

# Olympia Conservation Area

## Habitat Management and Monitoring Plan



*Prepared by:*

Jodi McGraw, Ph.D.  
Jodi McGraw Consulting  
PO Box 221 • Freedom, CA 95019 • (831) 768-6988  
[jodi@jodimcgrawconsulting.com](mailto:jodi@jodimcgrawconsulting.com)  
[www.jodimcgrawconsulting.com](http://www.jodimcgrawconsulting.com)

*Prepared for:*

San Lorenzo Valley Water District  
13060 Highway 9  
Boulder Creek, CA 95006

**September 2020**

**Contents**

<b>List of Tables</b>	<b>vi</b>
<b>List of Figures</b>	<b>vii</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Conservation Area Overview	1
1.2 Conservation Area Establishment History	3
1.3 Plan Area	3
1.4 Management Phases and Plan Revisions	4
1.5 Plan Development	5
1.6 Plan Contents	6
<b>2 Existing Conditions</b>	<b>9</b>
2.1 Location	9
2.2 Adjacent Lands	9
2.2.1 Mayer Conservation Easement Area	9
2.2.2 Morgan Preserve	10
2.2.3 Freeman Property	10
2.3 Physical Conditions	10
2.3.1 Geology and Soils	10
2.3.2 Topography	11
2.3.3 Water	11
2.4 Human Uses and Features	11
2.5 Plant Communities	12
2.5.1 Overview	12
2.5.1 Background	12
2.5.2 Sand Parkland	15
2.5.2.1 Associations	16
2.5.2.2 Stressors	18
2.5.3 Sandhills Chaparral Community	20
2.5.3.1 Associations	21
2.5.3.2 Stressors	22
2.5.4 Sandhills Woodlands and Forests	24
2.5.4.1 Ponderosa Pine Forest	24
2.5.4.2 Coast Live Oak Woodland	24
2.5.4.3 Mixed Hardwood Forest	25
2.5.4.4 Mixed Evergreen Forest	25
2.5.5 Transitional Riparian Communities	26
2.5.6 Other Land Cover Types	26
2.6 Sandhills Endemic Species	26
2.6.1 Overview	26

## Olympia Conservation Area

### Habitat Management and Monitoring Plan

### Contents

2.6.1 Animals	28
2.6.1.1 Santa Cruz Kangaroo Rat	28
2.6.1.2 Zayante Band-Winged Grasshopper	31
2.6.1.3 Mount Hermon June Beetle	33
2.6.2 Plants	36
2.6.2.1 Ben Lomond Spineflower	36
2.6.2.2 Ben Lomond Wallflower	39
2.6.2.3 Ben Lomond Buckwheat	42
2.6.2.4 Silverleaf Manzanita	45
2.7 Invasive and Exotic Plants	47
2.8 Other Management Issues	49
2.8.1 Fire Exclusion	49
2.8.2 Trespass and Erosion	49
<b>3 Goals and Objectives</b>	<b>50</b>
3.1 Ecosystem	50
3.2 Community	51
3.3 Rare Species	52
3.3.1 All Rare Species	52
3.3.2 Santa Cruz Kangaroo Rat	52
3.3.3 Zayante Band-Winged Grasshopper	53
3.3.4 Ben Lomond Wallflower	54
3.3.5 Mount Hermon June Beetle, Ben Lomond spineflower, Ben Lomond buckwheat, and Silverleaf manzanita	55
3.4 Cobenefits	56
<b>4 Habitat Management, Restoration, and Enhancement</b>	<b>58</b>
4.1 Strategies and Techniques	58
4.1.1 Disturbance Management	60
4.1.2 Exotic Plant Management	61
4.1.3 Access Management	65
4.1.4 Restoration	66
4.1.5 Species Population Enhancement	67
4.2 Initial Phase Management, Restoration, and Enhancement	68
4.2.1 Exotic Plant Management Action Plan	69
4.2.1.1 Priority Exotic Plant Management Treatments	69
4.2.1.2 Early Detection/Rapid Response	70
4.2.2 Access Management Action Plan	72
4.2.2.1 Allowed Access	72
4.2.2.2 Access Regulation	74
4.2.3 Restoration	74
4.2.4 Species Enhancement	77
<b>5 Monitoring, Reporting, and Adaptive Management</b>	<b>78</b>

<b>Olympia Conservation Area Habitat Management and Monitoring Plan</b>	<b>Contents</b>
5.1 Monitoring Approaches	78
5.1.1 Conservation Area Condition Monitoring	78
5.1.2 Photomonitoring	79
5.1.3 Project Monitoring	80
5.1.4 Species and Community Monitoring	80
5.2 Initial Phase Monitoring	80
5.3 Adaptive Management	84
5.4 Reporting	84
<b>6 Implementation</b>	<b>85</b>
6.1 Implementation Phases	85
6.2 Species Protection	86
6.3 Permitting	86
6.4 Roles and Responsibilities	87
6.5 Schedule	88
6.6 Budget	88
6.7 Funding	91
<b>References</b>	<b>93</b>
<b>Appendix A: Survey and Habitat Assessment Methods</b>	<b>99</b>
A.1 Plant Community Classification and Mapping Methods	99
A.2 Sandhills Specialty Plant Species List	100
A.3 Endemic Plant Mapping	100
A.3.1 Mapping in Plant Community Patches	101
A.3.2 Ben Lomond Wallflower Survey	101
A.4 Endemic Animal Surveys and Habitat Mapping	102
A.4.1 Mount Hermon June Beetle	102
A.4.2 Zayante Band-Winged Grasshopper	103
A.4.3 Santa Cruz Kangaroo Rat	104
A.5 Habitat Management Issue Assessment	104
A.5.1 Mining	104
A.5.2 Exotic and Invasive Plant Species	104
A.5.3 Erosion	106
A.5.4 Access	107
<b>Appendix B: Sandhills Specialty Plant List</b>	<b>110</b>
<b>Appendix C: Species Protection Measures</b>	<b>114</b>
C.1 Project Design	114
C.2 Project Implementation	114

<b>Olympia Conservation Area Habitat Management and Monitoring Plan</b>	<b>Contents</b>
<b>Appendix D: Large-Format Maps</b>	<b>119</b>
<b>Appendix E: Conservation Easement</b>	<b>120</b>
<b>Appendix F: Olympia Wellfield Management Agreement</b>	<b>121</b>
<b>Appendix G: Incidental Take Permit</b>	<b>122</b>
<b>Appendix H: San Lorenzo Valley Water District Integrated Pest Management Policy (2020-2021)</b>	<b>123</b>

**List of Tables**

Table 1: Olympia Conservation Area Summary	1
Table 2: Characteristics of the plant communities, associations, and other land cover showing	13
Table 3: Described endemic animals and plants	27
Table 4: Santa Cruz kangaroo rat habitat	30
Table 5: Zayante Band-Winged Grasshopper habitat	33
Table 6: Mount Hermon June beetle habitat	36
Table 7: Cover of the four endemic plants within the plant communities and associations	39
Table 8: Invasive plant guilds and species	48
Table 9: Plant community patches according to their cover of widespread exotic herbs	48
Table 10: Biodiversity goals and objectives promoted by the management strategies and techniques	59
Table 11: Criteria and scoring used to prioritize invasive plant species occurrences for treatment	63
Table 12: Invasive plant species in each site according to their treatment priority and guild	65
Table 13: Initial Exotic Plant Action Plan Treatments <sup>1</sup>	71
Table 14: Access Management Action Plan	72
Table 15: Restoration Action Plan for the 0.17-acre silver wattle area	75
Table 16: Conservation Area Condition Monitoring	79
Table 17: Initial Phase Monitoring	81
Table 18: Monitoring for Species and Communities during the Initial Phase of Implementation	82
Table 19: Olympia Conservation Area Phased Approach to Management	85
Table 20: Anticipated schedule during the initial phase of management	89
Table 21: Estimated costs (in 2020 dollars) for plan tasks during the initial phase	90
Table 22: District projects mitigated through the Olympia Conservation Area to date	91

**Tables in the Appendices**

Table A-1: Cover classes used to map endemic plants	101
Table A-2: Mount Hermon June beetle (MHJB) habitat classification	102
Table A-3: Zayante band-winged grasshopper habitat classification	103
Table A-4: Santa Cruz Kangaroo rat habitat classification	104
Table A-5: Invasive plant species assessed in the plant community patches	106
Table B-1: Sandhills specialty plant species known to occur in the Olympia Conservaton Area	111

## List of Figures

Figure 1: Olympia Conservation Area Map	2
Figure 2: Santa Cruz kangaroo rat image	29
Figure 3: Zayante band-winged grasshopper image	31
Figure 4: Mount Hermon June beetle images	34
Figure 5: Ben Lomond spineflower inflorescence images	37
Figure 6: Ben Lomond wallflower images	40
Figure 7: Ben Lomond buckwheat images	43
Figure 8: Silverleaf manzanita adult shrub images	45

## Appendix D: Large-Format Maps

Map 1: Plant Communities
Map 2: Santa Cruz Kangaroo Rat Habitat
Map 3: Zayante Band-Winged Grasshopper Observations and Habitat
Map 4: Mount Hermon June Beetle Observations and Habitat
Map 5: Ben Lomond Spineflower Cover
Map 6: Ben Lomond Wallflower Cover and Patches
Map 7: Ben Lomond Buckwheat Cover
Map 8: Silverleaf Manzanita Cover
Map 9: Management Issues

## 1 Introduction

This plan was developed to guide habitat management, restoration, enhancement, and related activities, (collectively, ‘management’) and monitoring within the Olympia Conservation Area—a 6.3-acre conservation area located within the San Lorenzo Valley Water District’s 180-acre Olympia Watershed Property. The conservation area was set aside by the District to mitigate impacts of its capital improvements and operations and maintenance projects on rare species and sensitive habitat in the Sandhills. This section provides an overview of the conservation area, the history of its establishment, and the goals and contents of this management plan.

### 1.1 Conservation Area Overview

The Olympia Conservation Area is a 6.3-acre area that supports endangered species and sensitive habitat found in the Santa Cruz Sandhills—a unique ecosystem found only on outcrops of Zayante soils, which supports unique assemblages of plants and animals that include seven endemic plants and animals<sup>1</sup> found nowhere else in the world (Table 1; McGraw 2004b). Estimated to originally cover 6,256 acres originally, the Sandhills ecosystem has been extensively modified through development and sand quarrying such that relatively intact Sandhills communities occupy approximately 3,190 acres today (McGraw 2004b). Remaining habitat has been degraded as a result of exclusion of the natural fire regime, the invasive and spread of exotic plants, and incompatible recreational uses. These and other anthropogenic factors, including climate change, threaten the persistence of the unique ecosystem, communities, and endemic species (Section 2.6).

**Table 1: Olympia Conservation Area Summary**

Species and Communities	Status in Olympia Conservation Area
<b><u>Species</u></b>	
Santa Cruz kangaroo rat	Suitable Habitat
Zayante band-winged grasshopper	Species Present
Mount Hermon June beetle	Species Present
Ben Lomond spineflower	Species Present
Ben Lomond wallflower	Species Present
Ben Lomond buckwheat	Species Present
Silverleaf Manzanita	Species Present
<b><u>Communities</u></b>	
Sand Parkland	3.3 acres
Sand Chaparral	0.94 acres
Sandhills Woodlands and Forests	2.8 acres
Riparian	0.2 acres
Ornamental	0.01 acres
<b>Total Area</b>	<b>7.3 acres</b>

<sup>1</sup> The Olympia Conservation Area is a 6.3-acre area that is part of the SLVWD’s 180-acre Olympia Wellfield. This plan assessed the contiguous 1.0-acre Mayer Conservation Easement area, which was previously protected but is not actively managed.

<sup>1</sup> Santa Cruz kangaroo rat was historically known from locations outside of the Sandhills but was thought to be currently limited to the sandhills (Bean 2004). In 2019, a population was discovered in the Sierra Azul region of the Santa Cruz Mountains, such that this species is not truly ‘endemic’ to the Sandhills. Due to its extraordinary rarity and the importance of Sandhills habitat, it is treated along with the six described endemic species in this plan.

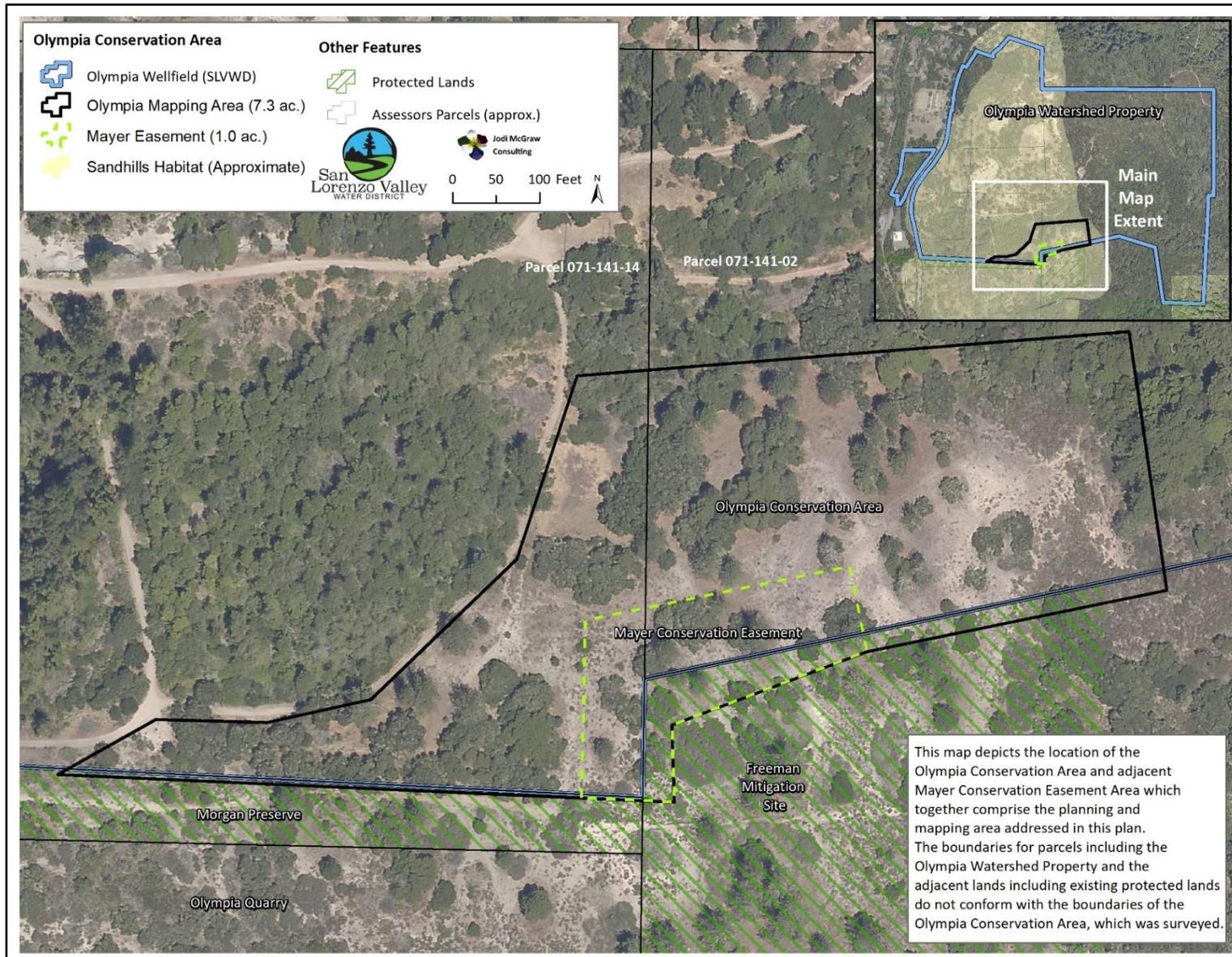


Figure 1: Olympia Conservation Area showing Mayer Conservation Easement Area and Olympia Mapping Area

## 1.2 Conservation Area Establishment History

The San Lorenzo Valley Water District (District) established the Olympia Conservation Area in 2017 by granting to the Land Trust of Santa Cruz County (Land Trust) a conservation easement that permanently protects the property from development and other activities that would impact the conservation values (Appendix E). The District established the Olympia Conservation Area to mitigate the impacts of the District's operations including capital improvements and operations and maintenance on Sandhills endangered species and sensitive habitat, which occur in some of the District's facilities and associated infrastructure areas.

The 6.3-acre Olympia Conservation Area was protected as part of the District's Probation Tank Replacement Project, which replaced a dilapidated and undersized tank atop Mount Hermon with a new water tank in 2018 and 2019. The Probation Tank project occurred within Sandhills habitat that supports Santa Cruz kangaroo rat and three federally listed endangered species found in the sandhills (Table 1): Mount Hermon June beetle, Zayante band-winged grasshopper, and Ben Lomond spineflower. As part of a habitat conservation plan (HCP) developed to comply with the Endangered Species Act (McGraw 2017), the District compensated for the permanent and temporary impacts of the Probation Tank Project on sandhills species by permanently protecting and agreeing to manage and monitoring in perpetuity, 0.995 acres of habitat supporting the three federally listed species impacted by the project, as well as the federal and state-listed endangered Ben Lomond wallflower (*Erysimum teretifolium*; McGraw 2017). Rather than setting aside just 0.995 acres, the District committed to protecting and managing a larger area of Sandhills habitat to both provide for more meaningful conservation and provide a mechanism to mitigate its future capital improvement projects and operations and maintenances activities in the sandhills (McGraw 2017).

Located in the southern portion of the Olympia Watershed Property, the Olympia Conservation Area boundaries were drawn to:

- Protect the highest quality sandhills habitat remaining within the Olympia Watershed Property, including habitat that supports or is suitable for all of the endemic Sandhills species (Table 1);
- Avoid existing and planned uses of the site by the District as a wellfield, by excluding existing facilities including underground pipelines, and areas identified as most suitable for potential future groundwater wells; and
- Buffer and expand other adjacent protected lands within the site, including the 1.0-acre Mayer Conservation Easement located within the Olympia Watershed Property, the two adjacent conservation areas south of the property—the 6 acre Freeman Mitigation Area protected by the Center for Natural Lands Management, and the 202 acre Morgan Preserve, protected by the Land Trust of Santa Cruz County (Figure 1).

The Probation Tank HCP estimated that the conservation area would be 6.7 acres but noted that the final area would be identified through a land survey; that survey defined the Olympia Conservation Area as 6.3 acres (Land Trust 2017).

## 1.3 Plan Area

The Olympia Conservation Area is immediately adjacent to the Mayer Conservation Easement Area—a 1.0-acre easement area established when the District granted a conservation easement in 2002 to the Center for Natural Lands Management (Section 2.2.1). For evaluation and planning purposes, the

assessments conducted to develop this plan included the 7.3 acres that includes the Olympia Conservation Area and the Mayer Conservation Easement area. The latter property was included in planning for the following reasons:

- The Olympia Conservation Area is continuous with the Mayer Conservation Easement Area on three of its sides such that management should be coordinated across sites to achieve the conservation goals for the Olympia Conservation Area;
- The management actions planned for the Mayer Conservation Easement area are unclear and the District has committed to certain management actions in the area as part of the management agreement (Section 2.2.1); and
- The eastern, northern, or western boundaries of the Mayer Conservation Easement Area are neither fenced nor otherwise delimited on the ground. While a global positioning system featuring the boundary digitized from available maps was used, there is some error associated with the boundary, such that more comprehensive mapping was warranted.

The surveys, assessments, and planning for the 6.3-acre Olympia Conservation Area also included the 1.0-acre Mayer Conservation Easement area, such that the total planning area is 7.3 acres.

#### 1.4 Management Phases and Plan Revisions

Management of the Olympia Conservation Area will be phased in over time, as the size of the non-wasting endowment that the District established to fund management and monitoring increases, thus increasing funds available for management and monitoring tasks. With each project for which the District uses the Olympia Conservation Area as compensatory mitigation, the District has contributed to the endowment. Currently, the District has used the site to mitigate the impacts of three projects—the Probation Tank Replacement (2018-19), Pasatiempo Wells Emergency Repair and Replacement (2019), and Lewis Tank Replacement (2020; Section 6.7). A total of 2.1 acres of the 6.3 acres of mitigation within the site have been used.

The District anticipates using the remainder of the Olympia Conservation Area to mitigate its future capital improvement and facilities operations and maintenance projects that impact the Sandhills communities and species. Such future projects are anticipated to be permitted and mitigated through the District’s Sandhills Habitat Conservation Plan (HCP)—a programmatic HCP that is currently being developed to cover all of the District’s future activities in the Sandhills for a term of approximately 25 years (after which it can potentially be renewed). Though the mitigation needs from future activities have not yet been calculated, the covered activities in the Sandhills HCP are anticipated to outstrip the approximately 4.2 acres of mitigation remaining in the Olympia Conservation Area, such that additional habitat will need to be set aside at the Olympia Watershed Property to meet future mitigation needs.

Based on these assumptions, this management plan was developed to provide an overall framework for management and monitoring and to guide implementation of management in phases:

1. Management of the 6.3-acre Olympia Conservation Area, which will be conducted in two phases:
  - a. Initial management phase, which represents the first approximately five years of management; and
  - b. Long-term management phase, which will continue in perpetuity; and

2. Management of any additional lands protected to expand the Olympia Conservation Area as part of the District Sandhills HCP.

This management plan will be updated as part of work to finalize the District Sandhills HCP, or early during its implementation. That update will address the long-term management of the Olympia Conservation Area, as well as its potential expansion.

As drafted, this management plan provides the overall framework for management of the Olympia Conservation Area, including goals and objectives (Section 3), management strategies and techniques (Section 4), and monitoring approaches (Section 5). These core elements are anticipated to be carried through into the revised plan, with identified modifications or improvements as part of the HCP planning process. To guide initial implementation based on the District's obligations per the existing projects mitigated at the Olympia Conservation Area, this plan also provides the detailed management (Section 4.2) and monitoring (Section 5.2) actions during the initial phase. The revised management plan will build upon this plan and is envisioned to address: 1) additional areas to be protected within the Olympia Watershed Property or perhaps elsewhere, 2) additional management, restoration, and enhancement actions, and 3) long-term monitoring protocols and the adaptive management framework in which management and monitoring will be implemented to promote effectiveness over time.

## 1.5 Plan Development

As part of the Probation Tank HCP (McGraw 2017), the District committed to managing and monitoring the Olympia Conservation Area in perpetuity pursuant to a habitat management and monitoring plan (i.e., this plan; Section 1.4). The HCP outlined how the plan would describe in detail the methods that the District will use to manage and monitor the area and also the measures that will be taken to minimize adverse effects to the listed species resulting from the management and monitoring activities and:

1. Provide a map of the habitat set-aside;
2. Describe the habitat and listed species within the site and the ecological factors that are affecting their populations
3. Describe prior management of the site, including history of invasive plant removal and related habitat management;
4. Provide biological goals and objectives for the habitat and species, which reflected its desired future conditions;
5. Identify strategies to achieve the goals through management, which will include:
  - Habitat maintenance: installation of fences and/or surveillance cameras, conducting patrols, and implementing other measures to protect the habitat for trespass;
  - Habitat management: invasive plant removal, erosion control, and other methods to maintain or enhance habitat conditions; and
  - Restoration: steps to restore sand parkland habitat and recover populations of listed plants and insects.

6. Describe monitoring methods that will be used to evaluate effectiveness of the treatments at creating the desired habitat conditions; and
7. Outline an adaptive management framework that will be used to adjust management, as needed, to achieve the goals and objectives.

Developed to meet the requirements for the habitat management and monitoring plan (McGraw 2017), this plan was developed through the following main steps:

1. Review available information about the site;
2. Map the plant communities and assess the habitat conditions for the endemic species as well as evaluate anthropogenic issues and threats, to provide critical information for planning as well as document initial conditions for purposes of evaluating changes over time;
3. Conduct focal species surveys to better understand their distributions in order to plan management to protect and expand their populations, where appropriate;
4. Develop conservation goals for the ecosystem, communities, species, and other conservation values of Sandhills habitat, including cobenefits for water, paleontological resources, and recreation;
5. Identify management strategies, techniques, and specific actions to promote the rare species and sensitive habitat and address management issues at each site; and
6. Outline implementation methods including an initial schedule and estimated costs associated with initial management and monitoring.

Appendix A provides details about the methods used to assess the habitat and species.

## 1.6 Plan Contents

This plan contains the following sections:

- **Section 2-Sandhills Communities, Species, and Sites:** Descriptions of the Sandhills communities, species, and the conservation area, with an emphasis on aspects relevant to management;
- **Section 3-Goal and Objectives:** Goals and objectives for the Sandhills ecosystem, communities, and species, as well as other cobenefits of Sandhills conservation (i.e., for water resources, paleontological resources, fire management, and education);
- **Section 4-Sandhills Management Restoration, and Enhancement:** A description of the strategies and techniques to maintain or enhance habitat conditions for the endemic species and native communities; and
- **Section 5-Monitoring, Reporting and Adaptive Management:** An outline of the approaches to monitoring the conservation area and adapting management to promote long-term effectiveness; and
- **Section 6-Implementation:** A schedule, budget, and responsibilities for the initial phase of management, as well as guidelines for species protection.

The appendices contain additional information that can facilitate management including:

- **Appendix A-Species and Habitat Assessment Methods:** An outline of the methods that were used to conduct the community mapping, focal species surveys, and habitat condition assessment and related work to prepare the plan;
- **Appendix B-Sandhills Specialty Plant List:** A partial list of the rare and unique plant species known from the Sandhills that were observed in each site during the course of management planning;
- **Appendix C-Species Protection Measures:** An initial list of measures to avoid and minimize short-term negative impacts to the endemic species during the course of implementing habitat restoration, management, and species enhancement. This list is can be used as a starting point for developing project-specific measures;
- **Appendix D-Maps:** The large-format maps of the Olympia Conservation Area;
- **Appendix E- Conservation Easement:** The conservation easement that the District dedicated to the Land Trust of Santa Cruz County to protect the Olympia Conservation Area.
- **Appendix F-Olympia Wellfield Management Agreement:** The agreement between the District, CNLM, and the private landowners that helped contribute to the Mayer Conservation Easement, which is adjacent to the Olympia Conservation Area.
- **Appendix G-Incidental Take Permit:** The permit issued to the District by the United States Fish and Wildlife Service pursuant Section 10 of the Endangered Species Act, which covered the Probation Tank Replacement Project as well as twenty years of management of the Olympia Conservation Area under this plan.

This planning project also developed a geographic information system containing spatial data layers that depict the plant communities, special-status species observations and habitat, and habitat management issues including invasive species. Maps are limited to those deemed most helpful to visualize the sites and their resources; the GIS database provided as part of the project can be used to examine additional features discussed but not presented in maps.

Text describing the ecological system, species, and management strategies and techniques is limited to that deemed most relevant to informing management. Additional information can be found in the *Sandhills Conservation and Management Plan* (McGraw 2004b) which provides more detailed assessment of the following:

- Sandhills physical environment, including geology and soils (Chapter 2);
- Sandhills biology, including communities, species, and disturbance ecology (i.e., for fire and soil disturbances, Chapter 3);
- Sandhills threats including various factors degrading habitat (Chapter 4);
- Sandhills endemic species accounts, which provide more detailed information about the species addressed in this plan (Chapter 5);
- Sandhills management general approaches (Chapter 7);
- Sandhills fire management (Chapter 8);
- Sandhills exotic species management (Chapter 9);

- Sandhills recreation and access management (Chapter 10);
- Sandhills reclamation, reconstruction, and restoration guidance (Chapter 11);
- Sandhills research guidance (Chapter 12); and
- Sandhills education, interpretation, and outreach recommendations (Chapter 13).

## 2 Existing Conditions

This section describes the existing conditions of the Olympia Conservation Area. This information was developed based upon surveys of the Sandhills habitat and focal species surveys conducted by Jodi McGraw Consulting in spring and summer 2018 (Appendix A), which were updated based on reconnaissance-level observations in spring 2020. It also integrates prior research and information on the Sandhills, including information summarized in the *Sandhills Conservation and Management Plan* (McGraw 2004) and reports and plans prepared as part of work to manage other Sandhills sites including the Bonny Doon Ecological Reserve, Olympia Quarry, Quail Hollow Quarry Conservation Areas, and Zayante Sandhills Conservation Bank.

An emphasis was placed on describing aspects of the Sandhills communities and species, and providing information necessary to develop and implement management and monitoring. Additional information about the communities and species is provided in chapters 3 and 5, respectively, of the *Sandhills Conservation and Management Plan* (McGraw 2004b).

Appendix D provides the large-format maps that illustrate the communities and species, as well as management issues.

### 2.1 Location

The Olympia Conservation Area is located in the southern portion of the District's 180-acre Olympia Watershed property which is located at 7710 East Zayante Road Felton, CA 95018, in central Santa Cruz County. The easement area straddles assessor's parcels 071-141-14 and 071-141-02 (Figure 1). It is in the northern portion of Section 14 of Township 10S Range 2W in the Mount Diablo Base and Meridian, which is located in the Felton 7.5-minute quadrangle.

### 2.2 Adjacent Lands

The Olympia Conservation Area is bounded on the north, west, and east by the remainder of the Olympia Watershed Property, which is also known as the Olympia Well Field (Figure 1). On its southern border, the Olympia Conservation Area adjoins three properties: the Mayer Conservation Easement Area, the Morgan Preserve, and the Freeman Property (Figure 1).

#### 2.2.1 Mayer Conservation Easement Area

This property area was created in 2002 when the District dedicated a conservation easement over the 1.0-acre area to the Center for Natural Lands Management (CNLM) to mitigate a private development project in the sandhills that was implemented by the Mayers—private landowners who conducted a residential development project in the Whispering Pines neighborhood and needed mitigation for Sandhills species and communities to implement their project (Arnold 2002).

The *Olympia Wellfield Management Agreement* between the District, CNLM, and the private landowners (Appendix F) states that the private landowners provided the CNLM \$29,900 to fund the permanent compliance activities in maintaining the easement area as outlined in a Property Analysis Record (PAR), which was an exhibit to the agreement. Though the PAR was not included in the version of the management agree available, the management agreement describes the CNLM's duties and activities as including: 1) photodocumentation to assess changes to vegetation and condition on the site, 2) control

of non-native plant species, 3) installation of signage to control access, 4) annual site inspections, and 5) administration of the project. As part of the agreement, the District agreed to: 1) remove a Eucalyptus tree at the site, 2) maintain the fence, 3) remove any illegal dumping, and 4) conduct patrols to prevent unwarranted trespass.

As described in Section 1.3, the surveys, assessments, and planning for the 6.3-acre Olympia Conservation Area also included the 1.0—acre Mayer Conservation Easement area, such that the total planning area is 7.3-acres.

### 2.2.2 Morgan Preserve

While most of this 202-acre property owned by the Land Trust of Santa Cruz County occurs to the southeast, the Morgan Preserve features a narrow (~60-100-foot wide) disjunct parcel that runs along the southwestern border of the Olympia Watershed Property where it lies between it and the CEMEX Olympia Quarry to the south. The *Sandhills Management Plan for the Land Trust of Santa Cruz County Properties* (McGraw 2019) identifies management goals, objectives, strategies, and projects for the Morgan Preserve along with the Land Trust’s six other fee and easement properties. These include the Olympia Conservation Area, though the Land Trust plan defers to this plan to guide management and monitoring on the site, to avoid conflicts with the District’s management of the Olympia Conservation Area.

### 2.2.3 Freeman Property

This 40.5-acre parcel southeast of the Olympia Conservation Area was recently sold by Lehigh Hanson, which owned and operated the Hanson Quarry, to a private party. The northwestern 5 acres (Figure 1) is protected by a conservation easement that was granted to CNLM in the early 2000s to mitigate the impacts of quarry activities on Sandhills species. The current owners of the property have expressed interest in developing the unprotected portion of the property, which also adjoins the Olympia Conservation Area.

## 2.3 Physical Conditions

### 2.3.1 Geology and Soils

The Olympia Conservation Area is underlain by the Santa Margarita Formation, which is formed from sediments deposited in the Miocene Epoch (about 5-24 mya) and consists of weathered arkosic (high feldspar content) sandstone (USDA 1980). The Santa Margarita formation contains readily extractable water resources that are important for the region’s water supply. Approximately half of the water that the District supplies each year comes from the groundwater extracted from wells in the Santa Margarita formation (J. Mueller, pers comm.), including wells within the Olympia Watershed Property.

Most of the Olympia Conservation Area is mapped as featuring Zayante Coarse Sand soil on 30 to 50% slopes. These soils are derived from the weathering of the sandstone of the Santa Margarita Formation in central Santa Cruz County, and feature 85 to 90% sand, 7-8 % silt, and 4% clay (USDA 1980). As a result of their coarse texture, they are poorly developed, and have low nutrient availability and water holding capacity (USDA 1980). The eastern 1.1 acres of the Olympia Conservation Area is mapped as featuring Nisene Aptos Complex soils on 50-75% slopes. Soils in this complex are generally loam soils

formed from sandstone, mudstone, and shale. These finer-textured soils have greater nutrient availability and water holding capacity than Zayante soils (USDA 1980). The different soil types have implications for the plant communities within the Olympia Conservation Area (Section 2.5).

### 2.3.2 Topography

The Olympia Conservation Area is located on a small east-to-west trending ridge. The terrain is largely moderately sloping (15-30% slope), with the southeastern corner featuring steeper slopes (30-46%); in contrast, the ridgetop features nearly flat terrain. The site features a range of slope aspects, including south-facing and west-facing slope in the southeastern corner; however, most of the site features north-facing slopes. These poleward facing slopes receive less solar radiation and thus feature generally cooler temperatures, and may confer some resiliency to climate change for the Sandhills species; that is, temperatures will be lower and may stay within the ranges to which some of the rare species are adapted.

### 2.3.3 Water

The Olympia Conservation Area does not feature any surface water, such as springs, streams, or ponds. It is just south of an ephemeral drainage that flows east to west into the old wash ponds that were created as part of an historic quarry operation that predates the District's acquisition of the site.

## 2.4 Human Uses and Features

The Olympia Watershed Property was subject to historic sand mining as part of the Old Kaiser (aka "old Ferrari") quarry between 1937 and the 1960s. This mining operation predated the passage of the Surface Mining Reclamation Act in 1975; as a result, the affected areas were not reclaimed. In 1977, the District acquired 163 acres of the property; the remaining 17-acre Ferrari property was acquired in 2009. The District installed the first of three production wells in 1981; currently, two wells (Olympia Wells 2 and 3) are in production (SLVWD 2012).

Despite the larger property's use as a mine and for water production, the Olympia Conservation Area is largely unaltered by human uses and features. The ridge features an old road cut that has not been driven in several decades and supports high quality habitat occupied by plant and insect species adapted to the thinner or otherwise more depauperate soils created by the historic grading. Remaining anthropogenic features include (Land Trust 2017):

1. **Fences:** The southern boundary features an old barbed-wire fence, while the northwestern boundary where the Olympia Conservation Area is adjacent to the District's dirt service road/trail features a wildlife-friendly fenced created by four stands of smooth wire. There is also a barbed-wire fence that runs from southwest to northeast in the center of the Olympia Conservation Area.
2. **Signs:** The western fence line features 10 signs posted "Sensitive Habitat Area Closed" as well as two signs advising on rattlesnakes, two equestrian use signs, and a sandhills habitat interpretive sign along the District's service road/trail.
3. **Pressure Release Valve:** There is a pressure release valve for the pipeline that generally runs underneath the service road northwest but traverses the northwestern portion of the Olympia Conservation Area. The infrastructure does not require routine maintenance (R. Rogers, pers.).

comm. 2020). In the event the infrastructure requires repair within the Olympia Conservation Area, the District will access the pipeline and valve from the adjacent road on foot, use hand tools (rather than heavy equipment), and follow all relevant species protection measures (Appendix C) to minimize soil disturbance, direct species impacts, and habitat degradation. Following needed repairs, the affected area will be restored following approaches outlined in this Plan.

## 2.5 Plant Communities

### 2.5.1 Overview

The Olympia Conservation Area primarily supports a mosaic of sand parkland (3.3 acres or 46%) and Sandhills woodlands and forests (2.8 acres or 39%), with smaller areas of Sandhills chaparral (0.9 acres or 13%); the balance is comprised of a small riparian area along an ephemeral drainage and an ornamental tree (Table 2). The sand parkland is located primarily on a north-facing slope, so accordingly is dominated by the mesic sand parkland associations.

The Sandhills chaparral associations are primarily mixed chaparral, which are dominated by black sage, buck brush, and Santa Cruz Mountains manzanita. The Sandhills woodlands and forests primarily consist of coast live oak trees which are scattered throughout the sand parkland and sandhills chaparral associations, though there is a large patch of mixed conifer forest in the northeastern corner of the site.

Table 2 summarizes the community and land cover types based on their general distribution, dominant or indicator species, and the rare species habitat that they provide and quantifies the area (acres) within the assessment, which includes the Olympia Conservation Area and Mayer Conservation Easement Area (Section 1.3, Figure 1). Section A.1 describes the methods that were used to map and characterize the plant communities.

### 2.5.1 Background

The Sandhills support a diverse mosaic of native plant communities, which are assemblage of plants and animals that naturally occur on Zayante sand soil—the soil type that supports the Sandhills (McGraw 2004b). The Olympia Conservation Area also contains plant communities that occur on transitional or non-Zayante soils, and/or occur in areas featuring hydrologic conditions (i.e., surface water or saturated soils) that give rise to assemblages of plants that differ from those on Zayante soils; these communities are referred to here as ‘**transitional communities**’, as their habitat conditions are often intermediate between Sandhills and non-Sandhills communities, though in some cases they are more similar to non-Sandhills communities. Finally, the site feature small ornamental plant area classified as **other land cover**.

These communities and other land cover types vary in their physiognomy (structure) as well as species composition in ways that influence the habitat that they provide for native species. The following sections describe these communities and other land cover types, with an emphasis on the Sandhills communities which are the focus of management.

**Table 2: Characteristics of the plant communities, associations, and other land cover showing habitat categories for the seven endemic species: Primary (P), Secondary (S), Occasional (O), and Dispersal only (D). (Blank indicates that the species is generally not found in that community or other land cover type)**

Plant Community and Association	Acres <sup>1</sup>	% of Total	General Distribution	Structure	Characteristic Species	Rare Species Habitat							
						SCKR	ZBWG	MHJB	BLS	BLW	BLB	SLM	
<b>Sand Parkland</b>	<b>3.32</b>	<b>46%</b>											
Native Forb-Dominated Sand Parkland	0.72	10%	South slopes of ridges and ridgetops in chronically disturbed (slides, trails) open canopy conditions	Sparse, forb-dominated herbs	Ben Lomond wallflower, pussy paws, Ben Lomond spineflower, golden aster, and <i>Gilia tenuiflora</i>	S	P	P	P	P	P	P	O
Mesic Sand Parkland	1.20	17%	North and east-facing slopes, or other areas featuring moister soils	Moderately dense mix of forbs and grasses	Goldfields, tipless tidy tips, silver hair grass, rattlesnake grass, sheep sorrel, hairy woodrush, yarrow, and bracken fern	S	P	P	P	P	P	P	O
Exotic-Dominated Sand Parkland	0.18	2%	South slopes of ridges in open canopy conditions	Relatively dense, grass-dominated herbaceous cover	Rat-tail fescue, smooth cat's ears, Ben Lomond spineflower, rip gut brome, and owl's clover	S	S	P	P	S	S	S	O
Pine-Influenced Sand Parkland	1.23	17%	Areas receiving shade and litter from relatively sparse/scattered ponderosa pines	Scattered trees with dense herbaceous and suffrutescent understory	Smooth cat's ears, rip-gut brome, ponderosa pine, silver bush lupine, and Ben Lomond buckwheat	S	S	P	S	S	P	P	O
<b>Sand Chaparral</b>	<b>0.94</b>	<b>13%</b>											
Chaparral Gaps-Herb Dominated	0.15	2%	In gaps between canopy of chaparral shrubs	Sparse to dense forb-dominated herbs	Ben Lomond spineflower, everlasting neststraw, and holly leaf navarretia	P	S	P	P	S	P	P	P
Chaparral Gaps-Shrub Dominated	0.07	1%	Gaps between shrubs where perhaps soils are deeper and/or disturbance is less recent than herb-dominated gaps	Moderate cover of subshrubs and soft-wooded shrubs, with sparse to moderate herbaceous plant cover	Sticky monkeyflower, mock heather, golden yarrow, black sage, and deer weed	P	S	P	P	S	P	P	P
Sand Chaparral	0.01	0.2%	Open canopy conditions on ridges and slopes, likely on thin soils	Dense shrub canopy with scattered trees	Silverleaf manzanita, ponderosa pine, sticky monkeyflower, and chamise <sup>2</sup>	P	O	P	O	O	O	O	P
Mixed Sand Chaparral	0.71	10%	Open canopy conditions on slopes and flats	Dense shrub canopy with scattered trees	Buck brush, chamise, black sage, yerba santa, and Santa Cruz Mountains manzanita	P	O	P	O	O	O	O	S
<b>Sandhills Woodland and Forest</b>	<b>2.81</b>	<b>39%</b>											
Ponderosa Pine Forest	0.23	3%	Dense ponderosa pine and associated trees with shrub understory	Trees with shrub understory	Sticky monkeyflower, Pacific madrone, ponderosa pine, and poison oak	P		P	O		P	P	P
Coast Live Oak Woodland	2.12	29%	Various areas where coast live oaks are established	Tree canopy with associated shrub and herb understory	Coast live oak, bracken fern, sticky monkeyflower, and poison oak	S		P			S	S	S
Mixed Hardwood Woodland	0.05	1%	Steep, north-slopes	Dense tree canopy with shrub understory	Pacific madrone, tan oak, coast live oak, and canyon live oak	S		S			S	S	S
Mixed Evergreen Forests	0.42	6%	North-facing slopes and other mesic areas including along streams	Dense tree canopy with shrub and shade-tolerant herb and vine understory	Pacific Douglas fir, Pacific madrone, tan oak, coast live oak (Shreve oak), bay laurel, poison oak, and California blackberry	S		S					O

Table 2: Characteristics of the plant communities, associations, and other land cover showing habitat categories for the seven endemic species: Primary (P), Secondary (S), Occasional (O), and Dispersal only (D). (Blank indicates that the species is generally not found in that community or other land cover type)

Plant Community and Association	Acres <sup>1</sup>	% of Total	General Distribution	Structure	Characteristic Species	Rare Species Habitat						
						SCKR	ZBWG	MHJB	BLS	BLW	BLB	SLM
<b>Transitional</b>	<b>0.20</b>	<b>3%</b>										
Riparian	0.20	3%	Areas of greater soil moisture along creeks	Tall deciduous trees with dense vines in the understory	Willow species, Fremont cottonwood, white alder, California blackberry, poison oak							O
<b>Other Land Cover</b>	<b>0.01</b>	<b>0.1%</b>										
Ornamentals	0.01	0.1%	Ornamental plant escape or plantings	Isolated trees and shrubs	<i>Pinus cf. contorta</i> (shore pine)							S
<b>Grand Total</b>	<b>7.29</b>	<b>100%</b>										

<sup>1</sup> Numbers may not sum due to rounding error. Also, the mapping area is not the same as the property boundary as illustrated in Figure 1.

<sup>2</sup> At this site, the Sand Chaparral Community consists of two silverleaf manzanita individuals.

A total of twelve associations were mapped as part of three main Sandhills communities:

1. **Sand Parkland:** A relatively sparse canopy of trees (<50%), minimal shrub cover (<25%), and sparse to dense but generally diverse herbs and subshrubs between the shrubs and trees;
2. **Sandhills Chaparral:** A relatively sparse canopy of trees (<20%), dense shrub cover (>25%), and herbs and subshrubs in canopy gaps between shrubs and trees; and
3. **Sandhills Woodlands and Forests:** Dense tree cover (>50%), sparse to dense shrub cover in the understory, and variable herbaceous plant cover comprised of plant species adapted to generally low-light conditions.

The following sections describe the associations within each of these three main Sandhills communities, based on the following factors which are summarized in Table 2:

1. **Association Name:** Descriptive name for the association or specific land cover type based on its structure and conditions in which it occurs, and the factors that distinguish it from other types;
2. **Generalized distribution:** Aspects of the abiotic conditions in which the association is primarily observed, though some patches may occur outside of these general conditions;
3. **Structure:** The physiognomy (vegetation structure) of the association, in terms of the dominant layers (trees, shrubs, subshrubs, and herbs), and the aspects of each layer (e.g. open, canopy, grass-dominated herbaceous layer, etc.);
4. **Characteristic species:** A synthesis of the dominant and indicator species, which collectively are used to characterize and map the association; and
5. **Endemic Species:** An assessment of whether the association provides habitat for the seven endemic species, which as characterized as: primary habitat (where they are often occur), secondary habitat (where they occur less frequently), occasional habitat, where they may occur at low frequency, dispersal habitat (habitat animals may move through but not reside in).

Following the descriptions of the associations is an assessment of the threats, or anthropogenic factors that degrade, each of the three main Sandhills communities.

### 2.5.2 Sand Parkland

Sand parkland associations are generally characterized by sparse (<50%) cover of ponderosa pine (*Pinus ponderosa*) and coast live oak (*Quercus agrifolia*) as well as low cover (<25%) of shrubs, including silverleaf manzanita (*Arctostaphylos silvicola*). Between the generally sparse tree and shrub canopy, sand parkland supports a diverse understory dominated by herbs as well as subshrubs (smaller, soft-wooded shrubs). Open sand parkland features tree cover that is <00% while dense sand parkland features tree cover that is between 30 and 50% (McGraw 2004b); areas with denser tree cover are classified as Sandhills Woodlands and Forests.

In terms of species richness, the herbaceous understory within sand parkland is dominated by annual forbs, including numerous rare and locally unique species such as the three herbaceous plan plants: Ben Lomond spineflower (*Chorizanthe pungens* var. *hartwegiana*), Ben Lomond wallflower (*Erysimum teretifolium*), and Ben Lomond buckwheat (*Eriogonum nudum* var. *decurrens*; McGraw 2004b). In terms of cover, the sand parkland understory is often dominated by exotic annual grasses, including primarily

rat-tail fescue (*Festuca myuros*), rip-gut brome (*Bromus diandrus*), and rattlesnake grass (*Briza maxima*), and exotic forbs including smooth cat's ears (*Hypochaeris glabra*) and sheep sorrel (*Rumex acetosella*).

Though scattered shrubs including silverleaf manzanita are found within sand parkland, these associations typically lack a shrub layer. In places, sand parkland features scattered (<30% cover) subshrubs, including silver bush lupine (*Lupinus albifrons* var. *albifrons*) and deer weed (*Acmispon glaber* var. *glaber*).

All sand parkland associations support the Mount Hermon June beetle which has been surveyed at higher abundance in the sand parkland than sandhills chaparral or woodlands and forests (McGraw and Amesquita 2017), though some of the increased abundance may be due to increased visibility of the light traps than more suitable or densely occupied habitat: surveys for Mount Hermon June beetles rely on attracting the species using black-lights, which may transmit a further distance in the more open-structure sand parkland (McGraw and Amesquita 2017). Sand parkland is the primary habitat for the Zayante band winged grasshopper and the three endemic herbs, which occur at varying frequency and abundance in the differing associations as described in Section 2.6. Sand parkland may provide some habitat for the Santa Cruz kangaroo rat where it occurs adjacent to sandhills chaparral communities, which are the preferred habitat. Silverleaf manzanita occurs at low abundance in sand chaparral, where its presence was generally used to classify and map habitat as sandhills chaparral communities (Section 2.5.4).

The sand parkland community is extraordinarily rare. The *Sandhills Conservation and Management Plan* (McGraw 2004) identified 208 acres based on aerial image analysis; while additional acreage has been mapped based upon on-the-ground reconnaissance since that time, the total is likely still less than 400 acres.

The Olympia Conservation Area and Mayer Conservation Easement Area together feature 3.32 acres of sand parkland, which comprises 46% of the mapping area (Table 2). The sand parkland community was classified and mapped into four associations based on differences in understory species composition, reflecting variation in the aspect, occurrence of ponderosa pines, and soil disturbance, as described below.

### 2.5.2.1 Associations

#### 2.5.2.1.1 Native Forb-Dominated Sand Parkland

Approximately 22% of the sand parkland (0.72 of the 3.32 acres) in the assessment area is this Native Forb Dominated Sand Parkland (Table 2).

Located away from trees and in areas that experience frequent soil disturbance, native forb-dominated sand parkland features a sparse assemblage of disturbance-adapted herbs, including the three endemic herbs (Ben Lomond wallflower, Ben Lomond spineflower, Ben Lomond buckwheat), golden aster (*Heterotheca sessiliflora*), pussy paws (*Calyptridium monospermum*), and *Gilia tenuiflora* ssp. *tenuiflora*. Soil disturbance is caused by trails (animal and/or human created), erosion due to water, wind, and gravity on steep slopes, and burrowing animals including pocket gophers (*Thomomys bottae*). These disturbances disproportionately reduce the abundance of European annual grasses and forbs, thus promoting the cover and richness of native herbs (McGraw 2004a). Ongoing soil disturbance precludes establishment of dense exotic annual grasses as well as native shrubs, thus maintaining open habitat for

the disturbance-adaptive native herbs, including the three endemic herbs. Experimental research showed that slides and trails facilitate the three herbaceous endemic plants, and the native herbaceous plant assemblage as a whole, by removing accumulated leaf litter that inhibits native forb establishment and increasing their survivorship, growth, and fecundity by reducing competition from exotic herbs that dominate other areas within sand parkland (McGraw 2004a).

Native Forb-Dominated Sand Parkland is the refuge for the Ben Lomond wallflower, an exceptionally rare herb found only in open areas where competition from European annual grasses is reduced (McGraw 2004a, b). Experimental removal of exotic plants in the other parkland associations resulted in greater performance of the Ben Lomond wallflower, relative to that on the slides, indicating that it does not prefer abiotic conditions on these disturbed areas, but instead is limited to them by exotic plants that are dominant in undisturbed areas (McGraw 2004a,b; Section 2.6.3.2).

Native Forb-Dominated Sand Parkland also provides the primary habitat for the Zayante band-winged grasshopper, which preferentially occurs in open sand soil that is frequently disturbed and thus loose (Section 2.6.2.2).

#### 2.5.2.1.2 Mesic Sand Parkland

The mapping area supports 1.20 acres of mesic sand parkland, which constitutes 17% of the total area assessed and 36% of the total sand parkland in the site. It occurs primarily on north-facing slopes where the sand parkland supports a unique assemblage of herbs adapted to the lower temperature, lower radiation, and increased soil moisture conditions. These abiotic conditions create a more mesic environment relative to that which occurs on the south and west-facing slopes. Where undisturbed, the soil surface can support mosses and cryptogams; it is also visibly darker owing to increased development (i.e., organic matter).

As a result of the cooler microclimate, Mesic Sand Parkland supports herbaceous plant species that often do not occur elsewhere in the Sandhills, such as goldfields (*Lasthenia gracilis*), tipless tidy tips (*Layia platyglossa*), hairy woodrush (*Luzula comosa*), muilla (*Muilla maritima*), *Meconella linearis*, and variable linanthus (*Leptosiphon parviflorus*). The mesic sand parkland supports a high diversity and abundance of native perennial herbs including golden yarrow (*Eriophyllum confertiflorum*), June grass (*Koeleria macrantha*), and yarrow (*Achillea millefolium*), as well as a high abundance of bracken fern (*Pteridium aquilinum* var. *pubescens*). The dominant exotic species are European hairgrass (*Aira caryophyllea*), rattlesnake grass (*Briza maxima*), and sheep sorrel (*Rumex acetosella*), with smooth cat's ears being subdominant.

The three herbaceous endemic plants occur at lower relative abundance within this assemblage, owing presumably to the lower light conditions, though lower temperatures may also be a factor. Zayante band-winged grasshopper can utilize this habitat though occurs at lower frequency and abundance than in the Native Forb-Dominated Sand Parkland.

#### 2.5.2.1.3 Pine-Influenced Sand Parkland

Areas in sand parkland that are influenced by ponderosa pines support an understory of subshrubs and herbs that are adapted to the modified abiotic conditions created by the trees, which include lower light availability, deeper cover of leaf litter, increased soil moisture, increased soil nutrients, lower temperature, and higher humidity (McGraw 2004a). Experimental research has demonstrated that leaf

litter is responsible for much of the shift in understory species composition, and that removing litter results in establishment of an understory association that resembles Exotic-Dominated Sand Parkland (McGraw 2004a). Subshrubs including silver bush lupine and deer weed attain their greatest abundance in this assemblage. Smooth cat's ears is the dominant herb under pines, which also supports annual grasses which occur primarily under and adjacent to trees, including rattlesnake grass. This association features relatively low density of large ponderosa pines; the occurrence of subshrubs and other indicator species may reflect the shade that the few, scattered trees create.

