement at the mitigation receptor sites. Care will be taken to minimize B or C horizons (lighter colored) soils material salvaged below the dark colored A horizon. All salvaged soil materials may be stockpiled in piles or windrows. Direct spreading and incorporation at the receptor sites is the preferred action, however. Because of the limited availability of on-site topsoil, the importation of suitable soils mix will also be required to meet the revegetated acreage requirement.

The receptor sites are on the closed landfills or adjacent disturbed slopes. Each site will be cleared of stored equipment, weeds and debris prior to site preparation. If access to gas recovery equipment or other service equipment is required, roadways will be field marked and identified. Traffic will be limited to those road areas only.

8.2 Site Accessibility for Equipment

The ultimate limits of landfill construction have been surveyed and marked in the field. Areas of sage scrub within the landfill clearing limits have been delineated and measured to confirm the acreage of sage scrub to be removed. This area involves 62 acres of impact and will result in revegetation of 69.5 acres at various locations within the landfill ownership (Figure 1).

8.3 Measures for Protecting Adjacent Development

Due to the limited invasive techniques anticipated during the revegetation effort and the rural agricultural nature of the adjacent uses, no special measures are anticipated to protect adjacent development.

8.4 Permanent and Temporary Measures for Protecting Revegetation Areas

Temporarily fencing will be in place in areas adjacent to sensitive habitats to avoid uncontrolled intrusion into these sites by construction equipment. Once the grading is completed, the fencing or flagging may be considered for removal. The revegetated areas will be posted with 8" by 12" signs installed on T-drive post. The all weather signs will states:

Sage Scrub Mitigation Area
Keep Out

The placement of this flagging or fencing should be considered temporary. Once the grading is completed, the fencing may be considered for removal.

8.5 Timing for Seeding Planting

The choice of plant species is based upon two principal criteria. The first is that the species be appropriate to the present and anticipated soil, temperature and rainfall regime of the site. The second is that the plant species be native to the region, occurring on the subject property. Plant species listed below will be with Southern California Coastal Foothill provenance, except for the Blando Brome, which is used for short-term erosion control. No salvage of live plant materials on the site for the purpose of this plan will be undertaken prior to grading. The seeding of the site will be done immediately following completion of soil and organic material placement. Irrigation will be installed at-grade once the salvaged soils and organic matter has been placed.

Once seeding has been done, permanent signage will be placed about the open space areas to preclude vandalism or unauthorized access.

8.6 List of Seed Mix

The revegetation areas will be planted accordingly with the seed mixes listed below. Application will be by hydroseeding. The receptor areas will be hydromulched with 1200 ponds per acre of ground wood fiber plus an organic tackifer. Selected soil salvaging in graded sites will allow for some retention of native seed bank as mentioned below.

Table 1. Shrubland Seed Mix

Botanical Name	Common Name	Pounds per Acre Application Rate
Plantago ovata	Plantain	6
Bromus hordaceus	Blando Brome	6
Lotus scoparius	Deerweed	5
Encelia californica	California Encelia	5
Eriogonum fasciculatum	Flat-top Buckwheat	5
Artemisia californica	California Sagebrush	5
Isocoma menziesii	Goldenbush	2
Sisyrinchium bellum	Blue-eyed Grass	2
Salvia leucophylla	Purple Sage	2
Salvia columbariae	Chia Sage	2
Eriophyllum confertiflorum	Golden Yarrow	0.5
Gutierrezia californica	Matchweed	0.5
Diplacus aurantiacus	Bush Monkeyflower	0.5
Layia platyglossa	Tidy-tips	0.5
Salvia apiana	White Sage	0.5
Salvia mellifera	Black Sage	0.5
Lasthenia californica	Goldfields	0.5
Phacelia distans	Wild Heliotrope	0.25
Hesperoyucca whipplei	Our Lord's Candle	0.25
Penstemon spectabilis	Showy Penstemon	0.25

8.7 Soil Preparation

Soil testing will be performed by the revegetation biologist to ascertain the suitability of the subsoils as well as the salvaged and imported topsoils. Salvaged soils will be used when available from the various phases of landfill operation and supplemented with imported topsoil. Aside from the salvaged soils, soil amendments will be used in the plantings if the soils test results warrant such materials. Placing this salvaged soil mixture over closed landfill slopes and cut and fill graded sites allows for a more rapid and denser recovery of the native vegetation. Aside from the placement of salvaged soils on the closed landfill slopes, the initial step in soil salvage is to locate a site where the soil can be temporarily placed without disturbance until needed for relocation on the finished cut or fill slopes. The time of the stockpiling should be as short as possible. The stockpiles should not be permanently tarped since this will elevate soil temperatures and destroy the seed and fungal material. The stockpiles should also be no more than three feet high, but they can be long structures or windrow-like formations.

