

NATIVE GRASSLAND RESTORATION AND ENHANCEMENT REPORT
GRADY RANCH, MARIN COUNTY, CALIFORNIA

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1.0 INTRODUCTION

1.1 Brief Summary of Overall Project

The Grady Ranch site is northwest of the City of San Rafael, Marin County, California. Sensitive on-site biological resources include stands of native grassland. The proposed development project on the Grady Ranch site will avoid the majority of the on-site native grassland, but grading activities will impact some stands of native grassland. This grassland restoration report is written to address these impacts and describe appropriate restoration and monitoring activities. This report is based on a similar plan prepared for the nearby Big Rock Ranch site by LSA Associates, Inc. (LSA 1999) but is modified to incorporate lessons learned during five years of monitoring the Big Rock Ranch native grassland mitigation sites (WRA 2008).

1.2 Background Biological Information

Perennial, tussock forming purple needlegrass (*Nassella pulchra*) was the dominant native grass in the native grassland occurring on Grady Ranch. Native grassland occurred in stands that varied in cover of needlegrass, and non-native grasses and other species typical of non-native annual grassland were intermixed with the needlegrass. Approximately 3.3 acres of native grassland were mapped on the entire Grady Ranch site (Native Grassland Restoration Plan [LA3]).

In 2008, WRA surveyed areas of native grassland within the entire development area on Grady Ranch to determine percent cover of native grasses. While the majority of the grassland on the site will not be impacted by proposed development, there are thirteen distinct areas where impacts will occur. These areas total 21,415 square feet (0.49 acre) of native grassland habitat ranging from five to 20 percent cover which is the equivalent of 1,975 square feet of 100 percent native grassland habitat cover when combining the area of proposed impacts with the percent cover of native bunchgrasses.

89 square feet at 20% cover =	17.8 square feet at 100% cover
7,914 square feet at 15% cover =	1187.1 square feet at 100% cover
630 square feet at 10 % cover =	63 square feet at 100% cover
287 square feet at 8% cover =	23 square feet at 100% cover
2,617 square feet at 7% cover =	183.2 square feet at 100% cover
726 square feet at 6% cover =	43.6 square feet at 100% cover
9,152 square feet at 5% cover =	457.6 square feet at 100% cover

Total: 21,415 square feet (0.49 acre) = 1,975.3 square feet (0.045 acre) at 100% cover

1.3 Restoration/Mitigation Objectives

This plan has two objectives. The first is to protect stands of preserved native grassland from construction impacts. The second is to reestablish stands of native grassland lost to grading. These stands will be reestablished in several planting sites for a total of at least 1:1 ratio of lost to restored native grassland.

2.0 PROTECTION MEASURES

The proposed project shall make every attempt to limit impacts to native grassland to that within graded areas. The following measures shall be implemented to ensure that impacts are minimized:

- Color-coded flagging, a temporary construction fence, or other acceptable methods shall separate areas proposed for grading from areas of preserved native grassland.
- Landscape or mitigation tree plantings shall not be placed in existing native grassland or in native grassland reestablishment sites.

3.0 RE-ESTABLISHMENT MEASURES

3.1 Location of Planting Sites

Potential re-establishment sites (Drawing LA3) were chosen in some graded areas where slope and aspect were comparable to stands of naturally-occurring grassland. Additionally, areas dominated by existing non-native annual grassland that appeared to provide suitable native needlegrass habitat were also selected for potential re-establishment sites. Prior to planting, a biologist will examine the potential sites and choose which ones will be planted. Approximately one acre of native grassland should be re-established at five percent cover in order to mitigate for proposed project impacts. Several sites will be chosen in order to maximize the total planting area and account for any site-specific differences in re-establishment success.

3.2 Site Preparation

The planting sites will be located on graded areas or areas composed of non-native grassland away from proposed roads and buildings. Purple needlegrass does well in relatively infertile areas with shallow soil, so site preparation of graded areas can involve little more than smoothing the planting areas to make a suitable planting bed. In areas dominated by non-native grasses that are to be restored to native grassland, site preparation should include excavating the existing vegetation and the top layer of topsoil to remove the non-native, exotic seedbank.

3.3 Implementation and Schedule

The restoration program will include the following measures:

- The planting areas should be prepared to receive seed in August or September.
- During late November or early December, purple needlegrass seed will be spread throughout the mitigation areas. Native wildflower seed known from the area may also be included in the seed mix and include species such as California poppy (*Eschscholzia californica*), willow herb (*Epilobium brachycarpum*), and/or succulent lupine (*Lupinus succulentus*). Other regionally-appropriate native grasses such as red fescue (*Festuca rubra*), meadow barley (*Hordeum brachyantherum*), blue wild-rye (*Elymus glaucus*), squirreltail (*Elymus elymoides*), and /or California oatgrass (*Danthonia californica*) will also

be included in the seed mix.

