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Vallemar Bluffs

Botanical Survey Report

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Table of Contents

List of Tables

List of Figures

1 Introduction

1.1 Overview

This report presents an analysis of the potential impacts and benefits of a proposed conservation and development project on special-status plants and natural communities within the Vallemar Bluff Property—a 2.35-acre[1] property in Moss Beach, San Mateo County (Figure 1). The report was prepared to facilitate environmental review of a proposed development project that would build four homes on the eastern portion of the property; the remaining area would be protected via a conservation easement. The report was prepared based on the following:

1. A synthesis of existing information about the site; and
2. A survey of natural communities and plants conducted in spring and early summer 2018; and
3. An analysis of the potential impacts, both positive and negative, of the proposed conservation and development elements, on native plants and natural communities.

The survey was conducted and the report was prepared following the *Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Natural Communities* prepared by the California Department of Fish and Wildlife (CDFW 2009). It was developed to address questions and issues raised by CDFW (2018a) and the California Coastal Commission (CCC 2018) based on their review of the initial study/mitigated negative declaration (IS/MND) prepared by the County of San Mateo for the proposed development application (County of San Mateo 2018). The report was prepared to facilitate County revision of the IS/MND.

1.2 The Proposed Project

1.2.1 Description

Moss Beach Associates, LLC proposes to build four new single-family residences on a 2.35-acre property located north and west of the intersection of Vallemar Street and Juliana Street in Moss Beach, an unincorporated community in coastal San Mateo County (Figure 1). The houses are proposed to be developed on four parcels that would be reconfigured from the current seven legal parcels. A total of 1.43 acres (61%) on the eastern portion of the property would be developed; the remaining 0.92 acres (39% of the property) would be permanently protected via a conservation easement that would be recorded across all four lots between the west facing sides of the houses and the coastal trail along the ocean bluffs (Figure 1). The conservation area would adjoin the Fitzgerald Marine Reserve—a 402-acre, three-mile long natural resource area that is owned by the County of San Mateo and managed by the County Parks Department for conservation, recreation, and public education. Funding for management of the conservation area would be provided on an annual basis through fees assessed by the Vallemar Bluffs Maintenance Association.

[1] This acreage was derived in GIS from the survey data for the property and may differ slightly from the parcel are recorded on the titles.

1.2.2 Permitting and Environmental Review

To implement the proposed project, Moss Beach Associates submitted to the County of San Mateo in 2017 an application to obtain a Coastal Development Permit (CDP), Resource Management-Coastal Zone (RM-CZ) permit, Grading Permit, and Lot-Line Adjustment (LLA). The application, which included project plans as well as a preliminary outline of the conservation strategy (JMc 2016), integrated the findings of studies of the site's vegetation and plant species (Zander Associates 2015), drainage (Mesiti-Miller Engineering 2017), and geotechnical considerations (HKA 2016). The plans addressed community input obtained through a series of public meetings including those held at the Midcoast Community Council.[2]

As part of the environmental review process under the California Environmental Quality Act (CEQA), the County of San Mateo (County) prepared an initial study/mitigated negative declaration for the project application in January 2018 (County of San Mateo 2018). In February 2018, the California Department of Fish and Wildlife provided a letter commenting on the IS/MND (CDFW 2018a). The California Coastal Commission submitted a letter regarding the IS/MND in March 2018 (CCC 2018).

Several of the comments in the agency letters address issues related to the natural communities (i.e., vegetation) and rare plant species within the site and the adjacent habitat in the Fitzgerald Marine Reserve. Notably, the letters addressed concerns about the impacts of the proposed project on coast yellow leptosiphon (*Leptosiphon croceus*)—an annual plant known only from an estimated 1,800-square-foot area on the bluffs within the Fitzgerald Marine Reserve (CDFW 2017). Specifically, CDFW (2018b) stated that the prior vegetation mapping study (Zander Associates 2015) was not implemented using a systematic survey methodology necessary to evaluate whether the property supports the rare plant, which a candidate for listing as endangered under the California Endangered Species Act. The letter and accompanying staff report for the listing noted that one individual of coast yellow Leptosiphon was observed on the MBA project property (CDFW 2017).