While Ben Lomond buckwheat occurs at relatively high abundance in this sand parkland assemblage, Ben Lomond wallflower and Ben Lomond spineflower occur at low relative abundance perhaps due to the dense leaf litter on the soil surface, which inhibits their seedling establishment (McGraw 2004a). The leaf litter may similarly explain the reduced abundance of Zayante band-winged grasshoppers in this community.

The mapping area supports 1.23 acres of this association, which constitutes 17% of the area assessed and 37% of the total sand parkland. It is concentrated on the center eastern portion of the site

#### 2.5.2.1.4 Exotic-Dominated Sand Parkland

Open areas away from ponderosa pines in sand parkland that are not affected by soil disturbances, such as slides and trails, are often dominated by exotic herbs including rat-tail fescue, rip-gut brome, and smooth cat's ears. Native forbs and grasses occur at low to moderate diversity and abundance in this association, due primarily to intense competition by the exotic species but include Ben Lomond spineflower and owl's clover (*Castilleja exserta*). This association often occurs adjacent to Pine-Influenced Sand Parkland, which occurs under and adjacent to ponderosa pines, and Native Forb-Dominated Sand Parkland, which occurs in areas of disturbance or where soil conditions have been altered to limit exotic plant establishment, including previously mined areas at the Morgan Preserve. Though the three herbaceous endemic plants occur at relatively high frequency in this association, their abundance is lower due to the dense competition from exotic plants.

Within the assessment area, the Exotic-Dominated Sand Parkland association occurs on just 0.18 acres or 2% of the mapped area and 5% of the sand parkland. It is concentrated in the north central portion of the site adjacent to the riparian area (Map 1). This is not to say that sand parkland in the site is not exotic dominated, as with the exception of Native Forb-Dominated Sand Parkland, all of the sand parkland associates are dominated by exotic plants.

#### 2.5.2.2 Stressors

The sand parkland associations and populations of the three herbaceous plan plants and Zayante band winged grasshopper that they support are primarily threatened by the following factors:

1. Invasion and spread of woody exotic plants, including brooms and acacias;
2. Competition from dense exotic annual grasses and forbs, which reduce rare plant populations and may even cause extirpations (McGraw 2004a), and degrade habitat for the Zayante band-winged grasshopper (McGraw 2013b);
3. Incompatible recreation, which can cause erosion (i.e., gullyng) on steep slopes (McGraw 2004b); and

4. Unnatural succession of open sand parkland to communities featuring denser tree and shrub cover, including ponderosa pine forest, due to fire exclusion and lack of other disturbance (McGraw 2004a,b).

#### 2.5.2.2.1 Exotic Plants

European annual grasses and herbs that are abundant in sand parkland are highly competitive and greatly reduce the demographic performance (germination, survivorship, and fecundity) of the Ben Lomond spineflower and Ben Lomond wallflower, as well as reduce both the cover and species richness of native herbs (McGraw 2004a). Experimental research has shown that removal of exotic herbs promotes these and other native plant species (McGraw 2004a). Small-scale soil disturbances including slides, trails, and gopher mounds, also promote native plant populations, in part, by reducing competition from exotic plants (McGraw 2004a). Indeed, infrequent (e.g., every 5 years), moderate soil disturbance could be used as a management tool to enhance rare herbaceous plant populations by reducing the abundance of the exotic plants (McGraw 2004a).

Despite their inimical soil conditions, the Sandhills including sand parkland community within the mapping area have been invaded by species like French broom (*Genista monspessulana*), Portuguese broom (*Cytisus striatus*), and silver wattle (*Acacia dealbata*). These nitrogen-fixing, woody invasive plants can have profound negative effects on sand parkland habitat, by:

1. Reducing the area of open sand habitat required by the three endemic herbs and the Zayante band-winged grasshopper;
2. Reducing the diversity of other native plants including host plants for the two endemic insects; and
3. Increasing the invasibility of the Sandhills further by increasing soil nitrogen, which promotes the growth of invasive grasses including riggut brome.

Broom also creates a fire hazard and can increase the risk of wildfire in Sandhills.

Efforts to control broom species require a long-term commitment, owing to the species long-lived seed bank; seed can be dormant in the soil for more than 20 years. Silver wattle and other acacias also require ongoing control as they can re-establish from root and stump resprouts as well as seed. Sustained efforts to control brooms and acacias in the Sandhills have resulted in increased cover and diversity of native plants (McGraw 2012).

#### 2.5.2.2.2 Recreation

Recreational uses can have positive and negative effects on sand parkland habitat, with the nature and magnitude of the effects dependent on a variety of factors including the type, intensity, and frequency of the use, as well as conditions of the habitat in which it occurs. A full discussion of these factors and recommendations for managing recreation is beyond the scope of this plan, but is provided in Chapter 10 of the *Sandhills Conservation and Management Plan* (McGraw 2004b).

Sand parkland habitats often occur on relatively steep slopes (>30%), where recreation can cause erosion when trails become channelized and form gullies. Intensive uses, including equestrian, mountain bike, and off-highway vehicle use, typically remove all plant cover, as can too frequent pedestrian use (i.e., hiking).

In the absence of recreation or other disturbance, trail corridors that previously supported a high diversity and abundance of native herbs often are colonized by dense exotic plants, which outcompete the native species. Trail use may also help maintain loose sand soil conditions required by the Zayante band-winged grasshopper, which has experienced declines in its distribution following cessation of recreational use at the Quail Hollow Quarry Conservation Areas (McGraw and Gern 2018). These observations suggest that low-frequency, low-intensity recreational use, such as that associated with site management, monitoring, and supervised field trips, can help maintain sand parkland associations, including Native Forb-Dominated Sand Parkland.

#### 2.5.2.2.3 Fire Exclusion

The persistence of native biodiversity in sand parkland can be threatened by fire exclusion, which allows deep leaf litter to accumulate on the soil surface in areas near trees; this litter, in turn, limits establishment and reduces survivorship of native herbs, including the three endemic herbaceous plants, and subshrubs (McGraw 2004a). Research has shown that a surface fire, or raking litter to mimic the effects of a fire, enhances native plant diversity and abundance by removing accumulated leaf litter and by reducing the abundance of exotic annual herbs (McGraw 2004a).

Fire exclusion may also reduce the areal extent of sand parkland by facilitating woody plant encroachment, particularly in the absence of soil disturbances that also prevent tree and shrub establishment. This effect is likely to be most prominent on north-facing slopes and flat areas including ridge tops and the base of slopes, and is less of a concern on the more xeric south- and west-facing slopes, where woody plant encroachment appears to be slow or nonexistent (McGraw 2004a,b).

#### 2.5.3 Sandhills Chaparral Community

The Sandhills chaparral community features relatively dense cover of sclerophyllous shrubs (<50%), scattered trees (<20%), and herbaceous plants found only in gaps in the woody vegetation. Although Sandhills chaparral communities dominate the remaining sandhills habitat (McGraw 2004b), the mapping area features just 0.94 acres, which represents or just 13% of the mapped area (Table 2). The greater acreage of sand parkland resulted because that community type was targeted for protection in the Olympia Conservation Area (McGraw 2016) and the Mayer Conservation Easement Area (Arnold 2002) due to its higher diversity of endemic species, which include Zayante band-winged grasshopper and Ben Lomond wallflower: these species are not typically found in sandhills chaparral communities, though can occur in them at lower frequency and abundance (McGraw 2004b). Sandhills chaparral associations, most notably the chaparral gap associations, support Ben Lomond spineflower and Ben Lomond buckwheat at highly variable density. Sand chaparral associations also support the Mount Hermon June beetle (McGraw and Amesquita 2017) and are the primary habitat for the Santa Cruz kangaroo rat (Bean 2004).

Sandhills chaparral associations differ in their structure, with patches dominated by shrubs distinguished from the canopy gaps dominated by herbaceous plants and subshrubs. The two shrub-dominated associations and two gap associations are further differentiated in terms of their dominant plant species, as described below.

### 2.5.3.1 Associations

#### 2.5.3.1.1 Sand Chaparral

Sand Chaparral is dominated by the endemic sandhills shrub, silverleaf manzanita. The association also scattered chamise (*Adenostoma fasciculatum*), ponderosa pine, and knobcone pine (*Pinus attenuata*). Silverleaf manzanita shrub cover can be dense, with small gaps in the canopy being maintained by disturbance (e.g., trails) and/or thin soils which inhibit root penetration. Sand Chaparral occupies just 0.01 acres (0.2% of the mapping area) where it is represented by a single silverleaf manzanita along the northern border of the Olympia Conservation Area.

#### 2.5.3.1.2 Mixed Sand Chaparral

Mixed Sand Chaparral is dominated by buckbrush (*Ceanothus cuneatus* var. *cuneatus*) and also includes other chaparral shrubs including yerba santa (*Eriodictyon californicum*), black sage (*Salvia mellifera*), Santa Cruz Mountains manzanita (*Arctostaphylos crustacea* var. *crinita*) and chamise and features a scattered overstory of ponderosa.

Mixed Sand Chaparral occupies 0.71 acre which represents 75% of the sandhills chaparral associations and 10% of the mapping area. This association largely occurs in the eastern portion of the Olympia Conservation Area where soils are mapped as part of the Nisene Aptos complex—a loam soil that tends to support this association where it occurs near the sandhills. Smaller patch of Mixed Sand Chaparral also occurs in the western portion of the Olympia Conservation Area and in the southern portion of the Mayer Conservation Easement Area (Map 1).

#### 2.5.3.1.3 Chaparral Gaps-Herb

Gaps in the shrub canopy within the sandhills chaparral that support primarily herbaceous plant species occur patchily in the mapping area; due to their small size, they total just 0.15 acres or 2% of the mapping area (Table 2). Patches of herb-dominated chaparral gaps are concentrated on the eastern portion of the Olympia Conservation Area though occur scattered elsewhere.

Characteristic species include Ben Lomond spineflower, everlasting nest straw (*Stylocline gnaphaloides*), holly-leaf navarretia (*Navarretia atractyloides*), and Santa Cruz monkeyflower (*Mimulus rattanii* ssp. *decurtatus*). On deeper soils and perhaps in cooler microclimates, these gaps support mosses and cryptogams, which appear to inhibit growth of herbaceous plants, and deter invasion of exotic herbs, though research is needed to evaluate this further (McGraw 2004b).

Herb-dominated sand chaparral gaps are more similar in species composition to the herb-dominated sand parkland associations, specifically the Native Forb-Dominated Sand Parkland, than they are to the shrub-dominated sandhills chaparral associations. The notable difference is that, when compared with sand parkland associations, the cover of exotic herbs in sand chaparral gaps is low; inimical soils and/or herbivory by small mammals including brush rabbits (*Sylvilagus bachmani*) may limit the abundance of species rat-tail fescue, rip-gut brome, smooth cat's ears, and woodland groundsel (*Senecio sylvaticus*).

Where they occur next to sand parkland associations, herb-dominated chaparral gaps can be utilized by Zayante band-winged grasshopper and are occupied by Ben Lomond buckwheat and Ben Lomond wallflower as well as Ben Lomond spineflower. Like all sandhills chaparral communities, they provide

habitat for the Mount Hermon June beetle. Herb-dominated gaps may be critical to the Santa Cruz kangaroo rat, which feeds primarily on annual plant species that can be abundant in this association but are excluded by the canopy of the shrubs (Section 2.6.2.1).

#### 2.5.3.1.4 Chaparral Gap-Shrub

Some chaparral gaps within the properties feature greater cover of subshrubs and soft-wooded shrubs, including mock heather, sticky monkeyflower, and black sage (*Salvia mellifera*); consequently, these gaps have lower cover of herbaceous plants than in the herb-dominated chaparral gaps but Ben Lomond spineflower holly leaf navarretia, and nest straw and typically present. These shrub-dominated chaparral gaps occupy a total of 0.07 acres (1% of the plan area) where they occur adjacent to the Mixed Sand Chaparral in the eastern portion of the Olympia Conservation Area and the southern portion of the Mayer Conservation Easement Area.

When compared with herb-dominated chaparral gaps, this association may represent a later successional stage; that is, following disturbance in sandhills chaparral, gaps may be colonized initially by herbs, and then gradually, over time, become colonized by shrubs before ultimately succeeding to Sand Chaparral or Mixed Chaparral. In areas with thin soils, such as on ridgetops or on steep, erosive slopes, shrub establishment may be inhibited such that the open structure is stable. Alternatively or additionally, these areas could feature deeper soils that are more conducive to subshrub and soft-woody shrub establishment. Ongoing monitoring will be needed to better understand the successional relationships between the sandhills chaparral associations.

Like the herb-dominated gaps, shrub dominated gaps are highly suitable habitat for the Santa Cruz kangaroo rat and Mount Hermon June beetle. Although they occur at generally lower frequency and density, Zayante band-winged grasshopper and the three herbaceous plants can also be found in this association particularly where it is adjacent to sand parkland.

#### 2.5.3.2 Stressors

As in the sand parkland, native plants and animals in the sandhills chaparral community are threatened by the following factors:

1. Fire exclusion, which can cause unnatural succession to Sandhills woodlands and forests and pose a 'senescence risk' to the fire-adapted species (McGraw 2004a,b).
2. Invasion and spread of woody exotic plants, including brooms and acacias;
3. Competition from dense exotic annual grasses and forbs, which reduce rare plant populations and may even cause extirpations (McGraw 2004a), and degrade habitat for the Zayante band-winged grasshopper (McGraw 2013b); and
4. Incompatible recreation, which can cause erosion (i.e., gullying) on steep slopes (McGraw 2004b).

##### 2.5.3.2.1 Fire Exclusion

Persistence of native biodiversity in the sandhills chaparral community is primarily threatened by the disruption of the natural fire regime with which the native shrubs, trees, and herbs have evolved

(McGraw 2004b). The dominant shrubs, buck brush and silverleaf manzanita, are both obligate-seeding species that require open canopy and soil conditions in order to establish from seed. In the absence of fire, these shrubs and trees will senesce without regenerating (McGraw 2004b), creating what is known as 'senescence risk'.

The fire history of the site is unknown. Analysis of aerial imagery suggests that the site did not burn in 1954 Dump Fire, which was the last major fire in the region; the site may have burned in one or more smaller fires. The 1954 Dump Fire burned the sandhills chaparral communities in the Quail Hollow Quarry Conservation Areas. In the ensuing 65 years, the area of shrub canopy has increased, reducing the area of sand chaparral gap associations. Between 2003 and 2014, chaparral gaps declined in area by 7% in the nearby Quail Hollow Quarry Conservation Area (McGraw 2015). The loss of habitat while likely accelerate, as shrub canopy growth increases with shrub size (i.e., increases exponentially).

Fire suppression also has implications for the herbaceous plants that inhabit the chaparral gap associations. These species, including the Ben Lomond spineflower and the Santa Cruz monkeyflower, a CRPR Rank 4 plant, require high-light, low-litter conditions. In the absence of fire, ongoing shrub and tree growth reduces the canopy gaps, thus removing habitat for these species. The loss of canopy gaps due to fire exclusion has also been implicated as a factor contributing to extirpations of the Santa Cruz kangaroo rat (Bean 2004).

#### 2.5.3.2.2 Exotic Plants

Unlike sand parkland, the sandhills chaparral community is dominated both in terms of cover and richness by native plants. Exotic plant species are limited to a few herbaceous plants that occur at relatively low abundance. The most pressing concern for management is whether natural disturbance or management treatments designed to mimic them, in order to enhance shrub regeneration and maintain chaparral gaps, will promote the invasion and spread of European annual grasses and shrubs from nearby sand parkland where they are prevalent (McGraw 2004b). Such post-disturbance invasion could reduce native plant establishment and survival, thus preventing chaparral shrubs and trees from establishing cohorts that are large enough to replace the current populations. Invasions could similarly degrade habitat for the chaparral gap herbs, many of which are typically outcompeted by the European annual grasses and forbs (McGraw 2004b). In doing so, they could degrade habitat for Santa Cruz kangaroo rat, which relies on gaps, and Zayante band-winged grasshopper, which uses relatively open gaps adjacent to sand parkland.

Recent fires within the Sandhills chaparral community have demonstrated that fire can promote the invasion and spread of exotic plants. At the Quail Hollow Conservation Area, a 2008 fire increased the cover of herbaceous exotic plants three years post-fire, though burned areas also featured higher native plant diversity than unburned areas (McGraw 2011). A 2018 prescribed fire at the Zayante Sandhills Conservation Bank promoted establishment of a diverse assemblages of exotic plants including cheat grass (*Bromus tectorum*; J. McGraw, unpublished data). However, 11 years following the 2008 Martin Fire that burned the Bonny Doon Ecological Reserve, the sandhills chaparral community there remains dominated by native sandhills plants which re-established from seed and stump sprouting. French broom (*Genista monspessulana*) found along the Reserve's perimeter has not invaded the interior. These results suggest that Sandhills chaparral communities should be monitored post-fire but that the threat of invasion by exotic plants may be lower than the senescence risk posed by fire exclusion and that fire management (including fire surrogates) should be used to promote regeneration of fire-adapted plant species populations.

#### 2.5.3.2.3 Recreation

As in sand parkland, recreation in the sandhills chaparral community represents a double-edged sword for the chaparral gap associations. On the one hand, these associations feature native herbaceous plants that are readily uprooted and killed as a result of trampling. On the other hand, soil disturbance associated with recreational may help maintain gaps in the woody plant canopy that would otherwise close in the absence of fire, though some canopy gaps are maintained by thin soils or other abiotic factors. As in the sand parkland, low intensity, low frequency recreational use including infrequent trail use by managers and supervised educational groups may help maintain open habitat conditions required by herbaceous plant species adapted to open canopy conditions.

#### 2.5.4 Sandhills Woodlands and Forests

Sandhills woodlands and forests cover 2.81 acres or 39% of the plan area where they are scattered throughout the mapping area (Table 2, Map 1). This community features dense tree cover (>50%) with a variable understory that can include no to moderate shrub cover, as well as varying cover of primarily shade-tolerant herbs and vines. The four mapped Sandhills woodland and forest associations differ in their dominant canopy trees as well as their understory species composition, as described below. Notably, these associations are more similar to each other, in terms of species composition, than they are to the sand parkland or sandhills chaparral; moreover, they feature a higher proportion of plant species that are also found in communities on non-Zayante soils in the region, such as mixed evergreen forest and coast live oak woodland. Mixed Evergreen Forest at the site occurs in the area mapped as featuring Nisene Aptos complex soils; soils in this area are likely transitional between Zayante and non-Zayante soils.

The ponderosa pine forest and coast live oak woodland support Mount Hermon June beetle at relatively high frequency albeit lower abundance; as noted above, it is not clear whether this reflects a habitat preference or reduced detectability in these communities (McGraw and Amesquita 2017). Due to their dense canopy cover, the Sandhills woodlands and forests only support the endemic herbaceous plants at low abundance and frequency. These areas also generally do not provide suitable habitat for the Zayante band-winged grasshopper, and likely only constitute secondary habitat for the Santa Cruz Kangaroo rat.

##### 2.5.4.1 Ponderosa Pine Forest

Areas where scattered ponderosa pine and, in some cases, Pacific madrone (*Arbutus menziesii*) occur with a dense understory of shrubs, including sticky monkey flower and mock heather, are classified as Ponderosa Pine Forest. These forests occupy 0.23 acres (3% of the mapping area) where they occur scattered throughout the central portion of the site (Table 2, Map 1). The dense leaf litter on the soil surface limits herbaceous plant growth and thus the cover and richness of the herb layer, thus differentiating this association from Pine-Influenced Sand Parkland.

##### 2.5.4.2 Coast Live Oak Woodland

The Coast Live Oak Woodland consists of areas where medium to large coast live oaks have become established. This association comprises 2.12 acres (29%) of the mapping area, where it is scattered throughout the site, though a large area occurs in the western portion of the mapping area. The larger

patches feature an understory that consists of oak woodland species such as poison oak (*Toxicodendron diversilobum*), bracken fern, and miner's lettuce (*Claytonia perfoliata*). Where coast live oaks occur within the sand parkland and sand chaparral associations, the diversity and abundance of understory species is low, as understory species are primarily limited to the area near the skirt of the tree canopy.

#### 2.5.4.3 Mixed Hardwood Forest

Mixed Hardwood Forest supports dense cover of large, mature trees including coast live oak, Pacific madrone, and ponderosa pine, with scattered tan oak (*Notholithocarpus densiflorus*) and California bay (*Umbellularia californica*). The understory is comprised of shade-tolerant perennial herbs and vines adapted to the low light, mesic conditions, including California blackberry (*Rubus ursinus*), poison oak, and common snowberry (*Symphoricarpos albus*). The large size of the trees and lush understory of this association, which is more typical of non-Zayante soils in the region, may reflect the greater soil moisture availability and cooler microclimate (and thus reduced climatic water deficit) associated with north-facing slopes and more developed soils. This association was mapped in one patch totaling 0.05 acres (1%) of the plan area, where it occurs on the northern boundary adjacent to the Mixed Evergreen Forest (Table 2, Map 1).

#### 2.5.4.4 Mixed Evergreen Forest

Mixed Evergreen Forest is similar to Mixed Hardwood Forest, in that it supports dense cover of large, mature hardwood trees including Pacific madrone, tan oak, and California bay; however, it also includes large mature Pacific Douglas fir (*Pseudotsuga menziesii*) and scattered coast redwood (*Sequoia sempervirens*). Like the mixed hardwood forest, the understory of mixed evergreen forest is comprised of shade-tolerant perennial herbs and vines adapted to the low light, mesic conditions, including California blackberry, poison oak, pink honeysuckle (*Lonicera hispidula*), yerba buena (*Clinopodium douglasii*), and Douglas iris (*Iris douglasiana*). It also features shade tolerant shrubs including beaked hazelnut (*Corylus cornuta*). As with the hardwood forest, the large size of the trees and lush understory of this association reflects the greater soil moisture availability and cooler microclimate (and thus reduced climatic water deficit) associated with north-facing slopes and more developed soils. This association was mapped within 0.42 acres (6% of the mapping area) where it occurs in a single patch in the northeastern corner of the site, which is mapped as featuring the loamy Nisene and Aptos soil complex (Table 2, Map 1).

##### 2.5.4.4.1 Stressors

The Sandhills Woodlands and Forests face limited threats to the persistence of native biodiversity. The species in these late-successional systems are adapted to long fire return intervals and the dense canopy and litter conditions that result. Owing to the low-light availability, herbaceous exotic plant cover is low in these associations; however, canopy gaps present opportunities for the establishment of invasive species including French broom, Portuguese broom, and silver wattle, with the former mapped in the Mixed Evergreen Forest at the site.

Due to the dense canopy conditions and occurrence of poison oak, recreation in these areas is limited.

The sandhills woodland and forest associations may be late-successional communities that have developed in the absence of fire. They also occur on north-facing slopes which feature greater soil

moisture availability, which may also explain the more mesic vegetation. So in essence, these communities may represent the outcome of fire exclusion in the Sandhills. As noted above, the loamier soils also promote dense tree growth owing to their greater fertility and soil-moisture-holding capacity. The cooler temperatures and higher humidity on the north-facing slopes may also promote dense tree growth. As such, sandhills woodlands and forests may provide climate change refugia for the endemic species; though they occupy these areas at lower frequency and abundance currently, the sandhills woodlands and forests may support suitable conditions as the climate warms and the climatic water deficit increases.

### 2.5.5 Transitional Riparian Communities

The Olympia Conservation Area supports a small patch (0.2 acres or 3% of total) of habitat on the northern border that was classified as riparian based on the presence of willows (*Salix* spp.), Fremont cottonwood (*Populus trichocarpa*), and white alder (*Alnus rhombifolia*). These vegetation is supported by the higher soil moisture due to the proximity of the ephemeral creek that runs north of the site. This area may support Mount Hermon June beetle at low abundance, though is unlikely to support the other endemic Sandhills plants and animals.

### 2.5.6 Other Land Cover Types

The Olympia Conservation Area features a single pine that is not native to the Sandhills (*Pinus cf. contorta*) on the western edge of the site. The pine was either planted by the District as part of broader efforts to plant non-native pines in the Olympia Watershed Property in the 1970s and 1980s; alternatively, it may have dispersed from other plantings in the region. This community type might also be occupied by Mount Hermon June beetle but is unlikely to provide habitat for the other endemic sandhills species.

## 2.6 Sandhills Endemic Species

### 2.6.1 Overview

The Sandhills support seven endemic species that have been described by science (Table 3). In addition, there are numerous plants and insects (McGraw 2004b), as well as a recently discovered mushroom, *Amanita "baccata"*, that have yet to be fully described. The Sandhills also support disjunct populations of other locally unique plants and animals such as Blainville's horned lizard (*Phrynosoma blainvillii*) and western whiptail lizard (*Aspidoscelis tigris munda*), some of which may be genetically differentiated from the more widespread populations (McGraw 2004b).

The Olympia mapping area supports all of the endemic species except perhaps the Santa Cruz Kangaroo rat (Table 3). The species was known to inhabit the site in the 1980s but was not found during trapping in the early 2000s (Bean 2004), nor was it detected in traps located within the adjacent Olympia Quarry and Morgan Preserve (disjunct parcel) in April 2017 (D. Rhoades, unpublished data; Section A.4.3).

The Olympia mapping area supports Mount Hermon June beetle and Zayante band-winged grasshopper, with the latter observed throughout much of the native forb-dominated sand parkland and open areas in the mesic sand parkland. The site is occupied by small patches of Ben Lomond wallflower, which has declined at the site since the late 1990s; a reduction in recreational trespass including off-highway

**Table 3: Described endemic animals and plants**

Name	Status <sup>1</sup>	Habitat	Threats Related to Habitat Condition
<u>Animals</u>			
Santa Cruz kangaroo rat <sup>2</sup> ( <i>Dipodomys venustus venustus</i> )	Special Animal	Sandhills chaparral communities and adjacent habitat with sufficient shrub cover	<ul style="list-style-type: none"> <li>• Fire Exclusion (unnatural succession)</li> <li>• Intense and/or frequent recreation (loss of native plant cover)</li> <li>• Predation by dogs and cats</li> <li>• Exotic plants</li> </ul>
Mount Hermon June beetle ( <i>Polyphylla barbata</i> )	Federally Endangered	Zayante soil and adjacent transitional soils in central Santa Cruz County	<ul style="list-style-type: none"> <li>• Fire Exclusion (unnatural succession)</li> <li>• Intense and/or frequent recreation (loss of native plant cover)</li> <li>• Excessive Erosion</li> <li>• Invasive plants</li> </ul>
Zayante band-winged grasshopper ( <i>Trimerotropis infantilis</i> )	Federally Endangered	Open sand parkland associations with sparse herbaceous understory	<ul style="list-style-type: none"> <li>• Fire Exclusion (unnatural succession)</li> <li>• Lack of soil disturbance</li> <li>• Intense and/or frequent recreation (loss of native plant cover)</li> <li>• Excessive Erosion</li> <li>• Exotic plants</li> </ul>
<u>Plants</u>			
Ben Lomond spineflower ( <i>Chorizanthe pungens</i> var. <i>hartwegiana</i> )	Federally Endangered; CRPR 1B.1	Openings in sand parkland and sand chaparral, away from woody vegetation, dense grasses, and litter	<ul style="list-style-type: none"> <li>• Fire Exclusion (unnatural succession)</li> <li>• Exotic plants</li> <li>• Intense and/or frequent recreation</li> <li>• Excessive Erosion</li> </ul>
Ben Lomond buckwheat ( <i>Eriogonum nudum</i> var. <i>decurrens</i> )	CRPR 1B.1	Sand parkland and sand chaparral canopy gaps	<ul style="list-style-type: none"> <li>• Fire Exclusion (unnatural succession)</li> <li>• Exotic plants</li> <li>• Intense and/or frequent recreation</li> <li>• Excessive Erosion</li> </ul>
Ben Lomond wallflower ( <i>Erysimum teretifolium</i> )	Federally Endangered; California Endangered; CRPR 1B.1	Openings in sand parkland and sand chaparral, away from woody vegetation, dense grasses, and litter	<ul style="list-style-type: none"> <li>• Fire Exclusion (unnatural succession)</li> <li>• Lack of soil disturbance</li> <li>• Exotic plants</li> <li>• Intense and/or frequent recreation</li> <li>• Excessive Erosion</li> </ul>
Silverleaf manzanita ( <i>Arctostaphylos silvicola</i> )	CRPR 1B.2	Sand chaparral communities	<ul style="list-style-type: none"> <li>• Fire Exclusion (unnatural succession and senescence risk)</li> <li>• Exotic plants</li> <li>• Excessive Erosion</li> </ul>

<sup>1</sup> Status Designation Descriptions

**Table 3: Described endemic animals and plants**

Name	Status <sup>1</sup>	Habitat	Threats Related to Habitat Condition
<sup>1</sup> <b>Federally Endangered:</b> Listed under the Federal Endangered Species Act; species in danger of extinction throughout all or significant portions of its range. <b>Special Animal:</b> On the California Department of Fish and Wildlife list of Special Animals (CDFW 2019). <b>State Endangered:</b> Listed on the California Endangered Species Act; species whose continued existence in California is jeopardized. <b>California Rare Plant Rank (CRPR) 1B:</b> Most plants in this category are endemic to California and have experienced significant declines over several decades; these plants are rare, threatened, or endangered throughout California and elsewhere. Decimals represent a "Threat Rank" (e.g., "List 1B.1"): <u>CRPR 1B.1:</u> Seriously threatened populations in California, with over 80% of occurrences are threatened. <u>CRPR 1B.2:</u> Marginally threatened populations in California, with between 20% and 80% of occurrences threatened. <b>California Rare Plant Rank (CRPR) 4.2:</b> Plants of Limited Distribution with between 20 and 80% of occurrences threatened.			
<sup>2</sup> <b>Santa Cruz kangaroo rat</b> was recently discovered in the Summit area of the Santa Cruz Mountains, so is not a sandhills endemic; however, the species' persistence likely relies on sandhills populations nonetheless.			

Vehicle use has reduced the area of loose sand soil that is preferentially occupied by this species (J. McGraw, pers. obs.). The Olympia mapping area supports the highest average cover of Ben Lomond buckwheat (0.7%; Section 2.6.3.3) of the six Land Trust sandhills sites mapped in 2018 (McGraw 2019); this reflects the area's predominant north-facing slope sand parkland which provides mesic conditions conducive to this perennial species. These cooler, moister conditions may limit the abundance of Ben Lomond spineflower, which averages 0.3% cover (Section 2.6.3.1). The Olympia mapping area supports just two patches of silverleaf manzanita.

Despite its small size, the Olympia mapping area also supports a relatively diverse assemblage of Sandhills specialty plant species including locally rare species such as pussy paws (*Calyptridium monospermum*), gilia (*Gilia tenuiflora*), white Chinese houses (*Collinsia bartsiiifolia* var. *bartsiiifolia*), and curly leaf monardella (*Monardella sinuata*; Appendix B).

The following sections summarize key information about the seven described endemic species, with an emphasis on factors most critical to planning and implementing habitat management and restoration. Additional and more detailed information is provided in the species accounts contained in Chapter 5 of the *Sandhills Conservation and Management Plan* (McGraw 2004b). The sections describing the occurrence of the species in the Olympia Conservation Area properties were developed based on habitat assessments and focal species surveys conducted in 2018, which are described in Appendix A.

## 2.6.1 Animals

### 2.6.1.1 Santa Cruz Kangaroo Rat

#### 2.6.1.1.1 Description and Conservation Status

Santa Cruz kangaroo rat (*Dipodomys venustus venustus*) is a five-toed, narrow-faced rodent in the family Heteromyidae. Though historically known from locations in the foothills of the Santa Cruz Mountains

(Best 1992, Bolster 1998), the subspecies is currently only known to occupy a single area centered on Mount Hermon in central Santa Cruz County (Bean 2004). Although not designated as a Species of Special Concern, Santa Cruz kangaroo rat is on the California Department of Fish and Wildlife's Special Animals List; it is critically imperiled due to its limited distribution and abundance (CDFW 2019).

#### 2.6.1.1.2 Distribution and Habitat Characteristics

Santa Cruz Kangaroo rat (Figure 2) is primarily known from the Sandhills (Bean 2004), where the loose Zayante sand soil provide an ideal substrate for digging burrows, which is a critical habitat component for *D. v. venustus* (Hawbecker 1940). Within the Sandhills, Santa Cruz kangaroo rat is known to have primarily inhabited sand chaparral, a type of northern maritime chaparral (Roest 1988). Typical woody plant species in areas where the rare species has been documented include silverleaf manzanita, Santa Cruz Mountains manzanita (*Arctostaphylos crustacea* ssp. *crinita*), chamise, buckbrush, poison oak, sticky monkey flower (*Diplacus aurantiacus*), yerba santa, ponderosa pine, and knobcone pine.



**Figure 2: Santa Cruz kangaroo rat.**  
**Photograph by Jodi McGraw.**

By the mid-1980s, Santa Cruz kangaroo rat was only known from four extant populations: Bonny Doon Ecological Reserve, Olympia Watershed Property, Gray Whale (Wilder) Ranch, and Quail Hollow Quarry (Roest 1988). Recent attempts to document presence of the species at the Bonny Doon Ecological Reserve, Zayante Sandhills Conservation Bank, Bias Property, intact habitat at the Olympia Quarry, have been unsuccessful (D. Laabs pers. comm. 2014, D. Rhoades unpublished data). As a result, up until 2019, Santa Cruz kangaroo rat was known to persist only in the Mount Hermon sandhills area, which covers approximately 350 acres and includes portions of Henry Cowell Redwoods State Park, Hanson Aggregates Felton Quarry, Mount Hermon Conference Center, and the Santa Cruz County Probation Department (Bean 2004, McGraw 2004b). However, in 2019, the species was observed in the Sierra Azul Open Space Preserve in the Summit Area of the Santa Cruz Mountains (K. Hickman, pers. com. 2019). Though these recent observations increase the likelihood of species persistence, they do not reduce the importance of effective management of remaining sandhills habitat for its populations.

Based on the natural patchiness of suitable habitat, Santa Cruz kangaroo rat populations likely historically likely functioned as a metapopulation, with occupied habitat patches maintained through occasional long-distance dispersal. However, large-scale habitat loss and fragmentation has likely increased the likelihood of extirpation and reduced the possibility of patch re-colonization.

#### 2.6.1.1.3 Life History and Ecology

Like all members of the genus *Dipodomys*, Santa Cruz kangaroo rats are nocturnal, granivorous, and adapted to living in relative arid environments where they inhabit underground burrows. More closely related to gophers (geomyids) than to rats (murids), kangaroo rats have hind legs that are well adapted to jumping locomotion. They have fur lined cheek pouches that they use to transport the seeds they collect to cache. The diet of the Santa Cruz kangaroo rat consists almost entirely of the seeds of annual plants, which they collect during the summer then store in surface caches (Bean 2004).

#### 2.6.1.1.4 Threats

Santa Cruz kangaroo rat is threatened by a variety of factors including (Bean 2004):

1. Ongoing habitat conversion for development;
2. Habitat fragmentation, which increases predation by cats and dogs and limits recolonization of suitable habitat;
3. Fire exclusion, which reduces the area of suitable habitat, particularly canopy gaps in sandhills chaparral, that support annual plants that provide the species primary food source;
4. Exotic plants which outcompete native annual plants that provide a food source; and
5. Incompatible recreation, which collapses burrows and increases predation or stress caused by dogs.

Climate change may also threaten this species, which is likely vulnerable to changes in temperature and precipitation regimes due to its very limited geographic range and limited ability due to disperse due to habitat fragmentation. The anticipated increased maximum daily temperature could stress the species directly and/or reduce the abundance of native plant seeds that it eats. Excessive and extended droughts could similarly reduce host plant availability, while years of high rainfall can promote dense exotic plants that degrade habitat at least temporarily. Research and monitoring as well as a climate change vulnerability analysis could increase understanding of the effects of climate change on this and other Sandhills species.

#### 2.6.1.1.5 Occurrence in the Plan Area

Santa Cruz kangaroo rat is not currently known to occur within the Olympia Conservation Area, though it has not been recently surveyed. As noted above, the Olympia Watershed Property (Olympia Wellfield) supported one of four of the last known occurrences in 1984; however, the species was not detected at the site during surveys conducted in the early 2000s (Bean 2004). The species was also not detected during surveys of the adjacent intact habitat in the Olympia Quarry. It is possible that the species occurs below detectable levels at that site, which features approximately 0.9 acres (13%) of primary habitat consisting of sandhills chaparral communities (Section 2.5.4); the remaining area of sand parkland and sandhills woodlands and forests were characterized as secondary habitat for this species (Table 4, Map 2).

Though the habitat within the Olympia Conservation Area is small and largely characterized as secondary habitat for purposes of this analysis (Section A.4.3), the habitat is highly intact and adjacent to extensive sandhills chaparral on adjacent properties (Morgan Preserve, Freeman Mitigation Site, and Olympia Quarry) and therefore could be occupied. The region features limited adjacent residential development and thus a lower density of cats and dogs, which could also increase their long-term suitability as habitat for Santa Cruz kangaroo rat.

**Table 4: Santa Cruz kangaroo rat habitat**

Habitat <sup>1</sup>	Ac.	% Site
Primary	0.9	13%
Secondary	6.3	87%
Unsuitable		
<b>Total<sup>2</sup></b>	<b>7.3</b>	<b>100%</b>

### 2.6.1.2 Zayante Band-Winged Grasshopper

#### 2.6.1.2.1 Description and Conservation Status

Zayante band-winged grasshopper is a member of the family Acrididae (Insecta: Orthoptera). It is a small (0.5 - 0.9 inch), pale grey to light brown grasshopper that features pale yellow hindwings, pale blue tibiae and a band across the eyes (Figure 3).

Zayante band-winged grasshopper was listed as federally endangered on January 24, 1997 (USFWS 1997). In 2001, the Service designated 10,560 acres in central Santa Cruz County within the known distribution of the Zayante band-winged grasshopper as critical habitat for the species. The primary constituent elements of critical habitat for the Zayante band-winged grasshopper are the presence of Zayante soils, the occurrence of Zayante Sandhills habitat, and the associated plant species, and certain microhabitat conditions, including areas that receive large amounts of sunlight, widely scattered tree and shrub cover, bare or sparsely vegetated ground, and loose sand (USFWS 2001).



**Figure 3: Zayante band-winged grasshopper. Photograph by Jodi McGraw.**

The Olympia Conservation Area and Mayer Conservation Easement area feature are within the boundaries of designated critical habitat for the Zayante band-winged grasshopper and the open sand parkland communities, sand chaparral gaps, and other open sparsely vegetated areas constitute critical habitat for this species.

#### 2.6.1.2.2 Distribution and Habitat Characteristics

Zayante band-winged grasshopper occurs only in the Sandhills on Zayante sand soil in central Santa Cruz County. Zayante band-winged grasshoppers are known from approximately 20 historic locations, though are currently thought to occur in just five primary areas in the vicinity of Mount Hermon, Felton, Ben Lomond, Zayante, and Scotts Valley (Arnold 2004, USFWS 2009). The amount of habitat presently occupied by the Zayante band-winged grasshopper is unknown; however, given the limited distribution of open sandhills habitat, it is likely less than 400 acres.

Within the Sandhills, the species is primarily associated with open, sunlit areas that are sparsely vegetated. Zayante band-winged grasshopper is most commonly observed within sand parkland, particularly the Native Forb-Dominated Sand Parkland association. However, Zayante band-winged grasshopper is also observed within sand chaparral gaps, particularly those adjacent to sand parkland.

#### 2.6.1.2.3 Life History and Ecology

Zayante band-winged grasshopper is a univoltine species with a one-year lifecycle during which it undergoes hemimetabolous (incomplete) metamorphosis. During the adult flight season, which is between May and October (USFWS 2001), Zayante band-winged grasshopper mates and lay eggs which overwinter in the soil. The species is preferentially observed in areas of loose sand soil, which may represent preferred sites for oviposition.

Little information is available about the timing and factors influencing egg hatching. Nymphs have been observed as early as April, suggesting eggs hatch in early spring. The timing of the flight season appears to be influenced by temperature; McGraw (2016) found that the peak of the flight season in the Quail Hollow Quarry Conservation areas was negatively correlated with mean average daily temperature between November 1 and October 31.

Nymphs (immatures) develop through five instars during the spring and early summer. Adults are observed as early as May (USFWS 2001), although adult activity typically peaks in July and August (Arnold 2004). Adults remain active until the first hard rainfall event, which typically occurs in October or early November (Arnold 2004).

The species feeds on silver bush lupine (*Lupinus albifrons* var. *albifrons*) and golden aster (*Heterotheca sessiliflora* ssp. *echioides*), as well as grasses (Poaceae; Chu 2002).

Most adult males are quite sedentary, with home ranges of no more than a few acres. A series of studies documented average dispersal distances of 91 feet at the Hanson Quarry, 123 feet at the Freeman Mitigation site, and 2015 feet at the Quail Hollow Quarry, where the maximum dispersal distance was 930 feet (Arnold 2004).

#### 2.6.1.2.4 Threats

Zayante band-winged grasshopper is primarily threatened by:

1. Fire exclusion, which reduces the area of open habitat;
2. Disruption of the soil disturbance regime, including natural slides, trails, and animal diggings (e.g., gopher mounds), which maintain open canopy habitat and create loose sand soil that may be required for reproduction;
3. Invasive plants including brooms and acacias, which convert open canopy habitat into shrublands;
4. Exotic annual grasses and forbs, which create dense thatch and herbaceous plant cover in open habitat, which is not utilized by the species, and also contribute to stabilizing soil and reducing erosion that creates and maintains open soil; and
5. Incompatible recreation, which can trample native host plants and the Zayante band-winged grasshopper life stages themselves (as they have low vagility), though seasonally timed, infrequent, and low-intensity recreation may help maintain loose sand soil and promote disturbance-adapted native plants.

Climate change may also threaten this species. The anticipated increased maximum daily temperature could stress the species directly and/or reduce the abundance of native host plants. Because Zayante band-winged grasshopper inhabits small and isolated patches of sand parkland habitat and has low dispersal ability (Arnold 2004), the species may not be able to migrate to stay within its adapted climate envelope. Excessive and extended droughts could similarly reduce Zayante band-winged grasshopper host plant availability, while years of high rainfall can promote dense exotic plants that degrade habitat at least temporarily. Research and monitoring as well as a climate change vulnerability analysis could

increase understanding of the effects of climate change on this and other sandhills species.

#### 2.6.1.2.5 Occurrence within the Plan Area

**Table 5: Zayante Band-Winged Grasshopper habitat**

Habitat <sup>1</sup>	Ac.	% Site
Suitable	3.3	46%
Marginal	0.2	2%
Degraded (Edaphic)		
Potential Future	3.6	50%
Converted		
Unsuitable	0.2	3%
<b>Total<sup>2</sup></b>	<b>7.3</b>	<b>100%</b>

Zayante band-winged grasshopper occurs within the Olympia Conservation Area and Mayer Conservation Easement Area, where the species has been observed within the open sand parkland habitat and sand chaparral gaps associations (Map 3). Of the 7.3 acres of habitat in the mapping area, 3.3 acres (46%) are suitable and another 0.2 acres (2%) are marginal (Table 5); the former consists of the sand parkland and herb-dominated sand chaparral gaps while the latter consists of the shrub-dominated chaparral gaps. An additional 3.6 acres (50%) were classified as potential future habitat; these areas consist of the shrub-dominated sandhills chaparral and the sandhills woodlands and forest associations that are

currently not suitable due to the dense canopy cover, but that could be suitable following fire of other disturbance that removes the woody vegetation.

Zayante band-winged grasshopper was observed in the formerly mined areas of the Olympia Watershed Property as part of separate surveys to inform the District’s HCP. Collectively, the occurrence within the Olympia Watershed Property (including Olympia Conservation Area), and adjacent Freeman Mitigation Site and Morgan Preserve, represent an important population for essential for long-term persistence of this species.

#### 2.6.1.3 Mount Hermon June Beetle

##### 2.6.1.3.1 Description and Conservation Status

Mount Hermon June beetle is a member of the family Scarabaeidae (Insecta: Coleoptera; Figure 4). Mount Hermon June beetle can be distinguished from three congeners (species of the same genus) which also occur in central Santa Cruz County by the presence of relatively dense, long, erect hairs that are scattered over the elytra (leathery forewings), and short erect hairs on the pygidium (last abdominal segment; Young 1967, 1988). Adult males are typically 20 millimeters (mm) long and 9.7 mm wide, while the slightly larger females are approximately 22 mm long and 12 mm wide (Hill and O’Malley 2009). The Mount Hermon June beetle was listed as federally endangered on January 24, 1997 (USFWS 1997). Critical habitat has not been designated for this species.

##### 2.6.1.3.2 Distribution and Habitat Characteristics

Mount Hermon June beetle occurs primarily in Sandhills communities on Zayante sand soil in central Santa Cruz County. The species has also been observed on sandy loam and loamy sand soils adjacent to Zayante soils (J. McGraw, pers. obs.).

The Mount Hermon June beetle has been recorded from approximately 150 locations in the vicinity of Mount Hermon, Felton, Ben Lomond, Zayante, Scotts Valley, and Bonny Doon (Arnold 2004, USFWS et al. 2011). While the entire known range of the Mount Hermon June beetle encompasses 10,000 acres, suitable habitat for the endangered insect is only known to occur within approximately 2,800 acres (McGraw 2004b). The amount of habitat which is presently occupied by the Mount Hermon June beetle is unknown.

Mount Hermon June beetle occurs in the various Sandhills associations, including sand parkland, Sandhills chaparral, and Sandhills woodlands and forests. A comparative study at the Zayante Sandhills Conservation Bank found Mount Hermon June beetle in all Sandhills associations, but found significantly higher observations in sand parkland (26.5%) than in the sand chaparral (17.1%), ponderosa pine forest (16.3%), mixed sand chaparral (14.2%), degraded areas (12.7%), oak woodland (7.3%), and mixed hardwood forest (6.0%). However, this pattern diminished during the flight season and may be influenced by the lightshed, or area within which light from the traps can be observed (McGraw and Amesquita 2017).

The endangered beetle has also been observed in areas where native Sandhills plant species have been removed, including those that are disturbed through development or feature ornamental or other non-native plant species (Arnold 2004). Mount Hermon June beetle also inhabits ecotones (i.e., transitional communities; J. McGraw pers. obs.).

#### 2.6.1.3.3 Life History and Ecology

Mount Hermon June beetle is univoltine (i.e., has only one generation per year). The majority of the life cycle of the Mount Hermon June beetle occurs beneath the soil surface. Though little research has been conducted on below-ground stages of the life cycle of the Mount Hermon June beetle (e.g., eggs, larvae, pupae, and portions of the adult stage), information can be cautiously inferred from other species of *Polyphylla* that are well-studied, including the tenlined June beetle (*Polyphylla decemlineata*).



Figure 4: Mount Hermon June beetle adult male (left) and larva (right). Photographs by Jodi McGraw.

The life cycle of Mount Hermon June beetle is estimated to require two to three years. After mating during the summer, adult females lay eggs beneath the soil surface on, or in close proximity to, host plant roots. Eggs hatch into larvae that feed on roots and underground stems (i.e., rhizomes) of plants as well as fungal hyphae. Mount Hermon June beetles are polyphagous, or generalist feeders. Frass pellets of *Polyphylla* larva obtained from Mount Hermon June beetle mating locations contained tissue from flowering plants, ferns, and fungi (Hill and O'Malley 2009).

As the larvae grow, they molt from first to second, and finally third instars. Third instar larvae pupate below the soil surface, and eventually male and female adults emerge from pupae. Adult emergence and seasonal mating activity often begin in May and continues through about August (activity period). However, seasonal activity may vary from year to year depending on weather conditions (Arnold 2004) with adults observed flying into late September in some years (McGraw et al. 2019).

During the summer, adult Mount Hermon June beetles are active between approximately 7:00 p.m. and 10:00 p.m., with peak activity usually between 8:45 p.m. and 9:30 p.m. At dusk, adult males emerge from the soil, fly up through herbs and shrubs, and then fly low to the ground in search of flightless females, which emerge from the soil but remain on the surface of the ground and can be found by males which sense their pheromones. After mating occurs on the soil surface, females burrow underground where they presumably lay eggs.

A seasonal capture-recapture study suggested that adult males live no longer than eight days and that most males have home ranges of less than a few acres (Arnold 2001). The maximum dispersal distance documented for adult male Mount Hermon June beetles is 923 feet (Arnold 2000). Similar data on lifespan and dispersal of females are lacking at this time because they are so infrequently observed.

#### 2.6.1.3.4 Threats

Mount Hermon June beetle is threatened by a variety of factors including:

1. Habitat conversion or other activities that cover the soil with impervious surfaces, compacts the soil, and otherwise removes native plant food sources;
2. Exotic plants including brooms and acacia, which outcompete native plant species with which the fossorial herbivore has evolved and therefore may preferentially consume; and
3. Increased light pollution associated with development including that adjacent to protected Sandhills habitat, as light distracts male Mount Hermon June beetles from mating and exposes them to predation.

Fire exclusion, which is promoting succession in the Sandhills, may also threaten this species by increasing the density of shrubs and trees and limiting overall diversity of native plants available for food, though the effects of succession on this species is unknown.

Climate change may also threaten the Mount Hermon June beetle, which is likely vulnerable to changes in temperature and precipitation regimes due to its very limited geographic range and limited ability to disperse, as it requires Zayante soils and females are flightless. The anticipated increased maximum daily temperature could stress the species directly and/or reduce populations of its native host plants. Excessive and extended droughts could similarly reduce host plant availability. Additional research and monitoring as well as a climate change vulnerability analysis could increase understanding of the effects

of climate change on this and other Sandhills species.

### 2.6.1.3.5 Occurrence within the Plan Area

The Mount Hermon June beetle likely occurs throughout the Olympia Conservation Area and Mayer Conservation Easement Area. Adults of the species were detected during all 32 traps scattered throughout the plant associations within the assessment area, which were operated on three nights during the 2018 flight season (Map 4). Of the 7.3 acres of habitat within the assessment area, 7.1 acres were mapped as suitable while the 0.2-acre patch of transitional riparian habitat was characterized as marginal habitat for the species as it features plant species composition that differs from the upland sandhills habitat (table 6, Map 4).

**Table 6: Mount Hermon June beetle habitat**

Habitat <sup>1</sup>	Ac.	% Site
Suitable	7.1	97.1%
Marginal	0.2	2.9%
Degraded	0.0	0.0%
Converted	0.0	0.0%
Unsuitable	0.0	0.0%
<b>Total<sup>2</sup></b>	<b>7.3</b>	<b>100.0%</b>

A total of 228 adult male Mount Hermon June beetles were captured in the 32 trap nights, for an average of 7.1 adult males per trap night. This value was greater than the six other Land Trust sandhills sites monitored during the same period, which ranged between 0 and 5.9 individuals per trap night. In addition, mean observations were only slightly lower than the 9.8 individuals per trap night detected atop Mount Hermon, where Mount Hermon June beetle occurs at high abundance and which is used as a reference site (McGraw 2019).

<sup>1</sup> Habitat classification described in Section A.4.1

<sup>2</sup> Numbers may not sum due to rounding error

Mount Hermon June beetle was observed at high frequency (number of traps occupied) and abundance (number of individuals in the traps) at the Bias, Hihn, Morgan, and Olympia sites in 2018, as well as the Bean Creek Preserve in 2012 when lower densities may be due, in part, to one survey night occurred after the peak of the flight season. As the survey was not designed to compare abundance and instead, was implemented to evaluate presence and absence, caution should be used in comparing trap densities among sites. Nonetheless, Mount Hermon June beetle abundance during 2018 appeared high at this site.

## 2.6.2 Plants

### 2.6.2.1 Ben Lomond Spineflower

#### 2.6.2.1.1 Description and Conservation Status

Ben Lomond spineflower is a small annual herb of the buckwheat family (Polygonaceae). It can grow up to 10 inches high, but more typically grows no more than a few inches above ground. When in bloom, the Ben Lomond spineflower often appears as a spreading mat of small, showy, pink flowers. Flower clusters and associated structures are pink with small distinct heads. Whorls of bracts below the flowers are 0.06 to 0.09 inches long and have pink margins (Figure 5). The Ben Lomond spineflower was listed as federally endangered on February 4, 1994 (USFWS 1994). Critical habitat has not been designated for the Ben Lomond spineflower.



**Figure 5: Ben Lomond spineflower inflorescence (left) and patch (right). Photographs by Jodi McGraw.**

#### 2.6.2.1.2 Distribution and Habitat Requirements

Ben Lomond spineflower is endemic to the Sandhills and restricted to sandy soils of the Zayante series. Within the Sandhills, Ben Lomond spineflower inhabits open, sparsely vegetated areas (McGraw and Levin 1998, McGraw 2004a,b) and occurs primarily in sand parkland and sandhills chaparral gap associations, though can also be found at low abundance around the edges of trees or in canopy gaps in Sandhills woodlands and forests. The core of current and historical populations of the species occurs in the vicinity of Mount Hermon, Felton, Ben Lomond, Zayante, Scotts Valley, and Bonny Doon. No information is available regarding the current or historical number of populations. However, a very rough estimate of total potential habitat is approximately 900 to 2,000 acres (USFWS 2007). Population sizes vary widely from year to year due to interannual variability in climate, particularly rainfall (McGraw 2004b).