The site of the limited soil salvage should be largely rock free since the mixture of rocks makes collecting the material very difficult. The vegetative overburden is crushed by "track walking" to break up the plants so they can be mixed into the soil matrix easily. Large stems may need to be manually removed so they do not foul the loading equipment. It is important when removing the upper layer of soil that the depth be controlled and that mineral soil be minimal in the mixture. It will be necessary to have a biologist on hand to determine the best depth for this procedure since the depth will vary within a given soil type. The material can be loaded into a

truck and dumped at a central site or located at the top of a cut slope where it will be out of the way of activity and can later be spilled onto the slope. Re-working of stockpiles is costly and introduces weeds into the soil matrix. As mentioned previously, because of the limited availability of on-site topsoil, the importation of suitable soils mix will also be required to meet the revegetated acreage requirement.

Grading of the slopes to be covered with the salvaged soil should leave a slope surface with irregularly spaced contour parallel ridges or benches of from 5 to 18 inches in height to serve as an anchor for the final salvaged soil layer. Once final grades are achieved, the soil is replaced over the new surface at an average depth of about 2 inches. This will vary due to benching of the base slope, however. This can vary depending upon the organic condition of the soil and the volume of soil available to cover a particular area. Once in place, this topsoil layer should be track walked to produce contour-oriented track marks to aid in rainwater retention and seed augmentation.

Receptor site preparation will include discing the landfill tops and other sites to a depth of 6 to 8 inches and ring rolling for surface treatment. On cut slopes, a contour rilling with a side board blade may be all that can be done without compromising the structural integrity of the slope yet allow for top soil retention. Representative soils samples will be collected for laboratory analysis to confirm the suitability for planting. If amendments are required, these will be applied and incorporated prior to spreading the salvaged topsoil.

Salvaged topsoil, including sage scrub mulched brush and seedbed, will be evenly spread over the prepared receptor sites. The minimum depth of salvaged soils should be about 2 inches, but will vary, depending upon the quantity of material salvaged form the donor site. Following the back spreading of the salvaged soils material, the receptor areas will be seeded with a supplemental seed mix and detailed below. Once the soil is in place and track-walked, supplemental seeding will be done. It is important to supplementally seed prior to any rainfall which can seal the soil and make seed germination difficult. The seed mixture should include, as it does in the above mixture, an erosion control component that will germinate quickly and stabilize the surface for slower germinating seeds.

8.8 Vegetative Material Salvage

The limited area of suitable on-site soil salvage precludes any need for vegetation material salvage.

8.9 Friable Soils Conditions for Horned Lizard

A special mitigation condition of the project is the provision to permit the retention of friable soils area for use by the native Horned Lizard. This will be accomplished by placement of sandier soil material that will be tarped and not supplementally seeded so that these areas do not develop vegetation cover. A total of 8 of these one-meter square areas are planned on the flat landfill area.

8.10 Irrigation Methods

8.10.1 Irrigation

The seeded, open space enhancement sites will be irrigated by an at-grade system involving low flow, low trajectory heads with electronically-controlled valves. The irrigation application will be sufficient to keep the surface soils moist until germination has occurred and the seedlings are established.

8.11.2 Irrigation Schedule

The seeded areas will be irrigated as needed by the seedlings. During the rainy season, the systems will be deactivated and manually operated. During the end of the second year the systems will be reduced by 50% of their times to harden-off the plants in preparation for deactivation of the system at the discretion of the revegetation specialist.

8.10.3 Irrigation System Removal

Regulatory agencies generally do not consider plantings successful unless they have been sustained, with ambient rainfall, for two growing seasons. At the end of the three-year monitoring period of the project the system will be removed.

8.11 Noise Control

Noise control measures are not considered necessary beyond those required for operation of the landfill.

9.0 PROJECT MAINTENANCE

9.1 Monitoring/Maintenance Schedule

Once seeded and planted, the areas will be maintained and monitored for growth and weed removal as necessary. Maintenance and monitoring will be conducted for 3 years. Irrigation system maintenance will continue for the first year to assure full establishment of the sage scrub. An evaluation will be completed at the end of the first growing season to determine the irrigation schedule for year 2 and if different from that below.