- Purple needlegrass seed should be applied at the rate of 20 pounds per acre. The native wildflower seeds will be sown at one to three pounds per acre. Other native grass seed will be sown at rates appropriate to the particular species. Seed should be spread by hand or with a seed drill.
- Biodegradable erosion control blanketing should be used to prevent erosion in the steeply sloped planting areas.
- A drip irrigation system should be installed to water the native bunch grass seedlings during the dry season (approximately May 1 to November 1) for the first two or three years after planting. After a few years, the native grasses are expected to have established and expanded their coverage and irrigation should no longer be necessary.

4.0 MONITORING

4.1 Performance Standards

At the end of the five-year monitoring period, the seeded areas are required to have an average relative cover of native grasses that is equivalent to 1,975.3 square feet at 100 percent cover. For example, if the seeded areas totaled 19,753 square feet, they would be required to have an average of 10 percent relative cover of native grasses. This requirement will mitigate at a 1:1 ratio for the total native grassland actually impacted by the project. In addition, invasive non-native weed species found on the California Invasive Plant Council (Cal-IPC) most recent “High” and “Moderate” Lists¹ are not to exceed five percent cover in the restored native grassland.

4.2 Monitoring Methods

Monitoring of the re-establishment sites will involve establishing one to four permanent transects in each planting area depending on size, for a total of at least 10 transects as well as at least five reference transects in nearby unimpacted native grassland. Five years of annual monitoring will be conducted by qualified biologists and will take place in April when grasses are readily identifiable. Visual estimates of absolute percent cover of plant species and bare ground in 0.5 meter square quadrats located in randomly-chosen locations along the transects will be recorded. An estimate of relative percent cover of plant species within each quadrat can then be calculated. In addition to recording cover class data, photographs will be taken at the zero end of each transect to visually document the areal cover of vegetation.

Percent cover will be totaled for each of the planted native grass species in each of the mitigation grasslands. In addition, the weighted average of each native grass species will be calculated by multiplying the percent cover of each species by the acreage of each mitigation grassland and dividing the sum of those products by the total mitigation acreage.

If percent cover of native grasses in the planting areas is not approaching that in the reference

¹These lists are available online at <http://www.cal-ipc.org/ip/management/ipcw/categories.php>.

areas, biologists may recommend contingency measures, as discussed in Section 5.3.

During grassland monitoring, visual observations will also be made to qualitatively assess the presence of non-native invasive weeds included in the most current version of Cal-IPC's "High" or "Moderate" Lists in all graded areas on the site. This will be done to account for any weeds that do not fall within the grassland monitoring quadrats.

5.0 MAINTENANCE AND LONG-TERM MANAGEMENT

5.1 Maintenance

The following maintenance activities will be necessary to help ensure successful establishment of the native grasses. Specific recommendations for maintenance actions will also be included in the annual monitoring reports.

- The irrigation system should be inspected prior to use and monthly during the months it is in use, for every year that it is needed.
- Mowing and/or weed-whacking should occur in late February to prevent non-native grasses from shading and out-competing the native grasses, and again in late April to prevent non-native grasses from dropping mature seed. Vegetation in the mitigation areas should be mowed or weed-whacked to a height of three to five inches, then raked to remove thatch accumulation and reduce competition for light and soil moisture.
- Weed removal, either by hand pulling or, as a last resort, using an appropriate herbicide, will be necessary in the first year or so following planting while cover of native grasses is low. After native grasses establish and expand in cover, weed control should be limited to occasional removal of isolated pest species.

5.2 Long-term Management

Management activities to help control weeds, such as mowing, or spot treatments of hand-pulling particularly noxious weeds, may be recommended to continue beyond the five-year monitoring period. The final Year 5 monitoring report will include recommendations for long-term management.

5.3 Contingency Measures

There are a variety of measures that can address the failure of native grasses to establish in the planting areas. Selected contingency measures should address specific reasons for failure, such as slope instability, shallow soil, lack of water due to steepness, failure of germination, herbivory, or poor seedling survival. Contingency measures designed to address initial failures can vary from sowing additional seed at a higher amount per acre, irrigating more frequently, or planting plugs of needlegrass. Selecting additional planting sites in areas dominated by non-native annual grassland may also be appropriate in some instances.

6.0 REFERENCES

LSA Associates, Inc. 1999. Native Grassland Restoration and Enhancement Plan, Big Rock Ranch, Marin County, California. Prepared for Lucasfilm Ltd. July 29, 1999.

WRA, Inc. 2008. Big Rock Ranch Grassland and Weed Monitoring Report, Year Five. Prepared for Lou Bouc, Skywalker Properties. January 2008.