#### 2.6.2.1.3 Life History and Ecology

Ben Lomond spineflower is a short-lived annual species. Seeds germinate in late fall after the first substantial rains. Plants form a basal rosette of leaves in the winter, bolt in late February and early March, flower between March and June, and then seed between June and August (McGraw and Levin 1998, McGraw 2004a,b). In open habitat, the Ben Lomond spineflower can reach seedling densities of hundreds to thousands per square meter (Kluse and Doak 1999, McGraw 2004b).

Ben Lomond spineflowers are monoecious and produce bisexual flowers (each with both pistil and stamens). No specific study has been conducted on the mating system of the Ben Lomond spineflower; however, other spineflowers with nine stamens exhibit a combination of outcrossing and selfing (self-fertilization). Flowers may initially keep the stigma elevated above the stamens so as to increase the chance that pollen from another flower will reach the stigma; however, when the flowers close at night, the stigma may be pollinated by anthers within the same flower (J. Reveal, pers. comm. 2003).

Though no study has yet examined pollination biology of the Ben Lomond spineflower, numerous insects have been observed visiting flowers and are likely pollinators. Small ants (<5mm) are commonly observed crawling in flowers while small flies, bee flies, European honeybees, and bumble bees frequently visit plants (McGraw 2004b).

#### 2.6.2.1.4 Threats

Ben Lomond spineflower is primarily threatened by (McGraw 2004a,b):

1. Habitat conversion, which removes open Sandhills habitat;
2. Habitat fragmentation, which promotes the invasion and spread of exotic plant species;
3. Fire exclusion, which reduces the area of open canopy/low litter cover habitat in sand parkland, and canopy gaps in sand chaparral;
4. Disruption of natural soil disturbance including slides, trails, and gopher mounds, which promoting establishment, survivorship, and reproduction both directly and indirectly, by reducing the abundance of exotic plants (McGraw 2004a);
5. Invasive plants including brooms and acacias, which convert open canopy habitat into shrublands;
6. Exotic annual grasses and forbs, which reduce Ben Lomond spineflower survivorship and reproduction where they are abundant; and
7. Incompatible recreation, which can trample the species and reduce its survivorship and reproduction, though seasonally timed, infrequent, and low-intensity human uses may help maintain open areas with reduced exotic annual herb cover preferred by the species.

Ben Lomond spineflower may be threatened by nitrogen deposition, which can fertilize the otherwise low-nutrient sand soil and promote dense growth of exotic annual grasses, which outcompete the diminutive annual herb. The sandhills region is estimated to receive a moderate amount of nitrogen deposition (~7 kg/hectare/per year) as a result of pollution from vehicles and other emissions (Tonnesen et al. 2007). Nitrogen deposition has been shown to increase exotic grass growth in serpentine soils, reducing the abundance of diminutive native plants (Weiss 1999).

Climate change may also threaten the Ben Lomond spineflower. The anticipated increase in maximum daily temperature could increase the climatic water deficit and promote desiccation stress thus reducing survivorship and reproduction. Excessive and extended droughts could similarly reduce Ben Lomond spineflower abundance, which long-term monitoring has demonstrated generally tracks annual rainfall (McGraw and Amesquita 2019). Conversely, periodic high rainfall years can promote dense exotic annual herbs and forbs that outcompete the rare annual plant. Because the species inhabits isolated patches of habitat (i.e., outcroppings of Zayante soil), Ben Lomond spineflower may not be able to migrate to stay within its adapted climate envelope as the climate changes. Research and monitoring as well as a climate change vulnerability analysis is needed to understand the effects of climate change on this and other sandhills species.

#### 2.6.2.1.5 Occurrences within the Plan Area

Ben Lomond spineflower (spineflower) had a weighted average cover of 0.30% within the mapping area, where the annual plant occurs patchily throughout the sand parkland and sand chaparral gap

associations (Table 7, Map 5). The species was not observed in the transitional riparian community, under the non-native pine, or in the sandhills forests and woodlands which feature high competition for light as a result of the dense woody plant canopy, with the exception of the ponderosa pine forest in which the species occurred at low relative cover (0.01%). When compared with other Land Trust sandhills sites sampled in 2018, Ben Lomond spineflower cover at the Olympia mapping area was intermediate; sites with more south-facing aspects that supported more sand parkland and sand chaparral gaps and less woodlands and forests featured higher cover (McGraw 2019).

**Table 7: Weighted average percent cover of the four endemic plants within the plant communities and associations<sup>1</sup>**

Plant Communities and Associations	Ben Lomond Spineflower	Ben Lomond Wallflower	Ben Lomond Buckwheat	Silverleaf Manzanita
<b>Sand Parkland</b>	0.24	0.08	0.55	0
Exotic-dominated Sand Parkland	0	0	0	0
Mesic Sand Parkland	0.09	0.03	0.24	0
Native Forb-Dominated Sand Parkland	0.08	0.05	0.07	0
Pine-Influenced Sand Parkland	0.07	0.01	0.23	0
<b>Sandhills Chaparral</b>	0.05	0	0.05	0.04
Mixed Sand Chaparral	0.03	0	0.02	0
Sand Chaparral	0	0	0.00	0.04
Sand Chaparral Gap	0.02	0	0.02	0
Sand Chaparral Gap-Shrub Dominated	0	0	0.00	0
<b>Sandhills Woodlands and Forests</b>	0.01	0	0.10	0
Mixed Evergreen Forest	0	0	0	0
Mixed Hardwood Woodland	0	0	0	0
Oak Woodland	0	0	0.09	0
Ponderosa Pine Forest	0.01	0	0.01	0
<b>Transitional</b>	0	0	0	0
Riparian	0	0	0	0
<b>Other</b>	0	0	0	0
Ornamentals	0	0	0	0
<b>Total</b>	<b>0.30</b>	<b>0.09</b>	<b>0.70</b>	<b>0.04</b>

<sup>1</sup> Calculated based on weighted averaging of percent cover values in community polygons.

## 2.6.2.2 Ben Lomond Wallflower

### 2.6.2.2.1 Description and Conservation Status

A member of the mustard family (Brassicaceae), Ben Lomond wallflower is a biennial to short-lived perennial herb that forms a basal rosette of long, linear leaves. After two to three years, plants bolt and produce dense, terminal spikes (racemes) of four-petaled, yellow flowers; Ben Lomond wallflower fruits



**Figure 6: Ben Lomond wallflower juvenile (left) and patch of adults (right). Photographs by Jodi McGraw.**

are long, slender capsules (siliques; Figure 6). Ben Lomond wallflower was listed as federally endangered on February 4, 1994 (USFWS 1994). Critical habitat has not been designated for the Ben Lomond wallflower.

#### 2.6.2.2.2 Distribution and Habitat Requirements

Ben Lomond wallflower is endemic to the Sandhills and restricted to sandy soils of the Zayante series. Known populations of the species occur near Mount Hermon, Felton, Ben Lomond, Zayante, Scotts Valley, and Bonny Doon. Population sizes vary widely from year to year due to interannual variability in climate, particularly rainfall (McGraw 2004b). No information is available regarding the current or historical number of populations. In 2008, three previously identified populations were found to have been extirpated, leaving just 13 known populations (USFWS 2008).

Like Ben Lomond spineflower, Ben Lomond wallflower primarily occurs in sand parkland, though also inhabits sand chaparral gap associations adjacent to sand parkland and canopy gaps in Sandhills woodlands and forests. Within these open canopy areas, Ben Lomond wallflower primarily occurs on recently or chronically disturbed areas, such as slides and along trail corridors (McGraw 2004a,b). Recent experimental research to evaluate methods of increasing wallflower populations has demonstrated that wallflower survivorship and reproduction are significantly higher in areas where the soil is loosened with a shovel (i.e., tilled) to a depth of one foot (McGraw 2019); results of this experimental work are consistent with that of prior research which found that wallflowers have higher demographic performance on experimental slides, trails, and gopher mounds. Given the recent population declines and extirpations of this species, such active habitat management to simulate the beneficial effects of fire and other disturbances is needed to maintain open habitat and sustain populations of species (McGraw 2004a,b).

#### 2.6.2.2.3 Life History and Ecology

Ben Lomond wallflower is a generally monocarpic biennial species. Like Ben Lomond spineflower, Ben Lomond wallflower seeds germinate in late fall after the first substantial rains. Seedlings form a basal

rosette of leaves during the winter and spring after germinating. A low proportion (<1%) of plants reproduce in their first year; however, the majority do not reproduce until their second or third year after germinating. Mortality of seedlings over the first summer is very high (>95%; McGraw 2004a). Ben Lomond wallflower bolt and flower in late winter and spring (February – May), and set seed in the spring and early summer (May – August). Though the vast majority of plants die after reproducing, a low proportion (<1%) of plants reproduce more than once (McGraw 2004b). Most often, these plants have been browsed by mammals (J. McGraw, unpublished data).

Ben Lomond wallflower exhibits self-incompatibility and suffers from inbreeding depression. High pollinator visitation, which is facilitated by a diverse assemblage of insect pollinators including solitary bees, butterflies, beetles, and bumblebees, results in reproductive success in this species (Melen et al. 2016). Small populations may suffer the effects of inbreeding due to self-incompatibility, which reduces seed set and fruit set (Melen et al. 2016).

#### 2.6.2.2.4 Threats

Ben Lomond wallflower is threatened by (McGraw 2004a,b):

1. Habitat conversion, which reduces the area of Sandhills habitat;
2. Habitat fragmentation, which promotes the invasion and spread of exotic plant species into occupied habitat;
3. Fire exclusion, which reduces the area of open canopy/low litter cover habitat in sand parkland and canopy gaps in sandhills chaparral;
4. Disruption of natural soil disturbance regimes including slides, trails, and gopher mounds, which promote the endangered plant directly by increasing the area of loose sand soil in which it preferentially occurs and exhibits greater survivorship and reproduction, as well as indirectly, by reducing the abundance of exotic plants;
5. Invasive plants including brooms and acacias, which convert open canopy habitat into shrublands;
6. Exotic annual grasses and forbs, which greatly reduced Ben Lomond wallflower survivorship and reproduction when abundant;
7. Excessive herbivory by black tailed deer (*Odocoileus hemionus columbianus*), which eat the inflorescences and, in doing so, greatly reduce and in some cases, preclude, reproduction; and
8. Incompatible recreation that tramples the seedlings and juveniles before they can reproduce, though seasonally timed, infrequent, and low-intensity human uses can help maintain open areas with reduced exotic annual herb cover and loose sand soil that is required by the species.

In addition, small populations of Ben Lomond wallflower may experience reduced population growth and be at increased risk of extirpation due to inbreeding depression. The species has a weak self-incompatible mating system which reduces production of seed among closely related individuals and may hasten extirpations once populations become very small (Melen et al. 2016).

Ben Lomond wallflower within the South Ridge Conservation Area of the Quail Hollow Quarry have also been found to be infected by a virus or have undergone a genetic mutation. The affected plants, which occur within an approximately 2.5-acre area on the south-facing slope of South Ridge, feature misshaped, bright fluorescent yellow petals rather than golden-yellow petals, and rarely produce fruits.

Laboratory research, including growing plants from seed, would be needed to determine if it is a genetic mutation or virus (G. Gilbert, pers. comm. 2018, I. Parker, pers. comm. 2018). Ongoing monitoring will be needed to evaluate whether this condition will threaten the population and or spread into adjacent occurrences, such as the one at the adjacent Bias Property (McGraw and Amesquita 2019).

Like Ben Lomond spineflower, Ben Lomond wallflower may be threatened indirectly by nitrogen deposition, which promotes exotic annual grasses that reduce the species' survivorship and reproduction. The Sandhills region is estimated to receive a moderate amount of nitrogen deposition (~7 kg/hectare/per year) as a result of pollution from vehicles and other emissions (Tonnesen et al. 2007). Nitrogen deposition has been shown to increase grass growth in serpentine soils, reducing the abundance of diminutive native plants (Weiss 1999).

Climate change may also threaten the Ben Lomond wallflower. The anticipated increased maximum daily temperature could increase the climatic water deficit and promote desiccation stress thus reducing survivorship, which greatly influences the population of the biennial plant, which must survive at least one hot, dry summer in order to reproduce; prior research has demonstrated that around just 5% of seedlings survive to reproduce, with most dying as a result of apparent desiccations stress (McGraw 2004a,b). Extended droughts could similarly reduce Ben Lomond wallflower abundance, which long-term monitoring has demonstrated is positively influenced by total annual rainfall (McGraw and Amesquita 2019). Conversely, periodic high rainfall years can promote dense exotic annual herbs and forbs that outcompete the rare annual plant. Because the species inhabits isolated patches of habitat (i.e., outcroppings of Zayante soil), it may not be able to migrate to stay within its adapted climate envelope as the climate changes. Research and monitoring as well as a climate change vulnerability analysis could increase understanding of the effects of climate change on this and other sandhills species.

#### 2.6.2.2.5 Occurrences within the Plan Area

Ben Lomond wallflower occurs within the sand parkland and sand chaparral gap associations, as well as on the perimeter of oak woodland and ponderosa pine forest patches within the mapping area (Table 7, Map 6). The exceptionally rare species was mapped in a total of 2,421 square feet or 7% of the total mapping area (Map 6). The Ben Lomond wallflower occurrence within the Olympia Conservation Area is small and could be threatened with extirpation due to demographic and environmental stochasticity.

#### 2.6.2.3 Ben Lomond Buckwheat

##### 2.6.2.3.1 Description and Conservation Status

Ben Lomond buckwheat (*Eriogonum nudum* var. *decurrens*) is a perennial herb or suffrutescent (subshrub) in the buckwheat family (Polygonaceae). Endemic to the Sandhills, the species has a California Rare Plant Rank of 1B.1, which reflects its serious endangerment resulting from its geographic range, habitat specificity, and multiple threats to remaining populations (CNPS 2019).

##### 2.6.2.3.2 Distribution and Habitat Requirements

Ben Lomond wallflower is endemic to the Sandhills, where populations are known from Mount Hermon, Felton, Ben Lomond, Zayante, Scotts Valley, and Bonny Doon. Within the

Sandhills, Ben Lomond buckwheat is found in both the sand parkland and sand chaparral gaps. In sand parkland, Ben Lomond buckwheat is found in areas adjacent to trees and shrubs and in open areas away from woody vegetation. Ben Lomond buckwheat is also found underneath the canopy of ponderosa pine and is preferentially found near the canopy edge of trees. The tree canopy may increase soil moisture and reduce desiccation stress and thus facilitate survivorship of the perennial plant through the hot dry summers (McGraw 2004a,b).

Unlike most herbaceous sand parkland species, which are preferentially found either on north or south aspects, but not both, Ben Lomond buckwheat is found on slopes of all aspects. The main factor restricting the distribution of the Ben Lomond buckwheat in sand parkland is the canopy of coast live oaks and shrubs (i.e., manzanita, buckbrush, and chamise; McGraw 2004b).



**Figure 7:** Ben Lomond buckwheat individual (left) and inflorescence (right). Photographs by Jodi McGraw.

#### 2.6.2.3.3 Life History and Ecology

Ben Lomond buckwheat is a perennial herb (Figure 7), in that it lives more than two years during which time it reproduces repeatedly. Though its life span is unknown, Ben Lomond buckwheat plants likely live 5-8 years or more (McGraw 2004b). Seedlings that establish in the fall require two or more years to flower beginning in late spring and early summer (May – July); the plant sets seed in the late summer and early fall (August- October; McGraw 2004b).

Though Ben Lomond buckwheat can germinate and establish through moderately thick litter associated with areas beneath trees, seedling establishment is facilitated by fire and raking that remove leaf litter on the soil surface (McGraw 2004a). Seedlings establish readily in sand parkland during the winter, but suffer high rates of mortality over the long summer drought that typically occurs between May and October (McGraw 2004b).

There have been no studies on the mating system or pollination biology of the Ben Lomond buckwheat. Numerous insects including European honeybees and bumble bees have been observed visiting flowers and may be pollinators of the Ben Lomond buckwheat (McGraw 2004b).

#### 2.6.2.3.4 Threats

Ben Lomond buckwheat is threatened by (McGraw 2004a,b):

1. Habitat conversion, which reduces the area of Sandhills habitat;
2. Habitat fragmentation, which promotes the invasion and spread of exotic plant species;
3. Fire exclusion, which reduces the area of open canopy/low litter cover habitat in sand parkland and the area of canopy gaps in sand chaparral;
4. Disruption of natural soil disturbance regimes including slides, trails, and gopher mounds, which promote the rare plant indirectly by reducing the abundance of exotic plants;
5. Invasive plants including brooms and acacias, which convert open canopy habitat into shrublands;
6. Exotic annual grasses and forbs, which compete with the rare perennial herb for limited soil resources; and
7. Incompatible recreation that tramples plants, though seasonally timed, infrequent, and low-intensity human uses can help maintain open areas with reduced exotic annual herb cover preferred by the species.

Like Ben Lomond spineflower and Ben Lomond wallflower, Ben Lomond buckwheat may be threatened indirectly by nitrogen deposition, which promote exotic annual grasses. The Sandhills region is estimated to receive a moderate amount of nitrogen deposition (~7 kg/hectare/per year) as a result of pollution from vehicles and other emissions (Tonnesen et al. 2007). Nitrogen deposition has been shown to increase grass growth in serpentine soils, reducing the abundance of diminutive native plants (Weiss 1999).

Climate change may also threaten Ben Lomond buckwheat. The anticipated increased maximum daily temperature could increase the climatic water deficit and promote desiccation stress thus reducing survivorship of the perennial plant. Extended droughts could similarly reduce Ben Lomond buckwheat populations, declines of which have been linked to the two recent droughts (2007-2009 and 2012-2015; McGraw and Amesquita 2019). Conversely, periodic high rainfall years can promote dense exotic annual herbs and forbs that outcompete the rare annual plant. Because the species inhabits isolated patches of habitat (i.e., outcroppings of Zayante soil), it may not be able to migrate to stay within its adapted climate envelope as the climate changes. Research and monitoring as well as a climate change vulnerability analysis are needed to understand the effects of climate change on this and other sandhills species.

#### 2.6.2.3.5 Occurrence within the Plan Area

Ben Lomond buckwheat is fairly widespread but occurs patchily and at generally low abundance within the mapping area, where it features a weighted average percent cover of 0.70% (Table 7). Percent cover ranged between <1% to up to 10% (Map 7), with the greatest average cover achieved in the Mesic Sand Parkland association (Table 7), where the perennial plant likely experiences greater performance due to reduced desiccation stress. Cover of Ben Lomond buckwheat in the mapping area was the greatest of the six Land Trust sites mapped in May 2018; this reflects the disproportionate area of sand parkland within the site relative to the other sandhills sites examined (McGraw 2019).

#### 2.6.2.4 Silverleaf Manzanita

##### 2.6.2.4.1 Description and Conservation Status

Also known as Bonny Doon manzanita, silverleaf manzanita is a large, evergreen shrub (1-6 m) in the heath family (Ericaceae), which is named for the grey-green color of its leaves (Figure 8). Endemic to the Sandhills, silverleaf manzanita has a California Rare Plant Rank of 1B.2, which reflects its fairly endangered as a result of its geographic range, habitat specificity, and multiple threats to remaining populations (CNPS 2019).



**Figure 8:** Silverleaf manzanita adult shrub (left) and inflorescence (right). Photographs by Jodi McGraw.

Within the Sandhills, silverleaf manzanita is the dominant shrub within the sandhills chaparral communities. Specifically, silverleaf manzanita dominates the sand chaparral, and occurs at lower density in the mixed sand chaparral, which also supports buck brush, chamise, yerba santa, and other chaparral shrubs (Section 2.5.4).

##### 2.6.2.4.3 Life History and Ecology

Silverleaf manzanita flowers between November and February, producing small white urn-shaped flowers (Figure 8) that are visited and likely pollinated by hummingbirds and bees (McGraw 2004b). The fruits, which are drupes that resemble small apples (hence the name “manzanita”), are produced in the spring and summer. A study examining the effects of the 2008 fire at the nearby North Ridge Conservation Area found that silverleaf manzanita seedlings that established the year of the fire began to flower in 2015, suggesting that silverleaf manzanita may require seven years to reproduce (McGraw 2018). The post-fire period included two, multi-year droughts; the time required for newly established shrubs to flower might be less during periods of greater rainfall (McGraw 2018a).

This long-lived shrub (>50-year life span) is adapted to recurring fire, which is an important component of the disturbance region within the Sandhills (McGraw 2004a, b). Fire kills adult silverleaf manzanita, which lack a burl from which to resprout; however, it also promotes seed germination and establishment, and therefore regeneration (McGraw 2011). Effective fire management will likely be

essential to the species' long-term persistence. Too-frequent fire may decrease populations by killing adults prior to accumulation of sufficient viable seed to replace them (Odion and Tyler 2002). At the same time, fire exclusion may cause 'senescence risk.' As adult shrubs senesce and die, seed production decreases; at some point, seed availability could be reduced to a level below which seedling establishment following an eventual fire is insufficient to replace the stand.

#### 2.6.2.4.4 Threats

Silverleaf manzanita is threatened by (McGraw 2004a,b):

1. Habitat conversion, which reduces the area of Sandhills habitat;
2. Habitat fragmentation, which promotes the invasion and spread of exotic plant species;
3. Fire exclusion, which creates 'senescence risk' for this obligate-seeding species, which relies on fire (or other disturbances that mimic its beneficial effects) to remove established canopy and litter on the soil surface and promote seed germination. In the absence of fire, seed may die due to predation, disease, or otherwise lose its viability, thus reducing seedling establishment and preventing the population from regenerating post-fire.
4. Invasive plants, including brooms and acacias, which convert open canopy habitat into shrublands;
5. Exotic annual grasses and forbs which can compete with seedlings for limited surface soil resources (i.e., moisture); and
6. Incompatible recreation that tramples the seedlings and juveniles and creates erosion.

In addition, silverleaf manzanita have exhibited die off and die back that has been linked to *Botryosphaeria dothidea*—a fungus that causes formation of cankers on a wide variety of shrub species including manzanitas (*Actostaphylos* spp.) and *Ceanothus* species and tree species including coast redwood and Pacific Douglas-fir (Brooks and Ferrin 1994). Ongoing monitoring will be needed to evaluate whether this disease will have population-level consequences for silverleaf manzanita, which could also alter the sand chaparral communities that it dominates (Section 2.5.4). Notably, if the disease impacts are pervasive, it may create high fuel loads that increase the risk of catastrophic fire.

Climate change may also threaten silverleaf manzanita. The anticipated increased maximum daily temperature could increase the climatic water deficit and promote desiccation stress thus reducing survivorship and potentially making shrubs more susceptible to disease effects. Extended droughts could similarly reduce populations; silverleaf manzanita die backs observed in the past five years may have been influenced by the two recent droughts (2007-2009 and 2012-2015; McGraw 2018). Conversely, periodic high rainfall years can promote exotic plants as well as pathogens like *Botryosphaeria*, which has caused high rates of die off and die back in high rainfall years following drought (Brooks and Ferrin 1994). Because the species inhabits isolated patches of habitat (i.e., outcroppings of Zayante soil), it may not be able to migrate to stay within its adapted climate envelope as the climate changes. Research and monitoring as well as a climate change vulnerability analysis can increase understanding of the effects of climate change on this and other Sandhills species.

#### 2.6.2.4.5 Occurrence within the Plan Area

Silverleaf manzanita occurs at very limited abundance in the mapping area, where it was found in just two nearby patches on the northwestern border of the site (Table 7, Map 8). The low abundance of this species, which dominates the sandhills chaparral communities, reflects the approach to siting the Olympia Conservation Area to include as much as possible of the intact, remaining sand parkland to conserve the critically rare Zayante band-winged grasshopper and Ben Lomond wallflower (McGraw 2016). Other portions of District's Olympia Watershed Property, including the 17-acre old Ferrari Property which is located in its southwestern corner, feature larger populations of silverleaf manzanita.

### 2.7 Invasive and Exotic Plants

The Olympia Conservation Area features habitat that is largely intact, as it has not experienced to extensive alterations from human uses including mining, that occurred throughout much of the remainder of the Olympia Watershed Property (Section 2.4). Nonetheless, habitat within the Olympia Conservation Area and Mayer Conservation Easement Area has been invaded by plants that are not native to California or the sandhills. For purposes of management, they are divided into two main groups:

- **Invasive Species:** These species have high impacts to native sandhills communities and species. While they have generally limited distributions currently, they have the potential to spread and further degrade habitat. Many are regarded as invasive by the California Invasive Plant Council (CalIPC 2020); and
- **Widespread Exotic Herbs:** These are herbaceous exotic plant species that are widespread within the site. They can have large impacts, especially where they are abundant, and many are identified as invasive species by CalIPC (2020).

As described in Section A.5.2, invasive plant species were mapped as points, and their area was estimated. To map the more widespread exotic plant species, their aggregate cover in the plant community patches using our cover classes:

- None: none present;
- Low: some present but cover <10%;
- Medium: 10-50% cover; and
- High: greater than 50% cover.

Table 8 lists the invasive plant species, which are mapped in Map 9. French broom and Portuguese broom are relatively dense around the perimeter, where more mesic conditions including those associated with the ephemeral drainage on the northern border, promote their growth and reproduction; there are also scattered shrubs in the sand parkland, particularly around the margins of trees. The site also supports the perennial velvet grass (*Holcus lanatus*), which is patchily dense underneath trees and in the riparian area, which also supports spring vetch (*Vicia sativa*), and Italian thistle. These species have the potential to spread further into the mapping area, where they can alter the structure and species composition of the habitat and reduce the rare species populations.

**Table 8: Invasive plant guilds and species**

Guild and Species	CalIPC Rating <sup>1</sup>	Approximate Area	
		Square Feet	Acres
<b>Invasive Brooms</b>		<b>960</b>	<b>0.022</b>
French broom	High	875	0.020
Portuguese broom	Moderate	85	0.002
<b>Invasive Herbs</b>		<b>2,525</b>	<b>0.058</b>
bull thistle	Moderate	200	0.005
Italian thistle	Moderate	225	0.005
poison wild lettuce	not listed	2,100	0.048
<b>Invasive Vines</b>		<b>3,010</b>	<b>0.069</b>
periwinkle	Moderate	3,000	0.069
spring vetch	not listed	10	0.0002
<b>Invasive Perennial Grasses</b>		<b>1,720</b>	<b>0.039</b>
velvet grass	Moderate	1,720	0.039
<b>Total</b>		<b>8,215</b>	<b>0.189</b>

<sup>1</sup> Invasiveness rating by the California Invasive Plant Council (2020)

**High** – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

**Moderate** – These species have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Table 9 and Map 9 identify areas of the site mapped within each of the four cover categories for widespread exotic plant species, which include primarily rattlesnake grass, ripgut brome, rattail fescue, cheat grass, and wild oats, as well as exotic forbs such as smooth cat’s ears and sheep sorrel. These species are patchily dense in the sand parkland, where they achieve the greatest cover under and adjacent to ponderosa pine trees or where there is litter accumulated on the soil surface; they are also more abundant where there is no soil disturbance (i.e., slides, trails, or gopher mounds). The invasive herbs were not recorded or occur at only low abundance in the shrub-dominated sandhills chaparral associations and in the mixed evergreen forest.

**Table 9: Plant community patches according to their cover of widespread exotic herbs**

Cover of Widespread Exotic Herbs	Acres	% of Site
High (> 50%)	1.40	19%
Medium (10-50%)	1.84	25%
Low (>0 - <10%)	2.82	39%
None (none present)	1.22	17%
<b>Total</b>	<b>7.29</b>	<b>100%</b>

Within the sand parkland, these abundant exotic species are reducing the area of open sand parkland required by Zayante band-winged grasshopper and Ben Lomond wallflower; they also reduce populations of Ben Lomond spineflower and Ben Lomond buckwheat (McGraw 2004a,b; Section 2.6.3).

## 2.8 Other Management Issues

### 2.8.1 Fire Exclusion

Fire is a natural part of the Sandhills disturbance regime, to which many sandhills plants and animals including the endemic species are adapted (McGraw 2004a,b; Sections 2.5 and 2.6). The Olympia mapping area has no known history of fire, which likely reflects, at least in part, the fire suppression policies designed to protect lives and property in the region.

In the absence of fire, the density of shrubs and trees may reduce the area of open habitat and thus habitat for the Zayante band winged grasshopper and endemic herbaceous plants as well as the diverse assemblage of Sandhills specialty plants (Appendix B).

### 2.8.2 Trespass and Erosion

Though the area is closed to the public, people infrequently enter the site, with most ingress occurring from the District service road/ trail on the northwest border. The low-frequency, low-intensity use may help maintain open habitat and loose sand soil required by Zayante band-winged grasshopper and Ben Lomond wallflower. However, some of the trails that run perpendicular to the slope are eroded and have formed deep (>3 feet) gullies. Intensified use and/or further erosion could cause this use to have a net-negative effect on Sandhills species.

### 3 Goals and Objectives

This section describes the goals and objectives for habitat management within the Olympia Conservation Area. They are presented using a biological hierarchy, which identifies goals for the Sandhills ecosystem, communities, and rare species. In addition to addressing aspects of habitat management, the goals and objectives address future habitat protection, restoration, and management within the Olympia Watershed Property, which will play an important role in conservation of Sandhills species and communities (McGraw 2004b). These broader goals can help inform expansion of the conservation area, including as part of the Sandhills Habitat Conservation Plan that the District is preparing, as well as grant-based or other voluntary, philanthropic activities.

#### 3.1 Ecosystem

**Ecosystem Goal: Promote persistence and ecological integrity of the Sandhills ecosystem and the natural processes that sustain it.**

**Objective E1: Preserve large, contiguous areas of Sandhills habitat within the Olympia Watershed Property to protect the sensitive Sandhills communities and safeguard the native biodiversity they contain, promote persistence of the rare species populations, including adaptation to a changing climate, and enable effective habitat management including using natural and managed disturbance using fire.**

E1-1: Protect Sandhills habitat within the Olympia Watershed Property to expand and buffer existing protected lands on site as well as those adjacent, with an emphasis on habitat that supports, or can be restored to support, multiple rare species populations.

E1-2: Restore Sandhills habitat that has been degraded by prior land uses, including mining, to buffer and expand habitat for the rare species and promote resiliency to a changing climate.

**Objective E2: Maintain and enhance connectivity of Sandhills habitat, to promote migration, dispersal, and other ecological processes (e.g., gene flow), which are necessary to maintain viable populations of the rare species.**

E2-1: Protect Sandhills habitat as well as adjacent, intact non-Sandhills communities, that can connect or maintain corridors between Sandhills habitat.

E2-2: Restore Sandhills habitat that has been degraded by prior land use, such as mining, where doing so can help connect otherwise isolated patches of intact Sandhills habitat.

E2-3: Manage Sandhills habitat within the range of variation of the natural fire disturbance regime, to create and maintain a mosaic of communities of various successional stages and prevent unnatural succession of Sandhills habitat to non-Sandhills communities in transitional soils, which can fragment sandhills habitat.

**Objective E3: Maintain and enhance the natural mosaic of native Sandhills plant communities and their varying successional stages, to provide a range of habitat conditions for the rare species and the**

**broader assemblages of native plants and animals in the ecosystem and facilitate their adaptation to a changing climate by providing a range of biotic and abiotic conditions.**

E3-1: Protect sandhills habitat featuring a range of abiotic and biotic conditions, including various successional stages of the native plant communities, with an emphasis on the sand parkland and relatively open-canopy Sandhills chaparral communities that support the rare species and diverse assemblages of Sandhills specialty plants (Appendix B).

E3-2: Restore habitat that has been degraded by prior land use activities, to re-create, where possible, the native plant community structure and species composition of sandhills communities, with an emphasis on the native sand parkland and Sandhills chaparral assemblages that support the rare species and diverse assemblages of Sandhills specialty plants.

E3-3: Use fire and vegetation management treatments that mimic fire's beneficial effects (i.e., fire surrogates) to manage Sandhills habitat within the range of variation of the natural fire regime to: 1) maintain habitat suitable for rare species adapted to recurring fire and the conditions that it creates, 2) create and maintain a mosaic of native plant communities of various successional stages and thus habitat conditions, and 3) maintain a range of microclimatic and other abiotic conditions that can facilitate adaptation to a changing climate.

## 3.2 Community

**Community Goal: Promote the natural structure and native species composition of the native Sandhills plant communities.**

**Objective C1: Restore and manage sand parkland to maintain habitat used by native species and promote resiliency to climate change, including by maintaining open habitat required by a suite of disturbance-adapted species including Zayante band-winged grasshopper and Ben Lomond wallflower.**

- C1-1: Restore sand parkland assemblages that have been degraded by prior land use, erosion, recreation, and/or dense infestations of invasive and other exotic plants, to recreate open community structure, promote diverse native plant assemblages, and increase suitability of habitat for rare species that utilize sand parkland, with an emphasis on those that preferentially or exclusively occur in this community, including Zayante band-winged grasshopper and Ben Lomond wallflower.
- C1-2: Actively manage sand parkland habitat to limit the negative effects of factors that degrade it, including excessive erosion that inhibits plant establishment and does not contribute to the natural disturbance processes that promote native species, competitive exotic plants that alter the structure of the community and degrade habitat, fire exclusion, where it is promoting establishment of dense woody plants (shrubs and trees), and incompatible recreation or other human activities.

**Objective C2: Restore and manage Sandhills chaparral to maintain a range of habitat conditions used by native species, including a mosaic of successional communities that provide a range of abiotic and biotic conditions that will maximize diversity of the native species assemblages and habitats, confer resiliency of the rare species to climate change by providing a range of abiotic and biotic conditions,**

and provide habitat for Santa Cruz kangaroo rat, which inhabits early-to-mid-successional sandhills chaparral.

- C1-1: Restore Sandhills chaparral habitat that has been degraded by prior land use, erosion, recreation, and/or dense infestations of invasive and other exotic plants, to promote diverse native plant assemblages, increase suitability of habitat for rare species including Santa Cruz kangaroo rat, silverleaf manzanita, and Ben Lomond spineflower.
- C1-2: Actively manage Sandhills chaparral, where and when needed, to prevent predominance of late-successional communities due to fire exclusion, limit excessive erosion that inhibits plant establishment and does not contribute to the natural disturbance processes that promote native species, control competitive exotic plants that alter the structure of the community and degrade habitat, and prevent incompatible recreation or other human activities.

### 3.3 Rare Species

#### 3.3.1 All Rare Species

**Rare Species Goal: Promote the recovery and long-term viability of the endemic Sandhills plants and animals including by facilitating their adaptation to a changing climate. These goals can generally be achieved through the following objectives:**

- Protect habitat that supports, or that has the potential to support, the endemic Sandhills species and their habitat.
- Restore degraded Sandhills habitat, especially previously mined areas, to expand, buffer, and connect suitable habitat for the rare species.
- Actively manage Sandhills habitat to address anthropogenic factors that degrade habitat, to maintain or enhance conditions for rare species and promote persistence of their populations; and
- Conduct species-specific management, where necessary, to prevent or reverse population declines that could lead to extirpations.

The following sections describe the specific goals and objectives for the rare species or groups of rare species based on the unique conservation needs.

#### 3.3.2 Santa Cruz Kangaroo Rat

**Objective S1: Increase the distribution and abundance of Santa Cruz kangaroo rat and promote the species persistence.**

S1-1: Protect additional habitat that can support Santa Cruz kangaroo rat, which occurred on site as recently as 1984.

S1-2: Restore Sandhills habitat on site to expand, buffer, and connect habitat suitable for Santa Cruz kangaroo rat.

- Use fire or fire surrogates to create and maintain a mosaic of early -to-mid-successional Sandhills chaparral associations characterized by at least 40% of the area lacking the shrub and tree canopy.
- Use active revegetation where natural recruitment is not sufficient to establish a native assemblage of native Sandhills chaparral plants in areas that have been previously mined or subject to other anthropogenic activities that removed native plant cover.

S1-4: Actively manage Santa Cruz kangaroo habitat where needed to maintain the early to mid-successional conditions that the species requires, including by:

- Sustaining natural disturbance regimes including soil erosion as well as fire, which are required to maintain open canopy, loose soil conditions required by the species;
- Simulating the beneficial effects of natural disturbance using management techniques such as vegetation management and managed soil disturbance that have been demonstrated to be effective at benefitting the species;
- Controlling populations of invasive plants that will degrade habitat, including woody species as well as dense annual grasses and forbs;
- Preventing the invasion of spread of new invasive plant species that can degrade open habitat, including stinkwort (*Dittrichia graveolens*) as well as new invasive plants that are not currently known to occur in the Sandhills;
- Managing human activities including recreation and educational uses as well as active management and restoration, to limit or avoid those that will result in net negative impacts to the species.

S1-5: Reintroduce Santa Cruz kangaroo rat into the site, if it is confirmed extirpated and the area is deemed suitable but unoccupied habitat, to promote persistence of the species.

### 3.3.3 Zayante Band-Winged Grasshopper

**Objective S2: Increase the distribution and abundance of Zayante band-winged grasshopper and promote the species' persistence.**

S2-1: Protect additional unprotected sand parkland supporting Zayante band-winged grasshopper within the Olympia Watershed Property, and connect it to the Olympia Conservation Area where possible.

S2-2: Promote connectivity between protected Sandhills habitat supporting Zayante band-winged grasshopper, to promote species dispersal and migration in response to a changing climate.

S2-3: Restore degraded sandhills habitat, including previously mined areas which can support populations of the endangered insect, to expand, buffer, and connect habitat occupied by the Zayante band-winged grasshopper.

- Address invasive plants, including brooms and dense exotic annual grasses, that degraded habitat for Zayante band-winged grasshopper.

- Prevent unnatural succession of sand parkland and adjacent sand chaparral through fire exclusion which increases woody vegetation and the accumulation of dense leaf litter on the soil surface.
- Maintain and restore loose sand soil conditions required by Zayante band-winged grasshopper, by sustaining and restoring natural processes that create and maintain open soil including soil erosion and fire, which prevents dense vegetation and litter from stabilizing soils. Where suitable and as proven feasible, use anthropogenic methods of soil disturbance including heavy equipment and carefully managed human uses, to create and maintain loose soil conditions. Such treatments are currently being conducted in the Quail Hollow Quarry Conservation Areas (McGraw 2019c).
- Restore soil conditions in areas featuring open habitat structure but where soil conditions have been rendered unsuitable due to anthropogenic uses including mining, such as the Geyer quarries.

S2-4: Actively manage Zayante band-winged grasshopper habitat where needed to maintain the open canopy, loose sand soil conditions that the species requires, including by:

- sustaining natural disturbance regimes including soil erosion as well as fire, which are required to maintain open canopy, loose soil conditions required by the species;
- simulating the beneficial effects of natural disturbance using management techniques such as vegetation management and managed soil disturbance that have been demonstrated to be effective at benefitting the species;
- controlling populations of invasive plants that will degrade habitat, including woody species as well as dense annual grasses and forbs;
- preventing the invasion or spread of new invasive plant species that can degrade open habitat, including stinkwort as well as new invasive plants that are not currently known to occur in the Sandhills; and,
- managing human activities including recreation and educational uses as well as active management and restoration, to limit or avoid those that will result in net negative impacts to the species.

S2-5: Introduce or reintroduce Zayante band-winged grasshopper into habitat that is suitable but unoccupied, where doing so is necessary to promote persistence of the species.

#### 3.3.4 Ben Lomond Wallflower

**Objective S3: Increase the distribution and abundance of Ben Lomond wallflower and promote the species' persistence.**

S3-1: Protect additional habitat supporting Ben Lomond wallflower as well as that which could support large populations of the species within the Olympia Watershed Property.

S3-2: Connect Sandhills habitat suitable for Ben Lomond wallflower, to promote species migration in response to a changing climate.

S3-3: Restore degraded habitat, including previously mined areas, to address invasive plants, including dense exotic annual grasses and invasive brooms and acacias, and areas featuring dense leaf litter on the soil surface, create more open soil habitat conducive to Ben Lomond wallflower, and expand the species populations and increase its resiliency to climate change.

S3-4: Actively manage Ben Lomond wallflower habitat, where needed, to maintain and enhance the open canopy, loose sand soil conditions that the species requires by promoting natural disturbance regimes (e.g., erosion and fire) and simulating the beneficial effects of natural disturbance using management techniques (i.e., so-called 'tilling') that promote Ben Lomond wallflower populations.

S3-5: Increase the size of Ben Lomond wallflower population, which is small and threatened with extirpation, by caging adults (i.e., flowering individuals) to prevent deer herbivory, which greatly reduces seed production.

S3-6: Collect along maternal lines, and store *ex situ*, the seed of Ben Lomond wallflower from the population for use in research and enhancement projects designed to promote long-term species persistence.

S3-7: Reintroduce Ben Lomond wallflower into habitat that is suitable but unoccupied, including as part of efforts to promote persistence of the species in the face of climate change.

### 3.3.5 Mount Hermon June Beetle, Ben Lomond spineflower, Ben Lomond buckwheat, and Silverleaf manzanita

#### **Objective S4: Maintain or increase the distribution and abundance of Mount Hermon June beetle, Ben Lomond spineflower, Ben Lomond buckwheat, and silverleaf manzanita, to promote persistence of these species.**

S4-1: Protect additional Sandhills habitat at the Olympia Watershed Property that supports Mount Hermon June beetle, Ben Lomond spineflower, Ben Lomond buckwheat, and/or silverleaf manzanita, with priority given to properties that: 1) also support Zayante band-winged grasshopper, Ben Lomond wallflower, and/or Santa Cruz kangaroo rat, which are more critically imperiled, 2) feature high-quality (i.e., intact) Sandhills communities, and/or 3) buffer or connect existing protected Sandhills habitat.

S4-2: Connect Sandhills habitat supporting Mount Hermon June beetle, Ben Lomond spineflower, Ben Lomond buckwheat, and silverleaf manzanita, to promote migration of these species in response to a changing climate.

S4-3: Restore degraded Sandhills habitat for Mount Hermon June beetle, Ben Lomond spineflower, Ben Lomond buckwheat, and silverleaf manzanita, including by 1) controlling invasive plants, including dense exotic annual grasses and invasive brooms and acacias, 2) addressing inimical soil conditions, including areas where topsoil has been removed through prior land uses (e.g., mining), development, or erosion, and 3) revegetating areas that lack native sandhills plants, to expand the rare plant populations and provide food for the fossorial beetle.

S4-4: Actively manage Sandhills habitat supporting Mount Hermon June beetle, Ben Lomond spineflower, Ben Lomond buckwheat, and silverleaf manzanita, where needed, to control

invasive plants, address fire exclusion which can extirpate the rare plants, and prevent widespread removal of native plants caused by incompatible recreation or damaging erosion.

### 3.4 Cobenefits

**Cobenefit Goal: Promote the multiple cobenefits of protecting, restoring, and managing Sandhills habitat, including benefits for water resources, fire risk reduction, paleontological resources, and education and recreation opportunities that are compatible with protection of native biodiversity in the Sandhills.**

**Objective B1:** Safeguard and enhance water resources, including the Santa Margarita aquifer (groundwater basin), and aquatic ecosystems, including coastal streams fed by the aquifer and Sandhills runoff.

B1-1: Protect Sandhills habitat within the site to promote aquifer recharge via rainfall infiltration, and prevent the additional loss of water quantity and quality associated with runoff resulting from the construction of by impervious surfaces (i.e., pavement and buildings) in the Sandhills.

B1-2: Restore Sandhills habitat that has been modified by prior land uses including mining to remove unneeded impervious surfaces and address extensive erosion that impacts aquatic systems and water resources.

B1-3: Manage Sandhills habitat to maintain or enhance natural hydrologic processes that sustain the quality and quantity of ground and surface water resources.

**Objective B2:** Preserve the fossiliferous Santa Margarita formation and provide opportunities for *in situ* research and education of this paleontological resources.

B2-1: Protect Sandhills habitat areas that feature outcroppings of Santa Margarita formation at the soil surface, where it can be viewed without extensive vegetation removal and excavation.

B2-2: Manage areas featuring paleontological resources *in situ* (as opposed to in museums), to protect the sensitive communities and species that it supports, while making areas available for scientific research and resource-dependent education that are compatible with the goals and objectives for the Sandhills ecosystem, community, and rare species.

**Objective B3:** Reduce the risk of catastrophic wildfire and associated impacts to human communities near the site, by managing vegetation within the Sandhills to reduce fuels while achieving goals related to conservation and management of the Sandhills ecosystems, communities, and species.

B3-1: Control invasive plants that can increase the risk and intensity of fire, including acacias, brooms, and other invasive shrubs and trees as well as dense exotic annual grasses, that create 'flashy fuels.'

B3-2: Use prescribed fire and vegetation management treatments that mimic fire's beneficial effects (i.e., fire surrogates) to reduce the fuel load and thus the risk and intensity of fire, while managing Sandhills habitat within the range of variation of the natural fire regime to achieve the goals and objectives related to fire for Sandhills ecosystems, communities, and species.

**Objective B4:** Increase awareness of the uniqueness, fragility, and rarity of the Sandhills ecosystem, communities, and species and their multiple conservation values, and promote support for Sandhills conservation, restoration, and management.

B4-1: Provide opportunities for Sandhills-dependent environmental education within the Olympia Watershed Property that are compatible with the goals and objectives for the Sandhills ecosystem, community, and rare species.

B4-2: Provide opportunities for low-intensity, low frequency, passive recreation, such as hiking/pedestrian use, that are compatible with the goals and objectives for the Sandhills ecosystem, community, and rare species, particularly where such use can be an effective component of sandhills habitat management to create and maintain sparsely vegetated areas featuring loose soil that support multiple rare sandhills species, including Zayante band-winged grasshopper, Ben Lomond wallflower, and Ben Lomond spineflower.

## 4 Habitat Management, Restoration, and Enhancement

This section outlines the habitat management, restoration, and enhancement strategies and techniques to achieve the ecosystem, community, and rare species goals and objectives, as well as aspects of those goals and objectives related to cobenefits of Sandhills Conservation and management (Section 3).

The strategies and techniques address the full range of habitat management, restoration, and enhancement currently proposed for the 6.3-acre Olympia Conservation Area as part of its long-term management, which will occur in perpetuity. The strategies and techniques can also be applied to the broader 180-acre Olympia Watershed Property, including future areas conserved as part of the District's Sandhills Habitat Conservation Plan or other initiatives.

To focus management of the Olympia Conservation Area, Section 4.2 identifies a suite of high-priority initial management tasks. As described in Section 1.4, these initial management tasks, along with the corresponding monitoring (Section 5.2), will be expanded upon as additional resources are available as the District makes addition contributions to the endowment used to fund mitigation (Section 6.7), or through other budget allocations or conservation efforts on behalf of the site.

### 4.1 Strategies and Techniques

A series of management strategies are recommended to achieve the goals and objectives. The strategies reflect a hierarchical approach to management in which:

- Natural and anthropogenic disturbances including fire, soil disturbances, and human access, are managed to address multiple objectives for the Sandhills ecosystem, community, and species, often at broader spatial scales;
- Exotic plant species are managed to promote multiple goals for the Sandhills communities as well as species; and
- Species-specific habitat management and enhancement techniques are applied where management of disturbance and exotic plants is not sufficient to achieve the goals and objectives related to species populations and persistence.

For each strategy, a list of specific management techniques is identified. Table 10 identifies the main biodiversity goals and objectives in Section 3 that can be promoted by each technique for each strategy.

Certain techniques recommend development of action plans—work plans that identify the specific treatments that will be conducted in terms of their locations, methods, personnel, timing, and species protection measures. The action plans will be developed by a qualified biologist based on the framework presented in this plan, including goals, objectives, and strategies, and in consideration of current conditions based upon pre-project conditions, and the latest available scientific information about the species, communities, and ecosystem, as well as the effectiveness of similar projects conducted at other sites as documented in reports and papers.

The initial exotic plant management action plan and access management plan are provided as part of this plan, as management of exotic plants and human activities are critical near-term management priority for the site (Section 4.2).

**Table 10: Checklist indicating the focal biodiversity goals and objectives that will be promoted by the management strategies and techniques, which will also promote goals and objectives related to cobenefits (not shown)**

Strategy and Technique	Technique Code	Focal Biodiversity Goals and Objectives							
		Ecosystem (E)	Sand Parkland (C1)	Sand Chaparral (C2)	Santa Cruz Kangaroo Rat (S1)	Zayante Band-Winged Grasshopper (S2)	Ben Lomond Wallflower (S3)	Other Endemic Species (S4)	
<b><u>Fire Management</u></b>									
Develop Fire Management Action Plan	FM-1	✓	✓	✓	✓	✓	✓	✓	
Implement Fire/Vegetation Management	FM-2	✓	✓	✓	✓	✓	✓	✓	
<b><u>Soil Disturbance Management</u></b>									
Develop Soil Disturbance Action Plan	SD-1	✓	✓			✓	✓	✓	
Conduct Soil Disturbance Management	SD-2	✓	✓			✓	✓	✓	
<b><u>Exotic Plant Management</u></b>									
Develop Exotic Plant Management Action Plan	EM-1	✓	✓	✓	✓	✓	✓	✓	
Eradicate/Control Brooms	EM-2	✓	✓	✓	✓	✓	✓	✓	
Eradicate/Control invasive herbs	EM-2	✓	✓	✓	✓	✓	✓	✓	
Eradicate/Control invasive vines	EM-2	✓	✓	✓	✓	✓	✓	✓	
Eradicate/Control ornamentals	EM-2	✓	✓	✓	✓	✓	✓	✓	
Eradicate/Control velvet grass	EM-2	✓	✓	✓	✓	✓	✓	✓	
<b><u>Access Management</u></b>									
Develop Access Management Action Plan	AM-1	✓	✓	✓	✓	✓	✓	✓	
Implement Access Management	AM2		✓		✓	✓	✓	✓	
<b><u>Species-Specific Management</u></b>									
Develop Ben Lomond Wallflower Action Plan	BL-1						✓		
Ben Lomond Wallflower Enhancement	BL-1						✓		
Ben Lomond Wallflower Caging	BL-1						✓		
Ben Lomond Wallflower Seed Storage	BL-1						✓		
Develop Zayante Band-Winged Grasshopper Action Plan	Z-1					✓			
Zayante Band-Winged Grasshopper Enhancement	Z-1					✓			
Santa Cruz Kangaroo Rat Action Plan	SCKR-1			✓					
Santa Cruz Kangaroo Rat Enhancement	SCKR-1			✓					

#### 4.1.1 Disturbance Management

**Fire Management Strategy:** Use prescribed fire and fire surrogates (i.e., vegetation management) that can simulate the beneficial effects of fire, to:

1. maintain or enhance native plant community structure and species composition in Sandhills chaparral and sand parkland communities that are susceptible to succession to non-sandhills communities, particularly in long-unburned areas or areas featuring transitional soils or more mesic microclimates (i.e., north-facing slopes);
2. create and maintain a mosaic of communities of varying successional stages that can maximize diversity and provide a range of abiotic and biotic conditions that can increase resiliency to climate change within the landscape;
3. maintain or expand open (sparsely vegetated) habitat required by the Zayante band-winged grasshopper, Santa Cruz kangaroo rat, and the three rare herbaceous plants, Ben Lomond spineflower, Ben Lomond wallflower, and Ben Lomond buckwheat;
4. promote establishment of fire-dependent species, including silverleaf manzanita, which establishes primarily following fire which promotes seed germination; and
5. reduce the risk of catastrophic wildfire, which could negatively impact rare species populations as well as adjacent human communities.

**Fire Management Technique FM-1:** Develop and maintain a current fire management plan that identifies:

- A. goals and objectives for the management of fire and fuels within each site;
- B. proactive fire management actions to achieve the goals and objectives within each property and overall;
- C. wildfire suppression strategies (i.e., aerial attacked and manual fire lines) that are most compatible with the conservation goals of the site, to facilitate protection of Sandhills communities during fire suppression activities conducted to protect human lives and property; and
- D. post-fire monitoring and remedial management techniques to limit negative effects of wildfire and fire surrogates, including monitoring for the invasion and spread of exotic plants and evaluating the effects of the fire or treatment on rare species populations and habitat.

**Fire Management Technique FM-2:** Implement prescribed fire and fire surrogates outlined in the fire management plan, to achieve the goals and objectives for the ecosystem, communities, and rare species. Vegetation management can be conducted in collaboration with CAL FIRE through their Vegetation Management Plan (VMP) program, which provides a skilled and cost-effective program to achieve the biodiversity goals for ecosystems, communities, and species while also promoting Objective B3, to reduce the risk of catastrophic wildlife. In 2018, the CAL FIRE VMP program was used to conduct a successful 1-acre prescribed fire in senescent Sandhills chaparral, and create a fuel break along the boundary of, the Ben Lomond Sandhills Preserve of the Zayante Sandhills Conservation Bank (McGraw 2019b).