The irrigation system would be surface- installed and will be removed at the end of the three-year monitoring period, unless otherwise arranged during the monitoring period. Any inoperable or vandalized irrigation heads will be repaired or replaced as necessary during the period of system operation.

Maintenance staff will be individuals familiar with working in native revegetation habitat. They must be able to identify plants at the site that are to be eradicated and those that are to be retained. They must be knowledgeable when irrigation is either too frequent or too infrequent and stressing the desired vegetation.

9.2 Irrigation System Schedule, Installation and Operation

The open space planting areas, if required by non-performance of the initial seeding, will be irrigated by an aerial sprinkler system every two weeks if necessary.

First Year
Non-Rainy Season
March-April
2 times per week or as needed
2 times per week or as needed
May-October
2 times per month or as needed
Rainy Season
November- February
One time per week or as needed
Arrest system during rainstorm of 1" or more and activate 2 weeks later

Second Year
Non-Rainy Season
March-June
One time per week or as needed
July-October
One time per week or as needed
Rainy Season
November- February
1 time per week or as needed
Arrest system during rainstorm of 1" or more and activate 2 weeks later

Third Year - Activate system only if success criteria have not been met.

Activate system with revegetation specialist present to remedy condition and set irrigation frequency as necessary to maintain established plants through summer.

9.3 Timing of Removal of Irrigation System

The irrigation system will be removed at the end of the third year if the plants are growing as planned; if not, the irrigation system will be removed after proposed success standards have been met.

9.4 Weeding Schedule

No herbicides or pesticides are to be used without permits. Fertilizers are not to be used except as pellets in the bottom of the planting hole, at the discretion of the responsible revegetation specialist. Manual weeding will require education of the laborers to be certain that proper weeding is done and no useful plants are eliminated. Selective weed abatement will be done manually and focus on larger, more aggressive non-natives such as Field Mustard (*Hirschfeldia incana*), Tree Tobacco (*Nicotiana glauca*), and Russian-thistle (*Salsola tragus*), but will include any other volunteer plants which are not conducive to rapid establishment of the target vegetation.

9.5 Trash Removal Program

Trash will be removed during workers presence during the weeding cycle.

9.6 Pest Control Program

Care must be taken to install, if necessary, and inspect the anti-herbivore cages to insure that growth of plants is not hampered.

9.7 Fertilization Program

Fertilizer will be used at the discretion of the revegetation consultant in light of success criteria needs.

10.0 PROJECT MONITORING

10.1 Seedling Acceptance

Following the seeding operation, the project biologist, revegetation specialist and City staff shall conduct a walk-through of the installed revegetation effort. "As-builts" will be provided two weeks after inspection and prior to City acceptance.