The District is currently working with a consultant to develop a fire management plan for the District's lands. The District-wide fire management plan will be developed to be consistent with the HMMP. Likewise, development and implementation of fire/vegetation management plans for the Olympia Conservation Area will reflect that broader plan, once available.

**Soil Disturbance Strategy:** Manage natural factors that disturb the soil, including erosion due to water, gravity, and wind, and animal disturbances including wildlife trails and burrows (e.g., gopher mounds), as well as anthropogenic factors including trails, roads, previously mined areas, to:

1. Create and maintain areas of friable (loose) sand soils lacking dense herbaceous plant cover or litter, which are preferentially used by Zayante band-winged grasshoppers and Ben Lomond wallflower;
2. Create and maintain early successional habitat conditions characterized by relatively open canopy (e.g., <20% cover) of woody vegetation that are preferentially utilized by the Zayante band-winged grasshopper and the three herbaceous plant species;
3. Promote diverse assemblages of native herbaceous plants found in the sandhills, many of which are also adapted to disturbance and occur in early successional habitats and/or loose soils, including curly leaf monardella, gilia, and pussy paws; and
4. Reduce the abundance of widespread and abundant exotic annual grasses and forbs, which proliferate in open canopy areas in sand parkland the absence of disturbance.

**Soil Disturbance Technique SD-1:** Develop an action plan to manage soil disturbances for the Sandhills properties, that identifies:

- A. existing soil disturbances that can be maintained (e.g., existing trails or slides) or introduced (i.e., new treatments) to achieve the goals and objectives within each property and overall; and
- B. disturbance treatments to increase the area of loose sand soil and open habitat, including disturbance treatments involving heavy equipment, off-highway vehicles, horses, or other suitable soil disturbance agents. Treatment prescriptions should identify the location, area, and shape of the treatment area, and the intensity and frequency of the disturbance, to maximize the beneficial effects while minimizing collateral damage.

**Soil Disturbance Management SD-2:** Implement soil disturbance management as outlined in the soil disturbance management action plan to achieve the biodiversity goals for ecosystems, communities, and species and cobenefited goals and objectives related to compatible education and recreation.

#### 4.1.2 Exotic Plant Management

**Exotic Plant Management Strategy:** Eradicate and control populations of exotic plant species to:

1. maintain or expand the area of open (sparsely vegetated) habitat required by Zayante band-winged grasshopper, Santa Cruz kangaroo rat, and the three rare herbaceous plant species;

2. maintain or increase the diversity and abundance of other native plant species that are outcompeted by exotic plants, including other Sandhills specialty plant species (Appendix B), and host plants for the rare native animals;
3. prevent alteration of Sandhills soils, which can degrade conditions for native plants and promote exotic plants, including increased nitrogen caused by nitrogen-fixing invasive plants (e.g., acacias and brooms) and also increased organic matter resulting from dense biomass production of exotic annual grasses and forbs;
4. reduce fuels that can promote potentially destructive wildfires; and
5. prevent the invasion and spread of new exotic plants that would degrade habitat through the mechanisms outlined above, and incur costs associated with their control.

**Exotic Plant Management Technique EM-1:** Develop and maintain a current exotic plant management action plan to guide efficacious work to manage exotic plant species in the Sandhills and includes the following:

- A. Priorities for exotic plant management based upon the benefits of treatment, the risk if treatment is not implemented, and the feasibility of control based on the criteria outlined in Table 11. These criteria were applied to the mapped occurrences of exotic plants species identified during this planning project (Section A.5.2). Table 12 presents the acreages of exotic plants in each of four priority categories, by guild (group of ecologically related species) by site.
- B. Identify preferred and alternative treatments to eradicate or control each exotic species or guild, based on the best available scientific information about treatment effectiveness, and in consideration of the unique aspects of the Sandhills ecosystem and species ecology, including known or likely impacts to the rare species. The techniques should be integrated with the soil disturbance management action plan, as soil disturbances can help control some guilds of exotic plants (i.e., exotic grasses and diminutive forbs) and may promote others (e.g., invasive thistles such as Italian thistle and tocalote). The techniques must be consistent with the District's Integrated Pest Management Policy; the current version is provided in Appendix H, though plan implementers will be sure that exotic plant management is consistent with any updated policies or plans related to pesticide use.
- C. Outline an early detection-rapid response program to detect and eradicate new invasions, which is often the most cost-effective method of reducing the impacts of exotic plants on rare species and their habitats; and
- D. Identify a schedule and budget for priority exotic plant control work that addresses follow-up treatments required to achieve the long-term goals and objectives. The costs can refine those estimates initially outlined for projects in Section 4.2 (Table 21 in Section 6.6).

**Table 11: Criteria and scoring used to prioritize invasive plant species occurrences for treatment.** Benefit and Risk address what can be achieved through treatment. Feasibility assesses the constraints or the extent to which they are limited. Each factor is scored on a scale of 1-5 based on the criteria provided, in which 5 meets the criteria based on multiple considerations, 3 = meets the criteria to a lesser degree/fewer of the considerations, 1 = does not meet the criterion/reflects few or none of the considerations. Scores of 2 and 4 are assigned to intermediate levels.

Criteria	Definition	Considerations
<p><b>Benefit</b></p> <p>1= Less Benefit 5 = More Benefit</p>	<p>If successful, the treatment will promote rare species populations, enhance diversity in special communities, restore natural community structure, and/or promote ecosystem processes.</p>	<ul style="list-style-type: none"> <li>• The treatment will maintain or promote plant or insect populations, by removing exotic plants that: <ul style="list-style-type: none"> <li>○ compete with rare native plants, and/or</li> <li>○ degrade habitat for a rare native animal.</li> </ul> </li> <li>• The treatment will promote native species diversity in a sand parkland or sand chaparral communities</li> <li>• The treatment will maintain or restore natural community structure, such by <ul style="list-style-type: none"> <li>○ Removing trees from shrublands or herb-dominated communities;</li> <li>○ Removing shrubs from herb-dominated communities;</li> <li>○ Removing tall or dense herbs from short or sparse herb-dominated communities.</li> </ul> </li> <li>• The treatment will promote natural ecosystem processes, including by eliminating species that affect: <ul style="list-style-type: none"> <li>○ nutrient cycling, as in the case of nitrogen fixers;</li> <li>○ hydrologic conditions, such as by reducing water levels in wetlands, ponds or streams, or soils where moisture is limiting to native plant growth, or</li> <li>○ fire cycles, by creating dense and/or highly flammable fuels.</li> </ul> </li> </ul>
<p><b>Risk</b></p> <p>1 = Less Risk 5 = More Risk</p>	<p>If successful, the treatment will significantly reduce future impacts that will likely result from the future invasion and spread of the species occurrence.</p>	<ul style="list-style-type: none"> <li>• The species is highly invasive, and will likely significantly increase its distribution and abundance in the absence of treatment.</li> <li>• The species has large impacts in the sandhills communities, though competition and/or alterations to natural communities and ecosystem processes.</li> <li>• Delaying treatment will likely substantially increase the cost of future treatment.</li> <li>• The species is in a heavily traveled route where it can more easily be vectored.</li> </ul>

**Table 11: Criteria and scoring used to prioritize invasive plant species occurrences for treatment.** Benefit and Risk address what can be achieved through treatment. Feasibility assesses the constraints or the extent to which they are limited. Each factor is scored on a scale of 1-5 based on the criteria provided, in which 5 meets the criteria based on multiple considerations, 3 = meets the criteria to a lesser degree/fewer of the considerations, 1 = does not meet the criterion/reflects few or none of the considerations. Scores of 2 and 4 are assigned to intermediate levels.

Criteria	Definition	Considerations
<b>Feasibility</b>  1 = Less Feasible 5 = More Feasible	Treatments are likely to be effective, and their cost are appropriate given the treatment benefits, including in reducing risk.	<ul style="list-style-type: none"> <li>• A known treatment has been proven effective is available and will likely achieve the treatment goal and objective.</li> <li>• The resources required to achieve and then maintain the treatment goal and objective over time are relatively certain and are proportional to the benefits.</li> <li>• The species is either absent or effectively managed on neighboring lands, such that reinvasion from adjacent lands will not significantly impede work to achieve the treatment goal and will enable it to be sustainable.</li> <li>• The treatment can be safely conducted using methods that minimize risk to the plan species and people to exposure to harmful chemicals, steep slopes, or other unsafe working conditions.</li> </ul>

**Exotic Plant Management Technique EM-2:**

Implement invasive plant control projects in general order of their priority and in a manner that promotes overall effectiveness of the program. Table 12 identifies the areal extent (i.e., acreage) of each guild (species with similar ecologies and impacts) in each of two priority categories devised based on the scoring in Table 11. The scoring allowed for medium and low priority categories; however, all of the current occurrences were identified as ‘very high’ or ‘high’ priority.

While occurrences of a given species were individually rated, treating all occurrences of a given species or guild as part of the same effort will promote efforts to control or eradicate the species, by preventing reinvasion from nearby occurrences that are untreated because of their lower rating.

This approach is reflected in identifying near-term exotic plant management protects in Section 4.2.

4.1.3 Access Management

**Access Management Strategy:** Manage human access, uses, and other activities within the Olympia Conservation Area to ensure they are compatible with the goals and objectives for ecosystems, communities, and species.

**Access Management Technique AM-1:** Develop and maintain a current access management action plan to guide appropriate research, education, and recreation to promote achievement of the biodiversity goals and objectives. The plan should identify the type, location, frequency, and intensity of human uses within each site, and the desired future habitat conditions associated with it. The goals of the action plan are to:

- A. Facilitate non-destructive research that increases understanding of the ecology of the Sandhills ecosystem, communities, and species; the effectiveness of management and restoration strategies; species vulnerability and adaptation to climate change; or fills other important data gaps to protect, restore, and manage Sandhills habitat and conserve its rare species.
- B. Allow and, where feasible, facilitate, educational use that increases public understanding of the uniqueness, rarity, and fragility of the Sandhills ecosystem, communities, and species, to promote public support for Sandhills protection, restoration, and management.
- C. Allow other (i.e., non-educational or research) public use, including passive recreation, that is compatible with, and where possible, promotes, the achievement of the biological goals and objectives, including as part of soil disturbance management (Section 4.1.1). Current research and monitoring of

**Table 12: Invasive plant species in each site according to their treatment priority and guild**

Priority and Guild	Acres (Approx.)
<b>Very High Priority</b>	<b>0.005</b>
Brooms	0.005
<b>High Priority</b>	<b>0.197</b>
Brooms	0.017
invasive herbs	0.058
invasive vines	0.069
ornamentals ( <i>Pinus cf. contorta</i> )	0.014
velvet grass	0.039
<b>Total</b>	<b>0.203</b>

Sandhills sites suggest that hiking can be compatible with Sandhills conservation goals, provided that it is relatively low frequency and intensity. Such use may benefit disturbance-adapted species. However, other uses, including that from off-highway vehicles, equestrians, and mountain bikes, removes most native plants, including the host plants for the native animals and the rare native plant themselves, and can promote erosion in some circumstances, which can degrade habitat. Such intensive uses may help create open habitat if utilized as part of infrequent (i.e., once every 1-5 years) management. The access management can be used to develop the specific prescriptions for access based on site conditions.

**Access Management Technique AM-2:** Implement access management as outlined in the access management plan. This includes maintaining the fence and signage designed to deter trespass from the District service road/trail, conducting regular patrols to detect and address incursions, and posting wireless cameras or taking other steps needed to otherwise maintain the appropriate type and level of access.

#### 4.1.4 Restoration

**Habitat Restoration Strategy:** Restore Sandhills habitat that has been degraded by prior land-use activities including mining, development, vegetation clearing (e.g., encroachment), exotic plant invasions, and/or intensive recreation, to address the legacies of these activities that will preclude or limit recolonization by native sandhills plants and animals and thus enhance habitat for rare species. Restoration will involve two main approaches:

1. **Passive Restoration:** Areas where native plant species have been removed through clearing, trampling (e.g., trail use), and competition by large or dense exotic plants, but that feature largely intact Zayante soil, can generally be restored through passive means. Native plants will naturally recolonize the soils once the stressors are alleviated, such as when invasive plants are removed and trampling or clearing is discontinued. Sandhills species are adapted to disturbance, and many native plants including the three endemic herbaceous plants as well as diverse assemblage of other sandhills specialty plants (Appendix B) will recolonize such areas as they do areas following disturbance (McGraw 2004b).
2. **Active Restoration:** Restoration treatments including soil modifications, erosion control, and seeding/planting, may be needed to promote native plant establishment in some areas where passive restoration will not result in the designed plant species composition. These are anticipated to include areas where: 1) soils have been altered by land use, which can reduce the depth of soil, compact soil, and alter soil texture and chemistry, or invasive plants (i.e., nitrogen fixers); 2) soils are actively eroding in a manner that inhibit establishment of even disturbance-adapted plants, or otherwise degrades habitat; 3) dense litter or thatch remains on the soil surface (i.e., following invasive plant removal) and inhibits native plant establishment; and 4) restoration areas are large and cannot be naturally recolonized expeditiously due to seed dispersal limitations.

These approaches will be evaluated on a case-by-case basis as future restoration needs arise and reflected in restoration action plans.

**Restoration Technique R-1:** Develop a restoration action plan for any areas of Sandhills habitat that where prior mining, development, and dense woody invasive species, among other land-use activities, have degraded habitat for the native plants and animals. The restoration action plan should include:

- A. Restoration goals and objectives as well as success criteria for the ecosystem, communities, and rare species that tier off those goals and objectives outlined in this plan;
- B. Restoration treatments that can achieve the biodiversity goals and objectives, including by addressing inimical soil conditions, erosion, and exotic plant species, among other factors.
- C. Where natural recruitment will not be sufficient to reestablish native plant composition over time, identify appropriate active revegetation techniques including seeding and planting of native plant species from site-collected material or other resources that maintains the genetic integrity of populations within the site, using methods that will limit the invasion and spread of exotic plants (i.e., appropriate use of fertilizers and irrigation) and that will avoid introduction of plant pathogens; and
- D. Implementation guidance including species protection measures designed to minimize short-term negative effects of the projects and maximize their long-term benefits for rare species, permitting programs or approaches, and grant or other funding opportunities. Appendix C provides species protection measures that have been utilized in similar Sandhills restoration projects.
- E. Monitoring methods that will be used to evaluate achievement of the goals and objectives.

**Restoration Technique R-2:** Implement restoration as outlined in the restoration action plan as resources allow. Section 4.2.3 describes the initial restoration activity identified for the initial phase of management.

#### 4.1.5 Species Population Enhancement

**Species Population Enhancement Strategy:** Implement species-specific management techniques when and where strategies for managing disturbances, exotic plants, and access may not be sufficient to achieve the goals and objectives for the species.

**Ben Lomond Wallflower Population Enhancement Techniques BL-1:** Develop and implement a comprehensive strategy to increase the population of Ben Lomond wallflower within the Olympia Conservation Area. The strategy should identify specific measures to:

- A. Prevent extirpation of the small population by: 1) caging adults to reduce deer herbivory, and 2) creating and then seeding (using site-collected seed) small-scale disturbance areas in and adjacent to the occupied habitat area to promote wallflower population growth.
- B. Ensure conservation of the genetic diversity represented in the disjunct Ben Lomond wallflower populations at the property, by submitting seed collected and stored along maternal lines (i.e., individual plants) to a seed bank facility for long-term conservation storage and use in research,

species recovery, and related conservation work. Seed banking should be conducted following a protocol designed to limit negative impacts on persistence of the populations, and can be facilitated through participation in the California Native Plant Society California Plant Rescue (CaPR).

Because Ben Lomond wallflower is a state-listed species, a scientific, educational, or management permit issued pursuant Section 2081(a) of the California Endangered Species Act will be obtained prior to any seed collection or other work constituting take of the species (Section 6.3).

**Zayante Band-Winged Grasshopper Population Enhancement Techniques Z-1:** Develop and implement a habitat enhancement strategy to maintain or expand the distribution and abundance of Zayante band-winged grasshopper and otherwise enhance the species population persistence at the site. The strategy should be integrated within and build upon the strategies developed to manage exotic plants (Section 4.1.2), fire, and soil disturbance (Section 4.1.1).

**Santa Cruz Kangaroo Rat Enhancement Technique SCKR-1:** Work with partners agencies and landowners as well as species experts to develop and implement a strategy to expand the distribution, abundance, and population persistence of Santa Cruz kangaroo rat. The strategy should evaluate:

- A. The suitability of the site for reintroduction of the species, based on the plant community structure and species composition, and landscape factors including proximity to development and the attendant cats and dogs.
- B. The likelihood of the success of the introductions, given the life history and ecology including territorial nature of kangaroo rats, as attempts to relocate other kangaroo rat species have faced challenges.
- C. The potential negative impacts of the introduction on the donor population, which is the last known population of the subspecies.

**Other Endemic Species Enhancement Technique ES-1:** Where passive revegetation will not be sufficient to reestablish native plant assemblages for the Mount Hermon June beetle, and occurrences of the Ben Lomond spineflower, Ben Lomond buckwheat, and silverleaf manzanita, use active revegetation including seeding and planting of native plant species from site-collected material or other resources that maintains the genetic integrity of populations within the site to expand the populations and increase their resiliency to climate change and other threats.

## 4.2 Initial Phase Management, Restoration, and Enhancement

The overall approach to management in the initial phase is to conduct relatively low-cost but high-priority management and restoration actions of known benefits to the endemic species and Sandhills communities. The available funds will also be allocated to implementing cost-effective monitoring to track conditions of the site, effectiveness of specific projects and restoration actions, and then at the end of the phase, re-assess the site conditions using approaches similar to the 2018 surveys to evaluate changes relative to those pre-management.

This section describes the management actions recommended for the first five years of plan implementation (2020-2024). Management actions were identified based on a review of the strategies and techniques (Section 4.1), the site conditions, the anticipated benefits to the plant communities and

species (Section 2), and the funding available for management during the initial phase (Section 6.7). The near-term management actions are designed to achieve benefits for multiple rare species through exotic plant control, and prevent the extirpation of the Ben Lomond wallflower through targeted measures for that exceptionally rare species.

Long-term management strategies will be developed following the initial management phase, to reflect changed conditions, lessons learned, and desired next steps. The scope of management will also be expanded at that time, to reflect increased resources available through contributions to the endowment (Section 6.7). The management actions will also be updated to reflect any expansions to the area covered by the plan, including as part of additional land protection through the District's Sandhills Habitat Conservation Plan or non-mitigation-based programs and policies including those that might be funded from outside grants.

#### 4.2.1 Exotic Plant Management Action Plan

In the near term, exotic plant management in the Olympia Conservation Area will include the following actions:

1. Control and eradicate, over time, French broom and Portuguese broom, which can have large negative impacts on native plants, degrade habitat for the Zayante band-winged grasshopper, create fuels that increase the risk of wildfire, increase the soil fertility through nitrogen fixation, and can spread rapidly and form a long-lived seed bank;
2. Eradicate the single non-native pine (*Pinus cf. contorta*), which currently occurs at limited distribution but could spread, thus increasing its impacts;
3. Control invasive herbaceous plants that occur at limited distribution and impacts but that have high potential to spread, particularly if conditions change (e.g., following fire), including Italian thistle (*Carduus pycnocephalus*), bull thistle (*Cirsium vulgare*), poison wild lettuce (*Lactuca virosa*), and velvet grass (*Holcus lanatus*).
4. Control invasive vines including periwinkle (*Vinca major*) and spring vetch (*Vicia sativa*), which have limited distribution but can spread if conditions change; and
5. Implement early detection and rapid response, to detect new occurrences and invasive plants and control them before they can spread throughout the site and cause impacts to the Sandhills communities and species.

##### 4.2.1.1 Priority Exotic Plant Management Treatments

Table 13 identifies the initial exotic plant management treatment plan which was developed per management strategies EM-1 and EM-2. For each targeted plant, it provides the treatment priority, methods, seasonality, and important notes about implementation. Map 9 identifies the mapped occurrences of the invasive plants from 2018. A reconnaissance level site visit confirmed several of the occurrences persist, however the velvet grass was not observed in most locations evaluated. As part of work to implement the plan, all occurrences of the target species will be treated as part of the action plan, which will also be adjusted to reflect any new species meeting the criteria as outlined in EM-1 and EM-2.

The treatments will all be implemented during the initial management phase, though will be initiated in phases based on their priority as follows and as illustrated in Table 13:

- Year 1: Portuguese broom, French broom, velvet grass, and thistles;
- Year 2: Add spring vetch;
- Year 3: Add ornamental pine;
- Year 4: Add periwinkle; and
- Year 5: Add exotic annual grasses and forbs.

The exotic plant management actions listed above will be phased in sooner if additional resources are available.

The exotic management action plan will be updated as part of annual reports and work plans, to reflect any changes in site conditions, including new species, and the effectiveness of treatments, among other new information, to guide ongoing exotic plant management to achieve the goals and objectives.

#### 4.2.1.2 Early Detection/Rapid Response

Early detection and rapid response will be implemented to detect and eradicate new exotic plant species that invade the Olympia Conservation Area before they have a chance to spread and establish a seed bank. This strategy will be implemented as part of quarterly monitoring, during which a biologist who can identify exotic plant species will walk throughout the conservation area, to evaluate a series of habitat conditions (Section 5.1.1) including to detect occurrences of new invasive species or new populations of invasive species already at the site. The biologist will also evaluate occurrences of invasive plant occurrences during the course of implementing priority exotic plant management tasks, other management tasks, and monitoring.

Additional monitoring for newly established exotic plant occurrences will also be conducted following events known or likely to promote invasion, including:

1. disturbances, such as fire, road or trail work, landslides;
2. infrastructure improvement projects adjacent to the conservation area (e.g., pipeline or well maintenance);
3. habitat management or restoration projects; and
4. very wet years (e.g., El Niño years).

Any new exotic plant species detected will be documented through mapping and then eradicated during the season of initial detection to prevent reproduction, wherever feasible. Follow-monitoring will be conducted to ensure the species has been eradicated and to evaluate reinvasion of the site, particularly if the species is known to occur in the region, thus increasing the likelihood of reinvasion.

Table 13: Initial Exotic Plant Action Plan Treatments<sup>1</sup>

Species	Priority	Type	Treatment	Timing	Treatment Comments
Ornamental Pine ( <i>Pinus cf. contorta</i> )	High	Single tree	Cut at base	Anytime	<ul style="list-style-type: none"> <li>• Cut down the tree at the base of the soil.</li> <li>• Dispose of entire tree or woodchips in District yard or green waste to avoid suppressing native Sandhills plants and rare insects.</li> </ul>
French broom and Portuguese broom	Very High	Dense monocultures of seedlings	Flame (i.e., blanch using the flame from a butane torch)	Late January – early March	<ul style="list-style-type: none"> <li>• Flame where broom density is high and native plant cover limited, as the treatment will impact native plants</li> <li>• Flame during wet conditions (during or immediately after rain when humidity is high) to reduce risk of fire; a McLeod and fire extinguisher must be on hand during treatment.</li> </ul>
	Very High	Sparse seedlings, juveniles, and adults	Pull by hand or using a weed wrench; remove all biomass from the site	Juveniles: any time Adults: before seed set (before June/July)	<ul style="list-style-type: none"> <li>• Treat during the fall to limit impacts to Zayante band-winged grasshopper and native herbaceous plants as a result of trampling.</li> <li>• Where soils are silty or compact elsewhere in the Olympia Watershed Property, treat during the wet season when soils are looser and pulling easier.</li> <li>• Dispose of biomass in the District yard or landfill to prevent it from impacting native plants and rare species if left to remain on the soil surface</li> </ul>
Velvet Grass	High	All	Hand pull and bag to remove from site	May-June	Treatment can be done any time, but conducting treatments when grasses are in flower can help distinguish veldt grass from widespread annual grasses (e.g., rip gut brome) while enabling it to be removed before it sets seed in late June
Italian thistle, bull thistle, poison wild lettuce	High	All	Pull by hand or cut at base with a hoe	March-May	If plants have bolted, cut, bag, and remove inflorescences to prevent seed set, which can occur after plants have been cut/pulled.
Spring vetch	High	All	Pull by hand	March-May	<ul style="list-style-type: none"> <li>• Hand pull and remove in the spring</li> <li>• Work can be conducted any time of year provided access is from riparian area where sensitive species do not occur.</li> </ul>
Periwinkle	High	All	Pull by hand or with McLeods	Any time	<ul style="list-style-type: none"> <li>• Be sure to remove all roots and stems to prevent resprouting</li> <li>• Work can be conducted any time of year provided access is from riparian area where sensitive species do not occur.</li> </ul>
Exotic annual grasses and fobs	Medium	Dense patches	Weed whack	March-April	Weed whack dense areas of exotic annual grasses, which primarily occur in the mesic sand parkland and around the oak woodland (i.e., oak trees).

#### 4.2.2 Access Management Action Plan

This section outlines the initial access management action plan for the Olympia Conservation Area and adjacent Mayer Conservation Easement Area which was developed per management strategy AM-1. Table 14 summarizes the elements of the plan, which is designed to allow use of the site for compatible uses, particularly research and education which can promote long long-term conservation, while limiting unsupervised access which could have negative impacts on the Sandhills species and communities if not well managed. The access plan will be revised, as needed, as documented in annual reports and work plans, to reflect the elements of techniques AM-1 and AM-2 (Section 4.1.3) as well as any management of disturbance as part of technique SD-1 (Section 4.1.1).

**Table 14: Access Management Action Plan**

Action	Description	Personnel	Frequency
Research and Education Access Management	District will develop and implement an application program to screen proposals for research to be conducted at the site, to ensure it is compatible with other aspects of the site’s conservation and management  District will develop and implement a program to screen applications for proposal for educational access (e.g., for site tours) to ensure it is compatible with other aspects of the site’s conservation and management	District	Ongoing
Conservation Area Condition Monitoring	As part of quarterly monitoring of the Olympia Conservation Area (Section 5.1.1), a qualified biologist will evaluate the status of fences and signs and look for signs of incursions/activity as well as assess impacts of all uses (authorized and unauthorized) on the site	Qualified Biologist	Quarterly
Site Patrols	The District will continue to have the entire Olympia Watershed Property patrolled to assess public uses including detect any access into the Olympia Conservation Area.	District or contractor	Monthly
Fence and Sign Maintenance	The District will maintain the current fences and signs as well as erect any new fences and signs determined to be necessary to increase compliance with the closure of Olympia Conservation Area to unsupervised public access. Fences should be wildlife friendly, with smooth wire on the top and bottom, to facilitate wildlife movement.	District or contractor	Ongoing

##### 4.2.2.1 Allowed Access

During the near term, public access to the Olympia Conservation Area will be limited to research and education.

#### 4.2.2.1.1 Access for Research

The District will develop and review applications for scientific research projects within the Olympia Conservation Area and approve research applications based on the following criteria:

1. **Contributes Important Information:** increases understanding of one or more of the following:
  1. the ecology of the Sandhills ecosystem, communities, and species;
  2. the effectiveness of management and restoration strategies;
  3. species vulnerability and adaptation to climate change; or
  4. fills other important data gaps to protect, restore, and manage Sandhills habitat and conserve its rare species.
2. **Minimize Negative Impacts:** is conducted following steps that will be designed to ensure that negative impacts to native Sandhills communities and species are avoided or minimized and that it will not impede successful conservation, management, and monitoring of the site (e.g., impacts to monitoring plots, etc.).
3. **Permitted:** is conducted with appropriate permits from state and federal wildlife agencies including recovery permits issued Section 10(a)(1)(A) of federal Endangered Species Act), scientific, educational, or management permit issued pursuant Section 2081(a) of the California Endangered Species Act, and scientific collection permits issued by the California Department of Fish and Wildlife.
4. **Reported:** results are reported to the District annually and upon completion of the project, so that the information gained from the research can be integrated into ongoing conservation and management of the site.

The District may add additional conditions designed to maintain health and safety and ensure the research is compatible with the use of the site for the public water supply.

#### 4.2.2.1.2 Access for Education

The District will allow access to the Olympia Conservation Area for compatible educational uses such as tours by school groups and non-profit organizations. The District may itself also conduct educational tours of the site. The District will review applications for education access to ensure that the events will meet the following criteria:

1. **Requires Access to Sandhills:** requires access to the Sandhills (as opposed to any type of habitat) to be effective;
2. **Increase Sandhills Awareness:** Increases public understanding of Sandhills, with priority given to those that educate about the uniqueness, rarity, and fragility of the Sandhills ecosystem, communities, and species, to promote public support for Sandhills protection, restoration, and management.
3. **Minimize Negative Impacts:** is conducted following steps that will limit impacts to native Sandhills communities and species and that will not impede successful conservation, management, and monitoring of the site (e.g., impacts to monitoring plots, etc.).

#### 4.2.2.1.3 Disallowed Access

During the initial phase of management, the Olympia Conservation Area will be closed for unsupervised access such as recreational use, including hiking, equestrian use, drone operation, and other unsupervised activities. Currently, the conservation area does not feature any of the trails that are currently open for pedestrian and equestrian as occur elsewhere within the Olympia Watershed Property. The conservation area could be opened if/when recreational use is identified as a disturbance management strategy to promote achievement of the goals and objectives as outlined in Section 4.1.1. If/when unsupervised access is used as a management tool, it will be carefully monitored and regulated to ensure that it has the desired benefits and does not result in unintended negative consequences, which could lead to closures.

#### 4.2.2.2 Access Regulation

The District will maintain and expand, as needed, the fence and signage used to deter unsupervised access, where and when needed. The site is largely fenced and where fences are missing, dense woody vegetation creates a 'brush barrier' that appears to deter access. The site also features interpretive signs as well as 'Sensitive Habitat' signs that are visible from the service road/trail and provide the rationale for the closure. Quarterly monitoring will be used to evaluate incursions into the Olympia Conservation Area and determine the need to replace or enhance signs and fencing to deter access. This more focused monitoring will be complemented by patrols throughout the Olympia Watershed Property, that the District implements monthly through a contract with the Land Trust of Santa Cruz County.

#### 4.2.3 Restoration

The northwestern corner of the Olympia Conservation Area, adjacent to the riparian habitat, features an approximately 0.17-acre area that supports dense exotic annual grasses and forbs including rip gut brome, rattail fescue, and smooth cat's ears. This degraded habitat does not support the four endemic plants, is not suitable for the Zayante band-winged grasshopper due to the dense growth of exotic grasses and has only limited cover and diversity of other native plants (e.g., sparse California poppy, *Eschscholzia californica*). This area previously supported a stand of silver wattle (*Acacia dealbata*), which was removed by the District between October 2011 and January 2012 as part of a larger effort to control the invasive tree throughout the Olympia Watershed Property (SLVWD 2012). The lack of native plant recolonization reflects the following interrelated factors (McGraw 2004a,b):

1. The nitrogen-fixing acacias increased the soil nitrogen, which promotes competitive exotic grasses over native herbaceous plants adapted to the low-nutrient Zayante soil;
2. The branches and leaf litter that were left on the soil surface, which inhibit establishment of smaller-seeded native plants and can promote larger seeded exotic plants, such as ripgut brome;
3. The strong competitive effects of the exotic annual grasses and forbs on the native herbaceous plants.

Table 15 outlines the elements of a restoration action plan for this area, based on the framework in Section 4.1.4.

Table 15: Restoration Action Plan for the 0.17-acre silver wattle area

Plan Element	Description
Goals and Objectives	<p><b>Goal:</b> Restore habitat for the native herbaceous plants and Zayante band-winged grasshopper, and enhance habitat for the Mount Hermon June beetle in the 0.17-acre area where silver wattle was removed.</p> <p><b>Objectives:</b></p> <ul style="list-style-type: none"> <li>O1: Establish an assemblage of native plant species similar in structure and species composition to the adjacent sand parkland habitat surrounding the treatment area; specifically, the restoration areas will have native plant richness and native plant cover that is at least 90% of that found in the adjacent sand parkland habitat surrounding the Project site after five years.</li> <li>O2: Establish Ben Lomond spineflower in the restoration area, with average absolute cover of at least 5% after five years.</li> <li>O3: Establish Ben Lomond wallflower in the restoration area, with average absolute cover of at least 1% after five years.</li> <li>O4: Establish Ben Lomond buckwheat in the restoration area, with average absolute cover of at least 3% after five years.</li> <li>O5: Provide food for the Mount Hermon June beetle by establishing a diverse assemblage of native plants, including native plant cover and richness that is at least 90% of that in adjacent sand parkland habitat surrounding the Project site after five years.</li> <li>O6: Provide suitable habitat for the Zayante band-winged grasshopper, by establishing native plant species that are either host plants for the Zayante band-winged grasshopper (ZBWG) or that provide important habitat for ZBWG, such as silver bush lupine (<i>Lupinus albifrons</i> var. <i>albifrons</i>) and bristly golden aster (<i>Heterotheca sessiliflora</i> ssp. <i>echioides</i>), which should achieve at least 3% cover in the restoration areas, while average absolute exotic plant cover will be less than 20% after five years.</li> <li>O7: Prevent widespread establishment of any invasive plants, including brooms, thistles, velvet grass, which will collectively average no more than 5% absolute cover after 5 years.</li> </ul>
Treatments	
Remove litter and woody debris	In the fall, remove all of the remaining tree leaf litter, woody debris (i.e., branches), and also thatch from exotic annual grasses and forbs, using rakes and McLeods. Avoid impacting native perennial plants, but the remainder of the area should feature bare ground (open sand soil). Remove the biomass to the District yard or green waste.

**Table 15: Restoration Action Plan for the 0.17-acre silver wattle area**

Plan Element	Description
Broadcast Seed	In the fall, disperse a mix of site-collected native plant seed that includes Ben Lomond spineflower, Ben Lomond wallflower <sup>1</sup> , Ben Lomond buckwheat, silver bush lupine, and sessile golden aster, and a mix of additional site-collected native plant seeds of herbs and subshrubs characteristic of sand parkland (Section 2.5.3, Appendix B).
Control Exotic Plants	Control exotic plants using appropriate manual and mechanical methods each spring, including: <ul style="list-style-type: none"> <li>• weed whacking dense and tall exotic grasses and forbs, where doing so will not significantly impact the native plants;</li> <li>• hand pulling or using a hoe to remove isolated plants (e.g., brooms, thistles, invasive vines).</li> </ul>
Species Protection Measures	Implement the following relevant species protection measures which are summarized here and described in greater detail in Appendix C: <p>Measure #4: Conduct initial treatment in the fall after native plants have set seed and at the end of the endangered insects flight seasons.</p> <p>Measure #7: Flag any native plants to be retained within the treatment area prior to raking.</p> <p>Measure #8: Conduct a pre-project training for all workers to ensure that the measures are implemented and species impacts minimized.</p> <p>Measure #9: Have a biologist monitor (as well as implement) the restoration treatments.</p> <p>Measure #10: Minimize soil disturbance below 2” below the soil surface, to avoid impacts to fossorial Mount Hermon June beetles.</p> <p>Measure #12: Minimize impacts to native species by retaining those that can be retained within the treatment area.</p> <p>Measure #15: Conduct all fuel equipment maintenance (e.g., for the weed whacker) to avoid spills and leakage within the habitat.</p>
Monitoring	Monitor for five years using annual qualitative monitoring in the spring to visually assess site conditions and evaluate plant establishment including invasive plant species, to determine the need for follow-up treatments. <p>In Years 1, 3, and 5, visually estimate plant species cover in 10, 2m x 2m plots randomly located throughout the treatment area. To compare habitat to intact habitat, quantify plant species cover in 10, 2m x 2m plots randomly located in intact sand parkland habitat near the treatment area. Use the cover estimates to assess achievement of objective O1-O7.</p>

<sup>1</sup> A 2081(a) permit from the California Department of Fish and Wildlife will be obtained prior to handling Ben Lomond wallflower individuals.

#### 4.2.4 Species Enhancement

The initial phase of management will include caging adult Ben Lomond wallflower to prevent herbivory by deer, which greatly reduces seed production and could contribute to declines in the already small population that could lead to its extirpation as a result of demographic or environmental stochasticity (Section 2.6.3.2.4).

During February of each year, a biologist will search areas known or likely to be occupied by Ben Lomond wallflower to identify individuals that are likely to flower that spring based on their size and/or evidence of bolting (i.e., initiation of a flowering stalk). These individuals will then be caged using 4' tall wire cages made of 2" avian wire or 2" x 4" welded wire, or other cage materials with a minimum opening of 2", which is necessary to avoid limiting access by pollinators such as the chalcidon checkerspot butterfly (*Euphydryas chalcedona*).

## 5 Monitoring, Reporting, and Adaptive Management

The Olympia Conservation Area will be monitored to:

1. Assess general habitat conditions and determine the need for management;
2. Evaluate the effectiveness of specific habitat management and enhancement projects at achieving their goals and objectives; and
3. Track the status of the Sandhills communities and species to evaluate effectiveness of management at achieving the goals and objectives for their conservation within the site.

These monitoring objectives will be achieved by employing the following coordinated monitoring approaches:

1. **Condition Monitoring**, to evaluate known stressors including exotic plants and issues related to access, as well as other factors such as erosion and disease;
2. **Photomonitoring**, to track changes in the condition of the vegetation and habitat area over time;
3. **Project Monitoring**, to assess the effectiveness of restoration and management projects and determine the need for remedial actions; and
4. **Species and Community monitoring**, to evaluate the endemic species and their habitat, as well as the structure and species composition of the native plant communities.

Like management, monitoring in this plan will be phased. During the initial phase of implementation, monitoring will focus on assessing habitat conditions and evaluating the effectiveness of initial management and restoration. As additional funds are available, monitoring will include more detailed tracking of the Sandhills communities and species in order to evaluate achievement of the goals and objectives (Section 3). This phased approach will enable much-needed funds to be used for habitat management, restoration, and enhancement (sections 4.2 and 6.6).

Section 5.1 describes the overall monitoring approaches while Section 5.2 identifies the monitoring for the initial phase of plan implementation

### 5.1 Monitoring Approaches

#### 5.1.1 Conservation Area Condition Monitoring

The Olympia Conservation Area will be monitored to assess factors that can influence the goals and objectives, including exotic plants and access. This condition monitoring will be conducted quarterly in January, April, July, and October by a biologist who can identify exotic plants as well as evaluate access, erosion, disease, and other issues.

During condition monitoring, the biologist will walk throughout the conservation area and evaluate the factors in Table 16, and note management actions to address any issues identified.

Table 16: Conservation Area Condition Monitoring		
Condition	Methods	Management Actions
<b>Access Management</b>		
Fences	Visually inspect fence and document	Repair fence
Signs	Visually inspect interpretive and 'sensitive habitat' signs	Replace signs or repair vandalized signs
Access	Look for signs of access including footprints, dog and horse tracks and feces, debris, play equipment, etc.	<ul style="list-style-type: none"> <li>Map locations and determine access points for additional signage or fencing</li> <li>Remove debris and related materials</li> </ul>
<b>Exotic Plant Management</b>		
Early Detection-Rapid Response	Visually inspect conservation area with an emphasis on invasion 'hot spots' (e.g. perimeter, trails, riparian area, etc.) to detect new invasive plant occurrences	<ul style="list-style-type: none"> <li>Map and characterize any new invasive plants</li> <li>Develop and implement seasonally timed treatment</li> </ul>
Examine Prior Invasive Plant Treatment Areas	Visually inspect prior invasive plant treatment areas to assess the need for follow-up treatments	Develop and implement follow-up treatments where needed
<b>Other Factors</b>		
Other Factors	Monitors should examine the site for other conditions that could influence management, including plant die-off or dieback due to disease or drought	Response to additional factors will depend on their nature, with some natural factors likely disease not being subject to management.

### 5.1.2 Photomonitoring

Photomonitoring will be used as part of this plan to:

1. **Document the baseline conditions** of the Olympia Conservation Area; and
2. **Evaluate changes in habitat conditions** including plant community structure and general species composition over time.

To document baseline conditions, photomonitoring will be conducted at the outset of implementation of this plan, prior to the initiation of the near-term management actions including exotic plant management and access management, a series of permanent photomonitoring stations will be established throughout the conservation area. The stations will be located to capture important baseline conditions as well as representative conditions including:

1. **Plant Associations:** Representative conditions of the 14 plant associations (Table 2);
2. **Endemic Plant Occurrences:** Patches of the four rare plants;
3. **Endemic Insect Habitat:** Suitable habitat for the Zayante band-winged grasshopper and Mount Hermon June beetle;
4. **Management Issues:** Invasive plants, dense exotic plants, ingress/egress areas, and erosion features (i.e., trails on steep slopes).

To facilitate relocation, photostation locations will be permanently monumented on the ground (e.g., using a metal plate or stake) and recorded using a resource-grade GPS. At each point, the general subject and view direction (azimuth) will be recorded for each photograph. The digital photographs will be labeled according to the station, azimuth, and date; for example, P05\_143\_20200504 would be the name of a photograph taken at photostation 5 with an azimuth of 143 degrees on May 4, 2020. Labeling photos in this way will enable them to be viewed sequentially to readily evaluate changes over time when stored in the same digital file folder.

### 5.1.3 Project Monitoring

Projects implemented under this plan, including restoration projects as well as larger management projects (e.g., invasive plant control), will be monitored to ensure that they are achieving the goals and objectives and identify the need for any follow-up treatments or other remedial actions. The monitoring designs will be developed as part of the project, to reflect their nature including areal extent, goals, and objectives, but will generally include two elements: 1) qualitative assessments of conditions of the site, and 2) collection of quantitative data using systematic methods based on sound scientific sampling and the use of descriptive and inferential statistical analyses to evaluate specific metrics that reflect the desired conditions (i.e., success criteria) and track changes over time and/or compare conditions to reference sites, where appropriate. These results of project monitoring will be used not only to evaluate and document effectiveness and inform implementation of future work. As noted, the specific details of project monitoring will be developed based on the project. Section 5.2.4 outlines the elements of project monitoring for restoration of the former silver wattle treatment area and reflects the type of approach that will be used for project monitoring under this plan.

### 5.1.4 Species and Community Monitoring

The sandhills communities and endemic species in the site will also be monitored to track achievement of the goals and objectives (Section 3) based on specific success criteria for management of the Olympia Conservation Area. As part of the initial phase, the approach will be to reduce costs relative to more intensive species and community monitoring by implementing protocols similar to those implemented in 2018 to collect the data used to develop this plan (Appendix A). This will enable the monitoring to relate to the baseline conditions when the District was issued the take permit for the Probation Tank—the first project that utilized the conservation area as its compensatory mitigation (Section 1.2). Long-term monitoring of the conservation area will involve more detailed species and community monitoring. The long-term monitoring protocols will be developed when this plan is revised as part of work on the District’s Sandhills Habitat Conservation Plan, which is anticipated to expand on the habitat protection, management, and monitoring at the Olympia Watershed Property (Section 1.4).

## 5.2 Initial Phase Monitoring

During the initial phase of implementation of this plan, monitoring will focus on assessing habitat conditions and evaluating the effectiveness of initial management and restoration as summarized in Table 17.

**Table 17: Initial Phase Monitoring**

<b>Monitoring</b>	<b>Methods</b>	<b>Frequency</b>
Conservation Area Condition (Section 5.1.1)	Visual inspections to assess key habitat conditions that will influence achievement of the goals and objectives	Quarterly (January, April, July, and October)
Photomonitoring (Section 5.1.2)	Capture photographs from set photostations	Biennially
Project Monitoring (Section 5.1.3)	Monitor the silver wattle restoration project area	Qualitative monitoring annual Quantitative monitoring in Years 1, 3, and 5
Species and Community Monitoring (Section 5.1.4)	Monitor occurrences of and habitat for the six endemic species known to occur on the site, as well as the areal extent and species composition of the communities	At the end of the initial phase (e.g. Year 5)

Table 18 details initial term monitoring approaches for the species and communities that are known to occupy the site. Maintaining native plant communities will also maintain suitable habitat for Santa Cruz kangaroo rat, which will not be separately monitored unless or until the species is introduced to the site or discovered within the site or any adjacent site.

For each monitoring element, it identifies success criteria, which tier off of the goals and objectives for the species and communities present within the site (Section 3). It also outlines the monitoring approach, which was developed based upon the initial surveys conducted in 2018 to develop the plan (Appendix A). This approach was taken so that the initial data could be used as a baseline for monitoring the effectiveness of management during the initial phase. As with the property surveys, the initial phase monitoring protocols focus on mapping and classification the plant communities in small-scale patches, and then characterizing the endemic species occurrences and habitat conditions in those patches. This approach is supplemented by low-intensity focal species surveys designed to document the species distribution within the site. For the insects, such low-intensity surveys cannot be used to evaluate or track changes in abundance over time, due to the higher variability in abundance on a given survey day. Long-term monitoring studies will be designed to track such changes over time.

**Table 18: Monitoring to be conducted for Species and Communities during the Initial Phase of Implementation of this Plan**

Species/ Community	Success Criteria	Initial Phase Monitoring
Mount Hermon June beetle	<ul style="list-style-type: none"> <li>Maintain or increase the area of suitable habitat for Mount Hermon June beetle.</li> <li>Maintain or increase the distribution of Mount Hermon June beetle.</li> </ul>	<p>Conduct the plant community classification and mapping (Section A.1) and then classify mapped patches according to their suitability for Mount Hermon June beetle (Section A.4.1).</p> <p>Sample 13 black light traps scattered throughout the conservation area (Map 4) on three nights during the peak of the flight season (e.g., mid-June to mid-July) and capture at least one Mount Hermon June beetle on at least one night in at least 11 of the 13 traps.</p>
Zayante band-winged grasshopper	Maintain or increase the area of habitat patches occupied by Zayante band winged grasshopper.	Conduct the plant community classification and mapping (Section A.1), conduct the Zayante band-winged grasshopper (Section A.4.2), and calculate the area of habitat in which Zayante band-winged grasshoppers were observed.
Ben Lomond spineflower	Maintain or increase the distribution and abundance of Ben Lomond spineflower	Estimate percent cover of Ben Lomond spineflower in each habitat patch during the plant community classification and mapping, and calculated the weighted average based on the patch size (Section A.3.1).
Ben Lomond wallflower	<p>Maintain or increase the distribution and abundance of Ben Lomond wallflower</p> <p>Maintain or increase the area occupied by Ben Lomond wallflower.</p>	<p>Estimate percent cover of Ben Lomond wallflower in each habitat patch during the plant community classification and mapping, and calculated the weighted average based on the patch size (Section A.3.1).</p> <p>Map Ben Lomond wallflower and calculate the area occupied (Section A.3.2).</p>
Ben Lomond buckwheat	Maintain or increase the distribution and abundance Ben Lomond buckwheat	Estimate percent cover of Ben Lomond buckwheat in each habitat patch during the plant community classification and mapping, and calculated the weighted average based on the patch size (Section A.3.1).
Silverleaf manzanita	Maintain or increase the distribution and abundance Silverleaf manzanita	Estimate percent cover of silverleaf manzanita in each habitat patch during the plant community classification and mapping, and calculated the weighted average based on the patch size (Section A.3.1).

**Table 18: Monitoring to be conducted for Species and Communities during the Initial Phase of Implementation of this Plan**

Species/ Community	Success Criteria	Initial Phase Monitoring
Communities	<ul style="list-style-type: none"> <li>• Maintain or increase the area of sand parkland and sand chaparral communities</li> <li>• Maintain or reduce the abundance of widespread exotic plants</li> <li>• Maintain or reduce the area occupied by invasive plants.</li> </ul>	<p>Conduct the plant community classification and mapping (Section A.1) and calculate the areal extent of sand parkland and sand chaparral communities.</p> <p>Classify exotic plant cover in the plant community patches (during plant community classification and mapping) and calculate the mean weighted average cover based on the patch sizes and the midpoint of the bins used to map patches (Section A.5.2).</p> <p>Map invasive plants as points and polygons, and calculate their areal extent (Section A.5.2)</p>

### 5.3 Adaptive Management

The Olympia Conservation Area will be managed through an adaptive framework, in which management and monitoring are adjusted, over time, in order to enhance their long-term effectiveness at achieving the goals (Section 3) as well as the success criteria for the species and communities (Table 18). Adaptive management will be used to:

1. Identify uncertainties and the questions that must be addressed to resolve the uncertainties;
2. Develop alternative strategies and determine which experimental strategies to implement;
3. confront the changes in conditions during the course of management of the property in perpetuity;
4. Integrate a monitoring program that is able to detect the necessary information for strategy evaluation; and
5. Incorporate feedback loops that link implementation and monitoring to a decision-making process.

The adaptive management process will be used to implement all elements of the plan, including the species protection measures as well as habitat protection, restoration, management, and monitoring.

### 5.4 Reporting

The results of monitoring and adaptive management will be documented in annual reports. By January 31 of each year following implementation of the plan, a report will be prepared and provided to the USFWS to document the following:

1. Description of the restoration activities conducted, in terms of the area treated and specific management treatments implemented including any changes relative to the plan;
2. Species protection measures implemented and their outcomes including covered species observations and incidental take/impacts;
3. Results of monitoring including qualitative and quantitative monitoring, if performed;
4. Adaptive management steps including new information and changed conditions as well as modifications to management and monitoring approaches; and
5. The work plan for the following year, which will identify the planned management and monitoring based on the schedule in this plan, as modified based on adaptive management (Section 5.3) and available funding (Section 6.7).

## 6 Implementation

This section describes the phased approach that will be used to implement management and monitoring and adapt this plan over time. It then provides information about how the plan will be implemented, including species protection measures to be implemented during management and restoration (Section 6.2), additional permitting requirements (Section 6.3), and responsibilities for plan implementation (Section 6.4). This section then provides a schedule (Section 6.5) and budget (Section 6.6) for the initial phase of plan implementation, which is anticipated to be five years.

### 6.1 Implementation Phases

This plan will be implemented and adapted through two anticipated phases: initial phase and long-term phase. The elements of this phased approach are summarized in Table 19.

<b>Element</b>	<b>Initial Phase</b>	<b>Long-Term Phase</b>
Period	Approximately first five years (2020-2024)	Following the initial phase and in perpetuity (e.g., 2024-in perpetuity)
Plan	This plan, with an emphasis on the Initial Phase (Section 1.4)	This plan as revised to include any new areas added, and to develop long-term management and monitoring elements as outlined below.
Plan Area	The 7.3 acres within the Olympia Conservation Area (6.3 acres) and the contiguous Mayer Conservation easement (1.0 acres)	<ul style="list-style-type: none"> <li>The 7.3 acres within the Olympia Conservation Area (6.3 acres) and the contiguous Mayer Conservation easement (1.0 acres).</li> <li>Additional areas in the Olympia Watershed Property that are added for habitat protection, management, restoration, and enhancement, as outlined in the District’s habitat conservation plan</li> </ul>
Management and Restoration	High-priority actions designed to prevent species extirpations and abate threats, including: <ul style="list-style-type: none"> <li>Invasive plant management</li> <li>Access management</li> <li>Restoration of the silver wattle removal area</li> </ul>	<ul style="list-style-type: none"> <li>Conduct ongoing management of invasive plants and access</li> <li>Develop and implement action plans for managing soil disturbances and fire</li> <li>Develop and implement exotic plant management strategies to address widespread exotic plants</li> <li>Develop and implement restoration plans for additional areas</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>Conservation Area Condition Monitoring (Section 5.1.1)</li> </ul>	<ul style="list-style-type: none"> <li>Conservation Area Condition Monitoring (Section 5.1.1)</li> <li>Photomonitoring (Section 5.1.2)</li> </ul>

**Table 19: Olympia Conservation Area Phased Approach to Management**

Element	Initial Phase	Long-Term Phase
	<ul style="list-style-type: none"> <li>• Photomonitoring (Section 5.1.2)</li> <li>• Restoration Project Monitoring (Section 5.1.3, Table 15)</li> <li>• Initial Phase Species and Community Monitoring (Section 5.1.4, Table 18)</li> </ul>	<ul style="list-style-type: none"> <li>• Develop and implement long-term monitoring protocols to track changes in species and communities over time (Section 5.1.4) and achievement of the goals and objectives (Section 3) based on specific success criteria for:                             <ul style="list-style-type: none"> <li>○ species populations and habitat</li> <li>○ native plant communities</li> </ul> </li> </ul>
Funding	<ul style="list-style-type: none"> <li>• Proceeds from the initial endowment contributions</li> <li>• Budget allocations</li> </ul>	Proceeds from the fully funded endowment, the size of which will be set based on analysis of annual costs to implement long-term management and monitoring

## 6.2 Species Protection

While this management plan was developed to promote the endangered species populations and aid their recovery, some of the management and restoration strategies and techniques could cause short-term negative impacts to the rare species. These impacts should be avoided and minimized through implementation of species protection measures. Appendix C provides species protection measures used in other Sandhills restoration and management projects to illustrate the types of measures that should be taken to minimize short-term negative impacts. These measures should be refined and expanded as part of development of the action plans, to address the unique aspects of various types of management. The measures implemented as part of each project should then be determined based on the unique aspects of the project including the community, association, and habitat in which it is occurring and the nature of the management activity.

## 6.3 Permitting

Though the species protection measures are designed to minimize impacts to the federal and state-listed species, as well as other rare species, some such impacts might be completely avoided. The two insects are protected under the Federal Endangered Species Act (ESA), which also affords some protection to the two federally listed plants: Ben Lomond spineflower and Ben Lomond wallflower. Meanwhile, the Ben Lomond wallflower is protected under the California Endangered Species Act (CESA). While developed to promote endangered species populations and aid their recovery, some management actions outlined in this plan could cause negative impacts known as take, which may be unavoidable, even following implementation of the species protection measures.

Take of the federally listed animals is prohibited under ESA, while CESA prohibits take of Ben Lomond wallflower individuals, which includes seed collection or other handling of individuals.

In 2017, the District received incidental take permit TE 58263C-0 (Appendix G) from the United States Fish and Wildlife Service (USFWS), which administers ESA, which allows the District to cause take of the four federally listed species. The 20-year permit was issued based on the Probation Tank Habitat Conservation Plan (McGraw 2017), which included as a covered activity habitat management,

monitoring, and restoration of the Olympia Conservation Area. As a result, any take associated with activities outlined in this plan is covered under the District's existing ITP through October 18, 2037, provided that the impacts meet the conditions of the ITP and are consistent with the HCP. The California Department of Fish and Wildlife (CDFW) administers CESA and can permit take associated with otherwise lawful activities, such as management. Section 2081(a) of the California Fish and Game Code allows CDFW to issue a scientific, educational, or management permit that can cover take associated with habitat restoration, management, monitoring, and species enhancement for Ben Lomond wallflower. The permit requires that individuals implementing the activities have sufficient expertise with the listed species. The District, or its designated consultant implementing the plan, will need to obtain a scientific, educational, or management permit for Ben Lomond wallflower prior to implementing activities that involve collection of plant material, such as seeds, such as for the restoration project in the silver wattle removal area (Section 4.2.3).

The Santa Cruz County Sensitive Habitat Ordinance (SHO) also protects Sandhills habitat including areas featuring Zayante sand soil and/or supporting one or more rare species. The County implements the SHO when landowners seek County permits, which could occur as part of facilities development of infrastructure improvements, including development of access plans. As a special district, aspects of the District's activities may be exempt from local land use regulations.

As part of work to implement this plan, the District should discuss the permitting needs with the County Planning Department Resource Planners, California Department of Fish and Wildlife Environmental Specialists, and United States Fish and Wildlife Service Biologists.

#### 6.4 Roles and Responsibilities

The following outlines the responsibilities of the agencies involved in implementation of this plan.

1. **District:** The District will be responsible for all aspects of plan development and implementation. The District, which funded development of this plan, will be responsible for funding and implementing all work including through contracts with biologists, restoration ecologists, and other professionals qualified to implement the habitat restoration, management, and monitoring; and
2. **USFWS:** The USFWS will review and provide feedback on the annual reports (Section 5.4).

As part of work to implement the Plan, the District will contract with biologists and restoration ecologists, where needed, to ensure that the management and monitoring tasks are implemented by qualified individuals. Habitat restoration including exotic plant management as well as monitoring will be implemented by biologists and restoration ecologists experienced with conducting restoration and management treatments and who can identify plants within the Sandhills. Biologists implementing the species protection measures (Section 6.2) and monitoring (Section 5.1.4) must also be able to identify the endemic species as well as indicator species of the communities and implement standardized monitoring protocols in order to collect data comparable to those used to establish the baseline. The qualified biologists can be assisted by District staff, volunteers, or others, where needed.

The Land Trust will be responsible for ensuring that the District upholds the terms of the conservation easement granted over the Olympia Conservation Area, including that District activities do not degrade the conservation values. As part of their work, the Land Trust will monitor the site conditions and

prepare internal reports to document their observations; they will contact the District in the event that they identify activities or conditions that are in violation of the easement terms.

The conservation easement dedicated to the Land Trust provides the Land Trust with the right to restore habitat in the event that Olympia Conservation Area is ever owned by an individual or entity other than San Lorenzo Valley Water District and/or the property is no longer subject to the HMMP. The District and the Land Trust may elect to partner on implementation of restoration and management activities that are consistent with this HMMP; however, such coordinated management is optional for both entities unless or until the District is no longer the owner and/or no longer implementing the HMMP, at which time the Land Trust has affirmative management rights, as outlined in Section 9 of the conservation easement (Appendix E). The District is ultimately responsible for implementing the management and monitoring outlined in this HMMP.

## 6.5 Schedule

Table 20 outlines an anticipated quarterly schedule of management and monitoring activities during the initial phase of implementation of this plan. As noted in Section 4.2.1, exotic plant management tasks are phased in order to maximize effective use of funding during the initial phase of management. Implementation of these tasks can be accelerated if/when additional resources are available.

## 6.6 Budget

Table 21 estimates the total as well as annual costs to implement the initial phase of management and monitoring outlined in this plan based on the activities and their anticipated frequency of occurrence, in terms of the number of years in the five-year period. The budget includes costs for qualified biologists to implement habitat management, restoration, and monitoring tasks as outlined in Section 6.4. The budget assumes that District staff will:

- administer the research and education access program (i.e., process requests for permits) and continue to contract for site patrols as part of their ongoing access management for the broader Olympia Watershed Property; and
- provide for disposal of biomass generated by exotic plant control projects at the District yard or a suitable off-site facility.

Table 20: Anticipated schedule during the initial phase of management																				
Task	Plan Section	2020			2021				2022				2023				2024			
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b>Exotic Plant Management</b>																				
Remove Ornamental Pine																				
French broom and Portuguese broom	Table 13																			
Velvet Grass	Table 13																			
Thistles	Table 13																			
spring vetch	Table 13																			
periwinkle	Table 13																			
Exotic Annual Grasses and Forbs	Table 13																			
<b>Access Management</b>																				
Research and Education Program	Table 14																			
Site Patrols	Table 14																			
Maintain Fences and Signage	Table 14																			
<b>Restoration of Silver Wattle Area</b>																				
Collect and Process Seed	Table 15																			
Remove litter and woody debris	Table 15																			
Seed	Table 15																			
Control Exotic Plants	Table 15																			
<b>Species Enhancement</b>																				
Cage Ben Lomond wallflower	4.2.4																			
<b>Monitoring</b>																				
Conservation Area Condition	5.1.1																			
Photomonitoring	5.1.2																			
Restoration Area Monitoring	5.1.3																			
Species and Community Monitoring	5.1.4																			
Annual Report	5.4																			

**Table 21: Estimated costs (in 2020 dollars) for plan tasks during the initial phase**

Task		Year 1	Year 2	Year 3	Year 4	Year 5	5-Year Cost (\$)
<b>Exotic Plant Management</b>							
Remove Ornamental Pine	Table 13			1,584			1,584
French broom and Portuguese broom	Table 13	1,176	1,176	588	588	588	4,116
Velvet Grass	Table 13	592	592	296	296	296	2,071
Thistles	Table 13	687	687	343	343	343	2,404
spring vetch	Table 13		467	233	233	233	1,167
periwinkle	Table 13			2,041	1,020	1,020	4,082
Exotic Annual Grasses and Forbs	Table 13					1,214	1,214
							-
<b>Access Management</b>							
Research and Education Program	Table 14	115	115	115	115	115	575
Site Patrols (no added cost)	Table 14	-	-	-	-	-	-
Maintain Fences and Signage	Table 14	252	252	252	252	252	1,261
<b>Restoration of Silver Wattle Area</b>							
Collect and Process Seed	Table 15		2,322				2,322
Remove litter and woody debris	Table 15		1,651				1,651
Broadcast seed	Table 15		917				917
Control Exotic Plants	Table 15		484	484	484	484	1,936
<b>Species Enhancement</b>							
Cage Ben Lomond wallflower	4.2.4		954	954	954	954	3,816
<b>Monitoring</b>							
Conservation Area Condition	5.1.5	1,198	1,198	1,198	1,198	1,198	5,989
Photomonitoring	5.1.2		847		847		1,694
Restoration Area Monitoring	5.1.3		2,524		2,524		5,048
Species and Community Monitoring	5.1.4					12,954	12,954
Annual Report	5.4	2,430	2,430	2,430	2,430	2,430	12,150
<b>Total</b>		<b>6,450</b>	<b>14,091</b>	<b>13,043</b>	<b>8,761</b>	<b>24,606</b>	<b>66,951</b>
						<b>Contingency (+15%)</b>	<b>76,994</b>
						<b>Average Per Year</b>	<b>15,399</b>

## 6.7 Funding

Implementation of this plan is anticipated to be funded by the proceeds of the non-wasting endowment that the District is building over time as it makes endowment contributions with each project that is mitigated through the habitat protection and management at the Olympia Conservation Area. As part of the Probation Tank HCP (McGraw 2017), the District committed to managing and monitoring the Olympia Conservation Area in perpetuity pursuant to a habitat management and monitoring plan (i.e., this plan; Section 1.5). To fund ongoing management and monitoring, the District established a non-wasting endowment with the Community Foundation of Santa Cruz County in 2018. Between 2018 and 2019, the District made an initial contribution to the endowment for the Probation Tank Project of \$121,380 (Table 22). As part of the Probation Tank project, the District donated \$40,000 to the Land Trust of Santa Cruz County to fund their conservation easement monitoring and defense (Section 6.4).

As outlined in the Probation Tank HCP (McGraw 2017), the District committed to providing additional funds to manage, restore, and enhance the protected habitat each time it uses acreage within the Olympia Conservation Area to mitigate a project. The Probation Tank HCP stated that the funding dedicated to mitigate impacts of future projects would be identified in future permitting documents, would be commensurate with the project impacts, and would be used to fund additional management, restoration, or enhancement projects identified in the Habitat Management and Monitoring Plan for the property (McGraw 2017).

Since it was established in 2017, the District has used the conservation area as the compensatory mitigation for two additional projects:

- Emergency replacement and repair of the Pasatiempo Wells 6 and 7 in 2018 and 2019, through which the District agreed to set aside 0.42 acres (Lee 2017); and
- Emergency replacement of the Lewis Tank in 2020, for which the District agreed to set aside 0.67 acres (DDA 2019).

As a result, the District has used 2.08 acres of the 6.3 acres available for mitigation in the site, and to date has contributed \$277,842 toward a non-wasting endowment established to fund ongoing management and monitoring (Table 22).

**Table 22: District projects mitigated through the Olympia Conservation Area, showing the habitat impacts and funds contributed to the endowment**

Project	Year	Habitat Set Aside		Endowment Contribution (\$)	
		Square Feet	Acres	Total	Per Square Foot
Probation Tank	2018-19	43,360	0.995	121,380	2.80
Pasatiempo Wells	2019	18,491	0.424	61,543	3.33
Lewis Tank	2020	28,851	0.662	94,919	3.29
	<b>Total</b>	<b>90,702</b>	<b>2.082</b>	<b>277,842</b>	

During the initial phase of management, the District will fund implementation of this plan using the proceeds from the endowment. Should the endowment proceeds be insufficient to cover annual costs, as may be the case initially, the District will use annual budget appropriations to cover the remaining costs. The tasks and estimated costs for work each year will be identified in the prior year's annual report (Task 5.4). In the event of funding limitations, the District will work with the qualified biologist

and the USFWS to prioritize habitat restoration, management, and monitoring tasks and identify how any unmet needs for the site will be addressed in the future.

The District's future infrastructure projects in the Sandhills are anticipated to be covered under a District Sandhills HCP to cover impacts of its Sandhills facilities and activities on listed species; the Olympia Conservation Area could be used to offset future emergency projects prior to permitting of the District Sandhills HCP, as the need arises. The programmatic HCP for the sandhills will identify how funding will be allocated to fund management of the Olympia Conservation Area, as well as any additional or expanded acreage conserved by the District as part of that plan.

## References

- Arnold, R. A. 2000. Monitoring report on the Mount Hermon June Beetle at Quail Hollow Quarry. Entomological Consulting Services, Ltd., Pleasant Hill, CA.
- Arnold, R. A. 2001. 2001 Monitoring Report for the Mount Hermon June Beetle at Hanson Aggregates' Felton Quarry. Entomological Consulting Services, Ltd.
- Arnold, R. A. 2002. Low-effect habitat conservation plan for the endangered Mount Hermon June beetle and Ben Lomond spineflower, for Geoffrey and Susan Mayer's Single-Family Residential Parcel (APN: 67-421-46) Located at 275 Bob's Lane, Scotts Valley, Santa Cruz County California. Prepared for Geoffrey and Susan Mayer. February 1, 2002. 39 pages.
- Arnold, R. A. 2004. Biology of the Mount Hermon June Beetle and Biology of the Zayante Band Winged Grasshopper. In J. M. McGraw, *Sandhills Conservation and Management Plan*. June 2004.
- Bean, C.E. 2004. Biology of the Santa Cruz kangaroo rat. In J. M. McGraw, *Sandhills Conservation and Management Plan*. June 2004.
- Best, T. 1992. *Dipodomys venustus*. Mammalian Species 403:1-4.
- Bolster, B.C. 1998. Terrestrial Mammal Species of Special Concern in California. Draft Final Report prepared by P.V. Brylski, P.W. Collins, E.D. Pierson, W.E. Rainey and T.E. Kucera. Report submitted to California Department of Fish and Game Wildlife Management Division, Nongame Bird and Mammal Conservation Program for Contract No.FG3146WM.
- Brooks, F. E. and D. M. Ferrin. 1994. Branch dieback of Southern California chaparral vegetation caused by *Botryosphaeria dothidea*. Phytopathology. 84: 78-83.
- California Department of Food and Agriculture. 2018. Report of testing of three silverleaf manzanita from Quail Hollow Quarry. Provided to Ecological Concerns, Inc. November 26, 2018. 1 page.
- California Native Plant Society. 2019. Inventory of rare and endangered plants of California. Sacramento, CA. Accessed on-line at: <http://www.rareplants.cnps.org/>
- California Department of Fish and Wildlife (CDFW). 2019. Special Animals List. August 2019. <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406&inline>.
- California Invasive Plant Council (CalIPC). 2020. The Cal-IPC Inventory of Invasive Plants. Online version accessed March 16, 2020 at <https://www.cal-ipc.org/plants/inventory/>.
- Chu, J. B. 2002. Diet for an endangered insect: What does the Zayante band-winged grasshopper eat? San Jose State University, San Jose, CA.
- County of Santa Cruz. 1994. General Plan and Local Coastal Program, including Sensitive Habitat Ordinance. Santa Cruz County Planning Department, Santa Cruz, CA.

- Denise Duffy Associates. 2019. Emergency Endangered Species Act Consultation for the San Lorenzo Valley Water District Lewis. Memorandum to Chad Mitcham, United States Fish and Wildlife Service July 9, 2019. 20 pages.
- Gilbert, G. S. 2018. E-mail correspondence between Jodi McGraw and Gregory S. Gilbert, Plant Pathologist and Professor of Environmental Studies at University of California at Santa Cruz. March 16, 2018.
- Hawbecker, A. 1940. The burrowing and feeding habits of *Dipodomys venustus*. *Journal of Mammalogy* 21(3):88-96.
- Hickman, K. 2019. Conversation with Ken Hickman regarding camera trap detections of Santa Cruz kangaroo rat in the Sierra Azul Open Space Preserve. November 7, 2019.
- Hill, K. and R. O'Malley. 2009. A picky palate? The host plant selection of an endangered June beetle. *Journal of Insect Conservation*. DOI 10.1007/s10841-009-9257-7.
- Kluse, J. and D. F. Doak. 1999. Demographic performance of a rare California endemic *Chorizanthe pungens* var. *hartwegiana* (Polygonaceae). *American Midland Naturalist* 142: 244-256.
- Knowles, K. and J. McGraw. 2008. Conceptual Area Protection Plan for the Santa Cruz Sandhills. Prepared for the Land Trust of Santa Cruz County. 19 pages.
- Laabs, D. Conversation with wildlife biologist David Laabs regarding negative findings in a survey for the Santa Cruz kangaroo rat at the Bonny Doon Ecological Reserve. 2014.
- Lacampagne, D. 2010. Conversation with Danielle Lacampagne regarding the history of the inholding parcel in the Dowd Site. 2010.
- Land Trust of Santa Cruz County. 2017. Olympia Watershed Conservation Easement Baseline Condition Report. October 27, 2017. 9 pages plus appendices.
- Lee, Brian. 2017. Letter from Brian Lee, District Manager of the San Lorenzo Valley Water District, to Chad Mitchem, Biologist, US Fish and Wildlife Service, regarding the Pasatiempo Well Emergency Repair Project. November 2017. 13 pages.
- Marangio, M., and R. Morgan. 1987. The endangered sandhills plant communities of Santa Cruz County. Pages 267-273 in T. S. Elias, editor. *Conservation and management of rare and endangered plants*. California Native Plant Society, Sacramento, CA.
- McGraw, J. M. 2004a. Interactive effects of disturbance and exotic species on the structure and dynamics of an endemic Sandhills plant community. University of California, Berkeley, California. 309 pages.
- McGraw, J. M. 2004b. Sandhills conservation and management plan: a strategy for preserving native biodiversity in the Santa Cruz Sandhills. Report submitted to the Land Trust of Santa Cruz County, Santa Cruz, CA. 354 pages.

- McGraw, J. M. 2007a. Quail Hollow Quarry Conservation Areas Plant Community Classification and Mapping Project. Report provided to Jones and Stokes Associates. January 12, 2007. 13 pages.
- McGraw, J. M. 2007b. The Santa Cruz Sandhills: Protecting our Biological Treasure, Water, and Endangered Salmonids in the Santa Cruz Mountains. 6 pages.
- McGraw, J. M. 2009. 2008 Recovery Permit Report for Mount Hermon June Beetle and Zayante Band-Winged Grasshopper: TE-118641-0. Report submitted to the Ventura Field Office of the US Fish and Wildlife Service. January 31, 2009.
- McGraw, J. M. 2010. Habitat assessment for the Lacampagne/Dowd Parcel (400 Green Valley Road, APN: 070-311-02), Scotts Valley, CA. Letter report provided to Ms. Jane Lacampagne. February 4, 2010. 7 pages.
- McGraw, J. M. 2011. Effects of fire and fuel break creation on the rare plant species, plant insect host plants, and plant community composition of the Quail Hollow Quarry Conservation Areas: 2009-2011. Provided to Granite Rock Company May 31, 2011. 36 pages.
- McGraw, J. M. 2012. 2012 Annual Report for the Metro PCS Cingular/Willow Pond Project Habitat Mitigation Plan. Report submitted to AT&T Mobility and the County of Santa Cruz Planning Department. December 12, 2012. 18 pages.
- McGraw, J. M. 2013a. Vegetation Mapping Report for the Ben Lomond Sandhills Preserve of the Zayante Sandhills Conservation Bank. Report provided to Paul Burrowes of the Zayante Sandhills Conservation Bank. 22 pages.
- McGraw, J. M. 2013b. Olympia Quarry Mount Hermon June Beetle and Zayante Band-Winged Grasshopper Survey, Habitat Mapping, and Reclamation Recommendations (Survey Conducted under Recovery Permit TE118641-1). Draft report submitted to CEMEX, Corporation. September 12, 2013.
- McGraw, J.M. 2015. 2014 Vegetation Mapping within the Quail Hollow Quarry Conservation Areas. Jodi McGraw Consulting, Freedom, CA. Report submitted to Granite Rock Company. December 28, 2015. 34 pages.
- McGraw, J.M. 2016. 2015 Monitoring Report for the Zayante Band-Winged Grasshopper within the Quail Hollow Quarry Conservation Areas. Report submitted to Granite Rock Company. March 2, 2015. 48 pages.
- McGraw, J. M. 2019. Assessment of the Conservation Values of the San Lorenzo Valley Water District's Proposed Habitat Set Aside within the Olympia Wellfield, Felton, CA. Letter to Daniel Medeiros, Land Trust of Santa Cruz County. December 8, 2016. 8 pages.
- McGraw, J. M. 2017. Low-Effect Habitat Conservation Plan for the San Lorenzo Valley Water District's Probation Tank Replacement Project Felton, Santa Cruz County, California. Submitted to the US Fish and Wildlife Service. February 2017. 73 pages plus appendices.

- McGraw, J. M. 2018a. 2017 Monitoring report for silverleaf manzanita within the Quail Hollow Quarry Conservation Areas. Report submitted to Granite Rock Company March 18, 2018. 34 pages.
- McGraw, J. M. 2018b. Laguna Sandhills Preserve 2018 Mount Hermon June Beetle Monitoring Report. Submitted to the City of Santa Cruz. December 2018. 22 pages.
- McGraw, J. M. 2019a. 2018 Annual Report for the Quail Hollow Quarry Conservation Area Long-Term Management and Maintenance Plan. Report submitted to Granite Rock Company. March 12, 2019. 47 pages plus appendices.
- McGraw, J. M. 2019b. 2018 Annual Report for the Ben Lomond Sandhills Preserve of the Zayante Sandhills Conservation Bank. Prepared for Paul Burrowes, Managing Partner for the Zayante Sandhills Conservation Bank. January 20, 2019. 44 pages plus appendices.
- McGraw, J. M. 2019c. South Ridge Conservation Area Enhancement Project. Technical Memorandum submitted to the Technical Advisory Panel for the Quail Hollow Quarry Habitat Conservation Plan Long-Term Management and Maintenance Plan. June 19, 2019. 14 pages.
- McGraw, J. M. and A. R. Amesquita. 2017. 2016 Mount Hermon June Beetle Monitoring Report Ben Lomond Sandhills Preserve of the Zayante Sandhills Conservation Bank: Characterizing Mount Hermon June Beetle Abundance Among Community Types and Over Time During the Flight
- McGraw, J. M. and A. Amesquita. 2019. 2018 Monitoring Report for Three Endangered Herbaceous Plants of the Quail Hollow Quarry Long Term Management and Maintenance Plan. Report submitted to Granite Rock Company. March 8, 2019. 46 pages.
- McGraw, J. M., Amesquita, A. and K. Gern. 2018. Olympia Quarry 2017 Quarry Floor Test Plot Monitoring Report: Effectiveness of Habitat and Revegetation Treatment to Promote Native Plants and Endangered Species on the Quarry Floor. Draft Report Submitted to CEMEX. January 26, 2018. 72 pages.
- McGraw, J. M., Amesquita, A., and N. Chrislock. 2019. 2018 Monitoring Report for the Mount Hermon June Beetle within the Quail Hollow Quarry Conservation Areas. Report submitted to Granite Rock Company. March 7, 2019. 36 pages.
- McGraw, J. M. and J. Burks. 2012. Initial Assessment of the Bean Creek Preserve. Report prepared for the Land Trust of Santa Cruz County. November 2012. 28 pages.
- McGraw, J. M. and M. Freeman 2004. Sandhills Conservation Planning Project. Chapter 6 of the Sandhills Conservation and Management Plan. Report submitted to the Land Trust of Santa Cruz County, June 2004. 356 pages.
- McGraw, J. M., and K. Gern. 2018. 2017 Monitoring Report for the Zayante Band-winged Grasshopper within the Quail Hollow Quarry Conservation Areas. Report submitted to Granite Rock Company. March 16, 2018. 48 pages.

- McGraw, J. M. and A. L. Levin. 1998. The roles of soil type and shade intolerance in limiting the distribution of the edaphic endemic *Chorizanthe pungens* var. *hartwegiana* (Polygonaceae). *Madrono* 45: 119-127.
- McGraw, J. M., Whittall, J. and T. Kasteen. 2017. Reintroduction of Ben Lomond Wallflower (*Erysimum teretifolium*) at the Bonny Doon Ecological Reserve: Experimental Examination of Habitat and Genetic Treatments Developed to Establish Persisting Populations. Proposal submitted for Section 6 funding. January 2017. 30 pages.
- Melen, M., J. Herman, J. Lucas, R. O'Malley, I. Parker, A. Thom, and J. Whittall. 2016. Reproductive success through high pollinator visitation rates despite self-incompatibility in an endangered wallflower. *American Journal of Botany* 103(11): 1979-1989.
- Morgan, R. 1983. Endemic plant communities of the Santa Margarita Sands. *in* Analysis of the loss of sand parkland vegetation at Lone Star Industries' Olympia Quarry, and the potential for reestablishing the sand parkland vegetation and other options. Harvey and Stanley Associates.
- Odion, D., and C. Tyler. 2002. Are long fire-free periods needed to maintain the endangered, fire-recruiting shrub *Arctostaphylos morroensis* (Ericaceae)? *Conservation Ecology* 6:4 online URL: <http://www.consecol.org/vol6/iss2/art4>.
- Parker, I. M. 2018. E-mail correspondence between Jodi McGraw and Ingrid M. Parker, Professor of Ecology and Evolutionary Biology, University of California at Santa Cruz. March 16, 2018.
- Resource Conservation District of Santa Cruz County (RCDSCC). 2015. Guide for Species Protection Under the Santa Cruz Permit Coordination Program. Provided by the RCD of Santa Cruz County. August 2015.
- Reveal, J. Email communication with James Reveal, botanist specializing in *Chorizanthe*, regarding the mating system. 2003.
- Roest, M. 1988. Recent records of the Santa Cruz kangaroo rat, *Dipodomys venustus venustus*, in Santa Cruz County. *California Fish and Game Journal* 74:177-179
- Rogers, R. 2020. Email correspondence with Rick Rogers regarding the water pipeline and pressure release valve underlying the Olympia Conservation Area. June 12, 2020.
- San Lorenzo Valley Water District (SLVWD). 2012. San Lorenzo Valley Water District Watershed Management Plan. Part III: Planning and Recommendations Report. Section 1: Management Alternatives and Prescriptions on District Lands. Chapter 2-Olympia Watershed. June 21, 2012. 82 pages.
- Tonnesen, G., Z. Wang, M. Omary, and C. J. Chien. 2007. Assessment of Nitrogen Deposition: Modeling and Habitat Assessment. California Energy Commission, PIER Energy-Related Environmental Research. CEC-500-2006-032. <http://www.energy.ca.gov/publications/displayOneReport.php?pubNum=CEC-500-2006-032> It

- U.S. Department of Agriculture. 1980. Soil Survey of Santa Cruz County. Soil Conservation Service, United States Department of Agriculture and University of California Agriculture.
- United States Fish and Wildlife Service (USFWS). 1994. Endangered and threatened wildlife and plants; endangered status for three plants and threatened status for one plant from sandy and sedimentary soils of central coastal California. Federal Register **59**:5499-5509.
- United States Fish and Wildlife Service (USFWS). 1997. Endangered and threatened wildlife and plants; determination of endangered status for two insects from the Santa Cruz Mountains of California. Federal Register 62:3616-3628.
- United States Fish and Wildlife Service (USFWS). 2001. Endangered and threatened wildlife and plants; final determination of critical habitat for the Zayante Band-Winged grasshopper. Federal Register 66:9219-9233.
- United States Fish and Wildlife Service (USFWS). 2008. Ben Lomond wallflower (*Erysimum teretifolium*) five-year review: summary and evaluation. Ventura Field Office of the US Fish and Wildlife Service. June 2008. 24 pages.
- U.S. Fish and Wildlife Service (USFWS). 2009. Zayante band-winged grasshopper (*Trimerotropis infantilis*) and Mount Hermon June beetle (*Poyphylla barbata*) 5-year review: Summary and Evaluation. Ventura Fish and Wildlife Office. August 2009. 33 pages
- Weiss, S.B., 1999. Cars, cows, and checkerspot butterflies: Nitrogen deposition and management of nutrient-poor grasslands for a threatened species. Conservation Biology, 13, pp.1476-1486.
- Young, R. M. (1967). Polyphylla Harris in America, North of Mexico. Part I: The DiffRACTA complex (Coleoptera: Scarabaeidae: Melolonthinae). Transactions of the American Entomological Society, 93, 279-318.
- Young, R. M. (1988). A Monograph of the Genus Polyphylla Harris in America North of Mexico (Coleoptera: Scarabaeidae: Melolonthinae). Bulletin of The University of Nebraska State Museum, 11(2), 1-106.

## Appendix A: Survey and Habitat Assessment Methods

This appendix describes the methods used to characterize and map the plant communities, evaluate the distribution and relative abundance of the rare plants and insects, assess the rare species habitat, and examine and categorize management issues as part of work to prepare this plan. The surveys, assessments, and planning for the 6.3-acre Olympia Conservation Area also included the 1.0-acre Mayer Conservation Easement area, such that the total planning area is 7.3 acres. The surveys, assessments, and planning were conducted in conjunction with similar efforts to assess the Land Trust of Santa Cruz Sandhills sites, to which some of the planning approaches (e.g., mapping mined habitat) described below apply, but that are not directly relevant to this site. Such approaches were retained to enable future mapping for the broader Olympia Watershed Property at some future date.

### A.1 Plant Community Classification and Mapping Methods

In May 2018, Jodi McGraw mapped the plant communities and other land cover types within the Olympia Conservation Area. The classification and mapping methods followed those used at the Quail Hollow Quarry Conservation Areas (McGraw 2007a) and the Zayante Sandhills Conservation Bank (McGraw 2013a). The Sandhills communities were mapped according to three main community types, sand parkland, Sandhills chaparral, and Sandhills woodlands and forests, based on their structure; each area was also assigned to a specific association which reflects the dominant plant species. This original classification was developed through multivariate analysis of plant species composition and structure at the Quail Hollow Quarry Conservation Areas (McGraw 2007a), which feature intact Sandhills communities that are generally representative of those found elsewhere in the San Lorenzo Valley where the Land Trust properties occur; Sandhills communities in the Bonny Doon area differ somewhat in plant species composition and structure.

Jodi McGraw mapped the plant communities in the field using maps printed at a scale of 1" = 50 - 75 feet (depending on the site) that featured the site boundaries over color, high-resolution (9" pixel) aerial image of each site taken in 2016. Field navigation and orientation was facilitated by a resource-grade global positioning system (Trimble Juno 3B) running ArcPad GIS software (ESRI 2012), which illustrated the current location with respect to the aerial imagery and site boundaries. In order to illustrate the fine-scale mosaic of plant associations, which often occur in small patches (e.g., chaparral gaps), there was no minimum mapping unit; instead an attempt was made to map all associations observed and patches ranged between 40 and 14,997 square feet.

To refine the vegetation map and integrate it within the geographic information system (GIS) used to aid management, Jodi McGraw heads-up digitized the boundaries delimited on the field maps. In this important step, the polygons outlining the different associations were adjusted based upon the signature of the vegetation types detected in the aerial imagery, providing an opportunity to increase the accuracy and precision of the field-based mapping.

The results of the plant community mapping are presented in Table 2, which identifies the acres of each community and association as well as other land cover types, and also identifies the percentage of each type that is found within the site (% Total).

Following the community mapping in May 2018, Jodi McGraw Consulting revisited all of the plant community patches in June 2018 to assess the following factors relevant to management:

- The cover of the four rare plants (Section A.3);
- The cover of invasive plants (Section A.5.2);
- Erosion includes rills, gullies, and slides (Section A.5.3); and
- Access issues, including trails and neighbor incursions (Section A.5.4).

The community patches were later attributed according to their habitat for the two rare insects and the Santa Cruz kangaroo rat (Section A.4).

## A.2 Sandhills Specialty Plant Species List

During the course of the plant community classification and mapping, Jodi McGraw annotated a checklist to note the Sandhills specialty plant species observed (Appendix B). These are primarily herbaceous species unique to the area based on *one or more* of the following criteria (Marangio and Morgan 1987, McGraw 2004b):

- Endemic to the Sandhills species, meaning they are found only in the Sandhills;
- Undescribed ecotypes, which are distinct forms occupying the Sandhills (e.g., California poppy or tipless tidy tips);
- Disjunct populations of montane species, which primarily occur in the mountains;
- Coastal disjuncts, which are species that primarily occur in the coastal strand communities;
- Threatened, endangered, or rare species;
- Locally unique species, which, in Santa Cruz County, are found solely in the Sandhills; and
- Species that occur more frequently in the Sandhills than other plant communities of the region.

This checklist may not be comprehensive as it was not created through a systematic search for each species; rather, it was compiled based on observations during the course of other assessments. Additional species are likely present in the sites but this list be used as a starting point for future assessments.

## A.3 Endemic Plant Mapping

In May and June 2018, JMc mapped the four plants endemic to the Sandhills using two main methods:

1. Assessment of cover in the plant community patches; and
2. Mapping of points and patches for Ben Lomond wallflower.

Ben Lomond wallflower was subject to more detailed mapping as this species is very rare and threatened with extirpation; this made comprehensive mapping both important and feasible.

### A.3.1 Mapping in Plant Community Patches

Following the community mapping, JMc will use cover classes (Table A-1) to record the absolute cover of each of the four endemic plant species in each mapped community polygon. The original community polygons (or patches) were split into multiple polygons, where needed, to reflect the heterogeneity in the cover of one or more rare plants. The midpoints of the cover classes were then used to calculate the average cover for each plant species in each site and community type, which was weighted based on the area of the community patch (i.e., the weighted average cover).

**Table A-1: Cover classes used to map endemic plants**

Cover Class	Range of Percent Cover (%)	Midpoint Used to Calculate Weighted Average
0	0	0
1	<1	0.5
2	1-5	3
3	6-10	8
4	11-15	13
5	16-25	20.5
6	26-50	38
7	51-75	63
8	76-90	83
9	91-100	95.5

### A.3.2 Ben Lomond Wallflower Survey

To obtain higher-resolution spatial data for Ben Lomond wallflower, which is exceptionally rare and more imperiled than the other three plant species (Section 2.6.3.2), JMc revisited the sites in May and early June 2018 to map the rare biennial plant. The survey was conducted by walking throughout the habitat suitable for this species, which included sand parkland and sand chaparral gaps as well as other open sandy habitat, and recording the locations of Santa Cruz wallflower patches using a hand-held GPS (Trimble Juno 3B) running ArcPad 10.2 (ESRI 2010). Each occurrence that was found was mapped as either a point or a polygon based on the following mapping rules:

1. A point was recorded if a single plant was found more than 5 meters away from the next nearest plant, or if the patch of multiple wallflower plants occupied an area of less than 1m<sup>2</sup>, in which case the center of the patch was recorded as the point; and
2. A polygon was created to delimit patches of plants within 5 meters of each other and occupying an area greater than 1m<sup>2</sup>.

The mapping rules were designed to facilitate accurate remapping in the future, so that the baseline mapping can facilitate evaluation of changes in the species distribution over time.

To digitize the boundary of polygons, the patch was first delimited with stake flags that marked the outermost plants of the patch, which was then walked with the GPS in hand to record the patch perimeter using the streaming feature in ArcPad.

For each point, the density of wallflower individuals was recorded for each life stage: seedling, juvenile and adult. For patches mapped as polygons, the relative abundance was recorded using three categories:

- low: less than 1 plant per 10 m<sup>2</sup>
- medium: 1-5 plants per 10 m<sup>2</sup>; and
- high: greater than 5 plants per 10 m<sup>2</sup>.

The spatial data were integrated into the geographic information system (GIS) which was used to address any errant points for the polygons and calculate the area of the patches as well as the number of point occurrences in each site.

## A.4 Endemic Animal Surveys and Habitat Mapping

### A.4.1 Mount Hermon June Beetle

During the middle of the Mount Hermon June beetle flight season (MHJB), JMc biologists conducted a three-night presence/absence survey for the endangered, nocturnal beetle. The MHJB survey conducted as part of this planning process was conducted under a Section 10(a)(1)(a) permit issued to Jodi McGraw (TE118641-2).

On June 22, July 11, and July 14, 2018, 9, 12, and 11 traps, respectively, were randomly located throughout the mapped plant associations. Once one or more MHJB were observed in a trap on a given night, that trap was retired and new trap locations were sampled to survey the largest area possible. Each night, a single trap was also located atop Mount Hermon—a known area for Mount Hermon June beetle, which can serve as a reference and ‘control for’ variation in weather among survey nights.

The composite presence/absence were used along with existing information about Mount Hermon June beetle habitat characteristics based on surveys in other Sandhills sites (e.g., McGraw 2013b, McGraw and Amesquita 2017, McGraw et al. 2019) to characterize the mapped plant community patches according to whether they are known or likely to provided suitable habitat for Mount Hermon June beetle, as outlined in Table A-2. Of these categories, habitat in the Olympia Conservation Area was only classified as either suitable or marginal.

<b>Category</b>	<b>Description</b>
Suitable	Areas of relatively intact Sandhills communities on unmined Zayante sand soil
Marginal	Areas supporting transitional communities (e.g., coastal scrub and coast redwood), where MHJB is anticipated to occur at lower abundance than in intact Zayante sand soils
Degraded	Areas that are mined, or were mapped as “Bare”, “Invasive”, “Ornamental”, or “Developed” but do not feature impervious surfaces, where Mount Hermon June beetle is anticipated to occur at lower abundance due to anthropogenic factors
Converted	Areas of impervious surface, which included paved roads and buildings. It is important to note that MHJB have been observed under pavement, where they presumably moved laterally from exposed soil areas, perhaps while following plant roots. Accordingly, these areas could represent a severe form of the <i>Degraded</i> category.
Unsuitable	Wetland areas and the stream corridor along Bean Creek, where hydrological conditions are expected to make the soils unsuitable for MHJB

#### A.4.2 Zayante Band-Winged Grasshopper

During the middle of the Zayante band-winged grasshopper flight season in 2018, JMc conducted a visual survey for the Zayante band-winged grasshopper. The 2018 survey was conducted under a Section 10(a)(1)(a) permit issued to Jodi McGraw (TE118641-2).

On August 20, August 31, and September 7, a JMc biologist walked throughout all habitat potentially suitable for the endangered grasshopper within each site using contiguous parallel transects with 20-foot spacing. All surveys were conducted between 11 a.m. and 5 p.m. on days featured weather conditions conducive to activity of the species, including temperatures above 75 °F but not greater than 100 °F and limited wind (<10 mph).

Observations of grasshoppers of any species were recorded using a resource-grade GPS (Trimble Juno 3B), which also recorded the track walked. The GPS data were examined and all areas of apparently suitable but unoccupied habitat were then re-examined during a revisit to each site.

The Zayante band-winged grasshopper observations were used along with existing information about the species' habitat characteristics based on surveys in other Sandhills sites (e.g., McGraw 2013, McGraw and Gern 2018, McGraw 2019) to characterize the mapped plant community patches according to whether they are known or likely to provide habitat for Zayante band-winged grasshopper based on criteria outlined in Table A-3. Of these types, habitat within the Olympia Conservation Area was mapped only as suitable, potential future, and unsuitable. It is important that some of the suitable habitat is degraded by exotic plants.

**Table A-3: Zayante band-winged grasshopper habitat classification**

Category	Description
Suitable	Areas of relatively open sand parkland and chaparral gaps connected to it, where most Zayante band-winged grasshoppers are observed
Marginal	Sand chaparral gaps, open woodland areas, dense mesic sand parkland, and ponderosa pine influenced sand parkland and other unoccupied areas around occupied parkland. These areas may also be used, especially for dispersal, and can be made suitable through management of disturbances (i.e., fire and soil disturbances)
Degraded	Areas of open habitat that have been mined and are therefore less than suitable due to the thin or otherwise altered soils
Potential Future	Areas dominated by shrubs and trees (i.e., woody vegetation) that are not suitable now but could be suitable following fire or vegetation management to mimic its beneficial effects.
Unsuitable	Wetland and Riparian areas, other than the small Coyote Brush patches that were as riparian (these were characterized as <i>Marginal</i> ). These areas could become suitable in the future if hydrologic conditions change.
Converted	Areas of impervious surface; paved areas and buildings (only). Zayante band-winged grasshopper can disperse through these areas but they are unsuitable for oviposition.

### A.4.3 Santa Cruz Kangaroo Rat

University of California Santa Cruz biologist Gage Dayton and undergraduate student Deanna Rhodes conducted a survey for the Santa Cruz kangaroo rat at the Olympia Quarry and adjacent Morgan Property on April 27, April 30, and May 1, 2017. They set 111, Sherman live traps in areas of suitable habitat including Sandhills chaparral and sand parkland associations. None of the traps contained Santa Cruz kangaroo rat, which has either been extirpated from these areas or occurs at below-detectable levels.

To facilitate management planning, JMc characterized the plant community patches into one of three habitat types for this species (Table A-4).

**Table A-4: Santa Cruz Kangaroo rat habitat classification**

Category	Description
Primary	Sandhills chaparral community
Secondary	Sand parkland and Sandhills woodland and forest, as well as areas mapped as coastal scrub, coastal scrub gap, invasive, ornamental, ruderal, and bare ground, and more open riparian areas adjacent to other primary or secondary habitat. These areas are likely to be suitable for temporary use when they occur adjacent to Sandhills chaparral communities.
Unsuitable	Wetland, dense Riparian, Coast Redwood, and Developed areas, which are unlikely to be suitable.
Converted	Areas of impervious surface; paved areas and buildings (only). Zayante band-winged grasshopper can disperse through these areas but they are unsuitable for oviposition.

## A.5 Habitat Management Issue Assessment

To assess site conditions, JMc also attributed the community patches mapped in May 2018 according to the occurrence of factors that can affect habitat (positively or negatively), including invasive plant species, erosion, and other anthropogenic land use or disturbances. Additionally, invasive occurrences were separately mapped as described below

### A.5.1 Mining

To facilitate management planning and implementation, the plant community patches were attributed according to whether they occur in an area that was subject to sand mining, which did not occur in the Olympia Conservation Area. This characterization was made based primarily based on analysis of aerial imagery in GIS that was corroborated with ground-level observations of topography, soils, and plant community composition.

### A.5.2 Exotic and Invasive Plant Species

During May and June 2018, JMc biologists collected data to inform the management of exotic and invasive plants. Exotic plants were operationally defined for this projects as all plants not native to California. Invasive plants include exotic plant species that occur at relatively low abundance and thus

can be mapped, but that can have large impacts. Many of the exotic plants, including rattail fescue, smooth cat's ears, rattlesnake grass, riggut brome, and wild oats, were not included in the invasive plant category as they are relatively widespread and assessing their cover or collecting data to map their occurrences was beyond the scope of this effort. However, these more ubiquitous exotic plants have as large if not larger in some cases impacts than many of their invasive counterparts.

1. **Exotic Plant Species:** Each community patch was characterized according to the absolute cover of all exotic grasses and forbs, using one of four categories:
  - A. None: none (or nearly so) present;
  - B. Low: some present but cover <10%;
  - C. Medium: 10-50% cover; and
  - D. High: greater than 50% cover.
  
2. **Invasive Plant Cover:** The cover of invasive plants was assessed using the same four cover classes as for exotic plants. Table A-5 lists the invasive plant species that were included in the category.
  
3. **Invasive Plant Point Occurrences:** To help locate the invasive plants and provide a more precise estimate of their areal extent, a resource-grade GPS was used to capture points in the center of patches of invasive species (Table A-5). For each occurrence, the dimensions of patch (e.g., 15 feet diameter, 10 feet x 30 feet, etc.) were estimated and used to calculate an estimated square footage. It is important to note that these points are not comprehensive of all invasive plants; additional occurrences may not have been observed or mapped during the revisits. In additions, the areal extents are approximated.
  
4. **Invasive Broom Mapping:** To more accurately depict the distribution of invasive brooms and provide additional information that will aid in planning and implementing management, JMc biologists mapped all of the French broom (*Genista monspessulana*) and Portuguese broom (*Cytisus striatus*). The GPS was used to capture points for occurrences that occupy 100 square feet or less (e.g. 10' x 10', or about 11' in diameter) and polygons for occurrences greater than 100 sf. A separation distance of 20 feet was used to differentiate occurrences (i.e., plants within 20 feet of each other were in the same occurrence). Approximate patch dimensions were recorded for point occurrences. All occurrences were attributed according to the species (singular or plural) and estimated density of adult (flowering) individuals as follows:
  - A. Number of plants: For occurrences with fewer than 50 plants (i.e. all points and small patches), the number of plants was estimated.
  - B. Ranges: For stands with more than 50 plants, the following density categories were used:
    1. Small: 50-100;
    2. Medium: 100-250;

3. Large: 250-500; and
4. Very Large: >500 plants.

All of the invasive plant occurrence data (points and polygons) were assessed according to three factors that influence their management (Table 10) and those scores were used to identify priorities for management as illustrated in Table 12 (Section 4.1.2).

**Table A-5: Invasive plant species assessed in the plant community patches. Species observed in Olympia Conservation Area are in bold font.**

6-Letter Code <sup>1</sup>	Scientific Name	Common Name
ACADEA	<i>Acacia dealbata</i>	silver wattle
AGAVSPP	<i>Agave</i> species	Agave species
BRANIG	<i>Brassica nigra</i>	black mustard
<b>CARPYC</b>	<b><i>Carduus pycnocephalus</i></b>	<b>Invasive</b>
CENMEL	<i>Centaurea melitensis</i>	toçalote
<b>CIRVUL</b>	<b><i>Cirsium vulgare</i></b>	<b>bull thistle</b>
CONMAC	<i>Conium maculatum</i>	poison hemlock
CORJUB	<i>Cortaderia jubata</i>	jubata grass
<b>CYTSTR</b>	<b><i>Cytisus striatus</i></b>	<b>Portuguese broom</b>
<b>GENMON</b>	<b><i>Genista monspessulana</i></b>	<b>French broom</b>
HEDHEL	<i>Hedera helix</i>	English ivy
<b>HOLLAN</b>	<b><i>Holcus lanatus</i></b>	<b>velvet grass</b>
HYPICAL	<i>Hypericum calycinum</i>	St. John's wort
<b>LACVIR</b>	<b><i>Lactuca virosa</i></b>	<b>poison wild lettuce</b>
MEDPOL	<i>Medicago polymorpha</i>	California bur clover
NEROLE	<i>Nerium oleander</i>	Oleander
ORNSP	Ornamental species	Various incl. Lavender
PINHAL	<i>Pinus pinea</i>	Stone pine
<b>PLALAN</b>	<b><i>Plantago lanceolata</i></b>	<b>English plantain</b>
ROBPSE	<i>Robinia pseudoacacia</i>	black locust
RUBARM	<i>Rubus armeniacus</i>	Himalayan blackberry
SONASP	<i>Sonchus asper</i>	Spiny sowthistle
<b>VICSAT</b>	<b><i>Vicia sativa</i></b>	<b>Spring vetch</b>

<sup>1</sup> Code used in spatial database

### A.5.3 Erosion

Erosion issues were assessed in the plant community patches during the May and June revisit. Each patch was examined to assess whether it features erosion that is chronically disturbing the soil. The following four categories were used to assess the erosion; additional information about the erosion features, including the type, dimensions, causes, and consequences, were recorded as well.

1. **None:** No visible erosion;

2. **Low:** Erosion is causing limited soil displacement with limited or even beneficial impacts to rare plants and insects;
3. **Moderate:** Soil erosion is limiting plant establishment and therefore degrading habitat for the rare plants and Mount Hermon June beetle, though some moderate erosion may be beneficial for the Zayante band-winged grasshopper; and
4. **High:** Severe erosion is causing loss of soil and precluding use of habitat by the rare plants and Mount Hermon June beetle, and may inhibit use by Zayante band-winged grasshopper, though some areas of high erosion can be beneficial for this species.

To aid further evaluation, most moderate and high erosion features were photographed. Patches with erosion were then generally categorized based on a desktop review of the rare species occurrences and other factors, into one of three categories:

1. **Beneficial Disturbance Area:** These features are known beneficial disturbance areas for Zayante band-winged grasshopper, Ben Lomond wallflower, and/or other rare or locally unique plants adapted to soil disturbances. They and should not be controlled or managed unless their conditions change such that they are causing net negative effects.
2. **Monitor/Prevent Extensive Impacts:** These areas feature erosion do not appear to be having a net negative impact on the Sandhills communities and species, and may be beneficial if they promote loose sand soil conditions required by the Zayante band-winged grasshopper and Ben Lomond wallflower. Monitoring is recommended to ensure that they do not become more extensive or degradative, as can occur when shallow rills and gullies become very deep gullies.
3. **Monitoring/Prevent Extensive Impacts (CEMEX):** This category was used to flag erosion features within the portion of the Morgan Preserve that is located in the CEMEX Olympia Quarry Reclamation Area, where CEMEX is currently working to reclaim habitat and should address erosion. It does not apply to the Olympia Conservation Area.
4. **Evaluate Erosion Control to Protect Habitat:** These features are known or likely to have a net negative effect that could worsen and should be evaluated for treatment.

Each of the mapped erosion features was assigned one of three priority designations:

1. **Medium:** Features that merit evaluation and treatment, if it is determined necessary, and as resources allow;
2. **Low:** Features that should be monitored as resources allow; and
3. **None:** Apparently beneficial features for which no action is warranted at this time.

All 18 of the mapped features in the Olympia Conservation Area were classified as 'low' priority. Some may have beneficial effects for Zayante band-winged grasshopper and/or Ben Lomond wallflower.

#### A.5.4 Access

To assess existing human access issues that can influence habitat conditions, JMc evaluated each plant community patch mapped in May 2018 to assess whether the habitat is being accessed or otherwise

impacted by humans. Each patch was classified into one of the following four categories and additional information about the access issues including type, size (i.e., dimensions), causes, and consequences were recorded:

1. **None:** no apparent access/use;
2. **Low:** low frequency/intensity/severity use that disturbs soil such as use by occasional pedestrians, that disturbs soil and keeps habitat more open, but does not completely remove plant cover;
3. **Moderate:** moderate frequency/intensity/severity use that largely denudes soil, oftentimes leaving just disturbance-adapted species present; and
4. **High:** high frequency/intensity/severity use that denudes the soil (no plants present) or greatly modifies the plant community (i.e., through building or mowing).

A total of 8 areas were mapped as having access issues in the Olympia Conservation Area, of which seven were categorized as low and one was categorized as moderate.

To aid further evaluation, many of the moderate to high access areas were photographed. The photographs, comments, and a desktop review of the rare species occurrences and other site factors were used to categorize the access areas into one of the following categories:

1. **Address (Apparent) Neighbor Incursions:** These are areas where adjacent landowners appear to have conducted activities, including vegetation management, erecting play structures and equipment, or building and parking equipment. These incursions are located along the property boundaries and some may be on adjacent properties; a survey would be needed to establish the boundaries on the ground.
2. **Coordinate Vegetation Management with Landowner:** This applies to the Dowd Property, where annual mowing for fire hazard abatement could perhaps be adjusted to limit negative impacts to Sandhills species, by avoiding the sand parkland area north of the houses and for the grasslands, occurring after the wildflower have set seed, if feasible.
3. **Clean Up Debris:** Areas where debris could be removed to free up habitat for rare plants and animals;
4. **Address Trail Use/Impacts:** Areas where trails are causing impacts to sensitive habitat and species;
5. **Monitor (Trail) Use/Impacts:** These access areas, most of which are *de facto* ('volunteer', or 'social') trails may have limited or even positive effects on the habitat, such as when low-frequency and intensity trail use maintains open habitat required by the Zayante band-winged grasshopper and Ben Lomond wallflower as well as other disturbed-adapted species. They could also invite unwanted other uses, such as camping or fossil digging, and should be monitored to evaluate impacts and managed if conditions if they are determined to be causing net-negative effects.
6. **Allowed Access/Infrastructure:** These are areas of sanctioned roads and property infrastructure that will likely maintained.

All of the Olympia Conservation Area features were classified for Monitoring of Trail Use/Impacts.

Each was assigned one of three priority designations:

1. **Medium:** This designation was assigned to issues that merit attention as resources allow;
2. **Low:** This designation was assigned to areas where some attention can be turned once the medium priority areas have been addressed, and as resources allow; and
3. **None:** This category was used to denote the areas of allowed access and existing infrastructure for which no action warranted.

All of the Olympia Conservation Area access issues were categorized as a medium priority for action.

## Appendix B: Sandhills Specialty Plant List

Table B-1 provides a partial list of the Sandhills specialty plant species observed in the Olympia Conservation Area. These are primarily herbaceous plant species unique to the area based on *one or more* of the following criteria (Morgan 1983, Marangio and Morgan 1987, McGraw 2004b):

- Endemic to the Sandhills species, meaning they are found only in the Sandhills;
- Undescribed ecotypes, which are distinct forms occupying the Sandhills (e.g., California poppy or tipless tidy tips);
- Disjunct populations of montane species, which primarily occur in the mountains;
- Coastal disjuncts, which are species that primarily occur in the coastal strand communities;
- Threatened, endangered, or rare species;
- Locally unique species, which, in Santa Cruz County, are found solely in the Sandhills; and
- Species that occur more frequently in the Sandhills than other plant communities of the region.

This checklist is not comprehensive for any of the sites as it was not created through a systematic search for each species; rather, it was compiled based on observations during the course of other assessments. Additional species are likely present in the sites but this list be used as a starting point as well as (incomplete) reference for future assessments.