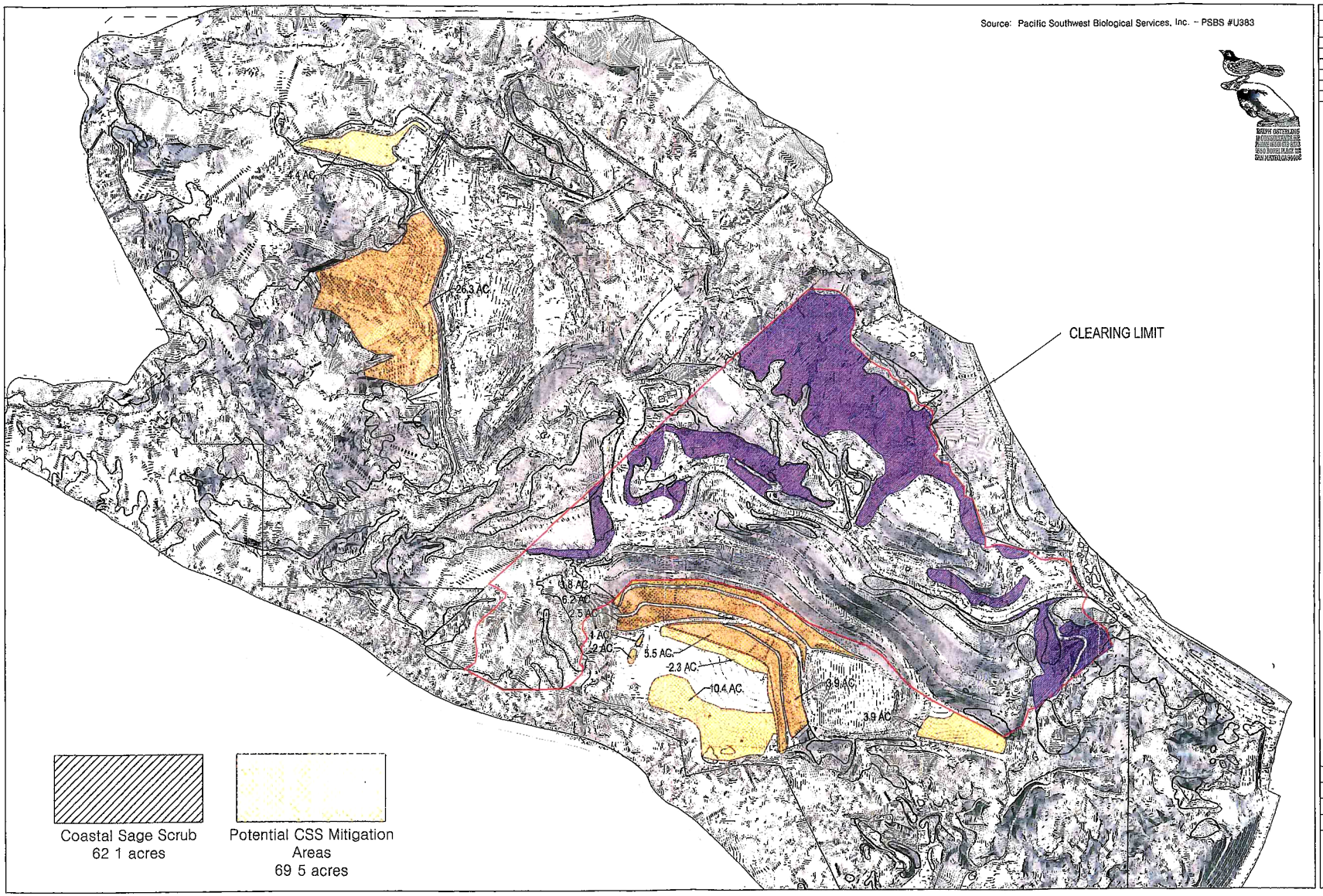
10.2 Remedial Actions

Unmet sage establishment areas will be remediated immediately by reseeding with the plant species determined by the revegetation biologist to be appropriate to the hydrological and soil conditions of the site, once disturbance factors, such as minor drainage issues, shading from successful growth of trees, or other such dynamics of the site, have settled out.

11.0 PROJECT DRAWING (SEE ATTACHED LANDSCAPE PLAN DRAWINGS)

APPENDIX B

Map of areas to be planted with Coastal Sage Scrub



Revisions
97 09-04

Sunshine Canyon City Landfill Coastal Sage Scrub Type Map

Scale: 1"=400'
Date: 08-15-04

Sheet No.
1 of 1

Attachment 2

County Sage Slope Photos

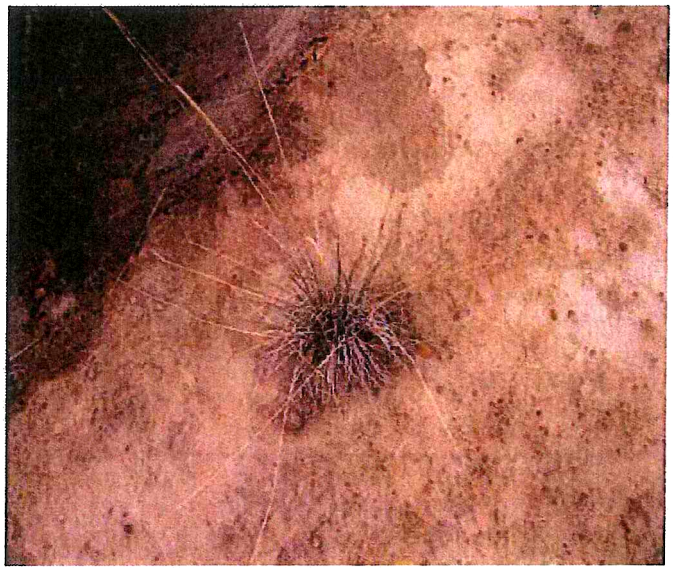
Sage Hill January 2010. Vegetation cover varies with soil quality

Sage Hill December 2009

Center of Sage Hill, January 2010.

California Sagebrush December 2009

Deerweed (pre-existing CSS plant) December 2009



Needlegrass container plant showing new growth after rain, December 2009