Table B-1: Sandhills specialty plant species known to occur in the Land Trust Sandhills sites

Genus	Species	Family	Life Form	Unique <sup>1</sup>	Olympia
<i>Acmispon</i>	<i>glaber</i> var. <i>glaber</i>	Fabaceae	Shrub	S	Present
<i>Acmispon</i>	<i>strigosus</i>	Fabaceae	Forb	S	Present
<i>Antirrhinum</i>	<i>multiflorum</i>	Plantaginaceae	Forb	S	
<i>Arctostaphylos</i>	<i>silvicola</i>	Ericaceae	Shrub	E	Present
<i>Armeria</i>	<i>maritima</i> ssp. <i>californica</i>	Plumbaginaceae	Forb	S,GC	
<i>Artemisia</i>	<i>pycnocephala</i>	Asteraceae	Forb	S?	
<i>Calyptridium</i>	<i>monospermum</i>	Montiaceae	Forb	GC	Present
<i>Camissoniopsis</i>	<i>micrantha</i>	Onagraceae	Forb	S	
<i>Campanula</i>	<i>angustiflora</i>	Campanulaceae	Forb	S	
<i>Cardionema</i>	<i>ramosissimum</i>	Caryophyllaceae	Forb	S	
<i>Castilleja</i>	<i>affinis</i> ssp. <i>affinis</i>	Orobanchaceae	Forb	S	
<i>Castilleja</i>	<i>exserta</i> ssp. <i>exserta</i>	Orobanchaceae	Forb	S,GC	Present
<i>Ceanothus</i>	<i>cuneatus</i> vars. <i>cuneatus/ramulosus</i>	Rhamnaceae	Shrub	S,GC	Present
<i>Chorizanthe</i>	<i>diffusa</i>	Polygonaceae	Forb	S	
<i>Chorizanthe</i>	<i>pungens</i> var. <i>hartwegiana</i>	Polygonaceae	Forb	E	Present
<i>Clarkia</i>	<i>purpurea</i> ssp. <i>quadrivulnera</i>	Onagraceae	Forb	S?	
<i>Clarkia</i>	<i>rubicunda</i>	Onagraceae	Forb	S?	
<i>Clarkia</i>	<i>unguiculata</i>	Onagraceae	Forb	S?	Present
<i>Collinsia</i>	<i>bartsiiifolia</i> var. <i>bartsiiifolia</i>	Plantaginaceae	Forb	S,GC	Present
<i>Corethrogyne</i>	<i>filaginifolia</i>	Asteraceae	Forb	GC	Present
<i>Cryptantha</i>	<i>clevelandii</i> var. <i>florosa</i>	Boraginaceae	Forb	S	
<i>Cryptantha</i>	<i>micromeres</i>	Boraginaceae	Forb	S	
<i>Delphinium</i>	<i>parryi</i> ssp. <i>parryi</i>	Ranunculaceae	Forb	S	
<i>Dichelostemma</i>	<i>capitatum</i> ssp. <i>capitatum</i>	Themidaceae	Forb	S	Present
<i>Dudleya</i>	<i>palmeri</i> ?	Crassulaceae	Forb	S?,GC	
<i>Ericameria</i>	<i>ericoides</i>	Asteraceae	Shrub	S	Present
<i>Eriogonum</i>	<i>nudum</i> var. <i>decurrens</i>	Polygonaceae	Forb	E	Present
<i>Eriogonum</i>	<i>vimineum</i> ?	Polygonaceae	Forb	S,GC	
<i>Eriophyllum</i>	<i>confertifolium</i> var. <i>confertifolium</i>	Asteraceae	Subshrub	S?	Present
<i>Erysimum</i>	<i>teretifolium</i>	Brassicaceae	Forb	E	Present
<i>Eschscholzia</i>	<i>californica</i>	Papaveraceae	Forb	S,GC	Present
<i>Festuca</i>	<i>microstachys</i>	Poaceae	Grass	S,GC	
<i>Festuca</i>	<i>octoflora</i>	Poaceae	Grass	S	
<i>Festuca</i>	<i>rubra</i>	Poaceae	Grass	S,GC	
<i>Gilia</i>	<i>tenuiflora</i> ssp. <i>tenuiflora</i>	Polemoniaceae	Forb	S,GC	Present
<i>Helianthemum</i>	<i>scoparium</i>	Cistaceae	Forb	S	Present
<i>Hesperocyparis</i>	<i>abramsiana</i> var. <i>abramsiana</i>	Cupressaceae	Tree	E	
<i>Hesperomecon</i>	<i>linearis</i>	Papaveraceae	Forb	S,GC	

Table B-1: Sandhills specialty plant species known to occur in the Land Trust Sandhills sites

Genus	Species	Family	Life Form	Unique <sup>1</sup>	Olympia
<i>Heterotheca</i>	<i>sessiliflora</i> ssp. <i>echioides</i>	Asteraceae	Forb	S	Present
<i>Horkelia</i>	<i>cuneata</i> var. <i>cuneata</i>	Rosaceae	Forb	S	
<i>Horkelia</i>	<i>cuneata</i> var. <i>sericea</i>	Rosaceae	Forb	S,GC	
<i>Koeleria</i>	<i>macrantha</i>	Poaceae	Grass	S	Present
<i>Lasthenia</i>	<i>gracilis</i>	Asteraceae	Forb	S,GC	Present
<i>Layia</i>	<i>platyglossa</i> (?)	Asteraceae	Forb	GC	Present
<i>Leptosiphon</i>	<i>parviflorus</i>	Polemoniaceae	Forb	S,GC	Present
<i>Loeflingia</i>	<i>squarrosa</i>	Caryophyllaceae	Forb	S	
<i>Logfia</i>	<i>filaginoides</i>	Asteraceae	Forb	S	Present
<i>Lupinus</i>	<i>albifrons</i> var. <i>albifrons</i>	Fabaceae	Shrub	S	Present
<i>Lupinus</i>	<i>arboreus</i>	Fabaceae	Shrub	S	
<i>Lupinus</i>	<i>bicolor</i>	Fabaceae	Forb	GC	Present
<i>Malacothrix</i>	<i>floccifera</i>	Asteraceae	Forb	S,GC	Present
<i>Micranthes</i>	<i>californica</i>	Saxifragaceae	Forb	S	
<i>Mimulus</i>	<i>androsaceus</i>	Phrymaceae	Forb	S,GC	
<i>Diplacus</i>	<i>aurantiacus</i> var. <i>aurantiacus</i>	Phrymaceae	Shrub	S	
<i>Mimulus</i>	<i>rattanii</i>	Phrymaceae	Forb	S,GC	Present
<i>Minuartia</i>	<i>californica</i>	Caryophyllaceae	Forb	S,GC	
<i>Minuartia</i>	<i>douglasii</i>	Caryophyllaceae	Forb	S	
<i>Monardella</i>	<i>sinuata</i>	Lamiaceae	Forb	S	Present
<i>Muilla</i>	<i>maritima</i>	Themidaceae	Forb	S,GC	
<i>Navarretia</i>	<i>hamata</i> ssp. <i>parviloba</i>	Polemoniaceae	Forb	S	
<i>Nemophila</i>	<i>humifusa</i>	Boraginaceae	Forb	S,GC	
<i>Nuttallanthus</i>	<i>texanus</i>	Plantaginaceae	Forb	S	Present
<i>Orobanche</i>	<i>fasciculata</i>	Orobanchaceae	Forb	S?	
<i>Pectocarya</i>	<i>penicillata</i>	Boraginaceae	Forb	S	
<i>Pellaea</i>	<i>mucronata</i> var. <i>mucronata</i>	Pteridaceae	Fern	S	Present
<i>Phacelia</i>	<i>distans</i>	Boraginaceae	Forb	S	
<i>Phacelia</i>	<i>douglasii</i>	Boraginaceae	Forb	GC	
<i>Phacelia</i>	<i>ramosissima</i>	Boraginaceae	Forb	S,GC	
<i>Pinus</i>	<i>ponderosa</i>	Pinaceae	Tree	S,GC	Present
<i>Plagiobothrys</i>	<i>tenellus</i>	Boraginaceae	Forb	S	
<i>Plantago</i>	<i>erecta</i>	Plantaginaceae	Forb	S	
<i>Poa</i>	<i>secunda</i> ssp. <i>secunda</i>	Poaceae	Grass	S	
<i>Pseudognaphalium</i>	<i>sp. nov.</i>	Asteraceae	Forb	E,GC	Present
<i>Salvia</i>	<i>mellifera</i>	Lamiaceae	Shrub	S	Present
<i>Scutellaria</i>	<i>tuberosa</i>	Lamiaceae	Forb	S	
<i>Senecio</i>	<i>aronicoides</i>	Asteraceae	Forb	S	

**Table B-1: Sandhills specialty plant species known to occur in the Land Trust Sandhills sites**

Genus	Species	Family	Life Form	Unique <sup>1</sup>	Olympia
<i>Silene</i>	<i>verecunda</i>	Caryophyllaceae	Forb	S,GC	
<i>Stephanomeria</i>	<i>virgata</i> ssp. ?	Asteraceae	Forb	S	
<i>Stylocline</i>	<i>gnaphaloides</i>	Asteraceae	Forb	S	Present
<i>Thysanocarpus</i>	<i>curvipes</i>	Brassicaceae	Forb	S	

<sup>1</sup> E=known endemic, GC=greatest concern for taxonomic research; S=locally unique within the Sandhills

## Appendix C: Species Protection Measures

Although designed, at least in part, to restore habitat for the rare species, some management treatments including invasive plant control and disturbance management may cause short-term, direct negative impacts to the listed species including the Mount Hermon June beetle, Zayante winged-grasshopper, Ben Lomond spineflower, and Ben Lomond wallflower. This section identifies a series of measures designed to minimize impacts to the listed species and also protect nesting birds. These measures, which are required as part of endangered species permitting, include aspects of the project design as well as steps taken during implementation to further protect the rare species.

These measures include those incorporated into the recovery permit issued by the US Fish and Wildlife Service to Dr. Jodi McGraw for the Mount Hermon June beetle and Zayante band-winged grasshopper (TE118641-2) as well as measures in the County-wide permit coordination program (RCDSCC 2010).

The measures used for any one project should be developed by species experts, based on the unique aspects of the project including the community, association, and habitat in which it is occurring and the nature of the management activity.

### C.1 Project Design

The following specific approaches to designing reclamation treatments will be implemented to minimize their impacts on the listed species.

- 1. Conduct a Series of Smaller, Phased Projects:** Rather than conducting a single, large project which could have dramatic impacts on the sensitive species populations, the reclamation treatments will be broken up into a series of phases that will enable recovery of the population within the property.
- 2. Retain Refugia and Promote Connectivity:** Within the reclamation area, refugia consisting of intact, occupied habitat, will be retained adjacent to the treatment areas. Connecting treatment areas to occupied habitat will facilitate recolonization of restored habitat following treatment.
- 3. Temporally Coordinate Co-Occurring Treatments:** To avoid impacting the population in a given area multiple times, co-occurring restoration treatments (i.e. drainage improvements and exotic plant control work) will be conducted at the same time, or consecutively, wherever possible. Revegetation will occur after such soil-disturbing activities are completed, and once sites are no longer needed for access, to avoid re-disturbing restored areas.

### C.2 Project Implementation

Management and restoration should be implemented following a series of measures designed to protect listed species as well as other sensitive biological resources, including other special-status species and nesting birds.

- 4. Avoid Work during Critical Periods of the Species' Life Histories:** Conduct work in the treatment areas during the following periods, to minimize impacts to the listed species.
  - a. Work in areas occupied by the Zayante band-winged grasshopper will be conducted early during the adult activity period (June and July), whenever possible, prior to egg

- laying, and when a USFWS-approved biologist (Project Biologist) can remove adults from harm's way.
- b. Work in areas that support Mount Hermon June beetle will be conducted outside of the adult flight season (May to August) to reduce the likelihood that adult male beetles that disperse from adjacent areas will be impacted by the treatments.
  - c. In areas occupied by both listed insects, work will be conducted during the flight season of the Zayante band-winged grasshopper, which is the rarer more readily impacted of the two species.
  - d. Intensive invasive plant removal or other vegetation removal will be conducted outside of the breeding bird season (February 1-August 31), whenever possible.
- 5. Conduct Seasonal Protection Measures:** When it is not possible to avoid work during the sensitive time periods outlined above, the following measures will be taken.
- a. **Cover exposed soil during the Mount Hermon June beetle flight season (May-August):** If soil disturbances occur during the Mount Hermon June beetle flight season (May to August), restoration personnel will cover all areas of open soil created by the restoration treatments that will later be re-disturbed. Such areas will be covered each night by 7:00 pm using tarps, visqueen, or material. This measure will prevent adult male beetles that disperse from adjacent areas from being impacted by the treatments.
  - b. **Avoid Active Bird Nests (February – August):** If vegetation removal will occur during the nesting bird season, the Project Biologist will conduct nesting bird surveys within two weeks of project work. If nesting birds are observed, buffer zones of adequate size will be established around the nest until the chicks have fledged.
- 6. Salvage Rare Plant Seed:** In areas supporting Ben Lomond spineflower, Ben Lomond wallflower, Ben Lomond buckwheat, or silverleaf manzanita, seed of the special-status species will be harvested prior to treatment, whenever possible. A 2081(a) permit from the California Department of Fish and Wildlife will be obtained prior to handling Ben Lomond wallflower individuals.
- 7. Fence or Flag Sensitive Areas:** Prior to ground-disturbing activities, flag native plants, areas occupied by listed species, and other sensitive areas including bird nest buffer zones, to facilitate avoidance of such plants or areas.
- 8. Conduct Pre-Restoration Project Training:** Prior to initiation of work, all restoration personnel will attend a training session by a biologist who is familiar with the listed species, who will:
- c. Describe the listed species and other sensitive resources in terms of their status, habitat, life history, and morphology, to help identify and avoid them and their habitats, where feasible; and
  - d. Review the treatments and the species protection measures for the project.

The biologist will conduct additional trainings for new personnel and as otherwise needed during the course of the project.

**9. Monitor All Restoration Treatments:** A biologist will be on site during implementation of all treatments to conduct the following tasks.

- e. Examine habitat within the treatment areas, access routes, and other affected areas, in order to detect and protect the listed species. Specifically, the biologist will:
  - i. Examine soil and plant roots disturbed by the restoration treatments, to salvage Mount Hermon June beetle. Salvaged larvae or adults will be relocated to nearby suitable habitat that is outside of the areas that will be subject to restoration as part of this project.
  - ii. Survey habitat suitable for Zayante-band winged grasshoppers prior to work each day, in order to make sure that the area is unoccupied. If the area is occupied, the biologist will herd the Zayante band-winged grasshopper out of harm's way or notify crews that work must be conducted in another area until the area is unoccupied.
  - iii. Collect seed from rare plants that would be impacted by the treatments and disperse it into nearby suitable habitat outside of the areas that will be subject to restoration as part of this project.
- f. Advise restoration personnel on appropriate access routes to and within treatment areas, in order to minimize impacts to listed species and their habitats, including native plants species, wherever feasible.
- g. Notify restoration personnel of the need to temporarily stop work in order to salvage and relocate listed species.
- h. Facilitate restoration crew implementation of other species protection measures.

**10. Minimize Ground-Disturbing activities:** To limit impacts to the fossorial Mount Hermon June beetle and Zayante band-winged grasshopper, restoration personnel will minimize activities that displace or compact soil, such as digging, grading, and removing vegetation. The following are specific measures that will be used to minimize ground disturbance.

- a. Restoration personnel will stage project materials, equipment, vehicles, and biomass (e.g. exotic plant piles) on paved areas, wherever feasible, and on designated staging areas located in degraded habitat.
- b. Restoration personnel will confine ground-disturbing activities to the designated restoration areas, and to access routes identified by the biologist.
- c. Restoration personnel will carry, rather than drag, materials between the staging area(s) and the treatment areas, wherever possible.
- d. Restoration personnel will remove all plant biomass (e.g. branches and trunks) from the site, where it will be disposed of at a green waste recycling facility; biomass from invasive species control or grubbing will not be left on the soil surface.

**11. Minimize covering and modification of the soil:** To limit impacts on the fossorial and ground-dwelling listed insects and the herbaceous listed plants, as well as other native plant species that constitute their habitat, restoration personnel will minimize the amount of the soil surface that will be covered by woody debris, litter, erosion control fabric, rock, and other materials.

**12. Minimize Impacts to Native Plant Species:** In order to maintain food sources and habitat for the listed insects, and promote native plant recolonization of the site following treatments, restoration personnel will limit impacts to native plant species by implementing the following:

- a. Avoid working in areas fenced or flagged by the biologist to protect native plants, sensitive species habitat, or nesting birds.
- b. Utilize access routes that avoid native plants and sensitive species habitat, wherever possible.
- c. Treat exotic plants individually rather than using mowing, aerial herbicide spraying, or other techniques that would cause collateral damage to native plants.

**13. Avoid or Minimize Impacts to Santa Cruz Kangaroo Rat:** The following measures should be implemented to reduce impacts to SCKR in occupied habitat.

- a. Restrict construction to daylight hours (½ hour after sunrise to ½ hour prior to sunset) to avoid SCKR, which are not active above ground during this time.
- b. Restrict vehicle traffic to the greatest degree possible. Use temporary fencing and signage during the period of construction to prevent vehicles from entering Sandhills habitats.
- c. Prior to ground disturbance in SCKR habitat, a burrow search and live trapping should be conducted. Depending on whether burrows are present within or near the project footprint, potential mitigations could include avoidance, housing captured SCKR in captivity until the project is completed in a given area, and release of SCKR into artificial burrows.
- d. If trenches or holes are to be left unfilled overnight, they should either be completely covered with plywood sheets or provided with escape ramps every 100 feet.
- e. Trenches should be checked prior to work each morning by a biological monitor to ensure that no kangaroo rats have been trapped. Any trapped kangaroo rats should be removed from the trench.

**14. Avoid or Minimize Potential Impacts Associated with Herbicide Use:** All herbicide use required to implement this plan will be consistent with the District's Integrated Pest Management Policy (IPMP; Appendix H). Potential negative impacts associated with the use of herbicides to treat exotic plants will be avoided and minimized through the following:

- a. Restoration personnel will utilize non-chemical treatments wherever practical, including by:
  - i. Mechanically treating herbaceous plants, whenever possible;
  - ii. Pulling small shrubs, rather than cutting and stump treating them;
  - iii. Cutting jubata grass and then spraying regrowth only as needed to kill the plants (rather than applying foliar spray to uncut plants); and
  - iv. Cutting large broom and silver wattle and then immediately applying herbicide topically to the cambium, to prevent regrowth (e.g. stump or root sprouts).

- b. Impacts associated with herbicide use, which must be consistent with the District's IPMP (Appendix H), and will be limited by:
  - i. Using triclopyr (e.g. Garlon) or other herbicides determined to have low impacts on beneficial arthropods (Kovach et al. 2014) and that are consistent with the District's IPMP (glyphosate has been banned by the District);
  - ii. Spraying only when wind speed is less than five miles per hour, and when there is no precipitation or significant fog or dew in order to prevent drift of the herbicide;
  - iii. Storing herbicides on paved access roads in an impermeable lining away from habitat for endangered species;
  - iv. Preparing herbicide mixes and filling applicator equipment on paved access roads; and
  - v. Applying herbicide in compliance with the manufacturer's written recommendations and in accordance with all label instruction.

**15. Avoid or Minimize Potential Impacts Associated with Equipment Fueling and Maintenance:**

Potential impacts associated with vehicle use will be avoided and minimized through the following:

- a. Refueling, greasing, and all other equipment or vehicle maintenance will be conducted on paved surfaces.
- b. All equipment and tools will be cleaned and maintained to prevent any leakage of fuel and lubricants.
- c. Fuel and lubricants will be stored on paved access roads within an impermeable lining.

## Appendix D: Large-Format Maps

This section contains 11" x 17" maps that illustrate the following.

- Map 1: Plant Communities
- Map 2: Santa Cruz Kangaroo Rat Habitat
- Map 3: Zayante Band-Winged Grasshopper Observations and Habitat
- Map 4: Mount Hermon June Beetle Observations and Habitat
- Map 5: Ben Lomond Spineflower Cover
- Map 6: Ben Lomond Wallflower Cover and Patches
- Map 7: Ben Lomond Buckwheat Cover
- Map 8: Silverleaf Manzanita Cover
- Map 9: Management Issues

# OLYMPIA CONSERVATION AREA

## MAP 1

### PLANT COMMUNITIES

#### Sand Parkland

- Exotic-dominated Sand Parkland
- Mesic Sand Parkland
- Native Forb-Dominated Sand Parkland
- Pine-Influenced Sand Parkland

#### Sandhills Chaparral Communities

- Mixed Sand Chaparral
- Sand Chaparral
- Sand Chaparral Gap-Herb Dominated
- Sand Chaparral Gap-Shrub Dominated

#### Sandhills Woodlands and Forests

- Oak Woodland
- Ponderosa Pine Forest
- Mixed Hardwood Woodland
- Mixed Evergreen Forest

#### Transitional Communities

- Riparian

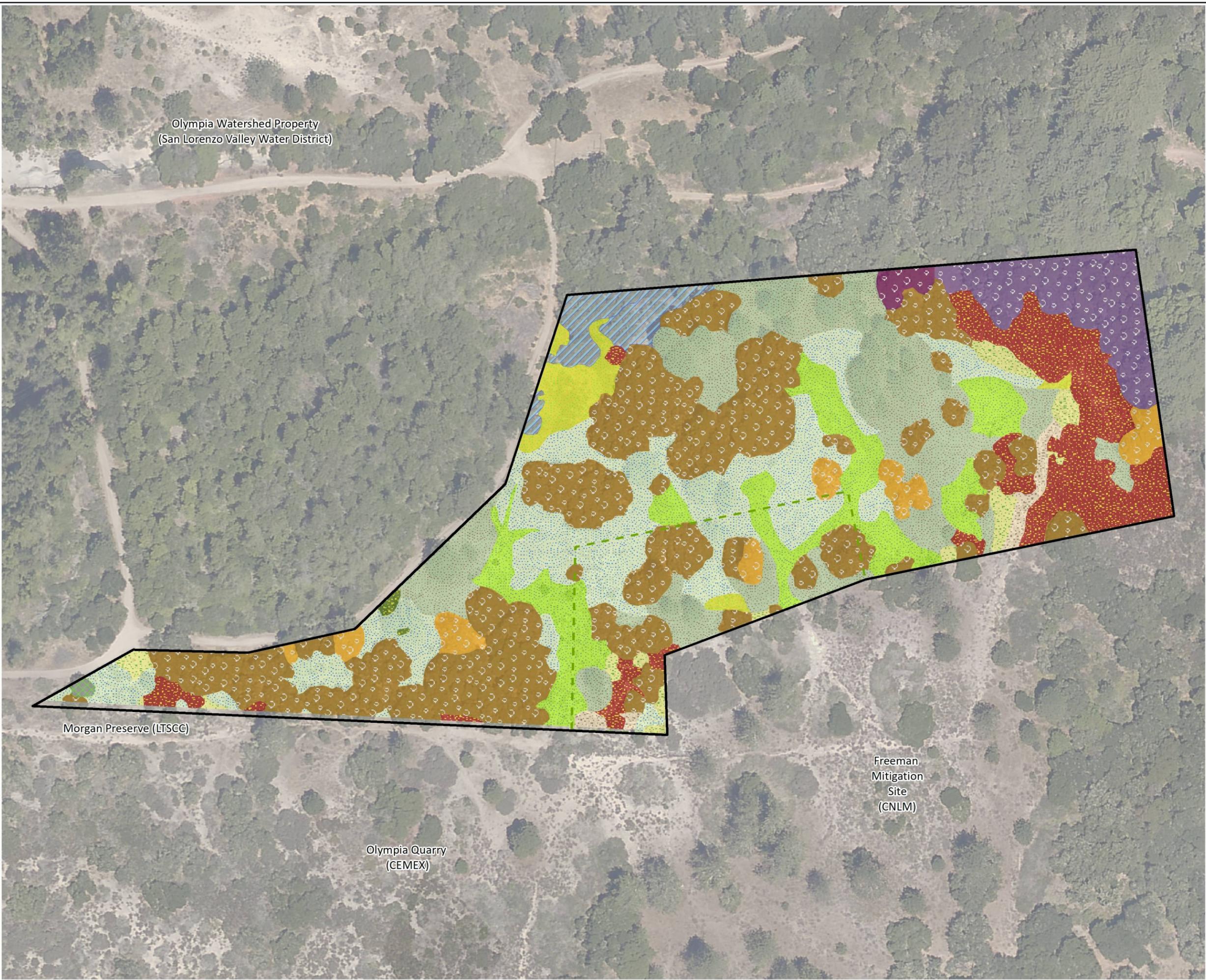
#### Other Land Cover

- Ornamentals
- Olympia Mapping Area
- Mayer Conservation Easement Area

This map illustrates the plant communities and other land cover types in the the Olympia Conservation Area and adjacent Mayer Conservation Easement Area, which collectively comprise the Olympia Mapping Area. Details about the plant community classification and mapping are provided in Section A.1.

1 inch = 100 feet

0 55 110 Feet



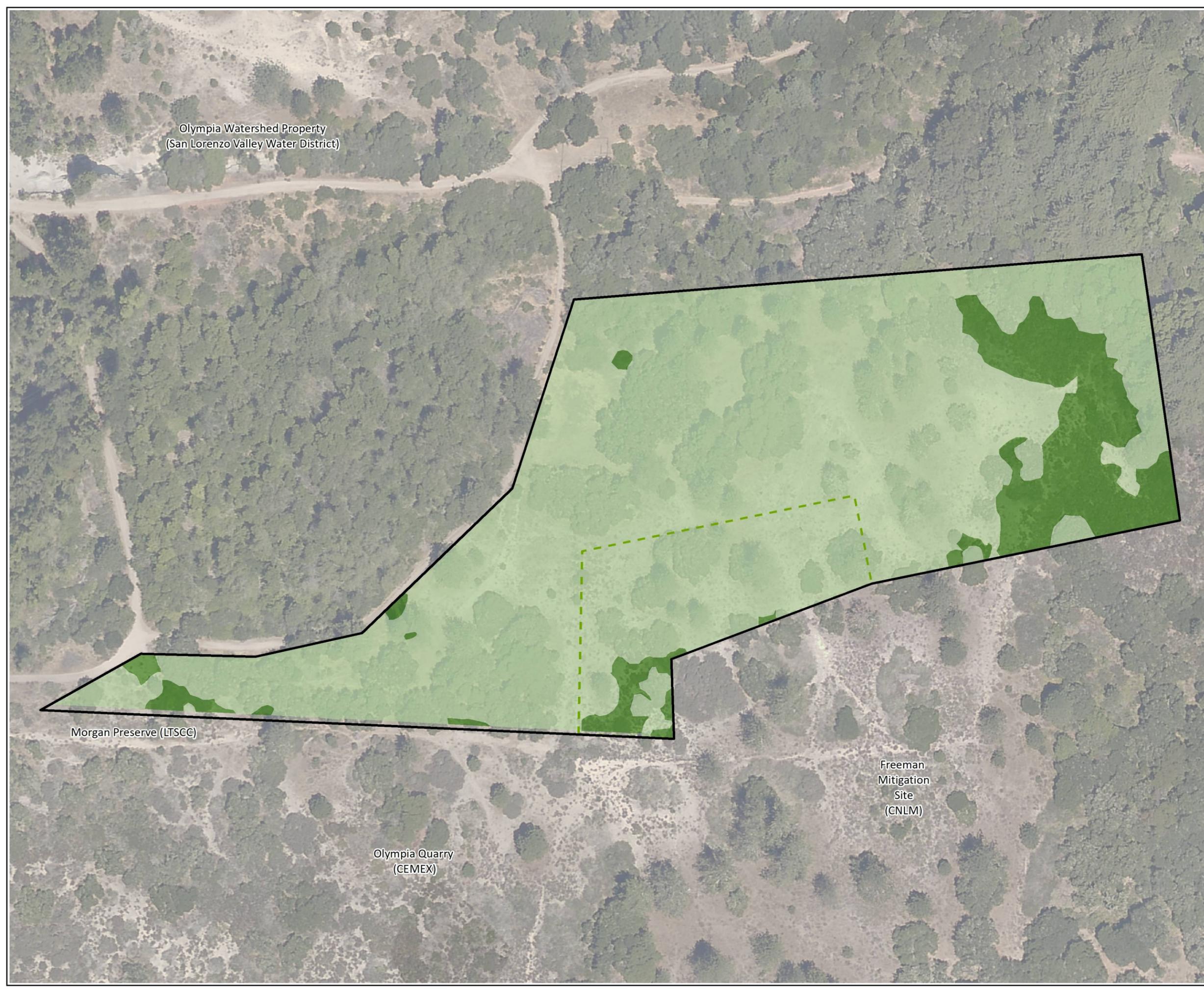
**OLYMPIA CONSERVATION AREA**

**MAP 2**

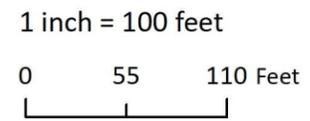
**SANTA CRUZ KANGAROO RAT**

**Santa Cruz Kangaroo Rat Habitat**

-  Primary Habitat
-  Secondary Habitat
-  Olympia Mapping Area
-  Mayer Conservation Easement Area



This map illustrates the plant communities and other land cover types in the Sandhills mapping areas according to their suitability as habitat for the Santa Cruz kangaroo rat. Section A.4.3 describes the habitat classification methods, which were based on the structure and species composition of the community. Other factors including proximity to human development can also influence suitability.



# OLYMPIA CONSERVATION AREA

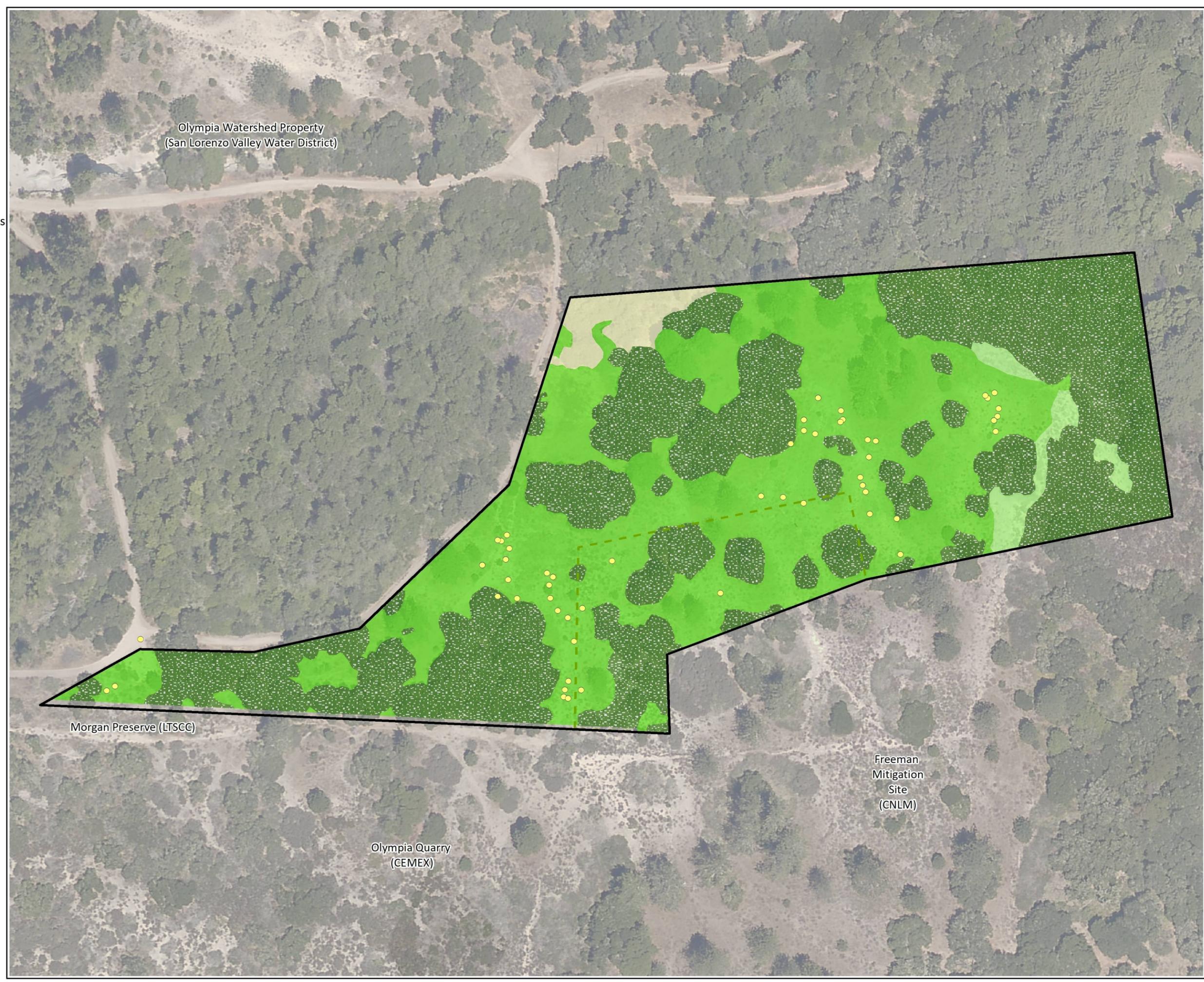
## MAP 3

### ZAYANTE BAND-WINGED GRASSHOPPER

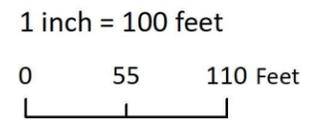
● Zayante Band-Winged Grasshopper Observations

#### Zayante Band-Winged Grasshopper Habitat

- Suitable Habitat
- Marginal Habitat
- Potential Future Habitat
- Unsuitable Habitat
- Olympia Mapping Area
- Mayer Conservation Easement Area



This map illustrates the locations of Zayante band-winged grasshoppers observed during a three-day survey. It also illustrates the plant communities and other land cover types according to their suitability as habitat for the Zayante band-winged grasshopper. Section A.4.2 describes the habitat classification methods, which were based on the structure and species composition of the community.

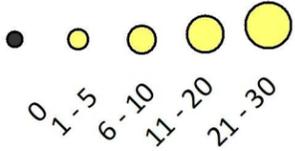


**OLYMPIA CONSERVATION AREA**

**MAP 4**

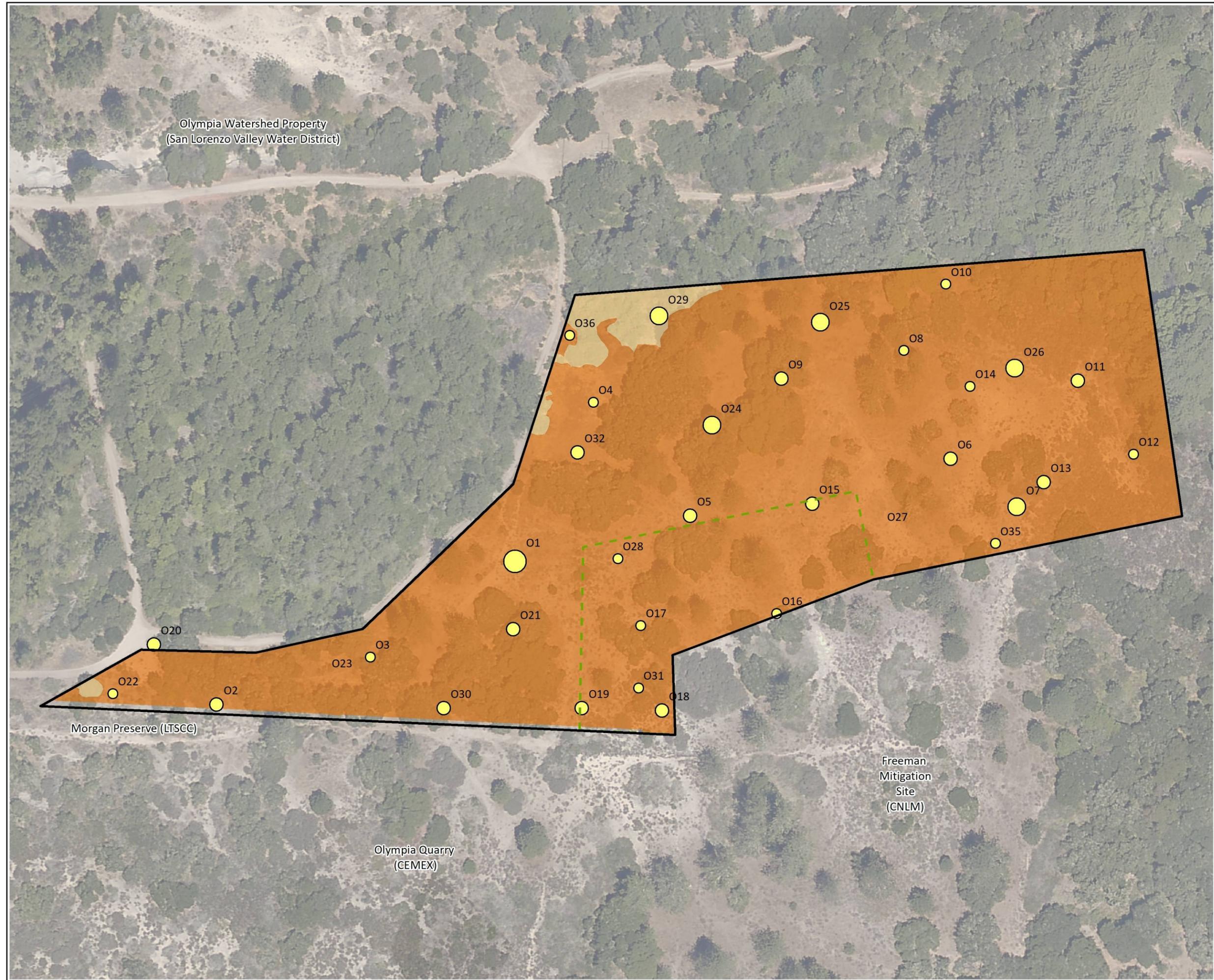
**MOUNT HERMON JUNE BEETLE**

**Number of Individuals in a Trap**

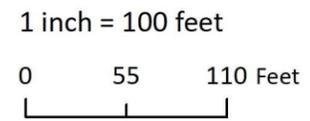


**Mount Hermon June Beetle Habitat**

- Suitable Habitat
- Marginal Habitat
- Degraded Habitat
- Unsuitable Habitat
- Converted Habitat
- Olympia Mapping Area
- Mayer Conservation Easement Area



This map illustrates the number of Mount Hermon June beetles observed in black light traps. It also illustrates the plant communities and other land cover types according to their suitability as habitat for the Mount Hermon June beetle. Section A.4.1 describes the habitat classification methods, which were based on the structure and species composition of the community.



**OLYMPIA CONSERVATION AREA**

**MAP 5**

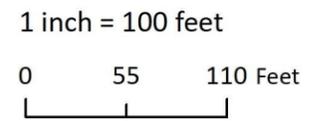
**BEN LOMOND SPINEFLOWER**

**Ben Lomond Spineflower Cover**

-  <1 %
-  1-5%
-  Olympia Mapping Area
-  Mayer Conservation Easement Area



This map illustrates the cover of Ben Lomond spineflower mapped within the plant community and other land cover patches in the Olympia Mapping Area which includes the Olympia Conservation Area and adjacent Mayer Conservation Easement Area. The cover estimates the average across the habitat patch. Section A.3 describes the rare plant mapping methods.

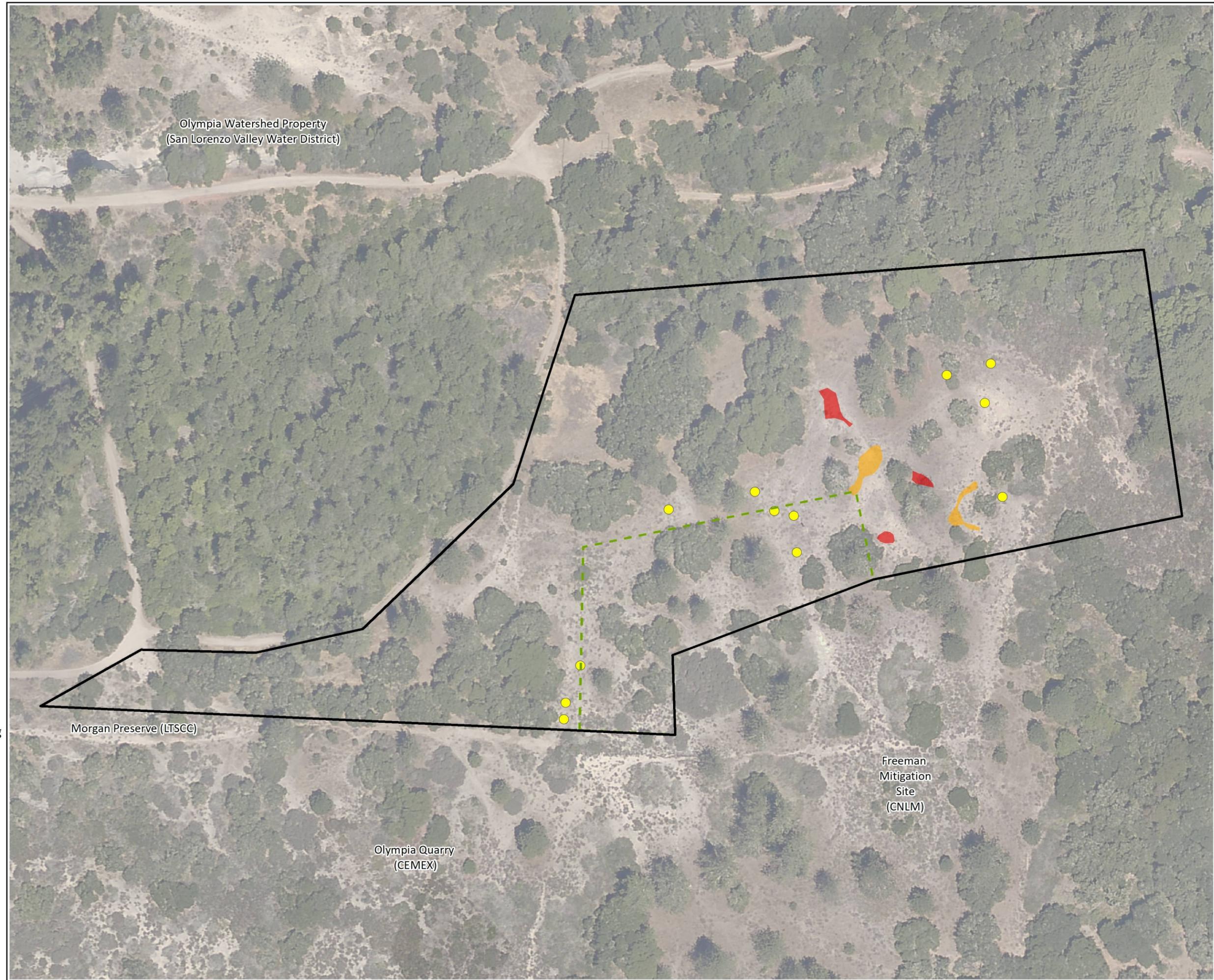


**OLYMPIA CONSERVATION AREA**

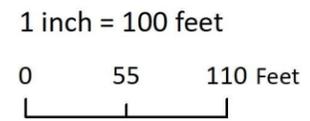
**MAP 6**

**BEN LOMOND WALLFLOWER**

- Wallflower Point Locations
- Wallflower Patches**
  - High Density
  - Medium Density
- Olympia Mapping Area
- Mayer Conservation Easement Area



This map illustrates the cover of Ben Lomond wallflower mapped within the plant community and other land cover patches in the Olympia Mapping Area which includes the Olympia Conservation Area and adjacent Mayer Conservation Easement Area. Section A.3 describes the methods used to map Ben Lomond wallflower using points and polygons.



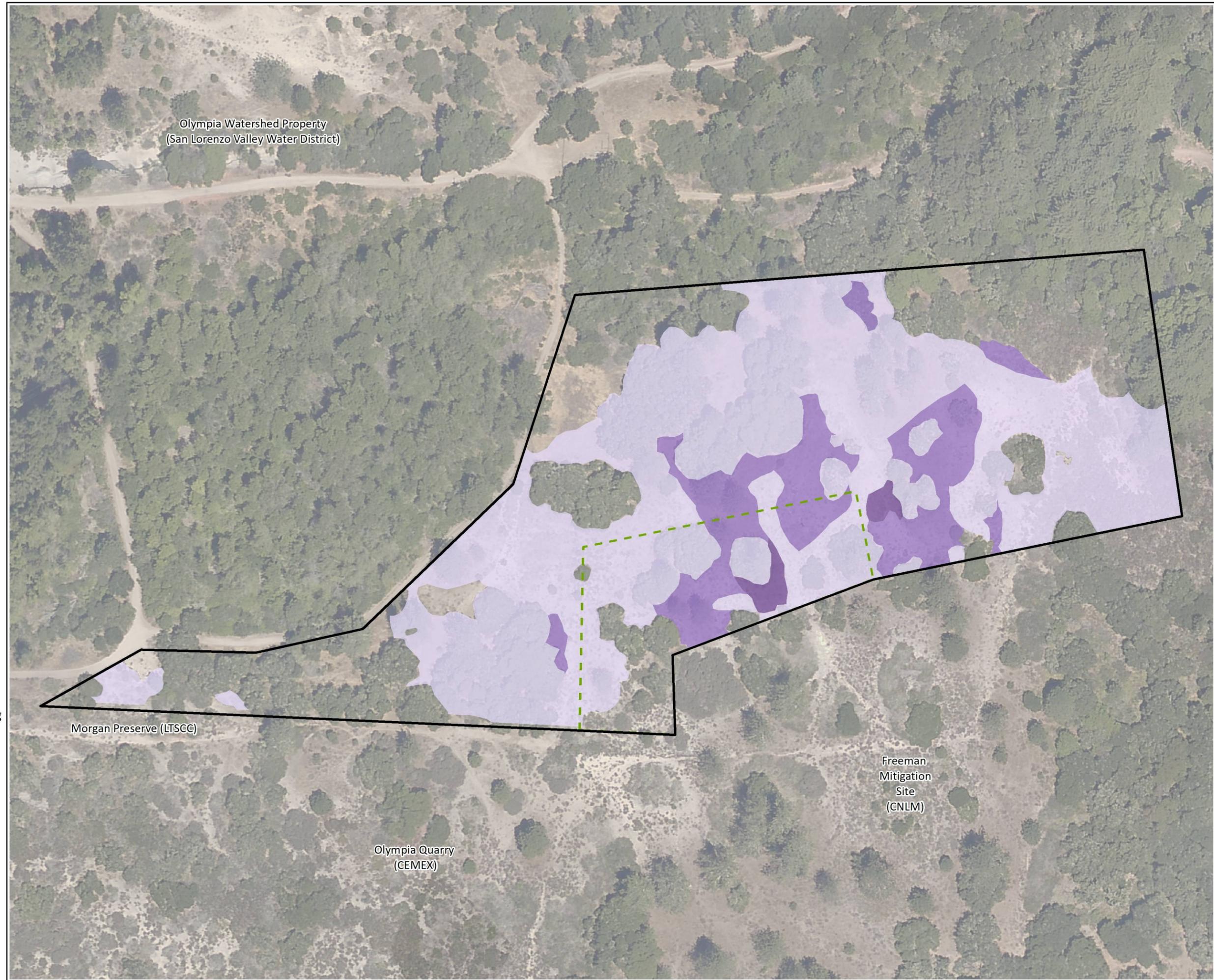
**OLYMPIA CONSERVATION AREA**

**MAP 7**

**BEN LOMOND BUCKWHEAT**

**Ben Lomond Buckwheat Cover**

-  <1 %
-  1-5%
-  6-10%
-  Olympia Mapping Area
-  Mayer Conservation Easement Area



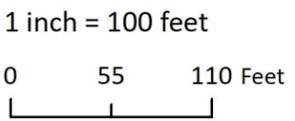
Olympia Watershed Property  
(San Lorenzo Valley Water District)

Morgan Preserve (LTSCC)

Olympia Quarry  
(CEMEX)

Freeman  
Mitigation  
Site  
(CNLM)

This map illustrates the cover of Ben Lomond buckwheat mapped within the plant community and other land cover patches in the Olympia Mapping Area which includes the Olympia Conservation Area and adjacent Mayer Conservation Easement Area. The cover estimates the average across the habitat patch. Section A.3 describes the rare plant mapping methods.



OLYMPIA CONSERVATION AREA

MAP 8

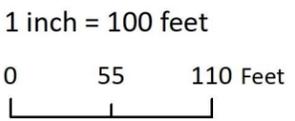
SILVERLEAF MANZANITA

Silverleaf Manzanita Cover

- 16-25%
- 26-50%
- Olympia Mapping Area
- Mayer Conservation Easement Area



This map illustrates the cover of silverleaf manzanita mapped within the plant community and other land cover patches in the Olympia Mapping Area which includes the Olympia Conservation Area and adjacent Mayer Conservation Easement Area. The cover estimates the average across the habitat patch. Section A.3 describes the rare plant mapping methods.



# OLYMPIA CONSERVATION AREA

## MAP 9

### MANAGEMENT ISSUES

 Silver Wattle Restoration Area (~0.17 ac.)

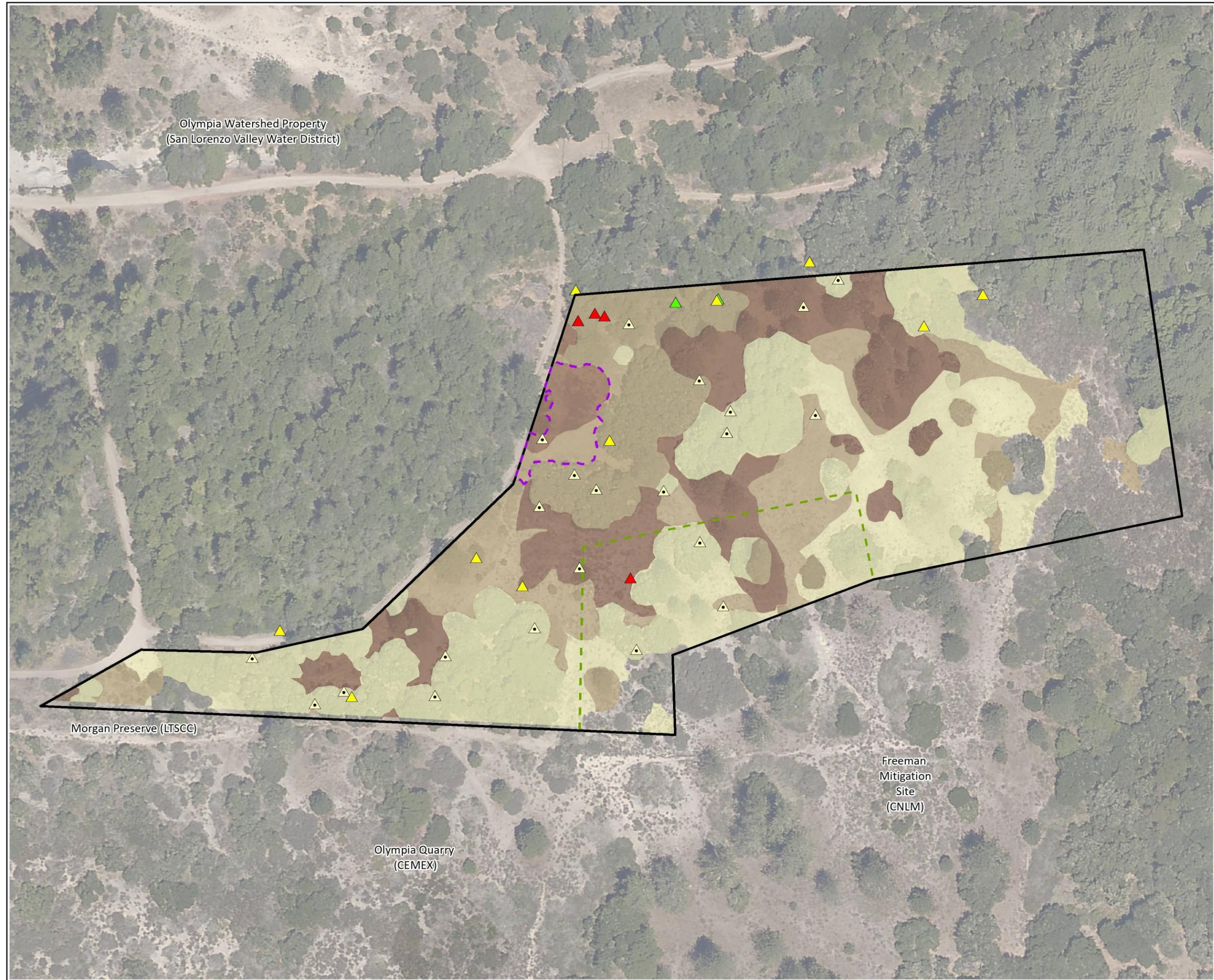
#### Exotic Plant Occurrences (Points)

-  brooms
-  invasive herbs
-  invasive vines
-  velvet grass

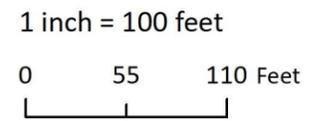
#### Exotic Herbs

- None
-  Low (<10% Cover)
-  Medium (10-50% Cover)
-  High (>50% Cover)

-  Olympia Mapping Area
-  Mayer Conservation Easement Area



This map illustrates the mapped locations of invasive plants, as well as the plant community and other land cover type patches according to the cover of other widespread exotic herbaceous plants. Section A.5.2 describes the methods used to map invasive and other exotic plants.



## Appendix E: Conservation Easement

This appendix contains the conservation easement granted by the District to the Land Trust of Santa Cruz County to establish the Olympia Conservation Area (i.e., the Olympia Watershed Conservation Easement).

2017-0042736

12/18/2017 11:05 AM

OFFICIAL RECORDS OF Santa Cruz County

Sean Saldavia Recorder

RECORDING FEE: \$126.00

COUNTY TAX: \$57.20

CITY TAX: \$0.00

217 ER CHICAGO TI - SIMPLIF EASE

Electronically Recorded 38 PGS

RCD157

Recording requested by and when recorded return to:

Land Trust of Santa Cruz County  
617 Water St.  
Santa Cruz, CA 95060

APNs (portion): 071-141-14 and  
071-141-02

**SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE**

Unincorporated Area

Documentary Transfer Tax: \$57.20

**DEED OF CONSERVATION EASEMENT**

THIS DEED OF CONSERVATION EASEMENT ("Easement") is made this 6<sup>th</sup> day of December, 2017 ("Effective Date"), by **SAN LORENZO VALLEY WATER DISTRICT**, a public corporation ("Grantor"), in favor of **LAND TRUST OF SANTA CRUZ COUNTY**, a California nonprofit public benefit corporation ("Grantee"). Grantor and Grantee are collectively referred to herein as the "Parties" and individually as a "Party."

**RECITALS**

A. Grantor is the owner in fee simple of certain real property located in Santa Cruz County, California, consisting of approximately 6.27 acres, identified as a portion of Assessor Parcel Numbers 071-141-14 and 071-141-02, and as more particularly described in Exhibit A, attached hereto and incorporated herein by this reference (the "Property"). The existing improvements on the Property are located as shown on the sketch map attached hereto as Exhibit B-1, attached hereto and incorporated herein by this reference ("Sketch Map").

B. Grantee is a nonprofit entity formed under the laws of the State of California authorized to hold conservation easements under California Civil Code section 815.3(a), and is an organization described in sections 501(c)(3) and 170(h)(3) of the Internal Revenue Code of 1986, as amended (the "Code"), and is an entity which meets the requirements of section 509(a)(2) of the Code. Grantee's primary purpose is the preservation, protection, and enhancement of natural landscapes in Santa Cruz County, California, and its associated agricultural, open-space, wildlife habitat, and/or scenic values.

C. The United States Fish and Wildlife Service ("USFWS"), an agency within the United States Department of the Interior, has jurisdiction over the conservation, protection, restoration, and management of fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of these species within the United States pursuant to the Endangered

Recording requested by and when  
recorded return to:

Land Trust of Santa Cruz County  
617 Water St.  
Santa Cruz, CA 95060

APNs (portion): 071-141-14 and  
071-141-02

**SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE**

Unincorporated Area

*JP*

Documentary Transfer Tax: \$ *57.20*

**DEED OF CONSERVATION EASEMENT**

THIS DEED OF CONSERVATION EASEMENT ("Easement") is made this *6<sup>th</sup>* day of *December*, 2017 ("Effective Date"), by **SAN LORENZO VALLEY WATER DISTRICT**, a public corporation ("Grantor"), in favor of **LAND TRUST OF SANTA CRUZ COUNTY**, a California nonprofit public benefit corporation ("Grantee"). Grantor and Grantee are collectively referred to herein as the "Parties" and individually as a "Party."

**RECITALS**

A. Grantor is the owner in fee simple of certain real property located in Santa Cruz County, California, consisting of approximately 6.27 acres, identified as a portion of Assessor Parcel Numbers 071-141-14 and 071-141-02, and as more particularly described in Exhibit A, attached hereto and incorporated herein by this reference (the "Property"). The existing improvements on the Property are located as shown on the sketch map attached hereto as Exhibit B-1, attached hereto and incorporated herein by this reference ("Sketch Map").

B. Grantee is a nonprofit entity formed under the laws of the State of California authorized to hold conservation easements under California Civil Code section 815.3(a), and is an organization described in sections 501(c)(3) and 170(h)(3) of the Internal Revenue Code of 1986, as amended (the "Code"), and is an entity which meets the requirements of section 509(a)(2) of the Code. Grantee's primary purpose is the preservation, protection, and enhancement of natural landscapes in Santa Cruz County, California, and its associated agricultural, open-space, wildlife habitat, and/or scenic values.

C. The United States Fish and Wildlife Service ("USFWS"), an agency within the United States Department of the Interior, has jurisdiction over the conservation, protection, restoration, and management of fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of these species within the United States pursuant to the Endangered

Species Act, 16 U.S.C. section 1531 *et seq.* (“ESA”), the Fish and Wildlife Coordination Act, 16 U.S.C. sections 661-666c, the Fish and Wildlife Act of 1956, 16 U.S.C. section 742(f) *et seq.*, and other provisions of federal law.

D. The Property supports habitat required to be preserved and managed in perpetuity by the USFWS under a Federal Endangered Species Act Incidental Take Permit (“Permit”) as mitigation for certain impacts of a new water tank located in the County of Santa Cruz near the unincorporated town of Felton, California, according to the Low-Effect Conservation Plan for the San Lorenzo Water District’s Probation Tank Replacement Project, dated February 14, 2017 (“HCP”), the terms of which are incorporated by reference in this Easement. Grantor, Grantee, and USFWS each has a copy of the HCP and the Permit.

E. The Property possesses the following significant conservation values: natural, scenic, open space, and habitat that supports a variety of rare and special-status plant and animal species (collectively, “Conservation Values”) of great importance to Grantee, the people of Santa Cruz County and the people of the State of California. Protecting, preserving, and restoring these Conservation Values are recognized by the State of California and the people of Santa Cruz County as being of significant public benefit. The Conservation Values of the Property are highlighted in Recitals F – J, below, and are further identified and described in the “Baseline Condition Report” referred to in Recital L below.

F. The Easement on the Property will serve to permanently protect high-quality habitat, expand and connect protected habitat, facilitate habitat management necessary to address threats to endangered species and will promote adaptation of the sandhills communities and endangered species to climate change by promoting resiliency and resistance to climate change impacts. This Easement will also serve to protect groundwater re-charge areas of the Property and the open-space and scenic characteristics of the Property.

G. *Protect High Quality Habitat.* The Property contains critical sandhills habitat. The sandhills are unique communities found only on outcrops of sandy soils derived from marine deposits in Santa Cruz County, central coastal California. They support diverse assemblages of endemic plants and insects, including four endemic species that are federally endangered. The conveyance of the Easement will help to permanently protect and improve the management of sandhills habitat that is essential to the long-term recovery of four federally endangered species: the Mount Hermon June beetle (*Polyphylla barbata*), Zayante band-winged grasshopper (*Trimerotropis infantilis*), Ben Lomond spineflower (*Chorizanthe pungens* var. *hartwegiana*), and Ben Lomond wallflower (*Erysimum teretifolium*). The Property also contains two additional endemic species: Ben Lomond buckwheat (*Eriogonum nudum* var. *decurrens*) and silverleaf manzanita (*Arctostaphylos silvicola*). Of critical importance, the Property contains approximately 4 acres of Sand Parkland habitat. This extraordinarily rare community supports the Zayante band-winged grasshopper and the Ben Lomond wallflower—the two sandhills endangered species with the smallest range and population sizes—which are therefore of greatest conservation concern. Sand Parkland also supports the Mount Hermon June beetle and Ben Lomond spineflower, which also occur within the chaparral that predominates on the remaining sandhills habitat. Given the small amount of Sand Parkland habitat that remains (approximately 210 acres), every acre that can be protected and managed is critical to the persistence of these species.

H. *Expand And Connect Protected Habitat.* These endangered species are threatened by habitat loss, fragmentation, and degradation. Assembling a network of interconnected, protected habitat blocks will promote long-term persistence of the endangered species and unique communities within the approximately 4,000 acres of remaining sandhills habitat. Ongoing development in the region threatens to eliminate important habitat and irrevocably sever connectivity. The Property is a high protection priority for the four endemic sandhills species, the Mount Hermon June beetle, Zayante band-winged grasshopper, Ben Lomond spineflower and Ben Lomond wallflower, because it contains sandhills habitat that is relatively intact, unfragmented, and undegraded, and occurs adjacent to other protected sandhills habitat. Protection of the Property will increase the size and connectivity of existing protected habitat, thus facilitating dispersal, gene flow, and natural disturbance processes that maintain viable populations.

I. *Facilitate Habitat Management.* Protection of this Property will also promote viability of the endangered species populations within the Property by enabling effective management of sandhills habitat, which is essential to the long-term persistence of the endangered species and rare communities. Habitat within the Property is threatened by: (1) the invasion of non-native plant species, which out-compete the endangered sandhills plants and alter habitat structure for the endangered insects; and (2) the disruption of the natural fire regime, which can reduce suitability of the habitat for the four endangered, endemic species. Protection of the Property will allow active habitat management to address these threats, as well as new threats identified in the face of a changing climate, as part of an adaptive management and monitoring program.

J. *Studies and Plans.* Permanent protection of the Property, together with other priority properties, will safeguard a significant amount of some of the highest quality unprotected sandhills habitat remaining. The Property was identified as a priority for protection in the Land Trust of Santa Cruz County's *Sandhills Conservation and Management Plan*: an ecosystem-wide conservation plan developed to inform Grantee's work in collaboration with state, county, and local agencies to conserve the sandhills.

K. The conservation purposes of this Easement are recognized by, and the grant of this Easement will serve, the following clearly delineated governmental conservation policies:

Section 815 of the California Civil Code, in which the California Legislature declares that the preservation of land in its natural, scenic, agricultural, historical, forested, or open-space condition is among the most important environmental assets of California, and further declaring it to be the public policy and in the public interest of the State to encourage the voluntary conveyance of conservation easements to qualified nonprofit organizations.

California Constitution Article XIII, section 8, California Revenue and Taxation Code, sections 421.5 and 422.5, and California Civil Code section 815.1, under which this Easement is an enforceable restriction, requiring that the Property's tax valuation be consistent with restriction of its uses for purposes of recreation, enjoyment of scenic beauty, use or conservation of natural resources, or production of food or fiber.

Section 75001 *et seq.* of the California Public Resources Code (known as Proposition 84, the Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006) declares that it is necessary and in the public interest to, among other things, protect the rivers, lakes and streams of the state from pollution and the loss of water quality, and from the destruction of fish and wildlife habitat and provides funding for the preservation, protection and restoration natural systems and landscape features, and plant and wildlife habitat improvements to increase the natural system value of the property.

Section 6 of the Endangered Species Act of 1973, 16 U.S.C. 1531 - 1534 *et seq.*, as amended, provides for the Cooperative Endangered Species Conservation Fund, including the Recovery Land Acquisition Program, declaring that loss of habitat is the primary threat to most listed species and land acquisition is often the most effective and efficient means of protecting habitats essential for recovery of listed species before development or other land use changes impair or destroy key habitat values and stating that its funding program supports the acquisition or protection of these habitats in support of approved or draft species recovery plans.

The Santa Cruz County General Plan (2030, adopted June 26, 2012) has documented in its Natural Resources and Conservation element, the County's goal: Goal NRC2.1 to "Protect, enhance, or restore habitat for special-status plant and animal species."

L. The specific Conservation Values of the Property are further documented in an inventory of relevant features of the Property contained in the baseline documentation report ("Baseline Condition Report"), which the Parties hereto have jointly prepared. The Parties agree that the Baseline Condition Report provides an accurate representation of the condition of the Property at the time of this Easement and is intended to serve as an objective, though nonexclusive, information baseline for monitoring compliance with the terms of this Easement. A signed acknowledgment and certification by the Parties of the condition of the Property as set forth in the Baseline Condition Report is attached hereto as Exhibit C and incorporated herein by this reference.

M. Grantor herein intends to convey this Easement over the Property to Grantee, including the right to preserve, protect and enhance in perpetuity the Conservation Values of the Property. Grantor and Grantee intend that this Easement will confine the use of the Property to activities that are consistent with the purposes of this Easement and will prohibit and prevent any use of the Property that will impair or interfere with the Conservation Values of the Property for the benefit of this generation and generations to come, all as provided herein.

NOW, THEREFORE, in consideration of the above and the mutual covenants, terms, conditions and restrictions contained herein, and pursuant to the laws of the State of California and in particular California Civil Code section 815 *et seq.*, Grantor hereby grants and conveys to Grantee, and Grantee hereby accepts, a conservation easement in perpetuity over the Property of the nature and character hereinafter set forth.

1. Conservation Purpose. The primary purpose of this Easement is to assure that the Property's relatively natural habitat will be preserved, maintained and enhanced in perpetuity (the "Primary Purpose"), thereby providing a significant public benefit, and to prevent any use of the Property that will impair or interfere with the Primary Purpose. To the extent that the preservation of the additional Conservation Values of the Property referenced above (among them, but not by way of limitation, the Property's natural, scenic and open-space values) is consistent with the Primary Purpose, it is also the purpose of this Easement to protect those additional Conservation Values. Any activity that impairs the Conservation Values shall be prohibited. These purposes shall collectively be referred to herein as the "Conservation Purpose" of this Easement. The Parties agree that Grantor's retention of certain rights specified in this Easement is consistent with the Conservation Purpose, provided said uses are carried out in a manner consistent with the terms and provisions of this Easement.

2. Extinguishment of Development Rights. Except as expressly reserved to Grantor in this Easement, all development rights that were previously, are now or hereafter allocated to, implied, appurtenant to or inherent in the Property are hereby relinquished, released, terminated, and extinguished, and may not be used on or transferred to any portion of the Property as it is now or hereafter may be bounded or described, or to any other property adjacent or otherwise, or used for the purpose of calculating permissible lot yield of the Property or any other property. This Easement shall not create any development rights.

3. Subdivision and Common Ownership of the Property. Grantor shall not sell, exchange, convert, transfer, assign, mortgage or otherwise encumber, alienate or convey the Property or portion thereof separately or apart from the Property as a whole, and Grantor and its successors in interest will at all times treat the Property as a single integrated economic unit of property. The division, subdivision, *de facto* subdivision or partition of the Property, including transfer of development rights, whether by physical, legal, or any other process, is prohibited. Grantor and Grantee agree that the Property is currently comprised of, and is described in Exhibit A as, a portion of two (2) legal parcels. Grantor will not apply for or otherwise seek recognition of additional legal parcels with the Property based on certificates of compliance, conditional certificates of compliance, or any other authority.

4. Rights of Grantee. To accomplish the Conservation Purpose of this Easement, the following rights are conveyed to Grantee:

(a) To identify, to preserve, and to protect in perpetuity the Conservation Values of the Property pursuant to the terms hereof.

(b) To enter upon, inspect, observe, and study the Property in accordance with the terms of this Easement, including but not limited to Section 10 (Monitoring) below, for the purposes of (i) identifying the current uses and practices thereon; (ii) monitoring the current

uses and practices and evaluating notices of new uses and practices to determine whether they are consistent with the terms of this Easement; and (iii) investigating, verifying, preventing and/or mitigating a violation or threatened violation of the terms of this Easement.

(c) To investigate, review, and approve, approve with conditions, or disapprove, in accordance with the terms of this Easement, those activities under this Easement requiring notice to or approval of Grantee.

(d) To enforce the terms of this Easement in accordance with Section 11, including the right to prevent any activity on or use of the Property that impairs the Conservation Values or is otherwise inconsistent with the Conservation Purpose or other terms of this Easement and to require the restoration of such areas or features of the Property that may be damaged by any condition, activity or use that is inconsistent with the terms of this Easement.

(e) To enjoin, through appropriate legal process, as set forth in Section 11, (i) any violation of the terms of this Easement by Grantor or its agents, contractors or invitees, and (ii) any use of, or activity on, the Property that is not expressly permitted in this Easement and that is detrimental to the Conservation Values, including trespasses by members of the public or neighbors, and to require the restoration of such areas or features of the Property as may be damaged by uses or activities inconsistent with the provisions of this Easement, subject to and in accordance with the provisions of Section 11.

(f) Subject to compliance with all applicable laws, Grantee has the right to place, maintain, and/or remove signs or other appropriate markers at the expense of Grantee, provided that the number, size and location of the signs are subject to Grantor's approval, which shall not be unreasonably withheld, conditioned, or delayed. The signs or other appropriate markers may be located in prominent locations on the Property, visible from other adjoining property, bearing information indicating that the Property is protected by the Easement and/or the participation of Grantee, the wording of which sign shall be decided upon by Grantee.

(g) For the purpose of restoring, enhancing or improving the health of the natural resources and habitats located on the Property, the right to enter the Property, along with Grantee's agents, contractors and volunteers, as set forth in Section 9 (Habitat Restoration).

(h) To enter the Property, along with Grantee's agents and contractors, at reasonable times and upon not less than five (5) days' prior written notice, in order to conduct scientific research within the Sandhill habitat area, including but not limited to conducting surveys to determine the presence or absence of listed species or to evaluate the condition of other natural resources. For access to the Property for the purposes set forth in this section, Grantee may give notice to Grantor by email. Grantee's scientific research activities shall not unreasonably limit or interfere with Grantor's use of the Property and shall be conducted at Grantee's sole cost and expense.

(i) To use existing roads, paths, and trails into and across the Property for Grantee, Grantee's agents, and contractors, to enter and access all portions of the Property for all of the purposes allowed by this Easement.

5. Reserved Rights. Grantor reserves unto itself and to its successors and assigns all rights accruing from its fee simple ownership of the Property that are not extinguished, transferred and conveyed hereby, and that are not expressly granted to Grantee or prohibited herein and are not inconsistent with the Conservation Purpose of this Easement, including the right to engage in or permit or invite others to engage in all uses of the Property that are not expressly prohibited herein and that are not inconsistent with the Conservation Purpose of this Easement. Without limiting the generality of the foregoing, the following rights relating to the Property are expressly reserved by Grantor:

(a) subject to the prohibition on transfer or severance as provided in Section 6(a) below, the right to hold and use all existing water rights on the Property for the benefit of the Property, to apply for additional riparian and/or appropriative rights as necessary for the permitted and ecological uses of the Property, and to obtain water supplies from any source permitted by applicable laws; and

(b) subject to the restrictions set forth in Section 3 (prohibiting subdivision) and Section 7(c) (regarding subordination of subsequent agreements and encumbrances to this Easement), the right to sell, lease, devise or otherwise transfer the Property as a whole, subject to this Easement, to anyone Grantor chooses; the right to use the Property as security for debt; and the right to privacy (subject to Grantee's rights to carry out habitat restoration, scientific research and monitoring of the Easement, all in accordance with the terms of this Easement) and the right to exclude any member of the public from trespassing on the Property and any other rights consistent with the Conservation Purpose of this Easement. Nothing contained herein shall be construed as a grant to the general public of any right to enter upon any part of the Property.

(c) subject to the restrictions set forth herein, the right to (i) the storage, sequestration and accumulation of carbon associated with the absorption by plants of carbon dioxide from the atmosphere and its conversion to carbon stored in all above-ground living biomass, below-ground living biomass, dead biomass including (without limitation) trees, plants and other vegetation and associated roots, surface duff and organic elements in the soil on the Property ("Carbon") and (ii) sell or trade any voluntary or regulatory reduction tons or emissions offset credits generated from Carbon ("Carbon Credits"), to the extent such sale or trade of Carbon Credits is consistent with the Conservation Purpose of this Easement and protection of the Conservation Values and the Carbon is captured as a natural consequence of the exercise of the uses by Grantor permitted herein. The terms and conditions of this Easement shall be taken into account when calculating the baseline/business as usual of the Property for purposes of establishing Carbon Credits or other emissions offsets that Grantor proposes to authorize, create, sell, exchange or transfer with respect to the Property. Grantor shall notify Grantee in writing at least forty-five (45) days prior to any such proposed establishment.

6. Prohibited Uses. Any activity on or use of the Property that impairs the Conservation Values of the Property or is inconsistent with the Conservation Purpose or other terms of this Easement is prohibited. Without limiting the generality of the foregoing, except as otherwise expressly permitted under the Habitat Management and Monitoring Plan approved by USFWS ("HMMP"), the following activities and uses are expressly prohibited on the Property:

(a) *Transfer of Water, Mineral, Air Rights.* Without the prior written consent of Grantee and USFWS, which Grantee and USFWS each may withhold for any reason, the following activities are prohibited: (1) transferring, encumbering, selling, leasing, or otherwise separating the mineral, air, or water rights for the Property; and (2) abandoning or allowing the abandonment of, by action or inaction, any water or water rights, ditch or ditch rights, spring rights, reservoir or storage rights, wells, ground water rights, or other rights in and to the use of water historically used on or otherwise appurtenant to the Property, including but not limited to: (i) riparian water rights; (ii) appropriative water rights; (iii) rights to waters which are secured under contract with any irrigation or water district, to the extent such waters are customarily applied to the Property; and (iv) any water from wells that are in existence or may be constructed in the future on the Property; provided, however, that clause (iv) above shall not prohibit Grantor from selling or transferring water that has been drawn from the Property from wells located offsite.

(b) *Destruction or Degradation of Specific Conservation Values.* Any use which causes or could reasonably cause or result in degradation or impairment of the Conservation Values, and, in particular, the sandhills habitat;

(c) *Construction of Buildings or Improvements.* The construction or reconstruction of any buildings, other structures, fences, or other improvements, except as and to the extent specified in Sections 7 and 8;

(d) *Signs and Billboards.* Except as provided in Section 7(a) (regarding permitted signage), the erection of any billboards or other type of signs or advertising;

(e) *Mining.* The filling, dumping, excavating, draining, dredging, mining, drilling, removing or exploring for or extracting from the Property of soil, rock, sand, gravel, oil, natural gas, fuel or any other hydrocarbon or mineral substance using any mining method;

(f) *Dumping and Trash.* The dumping or accumulation of any kind of trash, refuse, derelict equipment, vehicles, soil, ashes, garbage or other unsightly, or offensive materials;

(g) *Removal of Trees and Plants.* Removing, disturbing, altering, destroying, or cutting of trees, shrubs or other vegetation, except as required by law and in conformance with the USFWS-approved HMMP or another management plan approved by Grantee and USFWS for (1) fire breaks, (2) maintenance of existing foot trails or roads that are otherwise permitted under this Conservation Easement, or (3) prevention or treatment of disease;

(h) *Off-road Use of Motorized Vehicles.* Except as provided in Section 7(b) (regarding use of motorized vehicles for habitat restoration, mowing and emergencies), the use of motorized vehicles on or off of paths or off of roads;

(i) *Surface Alteration; Construction or Paving of Roads and Paths.* Altering the surface or general topography of the Property, including the construction or paving of any road or pathway on the Property;

(j) *Agricultural, Recreational, Residential, Institutional, Commercial, or Industrial Use.* Any agricultural, recreational, residential, institutional, commercial, or industrial use of any portion of the Property;

(k) *Hazardous Materials.* The use, disposal, storage, transport and/or release of any "Hazardous Materials" as defined in Section 15(e) in violation of applicable laws, and any use, disposal, storage, transport and/or release of any Hazardous Materials;

(l) *Commercial Power Generation, Collection or Transmission.* Any commercial power generation, collection or transmission facilities, including solar or wind farms or facilities;

(m) *Easements for Utilities and Roads.* The granting of easements for (i) utilities (except in conjunction with permitted uses in accordance with Section 8(c)) and (ii) roads existing as of the Effective Date of this Easement;

(n) *Hunting, Trapping.* Except as provided in Section 8(d) (regarding removal of problem animals), hunting and trapping on the Property;

(o) *Illegal Activity.* Any activity or use that may violate or fail to comply with relevant federal, state, or local laws, regulations, or policies applicable to Grantor, the Property, or the activity or use in question;

(p) *Watercourse Manipulation.* Manipulating, impounding or altering any natural water course, body of water or water circulation on the Property, and activities or uses detrimental to water quality, including but not limited to degradation or pollution of any surface or sub-surface waters;

(q) *Inconsistent Use.* Unseasonable watering; use of chemical fertilizers, pesticides, biocides, herbicides, rodenticides, fungicides or other agents; weed abatement activities; planting, introduction, or dispersion of non-native or exotic plant or animal species; incompatible fire protection activities; and any and all other activities and uses which may adversely affect the Conservation Values of the Property or otherwise interfere with the purposes of this Conservation Easement.

7. Permitted Uses. Grantee and Grantor intend that this Easement shall confine the uses of the Property to limited open-space, scenic and natural uses and other uses not inconsistent with the Conservation Purpose and other terms of this Easement, which are described herein, and, in accordance with Section 15(c), comply with applicable laws, including laws protecting rare and endangered species. Except as otherwise expressly permitted under the USFWS-approved HMMP, Grantor shall give thirty (30) days' advance notice to Grantee in writing in accordance with Section 23 prior to undertaking any construction or other improvement on the Property as permitted herein (i.e., any activity or improvement requiring a building, grading, or zoning permit or environmental regulatory review or permit), providing Grantee with adequate information, documents and plans so as to enable Grantee to confirm compliance with the terms of this Easement and enable Grantee to keep its records current ("Written

Advisement"). In addition to those reserved rights described in Section 5 above, examples of uses and practices that are consistent with the Conservation Purpose of this Easement, and that are hereby expressly permitted as long as they are conducted in a manner consistent with this Easement, are as follows:

(a) *Maintenance of Existing Improvements.* Any improvement existing on the Property as of the Effective Date, as more particularly described in the Baseline Condition Report, may be repaired, maintained, and replaced with an improvement of the same size and function and in the same location.

(b) *Use of Motorized Vehicles.* Motorized vehicles are permitted only on existing or permitted new roads. The use of motorized vehicles off roads is permitted only as necessary for restoration of the Property or for emergency purposes for the protection of persons or property.

(c) *Subsequent Liens or Encumbrances on Property.* Grantor may use the Property as collateral for subsequent borrowing, provided any subsequent obligation secured by the Property is subordinate to this Easement, generally, and all of the beneficiary's rights, interests, claims, remedies and privileges under any security instrument (including, but not limited to, any right of the beneficiary to insurance proceeds or proceeds in a condemnation proceeding), specifically, are, and at all times shall continue to be, subject and subordinate in all respects to this Easement and the interest of Grantee therein, with the same force and effect as if the Easement had been executed, delivered and recorded prior to the execution and delivery of the security instrument.

(d) *Habitat Restoration and Fencing under USFWS-Approved Management Plan.* Grantor may conduct restoration, enhancement, management, monitoring, and maintenance of the Property, including, but not limited to, installing fencing, pursuant to the USFWS-approved HMMP. Grantor shall provide to Grantee a copy of any approved HMMP, including any update or amendment thereto, within ten (10) business days of approval by USFWS.

8. Uses of Property with Grantee's Prior Consent. The following uses and practices may be consistent with this Easement, depending on the manner in which they are carried out. Except as otherwise expressly permitted under the USFWS-approved HMMP, the following uses of the Property are prohibited unless the prior written consent of Grantee is obtained in accordance with Section 13 below, provided that Grantee's consent hereunder may be given in Grantee's sole and absolute discretion:

(a) *Habitat Restoration.* Any restoration and enhancement of the sandhills and riparian habitats of the Property that is not described in the USFWS-approved HMMP.

(b) *Fencing.* The installation of perimeter and/or interior fencing that is not described in the USFWS-approved HMMP, but only for the purpose of preserving and protecting the Conservation Values of the Property.

(c) *Rights-of-Way for Utilities.* The granting of rights-of-way over and under the Property for wires, lines, pipes, cables or other facilities providing electrical, gas, water, sewer, communications, energy generation, or other utility services serving the improvements and uses

permitted herein, or to transmit power generated on the Property, provided such rights-of-way do not impair the Conservation Values of the Property.

(d) *Hunting and Trapping.* The control of problem animals may be permitted, using selective control techniques, which shall be limited in their effectiveness to specific animals that have caused damage. Such techniques shall be in full compliance with applicable laws and shall be consistent with the Conservation Purpose of this Easement.

(e) *New Signs.* New signs may be placed on the Property only for the purposes of identifying the Property, prohibiting trespass, and providing educational or interpretative information; provided, however, that, except for interpretative signage, the total surface area of all signs shall not exceed twelve (12) square feet and the top of each sign shall be no more than twenty (20) feet from the ground. Other than signs prohibiting trespass and interpretive signage, a maximum of two (2) new signs may be erected on the Property with no single sign exceeding a surface area of six (6) square feet. Notwithstanding the foregoing, all such signs, both individually and collectively, shall not impair the scenic or other Conservation Values of the Property as determined by Grantee in its sole discretion.

(f) *Other Activities, Uses and Structures and Improvements.* Grantor and Grantee acknowledge that, in view of the perpetual nature of this Easement, they are unable to foresee all potential future land uses, technologies, and natural changes to the land and its Conservation Values over time. If it is reasonably debatable as to whether an activity, use or structure or improvement that is not expressly addressed in this Easement, is consistent with the terms of this Easement or might impair the Conservation Values of the Property, then Grantor shall notify and seek prior approval from Grantee in the manner described in Section 13.

9. Habitat Restoration. For the purpose of restoring, enhancing or improving the health of the natural resources and habitats located on the Property, including the sandhills habitat, in the event (i) the Property is ever owned by an individual or entity other than San Lorenzo Valley Water District and/or (ii) Grantor or the Property is no longer subject to the HMMP, Grantee shall have the following rights:

(a) to enter the Property along with Grantee's agents, contractors and volunteers, at reasonable times and upon not less than five (5) days' prior notice to Grantor, in order to carry out the management and restoration activities set forth in this Section 9 within the sandhills habitat area, as such areas are generally delineated on the map attached hereto as Exhibit B-1 and more particularly described in the Baseline Condition Report;

(b) to conduct the following activities, provided that such activities are prescribed and carried out in accordance with a habitat restoration and management plan ("Habitat Management Plan") prepared by a credentialed natural resource professional at Grantee's sole cost and expense, which plan shall be provided to Grantor upon its completion in advance of the commencement of any such activities and upon any significant revisions or updates:

(i) *Management of Native and Non-Native Vegetation.* To manage native and non-native (exotic) vegetation, including exotic plant control, vegetation management,

including manipulating, pruning, cutting down and removing said vegetation for habitat management;

(ii) *Forest of Stream Habitat Improvement.* To carry out other forest or stream habitat improvement activities;

(iii) *Fencing of Sensitive Habitat Areas.* To fence sensitive habitat areas off from rest of Property;

(iv) *Monitoring Effects of Restoration.* To monitor the effects of the restoration activities;

(v) *Planting and Management of New Native Vegetation.* To plant and manage new native vegetation;

(vi) *Use of Pesticides, Herbicides or other Biocides.* With at least fifteen (15) days' advance notice to Grantor, to use pesticides, herbicides or other biocides to control non-native and noxious vegetation, provided the use of these substances does not significantly impact Grantor's permitted uses elsewhere on the Property;

(vii) *Development and Maintenance of Irrigation Systems.* To develop and maintain temporary or permanent irrigation systems to manage and enhance native vegetation, including for this purpose developing any surface and groundwater rights associated with the Property in a manner that does not significantly impact Grantor's permitted uses elsewhere on the Property;

(viii) *Restoration Activities.* To conduct restoration activities to repair or prevent damage to the habitat from erosion or other causes; and

(ix) *Controlled Burns or other Restoration Activities.* With at least fifteen (15) days' advance notice to and prior written approval by Grantor, (I) to manage native and non-native (exotic) vegetation, including exotic plant control and vegetation management, by burning (to simulate the beneficial effects of a fire, e.g., fuel reduction projects); and (II) to carry out additional restoration activities that serve the Conservation Purpose of this Easement that are not otherwise prescribed in the Habitat Management Plan.

Notice to be given to Grantor for activities set forth in this Section 9 may be given by email. Grantee's habitat management and restoration activities shall not unreasonably limit or interfere with Grantor's access to and use of the Property and shall be at Grantee's sole cost and expense, and Grantor shall not be responsible for upkeep and maintenance of Grantee's restoration projects. Grantee represents, warrants and covenants to Grantor that Grantee's activities on the Property shall comply in all material respects with all applicable laws, including but not limited to Environmental Laws (as defined below).

10. Monitoring. Grantee shall manage its responsibilities for the Easement, including but not limited to, annual monitoring, such additional monitoring as circumstances may require, record keeping, and enforcement, for the purposes of preserving the Property's enumerated Conservation Values in perpetuity. Grantee shall assume primary responsibility for Easement monitoring and stewardship. Failure to do so shall not impair the validity of the Easement or limit its enforceability in any way. Grantee shall have the right to enter upon, inspect, observe, monitor and evaluate the Property to identify the current condition of, and uses and practices on, the Property, and to determine whether the condition, uses and practices are consistent with the terms of this Easement. Monitoring visits shall be subject to the following conditions:

(a) Grantee shall give at least five (5) days' advance written notice to Grantor before entering upon the Property for its annual monitoring visit. In the event of an emergency or suspected emergency affecting the Conservation Values or other violation or suspected violation of the terms of the Easement, Grantee may enter the Property without the requirement to give advance notice to Grantor. Any required notice shall indicate the purpose of the entry and shall provide the timeframe during which Grantee is expected to be on the Property.

(b) Entry shall take place during normal business hours (8am-6pm) unless otherwise required due to exigent circumstances.

(c) Grantee shall indemnify, defend, and hold harmless Grantor and its members, directors, officers, employees, agents, representatives and contractors and the heirs, personal representatives, successors, and assigns of each of them against and from all expense, loss, liability, damages and claims, including Grantor's reasonable attorneys' fees, if necessary, arising out of the entry on the Property by Grantee, Grantee's agents, contractors and volunteers, or anyone under Grantee's direct control, for the purpose of monitoring, habitat restoration or otherwise, except to the extent any such expense, loss, liability, damage and/or claim is caused by Grantor's negligence or willful misconduct or arises out of a violation or suspected violation of the terms of the Easement.

11. Grantee's Remedies. If Grantee determines that Grantor is in violation of the terms of this Easement or that a violation is threatened, Grantee shall give written notice to Grantor of such violation or threatened violation and demand corrective action sufficient to cure the violation. Where the violation involves injury to the Property resulting from any use or activity that is inconsistent with the terms of this Easement, Grantor shall restore the portion of the Property so injured. If Grantor fails to cure the violation within thirty (30) days after receipt of notice thereof from Grantee, or under circumstances where the violation cannot reasonably be cured within a thirty (30) day period, fails to begin curing such violation within the thirty (30) day period, or fails to continue diligently to cure such violation until finally cured, Grantee may bring an action at law or in equity in a court of competent jurisdiction to enforce the terms of this Easement, to enjoin the violation, *ex parte* as necessary, by temporary or permanent injunction, to recover any damages to which it may be entitled for violation of the terms of this Easement or injury to any Conservation Values protected by this Easement and/or to require the restoration of the Property to the condition that existed prior to any such injury. If Grantee, in its sole discretion, determines that circumstances require immediate action to prevent or mitigate significant damage to any of the Conservation Values, Grantee may pursue its remedies under

this section without providing written notice and/or waiting for the period provided for cure to expire. These remedies shall be cumulative and shall be in addition to all remedies now or hereafter existing at law or in equity.

Grantor hereby waives any defense of laches, estoppel, prescription, unclean hands or the doctrine of changed circumstances in any action or proceeding, including but not limited to any mediation, brought by Grantee to enforce or to interpret the provisions of this Easement.

Nothing contained in this Easement shall be construed to entitle Grantee to bring any action against Grantor for any injury to or change in the Property resulting from unforeseeable trespass, fire, flood, storm, extreme temperatures, unavailability of water, and earth movement or other natural occurrences, or from any prudent action taken by Grantor under emergency conditions to prevent, abate or mitigate significant injury to any person, property, or the Property resulting from such causes; provided, however, that nothing in this paragraph shall be construed to waive Grantor's obligation to maintain the Property in a safe and habitable condition consistent with the terms of this Easement and to use commercially reasonable efforts to protect the Property from trespassers and other third parties comparable to the efforts made by prudent landowners.

12. Public Access. This Easement does not convey a right of access to the general public. Notwithstanding the foregoing, Grantor may allow public access, so long as such access is in accordance with the USFWS-approved HMMP. Any such public access occurring under the terms of an approved HMMP shall be consistent with the Conservation Purpose and shall not impair the Conservation Values.

13. Grantee's Consent. Where Grantee's consent is required under this Easement, said consent (a) shall not be unreasonably withheld, conditioned, or delayed by Grantee unless its consent is expressly provided herein to be in its sole and absolute discretion; (b) shall be sought and given in writing in accordance with the notice provisions of Section 23; and (c) shall in all cases be obtained by Grantor prior to taking the proposed action. In seeking approval, Grantor shall provide Grantee with adequate information, documents and plans of said action, so as to enable Grantee to confirm compliance with this Easement and to keep its records current. If the information submitted is insufficient for Grantee to make an informed judgment of the activity's consistency with the terms of this Easement, then Grantee shall request from Grantor the additional information Grantee reasonably deems necessary to allow Grantee make such a judgment.

Where approval is required, Grantee shall grant, grant with conditions, or withhold its approval in writing within thirty (30) days from the date that Grantee has received Grantor's notice and sufficient information to make a determination. Grantee may grant approval to Grantor only where Grantee determines that the proposed action will not diminish or impair the Conservation Values or otherwise be inconsistent with the terms of this Easement. If, in the judgment of Grantee, the proposed use or activity should not be permitted in the form proposed, but could be permitted if modified, then Grantee's response may propose to Grantor suggested modification(s) and/or condition(s) that would permit the use or activity. If Grantor disagrees with Grantee's decision, the Parties may agree to mediate the disagreement by written request of one party to the other party. Grantee shall use good-faith efforts to respond promptly to any

requests of Grantor. If Grantee does not respond to Grantor's notice within thirty (30) days from the date that Grantee received the notice and sufficient information to make a determination, Grantor's request shall be deemed denied.

14. Transfer Fee.

(a) There shall arise, by virtue of any transfer for consideration of the Property or interest therein (other than (i) a lease, license, or easement for a total term, including any options to renew or extend, not exceeding thirty-five (35) years; or (ii) any transfer of the Property or portion thereof from the San Lorenzo Valley Water District), a fee which is referred to herein as the "Transfer Fee." The Transfer Fee shall be the obligation of the seller of the Property and shall be payable to Grantee or subsequent holder of this Easement. The Transfer Fee shall be in the amount of Two Thousand and Five Hundred Dollars (\$2,500.00) (adjusted by the rate of inflation from the date of the grant of this Easement to the date of conveyance giving rise to the Transfer Fee) and shall be paid by Grantor to Grantee in connection with the transfer of any interest in the Property concurrently with the close of escrow or other consummation of the transfer of the Property.

(b) An exchange of properties pursuant to Internal Revenue Code section 1031, or similar statute, shall be deemed to be a conveyance of the Property for purposes of assessing the Transfer Fee.

(c) In the event of non-payment of the Transfer Fee in accordance with this section, Grantee shall have the right to record a lien against the Property in the amount equal to the unpaid Transfer Fee plus any and all reasonable costs and reasonable attorney's fees necessary to prepare and enforce the lien of the Transfer Fee. The lien shall be recorded in accordance with California Civil Code section 2872 *et seq.* The lien shall be subordinate to this Easement and any other prior liens, encumbrances, mortgages and deeds of trust of record and any subsequent mortgages or deeds of trust. A copy of the lien shall be mailed via certified mail, return receipt requested, to the seller and the purchaser at the last known address of each upon recordation of the lien. After the expiration of ninety (90) days following the mailing of a copy of the lien, the lien may be enforced in any manner permitted by law, including without limitation a sale by the court or sale by the trustee designated by Grantee in the lien, in the sole exercise of Grantee's discretion, in accordance with the provisions of section 2924 of the California Civil Code.

(d) Concurrently with the recordation of this Easement, in compliance with California Civil Code section 1098.5, Grantee shall record a document entitled "Payment of Transfer Fee Required" in the form required by statute and reasonably acceptable to the parties.

15. Costs and Liabilities. Except as otherwise expressly provided herein, Grantor retains all responsibilities and shall bear all costs and liabilities of any kind related to the ownership, operation, upkeep, and maintenance of the Property. Grantor shall keep the Property free of any liens arising out of any work performed for, materials furnished to, or obligations incurred by Grantor. Without limiting the generality of the foregoing, Grantor shall be responsible for each of the following:

(a) Liability Insurance. Grantor shall maintain comprehensive general liability insurance in the amount of no less than One Million Dollars (\$1,000,000.00) per occurrence (either in a stand-alone general liability policy, or as part of any umbrella coverage, or a combination of the two) for the Property. Grantor shall cause all such policies of insurance to name Grantee as an additional insured and shall provide Grantee with a certificate of insurance for each such policy and all renewals thereof. Grantor's liability insurance shall apply as primary insurance with respect to any other insurance or self-insurance programs afforded to Grantee. Grantor waives all rights of subrogation against Grantee and its agents, representatives, officers, directors and employees for recovery of damages to the extent these damages are covered by insurance maintained by Grantor pursuant to this Easement. The foregoing insurance requirements do not replace, waive, alter or limit the hold-harmless or indemnification provisions of this Easement. Not less frequently than every five (5) years, the parties shall cooperate in determining an appropriate increase, to adjust for inflation, in the limit of the insurance coverage required to be maintained by Grantor on the Property.

(b) Upkeep and Maintenance. Except as otherwise expressly provided herein, Grantee shall have no obligation for the upkeep and maintenance of the Property.

(c) Compliance with Laws. Grantor shall comply with all applicable laws with respect to the Property including all applicable laws protecting rare and endangered species. Nothing in this Easement relieves Grantor of any obligation with respect to the Property or restriction on the use of the Property imposed by law, whether currently existing or hereafter enacted or otherwise promulgated by any federal, state, county, municipal, or other governmental body (whether legislative, administrative, or judicial), or by any competent official of any of the foregoing. In no event shall this Easement be construed as granting any landowner rights not permitted by local building, land use and/or zoning regulations at the time of construction, demolition, occupation or other regulated use.

(d) Hold Harmless. Grantor shall hold harmless, indemnify, and defend Grantee and its members, directors, officers, employees, agents, and contractors and the heirs, personal representatives, successors, and assigns of each of them (collectively "Indemnified Parties") from and against all liabilities, penalties, costs, losses, damages, expenses, causes of action, claims, demands, or judgments, including, without limitation, reasonable attorneys' fees, arising from or in any way connected with injury to or the death of any person, or physical damage to any property, resulting from any act, omission, condition, or other matter related to or occurring on or about the Property, regardless of cause, or arises out of a violation or suspected violation of this Easement, except to the extent any such liability, penalty, cost, loss, damage, expense, cause of action, claim, demand, or judgment is caused solely by the gross negligence or willful misconduct of any of the Indemnified Parties arising out of the entry on the Property by Grantee, Grantee's agents, contractors and volunteers, or anyone under Grantee's direct control, for the purpose of monitoring, habitat restoration or otherwise, but excepting to the extent any such expense, loss, liability, damage and/or claim is caused by Grantor's negligence or willful misconduct or the violation of this Easement.

(e) Environmental Matters. Except as otherwise expressly provided herein, the Parties do not intend and this Easement shall not be construed such that it creates in Grantee or

the other Indemnified Parties: (1) the obligations or liabilities of an "owner" or "operator" or "arranger" as those words are defined and used in "Environmental Laws," as defined below, including without limitation, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 U.S.C. section 9601 *et seq.* and hereinafter "CERCLA"); or (2) the obligations or liabilities of a person described in CERCLA at 42 U.S.C. section 9607(a)(3) or (4); or (3) the obligations of a responsible person under any applicable Environmental Laws; or (4) the right or duty to investigate and remediate any "Hazardous Materials," as defined below, associated with the Property; or (5) any control over Grantor's ability to investigate, remove, remediate or otherwise clean up any Hazardous Materials associated with the Property.

Grantor represents, warrants and covenants to Grantee that Grantor's use of the Property shall comply in all material respects with all applicable Environmental Laws. Grantor further represents, warrants and covenants to Grantee that, to the best of Grantor's actual knowledge, there has been no release or threatened release of Hazardous Materials on the Property and hereby promises to indemnify, defend and hold the Indemnified Parties harmless from any and all loss, cost, claim (without regard to merit), administrative actions, liability or expense (including reasonable attorneys' fees and investigation, testing and remediation costs) arising from or with respect to any release of Hazardous Materials on the Property or violations of Environmental Laws, other than any release or violation which was directly caused by any Indemnified Party.

If at any time after the grant of this Easement there occurs a release in, on or about the Property of Hazardous Materials, Grantor agrees to take all steps that are required under federal, state or local law necessary to assure its containment and remediation, including any cleanup. Grantee shall be solely responsible for any such remediation, including any cleanup, for a release caused solely by Grantee, Grantee's agents, contractors and volunteers, or anyone under Grantee's reasonable control to the extent such remediation is required under federal, state or local law.

For the purposes of this Easement:

i. The term "Hazardous Materials" means any element, chemical, compound, material, mixture, solution, or substance that may pose a present or potential hazard to human health or the environment or is now, or after the Effective Date, defined or listed in, or otherwise classified or regulated pursuant to any federal, state or local laws, regulations and ordinances, as a "hazardous substance," "hazardous material," "hazardous waste," "extremely hazardous waste," "infectious waste," "toxic substance," "toxic material," "toxic pollutant," "toxic waste," or any other formulation intended to define, list or classify substances by reason of deleterious properties such as ignitability, corrosivity, reactivity, carcinogenicity, toxicity, reproductive toxicity, or "PE toxicity," and shall include petroleum, natural gas, natural gas liquid, liquefied natural gas, synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas), ash produced by a resource recovery facility utilizing a municipal solid waste stream, and drilling fluids, produced waters, and other wastes associated with the exploration, development or production of crude oil, natural gas, or geothermal sources.

ii. The term "Environmental Laws" includes, without limitation, any federal, state, local or administrative agency statute, regulation, rule, ordinance, order or requirement relating to the environment, industrial hygiene or public health or safety, environmental conditions or Hazardous Materials.

16. Termination of Easement. It is the intention of the Parties that the Conservation Purpose of this Easement shall be carried out in perpetuity, notwithstanding economic or other hardship or changed conditions of any kind (other than as provided below). No inaction or silence by Grantee shall be construed as abandonment of the Easement. The fact that the Property is not serving as habitat for the Mount Hermon June beetle, Zayante band-winged grasshopper, Ben Lomond wallflower, Ben Lomond spineflower is not reason for termination of this Easement. Nonetheless, if circumstances arise in the future so as to render the Conservation Purpose of this Easement impossible to accomplish, this Easement shall only be terminated or extinguished, whether in whole or in part, by judicial proceedings in a court of competent jurisdiction, and the amount of the proceeds to which Grantee shall be entitled from any sale, exchange, or involuntary conversion of all or any portion of the Property subsequent to such termination or extinguishment shall be determined as provided in Section 17 below, unless otherwise provided by California law and applicable federal law at the time. Grantee shall use all such proceeds in a manner consistent with the Conservation Purpose of this Easement.

17. Proceeds. This Easement constitutes a real property interest immediately vested in Grantee. For purposes of calculating the total proceeds due to Grantee following the extinguishment of this Easement pursuant to judicial proceedings, and for the purpose of allocating proceeds from a sale or other disposition of the Property at or after the time of termination, the Easement and Grantee's property right therein shall have a value equal to the difference between the current fair market value of the Property unencumbered by this Easement and the current fair market value of the Property encumbered by this Easement, each as determined on or about the date of termination. The ratio of the value of this Easement on or about the date of termination to the value of the Property, unencumbered by this Easement, on or about the date of termination shall be referred to herein as the "Proportionate Share." These values shall be determined by agreement of Grantor and Grantee, or in the absence of such agreement, by an MAI appraiser selected mutually by Grantor and Grantee, whose appraisal fee shall be shared by the Parties.

18. Condemnation.

(a) If all or any part of the Property is taken by exercise of the power of eminent domain, or acquired by purchase in lieu of condemnation, whether by public, corporate or other authority, so as to terminate this Easement, in whole or in part, Grantor and Grantee acknowledge that Grantee is entitled to certain rights of notice, comment and compensation as provided in section 1240.055 of the California Code of Civil Procedure. If Grantor or Grantee is notified that the Property may be acquired for public use by eminent domain, the party receiving such notice shall notify the other party of the potential acquisition no later than fifteen (15) days after first receiving such notice. Prior to the inspection of the Property by the appraiser pursuant to section 7267.1 of the California Government Code or any other provision of law, Grantor shall

notify Grantee that it or its designated representative may accompany the appraiser during his or her inspection. Within seven (7) days of receiving any notice of the hearing on the resolution of necessity pursuant to section 1245.235 of the California Code of Civil Procedure, Grantor shall provide Grantee a copy of the notice of the hearing. As provided in sections 1250.220 and 1250.230 of the California Code of Civil Procedure, in any eminent domain proceeding to acquire all or a portion of the Property, Grantee shall be named as a defendant and may appear in the proceedings. Grantor shall not agree to an in-lieu purchase without the prior written consent of Grantee.

(b) If all or any part of the Property is taken by exercise of the power of eminent domain, or acquired by purchase in lieu of condemnation, whether by public, corporate or other authority, so as to terminate this Easement, in whole or in part, Grantor, Grantee shall act collaboratively to recover compensation for their respective interests in the Property and Easement, and all direct or incidental damages resulting therefrom, in accordance with applicable law. Each of the Parties shall be entitled to its respective Proportionate Share of the amount recovered as set forth in Section 17. All expenses incurred by Grantor and Grantee in connection with the taking or in-lieu purchase shall be paid by each party out of its respective amount recovered. If only a portion of the Property is subject to such exercise of the power of eminent domain or in-lieu purchase, this Easement shall remain in effect as to all other portions of the Property. Grantor shall promptly notify Grantee of any notices or actions pertaining to the actual or potential condemnation of all or any part of the Property.

19. Grantor's Title Warranty. Grantor represents and warrants that, to the best of Grantor's actual knowledge, Grantor has good fee simple title to the Property, including the mineral estate, that the Property is not subject to any other conservation easement whatsoever, and that Exhibit D attached hereto and incorporated herein sets forth all senior liens and encumbrances affecting the Property ("Prior Encumbrances"). Grantor represents and warrants that, to the best of Grantor's actual knowledge, Grantor has disclosed to Grantee all off record matters, including leases, liens and encumbrances. Grantor shall defend title to the Property against all claims that may be made against it. If Grantor discovers at any time that any old or new interest in the Property exists that is not disclosed herein, Grantor shall immediately notify Grantee of the discovery of the interest and, with respect to any such interest the exercise of which may impair the Conservation Values or impair Grantee's rights hereunder, shall take all necessary steps to make the discovered interest subject to this Easement, and, with respect to all other interests, Grantor shall take all reasonable steps to make the discovered interest subject to this Easement.

20. Perpetuation of Easement. Except as expressly otherwise provided herein, this Easement shall be of perpetual duration, pursuant to California Civil Code section 815.1. No merger of title, estate or interest shall be deemed effected by any previous, contemporaneous or subsequent deed, grant or assignment of an interest or estate in the Property, or any portion thereof. It is the express intent of the Parties that this Easement shall not be extinguished by, or merged into, any other interest or estate in the Property now or hereafter held by Grantee or Grantee's successor or assignee.

21. Assignment of Easement. This Easement is transferable, but Grantee may assign its rights and obligations under this Easement only to an organization that is a qualified

organization at the time of transfer under section 170(h) of the Code (or any successor provision then applicable), and the applicable regulations promulgated thereunder, and authorized to acquire and hold conservation easements under California Civil Code section 815.3 (or any successor provision then applicable). Any such assignment shall be in writing, shall refer to this Easement by reference to its recordation data, and shall be recorded in the Official Records of Santa Cruz County, California.

22. Subsequent Transfers of Property. Grantor agrees to incorporate the terms of this Easement in any deed or other legal instrument by which the parties comprising Grantor divest themselves of any interest in all or a portion of the Property, including, without limitation, a leasehold interest. Grantor further agrees to give written notice to Grantee of the transfer of any interest at least thirty (30) days prior to the date of such transfer. The failure of Grantor to perform any act required by this Section 22 shall not impair the validity of this Easement or limit its enforceability in any way.

23. Notices. Except as otherwise provided, any notice, demand, request, consent, approval or communication that either party desires or is required to give to the other shall be in writing. Notice shall be sufficiently given for all purposes as follows:

(a) Personal Delivery. When personally delivered to the recipient, notice is effective upon delivery.

(b) Overnight Delivery. When delivered by overnight delivery, charges prepaid or charged to the sender's account, notice is effective upon delivery, if delivery is confirmed by the delivery service.

(c) Facsimile Transmission. When sent by facsimile to the last facsimile number of the recipient known to the party giving notice, notice is effective on receipt, provided that (i) a duplicate copy of the notice is promptly given by certified mail or by overnight delivery as set forth above, or (ii) the receiving party delivers a written confirmation of receipt. Any notice given by facsimile shall be deemed received on the next business day if it is received after 5:00 p.m. (recipient's time) or on a nonbusiness day.

(d) Email Notices. Where expressly provided in this Easement, written notice may be given by email to the parties at the email addresses set forth below. Notices transmitted by email, shall be deemed given on the date of successful transmission, or the next business day if it is sent after 5:00 pm (recipient's time) or on a nonbusiness day.

Addresses for purpose of giving notice are as follows:

To Grantor: San Lorenzo Valley Water District  
Attention: District Manager  
13060 Hwy 9  
Boulder Creek, CA 95006  
blee@slvwd.com

To Grantee: Land Trust of Santa Cruz County  
Attention: Executive Director  
617 Water St.  
Santa Cruz, CA 95060  
Email:  
stephen.slade@landtrustsantacruz.org  
cc:  
barry.baker@landtrustsantacruz.org

or to such other address or facsimile number as any party from time to time shall designate by written notice to the other.

Any correctly addressed notice that is refused, unclaimed, or undeliverable because of an act or omission of the party to be notified shall be deemed effective as of the first date that said notice was refused, unclaimed, or deemed undeliverable by the postal authorities, messenger, or overnight delivery service.

24. Recordation. This Easement shall be recorded in the Official Records of the County of Santa Cruz, State of California.

25. Amendment. If circumstances arise under which an amendment to or modification of this Easement would be appropriate, Grantor and Grantee may jointly amend this Easement; provided that no amendment shall be allowed that will adversely affect the qualification of this Easement or the status of Grantee under any applicable laws, including California Civil Code section 815.3 or section 170(h) or 501(c)(3) of the Code, and any amendment shall be consistent with the Conservation Purpose of this Easement and with Grantee's easement amendment policies and shall not affect its perpetual duration. Any such amendment shall be recorded in the Official Records of Santa Cruz County, California.

26. Executory Limitation. If Grantee ever ceases to exist or to be a qualified organization under section 170(h) of the Code, or to be authorized to acquire and hold conservation easements under California Civil Code section 815.3, and a prior assignment is not made pursuant to Section 21 above, then Grantee's rights and obligations under this Easement shall become immediately vested in an organization selected by Grantor, which organization is a qualified organization under section 170(h) of the Internal Revenue Code and is authorized to acquire and hold conservation easements under California Civil Code section 815.3.

27. Miscellaneous Provisions.

(a) Controlling Law. The interpretation and performance of this Easement shall be governed by the laws of the State of California. References to authorities in this Easement shall be to the statute, rule, regulation, ordinance or other legal provision that is in effect at the time this Easement becomes effective. No provision of this Easement shall constitute governmental

approval of any improvements, construction or other activities that may be permitted under this Easement.

(b) Liberal Construction. Any general rule of construction to the contrary notwithstanding, this Easement shall be liberally construed in favor of the grant to effect the Conservation Purpose of this Easement and the policy and purpose of California Civil Code section 815.1. If any provision in this instrument is found to be ambiguous, an interpretation consistent with the Conservation Purpose of this Easement that would render the provision valid shall be favored over any interpretation that would render it invalid.

(c) Severability. If any provision of this Easement, or the application thereof to any person or circumstance, is found to be invalid, the remainder of the provisions of this Easement, or the application of such provision to persons or circumstances other than those as to which it is found to be invalid, as the case may be, shall not be affected thereby.

(d) Entire Agreement. This instrument sets forth the entire agreement of the parties with respect to the Easement and supersedes all prior discussions, negotiations, understandings or agreements relating to the Easement, all of which are merged herein.

(e) No Forfeiture. Nothing contained herein will result in a forfeiture or reversion of Grantor's title in any respect.

(f) Successors. The covenants, terms, conditions, and restrictions of this Easement shall be binding upon, and inure to the benefit of, the parties hereto and their respective personal representatives, heirs, successors and assigns and shall continue as a servitude running in perpetuity with the Property.

(g) Termination of Rights and Obligations. A party's rights and obligations under this Easement terminate upon transfer of that party's interest in the Easement or Property, except that liability for acts or omissions occurring prior to transfer shall survive transfer.

(h) No Waiver. Enforcement of the terms of this Easement is at the discretion of Grantee. Any forbearance by Grantee to exercise its rights under this Easement or any failure of Grantee to discover a violation or potential violation shall not be deemed or construed to be a waiver by Grantee of such term or of any of Grantee's rights under this Easement. No delay or omission by Grantee in the exercise of any right or remedy shall impair such right or remedy or be construed as a waiver. No forbearance or waiver by Grantee of any default or breach, whether intentional or not, shall be deemed to extend to any prior or subsequent defaults or breaches, nor shall it affect in any way any rights arising by virtue of any prior or subsequent occurrence.

(i) Joint Obligation. If and when Grantor consists of more than one party, the obligations imposed by this Easement upon Grantor shall be joint and several.

(j) Administrative Costs. The administration of this Easement by Grantee requires considerable time and expense. Grantee shall bear all routine administrative expenses related to

the Easement including, but not limited to the following activities: routine easement monitoring and reporting and review of notices of permitted activities. Grantor agrees to pay Grantee's reasonable expenses for non-routine administration of the Easement including, but not limited to, actions requiring Grantee's prior approval; (ii) approval of certain activities requiring Grantee's prior written approval under Section 8 or otherwise requiring Grantee's approval under the terms of this Easement; (iii) enforcement of Easement violations; and (iv) any Easement amendment request made by Grantor.

(k) Counterparts. The parties may execute this instrument in two or more counterparts, which shall, in the aggregate, be signed by all parties; each counterpart shall be deemed an original instrument as against any party who has signed it. In the event of any disparity between the counterparts produced, the recorded counterpart shall be controlling.

(l) Exhibits and Recitals. All Exhibits referred to in this Easement are attached hereto and incorporated herein by this reference. All recitals in this Easement are accurate and shall constitute an integral part of this Easement, and this Easement shall be construed in light of those recitals.

(m) Third-Party Beneficiaries. Except as expressly provided below, there shall be no third-party beneficiaries of this Easement. Grantor and Grantee acknowledge that USFWS is a third-party beneficiary of this Easement with the right of access to the Property and the right to enforce all obligations of Grantor and all other rights and remedies of Grantee under this Easement. These enforcement rights are in addition to, and do not limit, the rights of enforcement under the Permit. Additionally, Grantor and Grantee acknowledge and agree that USFWS is expressly granted certain additional rights under this Easement including, but not limited to, prior written notice of certain specified actions and a right of approval of certain specified actions.

*[Signatures to follow on next page.]*

TO HAVE AND TO HOLD, this Grant Deed of Conservation Easement unto Grantee, its successors and assigns forever.

IN WITNESS WHEREOF Grantor and Grantee have set their hands on the day and year first above written.

GRANTOR:

GRANTEE:

**SAN LORENZO VALLEY WATER DISTRICT**, a public corporation

**LAND TRUST OF SANTA CRUZ COUNTY**, a California non-profit public benefit corporation

By:

Name: Brian Lee

Its: District Manager

By:

Name: Stephen Slade

Its: Executive Director

ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA )  
 ) ss.  
COUNTY OF Santa Cruz )

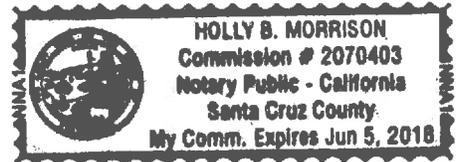
On December 6, 2017, before me, Holly B Morrison<sup>AKD</sup>, a Notary Public in and for said State, personally appeared Brian ~~XXX~~ Lee<sup>JD</sup>, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature Holly B. Morrison

(Seal)



ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA )  
 ) ss.  
COUNTY OF SANTA CRUZ )

On 12/06/, 2017, before me, BROOKE SQUYRES, a Notary Public in and for said State, personally appeared STEPHEN SLADE, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature Brooke Squyres

(Seal)



**EXHIBIT A**  
**PROPERTY DESCRIPTION**

*[Attached]*

APNs (portion): 071-141-14 and 071-141-02

## EXHIBIT "A"

### CONSERVATION EASEMENT

Situate partly in the Zayante Rancho, County of Santa Cruz, State of California, and partly in Section 14, Township 10 South, Range 2 West, Mount Diablo Base and Meridian,

And being a portion of the lands conveyed to the San Lorenzo Valley Water District, by deed recorded October 26, 1977 in Book 2830, Page 505, Official Records of Santa Cruz County, California, and more particularly described as follows:

**BEGINNING** at a ½" iron pipe tagged L.S. 5513 found on the easterly boundary of the Zayante Rancho, as said iron pipe is shown at the southerly terminus of that certain course "North 00°18'17" East 137.86 feet", on that certain Record of Survey filed in Volume 97 of Maps, Page 18 in the Office of the Recorder of Santa Cruz County, California, from which iron pipe a found (leaning) 6" x 6" concrete post bears North 00°18'17" East 137.66 feet (North 00°18'17" East 137.86 feet per 97 Maps 18), and also from which first said ½" iron pipe tagged L.S. 5513, a ½" iron pipe tagged L.S. 3709 bears North 00°18'17" East 10.30 feet and South 88°08'03" East 5.11 feet, as shown on said Record of Survey;

**Thence** northerly along said easterly boundary of the Zayante Rancho

North 00°18'17" East 10.30 feet (North 10.53 feet- Doc.#1998-0071324) to the northeast corner of that certain Parcel Twelve, as said Parcel Twelve was conveyed to Ocean Pacific Inc., a California Corporation, recorded November 20, 1998 in Document Number 1998-0071324, Official Records of Santa Cruz County, California;

**Thence** westerly along the northerly line of said Parcel Twelve, said northerly line also being the southerly line of said Lands of the San Lorenzo Valley Water District, North 88°08'03" West 99.86 feet to the southwest corner of that certain Conservation Easement granted from the San Lorenzo Valley Water

District to the Center for Natural Lands Management, Inc. , a California Non Profit 501 (c) (3) Corporation, recorded November 15, 2002 in Document Number 2002-0084208, Official Records of Santa Cruz County, California, said Conservation Easement property is subject to the Perpetual Conservation Easement Grant Agreement by and between the San Lorenzo Water District, the Center for Natural Lands Management and Geoffrey and Susan Mayer, and also being to the **TRUE POINT OF BEGINNING** of this description;

**Thence** continuing along said southerly line of the Lands of the San Lorenzo Valley District North 88°08'03" West 600.35 feet to an existing barb-less wire fence;

**Thence** leaving said southerly line and along said barb-less wire fence the following five (5) courses:

- 1) North 59°56' 02" East 128.19 feet
- 2) South 89°09'36" East 127.76 feet
- 3) North 76°53'41" East 121.67 feet
- 4) North 45°13'59" East 232.60 feet
- 5) North 17°15'14" East 220.62 feet;

**Thence** leaving said barb-less wire fence North 84°33'11" East 634.86 feet to a spike;

**Thence** South 09°08'32" East 299.09 feet to the southerly line of said Lands of San Lorenzo Valley Water District, said southerly line also being the northerly line of that certain parcel of land conveyed to Hanson Aggregates Mid -Pacific INC. , a Delaware Corporation, recorded November 3, 1999 in Document Number 1999-0070202, Official Records of Santa Cruz County, California;

**Thence** westerly along said southerly line of said Lands of San Lorenzo Valley Water District South 77°33'30" West 350.73 feet to the most easterly corner of of said Conservation Easement (Document # 2002-0084208);

**Thence** leaving said southerly line along the easterly, northerly and westerly lines of said Conservation Easement the following three (3) courses:

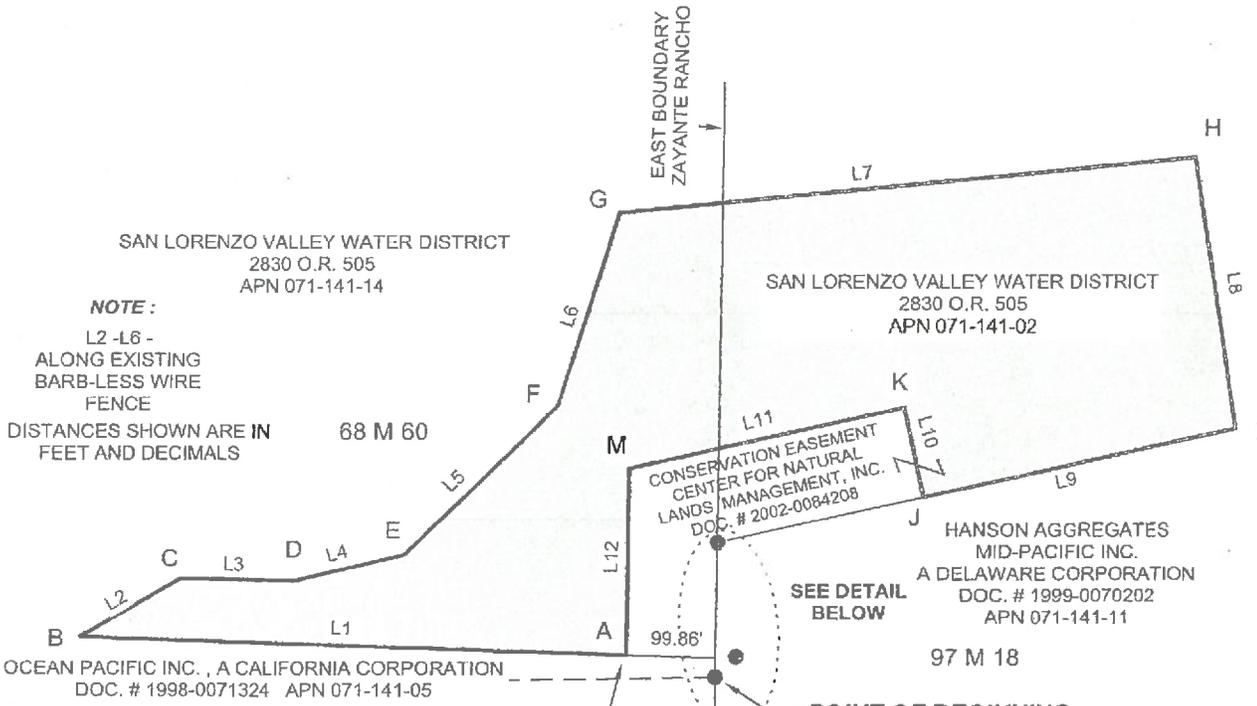
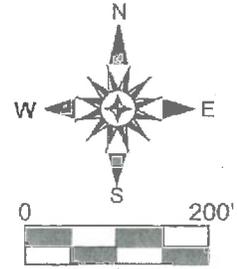
- 1) North 12°20'30" West 100.00 feet
- 2) South 77°33'30" West 309.55 feet
- 3) South 00°18'17" West 204.38 feet to the southwest corner of said Conservation Easement and also to the **TRUE POINT OF BEGINNING** of this description, containing 6.265 acres of land, more or less.

**Exhibit "A1" (2 pages) is attached hereto and made a part thereof.**

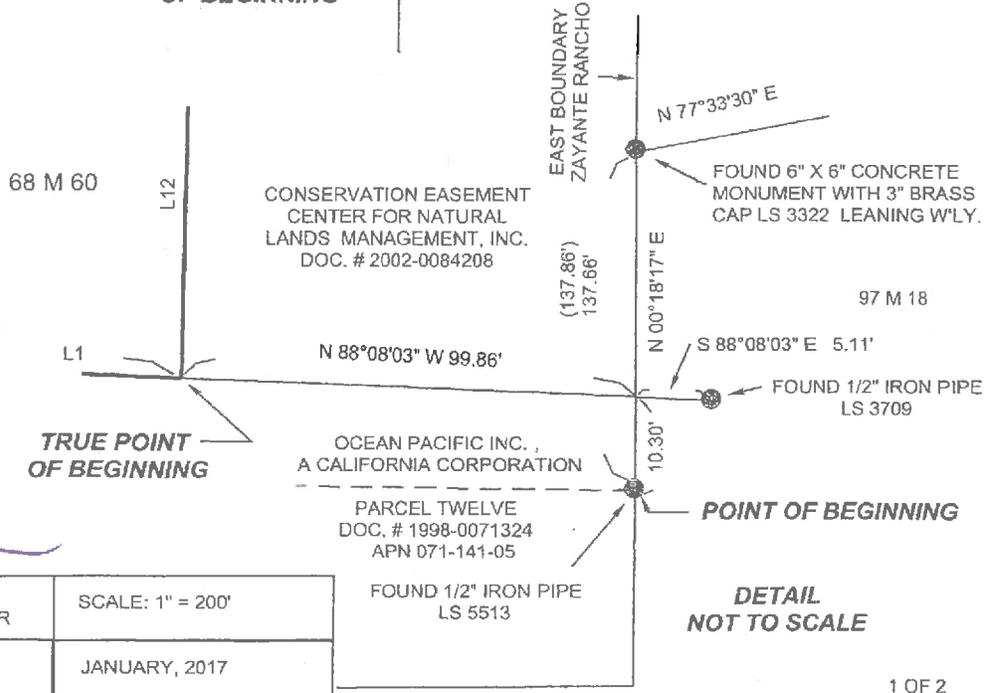


January 30, 2017

**EXHIBIT "A1"**  
**PLAT TO ACCOMPANY**  
**LEGAL DESCRIPTION**  
**FOR A**  
**CONSERVATION EASEMENT**



**TRUE POINT OF BEGINNING**



PAUL JENSEN  
 PROFESSIONAL LAND SURVEYOR

SCALE: 1" = 200'

CONSERVATION EASEMENT  
 APN'S 071-141-02,14

JANUARY, 2017

**COURSE TABLE**

L1	N 88°08'03" W	600.35'
L2	N 59°56'02" E	128.19'
L3	S 89°09'36" E	127.76'
L4	N 76°53'41" E	121.67'
L5	N 45°13'59" E	232.60'
L6	N 17°15'14" E	220.62'
L7	N 84°33'11" E	634.86'
L8	S 09°08'32" E	299.09'
L9	S 77°33'30" W	350.73'
L10	N 12°20'30" W	100.00'
L11	S 77°33'30" W	309.55'
L12	S 00°18'17" W	204.38'

DISTANCES SHOWN ARE IN FEET AND DECIMALS

**COORDINATE TABLE  
UTM, ZONE 10, METERS**

POINT	NORTHING	EASTING
A	4102626.39	584355.98
B	4102630.34	584173.03
C	4102650.29	584206.63
D	4102650.14	584245.57
E	4102658.95	584281.60
F	4102709.42	584331.38
G	4102773.86	584350.62
H	4102794.34	584543.04
I	4102704.50	584558.51
J	4102680.32	584454.38
K	4102710.02	584447.54
M	4102688.69	584355.63

**NOTE:**

UTM GRID IS ROTATED  
COUNTERCLOCK WISE  
BY 00°37'42"

PAUL JENSEN  
PROFESSIONAL LAND  
SURVEYOR  
CONSERVATION EASEMENT  
APN'S 071-141-02,14

**EXHIBIT B-1**  
**SKETCH MAP**

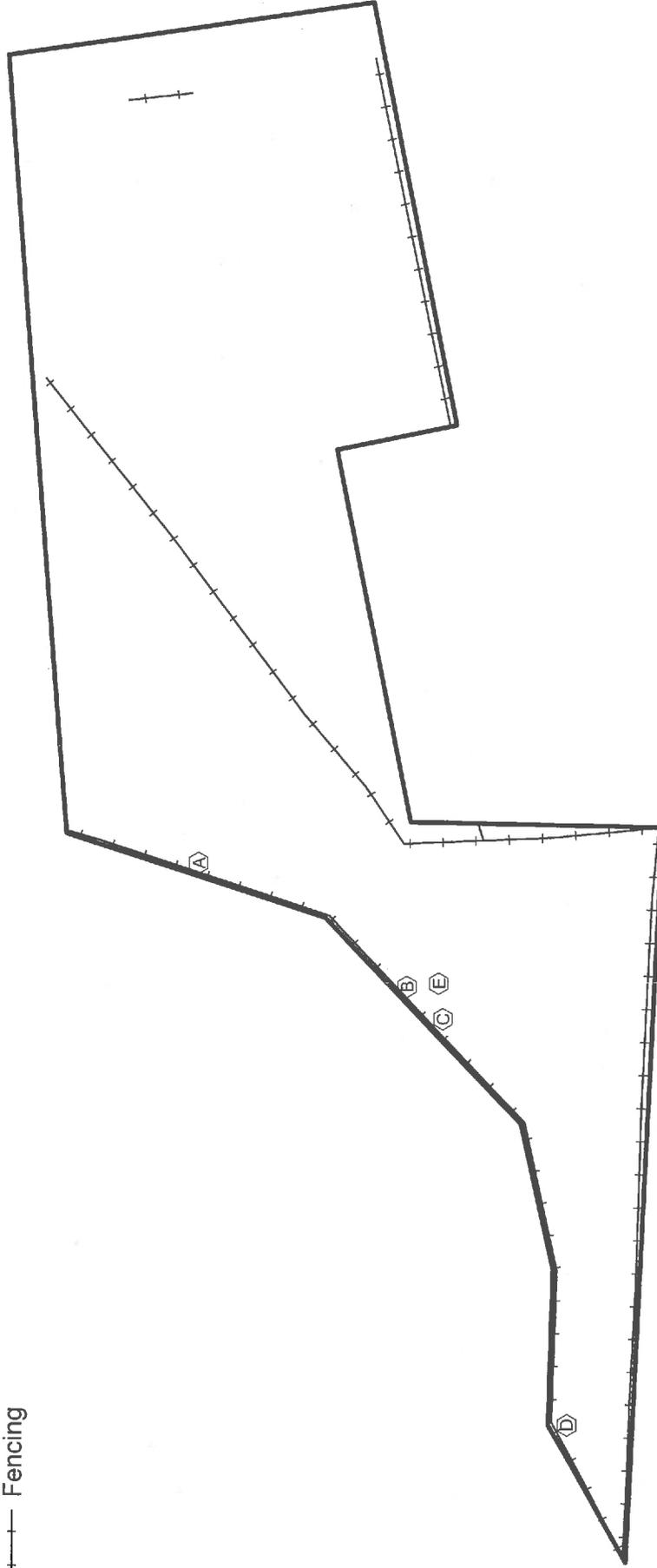
*[Attached]*

# Exhibit B-1 Improvements Sketch Map

 Olympia Sandhills Conservation Easement Area

 Improvements

 Fencing



## Property Improvements

A. Signage

B. Signage

C. Signage

D. Signage

E. Pressure Release Valve



Map location are approximations only  
& are not intended to be survey accurate.  
Map Prepared by Land Trust of Santa Cruz County  
on February 6, 2017.

**EXHIBIT C**  
**ACKNOWLEDGMENT OF BASELINE CONDITION REPORT**  
**AND RECEIPT OF BASELINE CONDITION REPORT**

Brian Lee, representing San Lorenzo Valley Water District, certifies as Grantor, and Stephen Slade, representing the Land Trust of Santa Cruz County, certifies as Grantee of the Conservation Easement, as follows:

- a) Each is familiar with the condition of the Property, and
- b) Each does hereby acknowledge and certify that the Baseline Condition Report, and all of its inclusions, dated November 20, 2017, prepared by Barry Baker, Conservation Steward, of the Land Trust of Santa Cruz County, is an inventory of the natural resources of the Property and an accurate representation of the condition of the Property as of the date of the Conservation Easement.

Duplicate originals of the Baseline Condition Report were signed and delivered by each of the Grantor and the Grantee, and each will receive a duplicate original of the Baseline Condition Report at the close of escrow.

**GRANTEE**

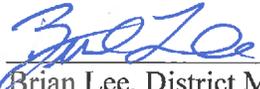
Land Trust of Santa Cruz County,  
a California nonprofit public benefit corporation

By:   
Stephen Slade, Executive Director

Date: 12/6/17

**GRANTOR**

San Lorenzo Valley Water District,  
a public corporation

By:   
Brian Lee, District Manager

Date: 12/6/17



ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

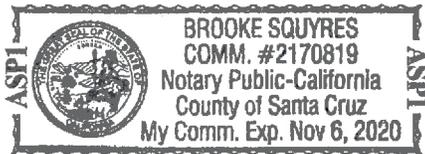
STATE OF CALIFORNIA )  
 ) ss.  
COUNTY OF SANTA CRUZ )

On 12/06/2017 before me, BROOKE SQUYRES, NOTARY PUBLIC  
personally appeared STEPHEN SLADE,  
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are  
subscribed to the within instrument and acknowledged to me that he/she/they executed the same  
in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument  
the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the  
foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature Brooke Squyres



**EXHIBIT D**  
**PRIOR ENCUMBRANCES**

1. Easement(s) for the purpose(s) shown below and rights incidental thereto, as granted in a document:

Granted to: Pacific Gas and Electric Company, a California corporation  
Purpose: Utilities  
Recording Date: June 26, 1975  
Recording No.: in Reel 2514, at Page 260, of Official Records  
Affects: The exact location is not disclosed by record

2. Matters contained in that certain document:

Entitled: Agreement Between San Lorenzo Valley Water District and Zayante Fire Protection District For The Exchange of Certain Properties  
Dated: November 4, 1985  
Executed by: San Lorenzo Valley Water District and Zayante Fire Protection District  
Recording Date: December 20, 1985  
Recording No.: in Book 3922, at Page 320, of Official Records

Reference is hereby made to said document for full particulars.

3. Matters contained in that certain document:

Entitled: Grant Deed With Reversionary Interests  
Executed by: Zayante Fire Protection District  
Recording Date: December 20, 1985  
Recording No.: in Book 3922, at Page 328, of Official Records

Reference is hereby made to said document for full particulars.

4. Matters contained in that certain document:

Entitled: Grant Deed With Reversionary Interests  
Executed by: San Lorenzo Valley Water District  
Recording Date: December 20, 1985  
Recording No.: in Book 3922, at Page 336, of Official Records

Reference is hereby made to said document for full particulars.

5. Matters contained in that certain document:

Entitled: Olympia Well Field Management Agreement  
Dated: October 15, 2002  
Executed by: San Lorenzo Water District and Center for Natural Lands Management Inc.  
Recording Date: November 15, 2002  
Recording No.: 2002-0084209 of Official Records

Reference is hereby made to said document for full particulars.

**PRELIMINARY CHANGE OF OWNERSHIP REPORT**

To be completed by the transferee (buyer) prior to a transfer of subject property, in accordance with section 480.3 of the Revenue and Taxation Code. A Preliminary Change of Ownership Report must be filed with each conveyance in the County Recorder's office for the county where the property is located.

NAME AND MAILING ADDRESS OF BUYER/TRANSFeree  
*(Make necessary corrections to the printed name and mailing address)*

The Land Trust of Santa Cruz  
617 Water St.  
Santa Cruz, CA 95060

ASSESSOR'S PARCEL NUMBER  
071-141-02 and 071-141-14

SELLER/TRANSFEROR  
San Lorenzo Valley Water District

BUYER'S DAYTIME TELEPHONE NUMBER  
(831) 429-6116

BUYER'S EMAIL ADDRESS  
Baird.baker@landtrustsantacruz.org

STREET ADDRESS OR PHYSICAL LOCATION OF REAL PROPERTY  
7710 E. Zayante Rd., Felton, CA 95018

MAIL PROPERTY TAX INFORMATION TO (NAME)  
The Land Trust of Santa Cruz

ADDRESS 617 Water St.	CITY Santa Cruz	STATE CA	ZIP CODE 95060
--------------------------	--------------------	-------------	-------------------

<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	This property is intended as my principal residence. If YES, please indicate the date of occupancy or intended occupancy. <u>Conservation Easement only</u>	MO	DAY	YEAR
---	---	----	-----	------

**PART 1. TRANSFER INFORMATION**

*Please complete all statements.*

This section contains possible exclusions from reassessment for certain types of transfers.

- YES NO
- A. This transfer is solely between spouses (addition or removal of a spouse, death of a spouse, divorce settlement, etc.).
- B. This transfer is solely between domestic partners currently registered with the California Secretary of State (addition or removal of a partner, death of a partner, termination settlement, etc.).
- C. This is a transfer:  between parent(s) and child(ren)  from grandparent(s) to grandchild(ren).
- D. This transfer is the result of a cotenant's death. Date of death \_\_\_\_\_
- E. This transaction is to replace a principal residence by a person 55 years of age or older.  
Within the same county?  YES  NO
- F. This transaction is to replace a principal residence by a person who is severely disabled as defined by Revenue and Taxation Code section 69.5. Within the same county?  YES  NO
- G. This transaction is only a correction of the name(s) of the person(s) holding title to the property (e.g., a name change upon marriage).  
If YES, please explain: \_\_\_\_\_
- H. The recorded document creates, terminates, or reconveys a lender's interest in the property.
- I. This transaction is recorded only as a requirement for financing purposes or to create, terminate, or reconvey a security interest (e.g., cosigner). If YES, please explain: \_\_\_\_\_
- J. The recorded document substitutes a trustee of a trust, mortgage, or other similar document.
- K. This is a transfer of property:
  - 1. to/from a revocable trust that may be revoked by the transferor and is for the benefit of  the transferor, and/or  the transferor's spouse  registered domestic partner.
  - 2. to/from a trust that may be revoked by the creator/grantor/trustor who is also a joint tenant, and which names the other joint tenant(s) as beneficiaries when the creator/grantor/trustor dies.
  - 3. to/from an irrevocable trust for the benefit of the  creator/grantor/trustor and/or  grantor's/trustor's registered domestic partner.
- L. This property is subject to a lease with a remaining lease term of 35 years or more including written options.
- M. This is a transfer between parties in which proportional interests of the transferor(s) and transferee(s) in each and every parcel being transferred remain exactly the same after the transfer.
- N. This is a transfer subject to subsidized low-income housing requirements with governmentally imposed restrictions.
- O. This transfer is to the first purchaser of a new building containing an active solar energy system.

\* Please refer to the instructions for Part 1.

Please provide any other information that will help the Assessor understand the nature of the transfer.

**THIS DOCUMENT IS NOT SUBJECT TO PUBLIC INSPECTION**

**PART 2. OTHER TRANSFER INFORMATION**

Check and complete as applicable.

- A. Date of transfer, if other than recording date: \_\_\_\_\_
- B. Type of transfer:  
 Purchase  Foreclosure  Gift  Trade or exchange  Merger, stock, or partnership acquisition (Form BOE-100-B)  
 Contract of sale. Date of contract: \_\_\_\_\_  Inheritance. Date of death: \_\_\_\_\_  
 Sale/leaseback  Creation of a lease  Assignment of a lease  Termination of a lease. Date lease began: \_\_\_\_\_  
 Original term in years (including written options): \_\_\_\_\_ Remaining term in years (including written options): \_\_\_\_\_  
 Other. Please explain: Accepting Donation of Conservation Easement
- C. Only a partial interest in the property was transferred.  YES  NO If YES, indicate the percentage transferred: \_\_\_\_\_ %

**PART 3. PURCHASE PRICE AND TERMS OF SALE**

Check and complete as applicable.

- A. Total purchase price. \$ 52,000
- B. Cash down payment or value of trade or exchange excluding closing costs Amount \$ N/A
- C. First deed of trust @ \_\_\_\_\_ % interest for \_\_\_\_\_ years. Monthly payment \$ \_\_\_\_\_ Amount \$ N/A  
 FHA (\_\_\_\_ Discount Points)  Cal-Vet  VA (\_\_\_\_ Discount Points)  Fixed rate  Variable rate  
 Bank/Savings & Loan/Credit Union  Loan carried by seller  
 Balloon payment \$ \_\_\_\_\_ Due date: \_\_\_\_\_
- D. Second deed of trust @ \_\_\_\_\_ % interest for \_\_\_\_\_ years. Monthly payment \$ \_\_\_\_\_ Amount \$ N/A  
 Fixed rate  Variable rate  Bank/Savings & Loan/Credit Union  Loan carried by seller  
 Balloon payment \$ \_\_\_\_\_ Due date: \_\_\_\_\_
- E. Was an Improvement Bond or other public financing assumed by the buyer?  YES  NO Outstanding balance \$ N/A
- F. Amount, if any, of real estate commission fees paid by the buyer which are not included in the purchase price \$ N/A
- G. The property was purchased:  Through real estate broker. Broker name: \_\_\_\_\_ Phone number: (\_\_\_\_) \_\_\_\_\_  
 Direct from seller  From a family member-Relationship  
 Other. Please explain: Acceptance of Donation of Conservation Easement
- H. Please explain any special terms, seller concessions, broker/agent fees waived, financing, and any other information (e.g., buyer assumed the existing loan balance) that would assist the Assessor in the valuation of your property.  
Acceptance of Donation of Conservation Easement

**PART 4. PROPERTY INFORMATION**

Check and complete as applicable.

- A. Type of property transferred  
 Single-family residence  Co-op/Own-your-own  Manufactured home  
 Multiple-family residence. Number of units: \_\_\_\_\_  Condominium  Unimproved lot  
 Other. Description: (i.e., timber, mineral, water rights, etc.)  Timeshare  Commercial/Industrial  
Conservation Easement
- B.  YES  NO Personal/business property, or incentives, provided by seller to buyer are included in the purchase price. Examples of personal property are furniture, farm equipment, machinery, etc. Examples of incentives are club memberships, etc. Attach list if available.  
 If YES, enter the value of the personal/business property: \$ \_\_\_\_\_ Incentives \$ \_\_\_\_\_
- C.  YES  NO A manufactured home is included in the purchase price.  
 If YES, enter the value attributed to the manufactured home: \$ \_\_\_\_\_  
 YES  NO The manufactured home is subject to local property tax. If NO, enter decal number: \_\_\_\_\_
- D.  YES  NO The property produces rental or other income.  
 If YES, the income is from:  Lease/rent  Contract  Mineral rights  Other: \_\_\_\_\_
- E. The condition of the property at the time of sale was:  Good  Average  Fair  Poor  
 Please describe: \_\_\_\_\_

**CERTIFICATION**

I certify (or declare) that the foregoing and all information hereon, including any accompanying statements or documents, is true and correct to the best of my knowledge and belief.

SIGNATURE OF BUYER/TRANSFeree OR CORPORATE OFFICER <u>[Signature]</u>	DATE <u>12/7/17</u>	TELEPHONE <u>(931) 429-6116</u>
NAME OF BUYER/TRANSFeree/LEGAL REPRESENTATIVE/CORPORATE OFFICER (PLEASE PRINT) <u>Land Trust of Santa Cruz County</u>	TITLE <u>Exec. Director</u>	E-MAIL ADDRESS <u>bany.baker@landtrust</u>

The Assessor's office may contact you for additional information regarding this transaction. Santa Cruz. org.

## Appendix F: Olympia Wellfield Management Agreement

This appendix contains the agreement between the District and the Center for Natural Lands Management regarding the Mayer Conservation Easement.

COPY

RECORDING REQUESTED BY:  
District Manager  
San Lorenzo Valley Water District  
13060 Highway 9  
Boulder Creek, CA 95066-9119



2002-0084209

Recorded  
Official Records  
County Of  
SANTA CRUZ  
RICHARD W. BEDAL  
Recorder

REC FEE .00

09:53AM 15-Nov-2002 | DLR  
Page 1 of 59

MAIL TO:  
Center for Natural Lands Management )  
425 E. Alvarado Street, Suite H. )  
Fallbrook, CA 92028 )

Geoffrey & Susan Mayer )  
260 Bobs Lane )  
Scotts Valley, CA 95066 )

**OLYMPIA WELL FIELD  
MANAGEMENT AGREEMENT**

This OLYMPIA WELL FIELD MANAGEMENT AGREEMENT ("Agreement") is made and entered into this 15<sup>th</sup> day of OCTOBER, 2002 by the San Lorenzo Water District, a political subdivision of the State of California, formed pursuant to section 30,000 et seq. California Water Code (hereinafter called the "District") and the Center for Natural Lands Management, Inc., a California nonprofit 501(c)(3) corporation (hereinafter called the "Center"), the United States Fish and Wildlife Service, a federal agency within the Department of Interior which is authorized by Federal law to administer the Federal Endangered Species Act and other laws and regulations (hereinafter called the "Service"), and Geoffrey & Susan Mayer, a married couple (hereinafter called the "Permittee") (collectively the "Parties") as set forth below.

**RECITALS**

**WHEREAS**, District is the owner of certain real property, called Olympia Well Field located in Felton, County of Santa Cruz, State of California generally described as Assessors Parcel Numbers 71-101-02 and -14 and Assessors Parcel Numbers 73-101-03, -10 and -12 as of this date and is further described in Exhibit "A.1" which by reference is attached hereto and incorporated herein; and

**WHEREAS**, District agrees to convey a Perpetual Conservation Easement Grant as identified in the Perpetual Conservation Easement Grant Agreement as Exhibit "A" which by reference is attached hereto and incorporated herein, consisting of one (1) acre (hereinafter called the "Easement Property") as more particularly described in Exhibit "A.3" and Exhibit "A.3.1"

("Easement Property Location Map") which by reference is attached hereto and incorporated herein to conserve and protect in perpetuity the conservation values of the Easement Property; and

**WHEREAS**, the Easement Property possesses wildlife and native habitat values (collectively, "Conservation Values") of great importance to the Parties and the people of the State of California; and

**WHEREAS**, the Center is a "qualified organization" within the meaning of section 170(h) of the Internal Revenue Code of 1986, as amended. The Center is also a tax-exempt nonprofit organization qualified under section 501(c)3 of the Internal Revenue Code and is qualified to do business in the State of California. The Center has as its primary purpose the management of land in an environmentally and biologically beneficial manner consistent with state and federal environmental laws; and

**WHEREAS**, establishment of the Easement Property as a protected area meets certain requirements of an incidental take permit (TE-054227-0) issued to the Permittee under section 10(a)1(B) of the Federal Endangered Species Act by conserving highly valuable resources administered by the Service; and

**WHEREAS**, this Property includes a mixture of Northern Maritime Coastal Chaparral and San Parkland-Ponderosa Pine Forest suitable to support populations of the Mount Hermon June Beetle (*Polyphylla barbata*), Zayante Band-winged Grasshopper (*Trimerotropis infantilis*), and Ben Lomond Spineflower (*Chorizanthe pungens* var. *hartwegiana*), and Ben Lomond wallflower (*Erysimum teretifolium*) which are Federally-listed endangered species; and,

**WHEREAS**, the Parties desire to enter into this Agreement to set forth the terms and conditions pursuant to which the Easement Property shall be established, implemented and managed as a Preserve.

## AGREEMENT

**NOW THEREFORE**, in consideration of the foregoing recitals and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties hereby agree as follows:

1. Establishment and Recordation of the Easement Property.
  - (a) District shall allow the recordation of a Perpetual Conservation Easement Grant Agreement for the Easement Property to the Center as described in the attached Easement.
  - (b) Permittee shall transfer funds in the amount of \$39,299 for the initial (\$9,399) and permanent stewardship (\$29,900) of the Easement Property to the Center as

provided in this Agreement. These funds are hereafter referred to as the "Contributions".

2. Conveyance of the Conservation Easement Grant

3. Management/Endowment Contributions.

(a) Center shall establish dedicated accounts for the Contributions, including: an Initial and Capital Account, in the amount of \$9,399; and an Endowment Account, in the amount of \$29,900, to be held by the Center. The Initial and Capital Account and the Endowment Account shall be held in trust by the Center for the purposes specified in this Agreement. The Center shall be the trustee of these accounts.

(b) The Initial and Capital Account for the Contribution shall be used to fund initial management and compliance activities, and the accrued interest and earnings from the Endowment Account for the Contribution shall be used exclusively to fund the permanent compliance activities in maintaining the Property. Compliance and management activities include the Easement Property's prorata share of the Center's administrative expenses. The basis for determining the Contributions is the Property Analysis Record ("PAR") completed by the Center, and is more particularly described in Exhibit "A.6", which by reference is attached hereto and incorporated herein.

(c) The Center shall maintain an accounting of all funds received and expended for management of the Property using accepted accounting methods. The Center's accounting shall be audited annually, and the accounting and the results of the audits shall be available to the public.

4. Center's Management Duties and Activities.

The Center shall accept and hold the Easement Property and shall manage the same as provided in this Section 3. The Center shall undertake the following obligations as further described in the On-goings Tasks and Cost of the Property Analysis Record ("PAR") attached as Exhibit "A.7" Monitoring and Reporting, which by reference is attached hereto and incorporated herein. The Center shall monitor and report the status of the biological resources and condition of the Easement Property as per the HCP, PERMIT and PAR.

(a) Photo Documentation. The Center shall photograph the Easement Property to assess changes in vegetation and condition on the site, and to document any serious impacts to the as per the HCP, PERMIT AND PAR;

(b) Non-native Control. The Center shall institute programs to control non-native plant species within native habitat areas as per the HCP, PERMIT AND PAR;

(c) Control Signage. The Center shall install appropriate signage for the purpose of controlling access and use of Easement Property as per the HCP, PERMIT AND PAR;

- (d) Administration. The Center shall be responsible for administering the project, including staffing, contractors as needed, government and community relations as per the HCP, PERMIT AND PAR;
- (e) Annual Site Inspection. The Center shall be responsible for making annual site inspections of the Easement Property;
- (f) Miscellaneous. The Easement Property shall be made available to approved scientific investigations provided that prior notification in writing has been given owner and approval has been obtained;

5. District's Management Duties and Activities

The District shall undertake all reasonable actions which consist of those past practices and actions undertaken by the District with respect to this and other properties to prevent the unlawful entry and trespass by persons whose activities may degrade or harm of the Easement Property. Specific initial and on-going duties and management activities are as follows:

- (a) Patrolling. The District shall patrol with the intention of preventing unwarranted trespass or illegal use on the Easement Property;
- (b) Exotic Plant Control –(Initial removal only). The District shall cut down the single eucalyptus tree growing on the property, treat the stump with an appropriate herbicide, and leave the downed material in place;
- (c) Illegal Dumping. The District shall be responsible for removing and controlling any illegal dumping on the Easement Property;
- (d) Fence Repair & Maintenance. The District shall be responsible for initial and on-going repair of the existing fence around the Property. If new or additional fences are installed around the property in the future, the District shall be responsible for repair of these fences as well.

6. Interpretation and Headings

The language in all parts of this Agreement shall in all cases be simply construed according to its fair meaning, and not strictly for or against any party. Headings of the paragraphs of this Agreement are for the purposes of convenience only and the words contained in such headings shall in no way be held to explain, modify, amplify, or aid in the interpretation, construction, or meaning of the provisions of this Agreement.

7. Modification.

This Agreement is not subject to modification except in a writing signed by all Parties,

and any attempted modification not in compliance with this requirement shall be void. The Parties shall use their good faith efforts to complete such modifications within ninety (90) days after the initial request is made for a modification by the requesting party.

8. Notices.

All notices, demands, or requests from one party to another may be personally delivered, sent by facsimile, sent by recognized overnight delivery service, or sent by mail, certified or registered, postage prepaid, to the persons set forth below or shall be deemed given five (5) days after deposit in the United States mail, certified and postage prepaid, return receipt requested, and addressed as follows or at such other address as any Party may from time to time specify to the other Parties in writing, and shall be effective at the time of personal delivery, facsimile transmission, or mailing.

District:	San Lorenzo Valley Water District. 13060 Highway 9 Boulder Creek, CA 95006-9119 Attn: District Manager FAX (831) 338-7986
Center:	Center for Natural Lands Management, Inc. 425 E. Alvarado St., Suite H Fallbrook, CA 92028 Attn: Sherry Teresa FAX (760) 731-7791
Service:	Ventura Fish and Wildlife Office United States Fish and Wildlife Service 2493 Portola Road Suite B Ventura, California 93003 Attn: Field Supervisor – Santa Cruz County FAX (805)644-3958
Permittee:	Geoffrey and Susan Mayer 260 Bob's Lane Scotts Valley, CA 95066 Fax (831) 439-0867

Any party may change the address to which such notices, payments, or other communications may be sent by giving the other Parties written notice of such change. The Parties agree to accept facsimile transmitted signed documents, and agree to rely upon such documents as if they bore original signatures. Each party agrees to provide to the other Parties, within seventy-two (72) hours after transmission, such documents bearing the original signatures.

9. Successors and Assigns.

This Agreement and each of its covenants and conditions shall be binding on, and shall inure to, the benefit of the Parties and their respective successors and assigns.

10. Exhibits.

Exhibit "A", the Perpetual Conservation Easement Grant Agreement, referred to in this Agreement is attached to this Agreement. Exhibits "A.1" through "A.7" are exhibits to the Exhibit "A", and are either attached to Exhibit "A" or are incorporated herein by this reference.

11. Counterparts.

This Agreement may be executed by the Parties in several counterparts, each of which shall be deemed to be an original executed document.

12. Attorneys' Fees.

If any action at law or equity, including any action for declaratory relief, is brought to enforce or interpret the provisions of this Agreement, each Party to the litigation shall bear its own attorneys' fees and costs.

13. No Partnerships.

This Agreement shall not make, or be deemed to make, any Party to this Agreement an agent for or the partner of any other Party.

14. Governing Law.

This Agreement shall be governed by and construed in accordance with the internal laws of the State of California, the Federal Endangered Species Act and other applicable federal law.

15. Severability.

If any provision of this Agreement, or the application thereof to any person or circumstances, is found to be invalid, the remainder of the provisions of this Agreement, or the application of such provision to person or circumstances other than those as to which it is found to be invalid, as the case may be, shall not be affected thereby.

16. Entire Agreement.

This Agreement and its related exhibits contain the entire agreement of the Parties with respect to the matters covered by this Agreement, and no other agreement, statement, or promise made by any party, or to any employee, officer, or agent of any party, which is not contained in this Agreement shall be binding or valid.

This instrument sets forth the entire agreement of the parties with respect to the Agreement and all exhibits and supersedes all prior discussions, negotiations, understandings, or agreements relating to the Agreement.

EXECUTED this 14<sup>th</sup> day of October, 2002.

SAN LORENZO VALLEY WATER DISTRICT.

By: James A Mueller

Print: JAMES A MUELLER

Title: DISTRICT MANAGER

Date: 14OCT02

CENTER FOR NATURAL LANDS MANAGEMENT, INC.

By: [Signature]

Print: WILLIAM A. PASHLEY

Title: CFO

Date: 4 OCT 02

U.S. Fish and Wildlife Service

By: Diane K Noda

Print: Diane K. Noda

Title: Field Supervisor

Date: 11/6/02

GEOFFREY & SUSAN MAYER

By: [Signature]

Print: GEOFFREY W MAYER

By: [Signature]

SUSAN R. MAYER

Date: Oct. 15, 2002

Date: Oct. 15, 2002

**LIST OF EXHIBITS**

EXHIBIT A

Perpetual Conservation Easement Grant Agreement

EXHIBIT A.1

Olympia Well Field Property

EXHIBIT A.3

Legal Description of Conservation Easement Property

EXHIBIT A.3.1

Easement Property Location Map

EXHIBIT A.6

Property Analysis Record ("PAR") for Olympia Well Field Conservation Easement Property

EXHIBIT A.7

Property Analysis Record ("PAR") for Monitoring & Reporting

## Appendix G: Incidental Take Permit

This appendix contains the incidental take permit issued to the District by the United States Fish and Wildlife for the Probation Tank Replacement Project pursuant the project habitat conservation plan (McGraw 2017). The ITP also covers take of the listed species associated with management of the Olympia Conservation Area.

NATIVE ENDANGERED SP. HABITAT CONSERVATION PLAN  
ENDANGERED WILDLIFE**Permit Number: TE58263C-0**

Effective: October 18, 2017 Expires: October 18, 2037

## Issuing Office:

Department of the Interior  
U.S. FISH & WILDLIFE SERVICE  
Endangered Species Permit Office  
2800 Cottage Way, Suite W-2606  
Sacramento, CA 95825-1846  
permitsR8ES@fws.gov



FIELD OFFICE SUPERVISOR

## Permittee:

**SAN LORENZO VALLEY WATER DISTRICT**  
**13060 CA HWY 9**  
**BOULDER CREEK, CA 95006**  
**U.S.A.**

## Name and Title of Principal Officer:

**BRIAN C LEE - DISTRICT MANAGER**

Authority: Statutes and Regulations: 16 USC 1539(a); 50 CFR 17.22, 50 CFR 13.

**Location where authorized activity may be conducted:**

The construction project is located within a San Lorenzo Valley Water District easement at 3650 Graham Hill Road in Felton. The 6.7-acre conservation easement area is located at the San Lorenzo Valley Water District's Olympia Wellfield, located adjacent east of the Zayante Fire Station (7700 E Zayante Road in Felton) and adjacent north of the CEMEX owned Olympia Quarry.

**Reporting requirements:**

See permit conditions for reporting requirements

**Authorizations and Conditions:**

- A. General conditions set out in Subpart B of 50 CFR 13, and specific conditions contained in Federal regulations cited above, are hereby made a part of this permit. All activities authorized herein must be carried out in accordance with and for the purposes described in the application submitted. Continued validity, or renewal of this permit is subject to complete and timely compliance with all applicable conditions, including the filing of all required information and reports.
- B. The validity of this permit is also conditioned upon strict observance of all applicable foreign, state, local tribal, or other federal law.
- C. Valid for use by permittee named above.
- E. All sections and provisions of Title 50 Code of Federal Regulations, parts 13 and 17.32, are conditions of this permit.
- F. The authorization granted by this permit is subject to compliance with, and implementation of the Low-Effect Habitat Conservation Plan for San Lorenzo Valley Water District's Probation Tank Replacement Project in Felton, Santa Cruz County, California (HCP), hereby incorporated by reference. This permit and the HCP are binding upon the Permittee, and any authorized officer, employee, contractor, or agent conducting covered activities.
- G. The Permittee, and its authorized officers, employees, contractors, and agents are authorized under the Endangered Species Act of 1973, as amended (Act), to incidentally take the endangered Mount Hermon June beetle (*Polyphylla barbata*) and Zayante band-winged grasshopper (*Trimerotropis infantilis*), to the extent that take of this species would otherwise be prohibited under section 9 of the Act, and its implementing regulations, or pursuant to a rule promulgated under section 4(d) of the Act. Take may only occur incidental to otherwise lawful covered activities within the 0.392-acre action area within Assessor Parcel Number 061-371-16, as described in the HCP, and as conditioned herein. Additionally, take may occur in association with habitat management activities within the 6.7-acre action area (conservation easement), located on Assessor Parcel Numbers 071-141-14 and 071-141-02, in Santa Cruz County, California, as described in the associated Habitat Management and Monitoring Plan (HMMP), and as conditioned herein. This permit authorizes the incidental take of all life stages of the Mount Hermon June beetle and Zayante band-winged grasshopper in the form of harassment, harm, capture, injury, and mortality caused by implementation of the project and habitat management activities within the parcels.
- H. The Permittee must refer to the permit number above in all correspondence and reports concerning permit activities. Any questions you may have about this permit should be directed to the Field Supervisor of the Ventura Fish and Wildlife Office, 2493 Portola Road, Suite B, Ventura, California 93003, telephone (805)



NATIVE ENDANGERED SP. HABITAT CONSERVATION PLAN  
ENDANGERED WILDLIFE

**Permit Number: TE58263C-0**

Effective: October 17, 2017 Expires: October 17, 2037

---

644-1766.

I. A copy of this permit must be on the premises of the project site, or in the possession of the Permittee or its designated agents while conducting activities that may result in incidental take.

J. Only qualified individuals authorized by the Service under the authority of this permit and its associated biological opinion may conduct handling of Mount Hermon June beetles and Zayante band-winged grasshoppers as prescribed in the HCP and HMMP. The Permittee must request our approval of any additional individual(s) it wishes to employ to conduct these activities. The Permittee must provide the names, addresses, phone numbers, and qualifications of the requested individuals to work with the Mount Hermon June beetle and Zayante band-winged grasshopper to the Ventura Fish and Wildlife Office at least 30 days prior to the start of the requested activities. Individuals may conduct the requested activities only following the written concurrence of the Service.

K. Annual reports must meet all requirements referenced in the HCP and be provided by the Permittee to the Service by January 31 of each year.

L. Upon finding dead or injured Mount Hermon June beetles or Zayante band-winged grasshoppers, the Permittee or designated agents must notify the Service's Ventura Fish and Wildlife Office at (805) 644-1766 within 3 working days. The notification must include the date, time, and location of the specimen, cause of death, if known, and any other pertinent information. Care must be taken in handling dead specimens to preserve biological material in the best possible state for later analysis. Should any injured Mount Hermon June beetles or Zayante band-winged grasshoppers survive, the Permittee must contact the Service regarding their final disposition. Any remains of intact Mount Hermon June beetles and Zayante band-winged grasshoppers should be placed with the California Academy of Sciences Entomology Department (Contact: David Kavanaugh, California Academy of Sciences Entomology Department, 875 Howard Street, San Francisco, California, 94103 (415) 321-8310).

## **Appendix H: San Lorenzo Valley Water District Integrated Pest Management Policy (2020-2021)**

This appendix contains the San Lorenzo Valley Water District's current Integrated Pest Management Policy. Implementation of the HMMP must follow the current policy as well as any District plans regulating pesticide use.