During discussions with MBA and County staff in March 2018, CDFW recommended that MBA conduct a survey of rare plant and natural communities following the CDFW protocols (2009).

1.3 The Survey

Between April and June 2018, Jodi McGraw Consulting (JMc) designed and implemented a survey of the rare plants and natural communities atop Vallemar Bluff. The survey protocol was developed by JMc based on the CDFW protocols (2009) and input from representatives of CDFW, CCC, and the County of San Mateo Parks Department, which manages the FMR. Input was also provided by Toni Corelli, a botanist with expertise in the flora of San Mateo and Santa Clara counties, who prepared the listing petition for coast yellow leptosiphon (Corelli 2016).

The objectives of the survey were to:

1. Compile a list all of all plants within the study area;
2. Map the distribution and estimate the abundance of all rare plants within the study area; and
3. Classify and map the natural communities within the study area.

[2] The Midcoast Community Council is an elected municipal advisory council to the San Mateo County Board of Supervisors, representing the communities of Montara, Moss Beach, El Granada, Princeton, and Miramar.

1.4 Report

This report documents the methods (Section 2) and results (Section 3) of the survey. It then describes the special-status plants and sensitive natural communities within the study area, and assesses their regional context and significance for conservation (Section 4). Section 5 assesses the potential impacts, both positive and negative, of the proposed project on special-status plants and sensitive natural communities, and for each, identifies measures that can be implemented to avoid, minimize and mitigate them; Section 5 concludes by providing an assessment of the net effects of the proposed conservation and development actions on the sensitive botanical resources in the study area (Section 5.3).

2 Study Methods

This section describes existing information about the study area and the methods used to conduct the survey.

2.1 Study Area

2.1.1 Location

The survey and analysis in this report address a 3.04-acre area referred as Vallemar Bluff. It is bounded on the east by Vallemar Street and on the south by Juliana Street. The study area extended to the edge of the bluff on the west; the northern edge of the study area extended to the MBA property line and included the adjacent bluff area (Figure 1).

2.1.2 Land Ownership

The study area includes a 2.35-acre property owned by Moss Beach Associates, which currently consists of 7 assessors parcels that range between 0.26 and 0.63 acres. The adjacent area to the west is owned by the County and is managed by the County Parks Department as part of the FMR. The study area also includes a strip of land south and east of the MBA property and the adjoining streets, which is apparently part of the County road right-of-way (Figure 1).

The study area included the entire Vallemar Bluff top area, rather than just the MBA property, to ensure that the analysis evaluated plants and communities that may be indirectly affected by the proposed project.

2.1.3 Topography and Elevation

The study area consists of a coastal bluff or terrace, elevated above the Pacific Ocean. Elevation ranges between 41 feet above mean sea level (amsl) in the southwest and 73 feet amsl in the northeast. The bluff slopes gently toward the coast (west) until the western border at the top of the bluff edge where it drops off steeply to the beach below.

2.1.4 Geology and Soils

The study area is located on the edge of a Pleistocene marine terrace (Brabb and Pampeyan 1983). Soils are mapped as part of two units identified by the USDA Soil Conservation Service (USDA undated):

1. **Rock-outcrop orthents (30-75% slopes):** soils derived from sedimentary, serpentine, and basaltic volcanic rock that are found on escarpments (i.e., the bluff face);
2. **Typic argiustolls, loamy-urban land association (5-15% slopes):** dark grayish brown and grayish brown sandy clay loam or sandy loam soils that occur on coastal (fluviomarine) terraces and that are formed from coastal alluvium derived from sedimentary rock. The surface soils on lower terraces, as in the study area, have higher clay content than those on higher terraces.

The rock-outcrop orthent map unit occurs in the western half of the study area, while the argiustolls map unit underlies the eastern half. The soil survey was mapped at the scale of 1:24,000 such that the accuracy of the mapped units is not suitable for differentiating soil types within the study area (USDA undated).

The geotechnical survey for the MBA property included five exploratory test borings for the new home sites and five percolation test holes in the proposed drain fields of the five houses, which were originally proposed to be built on the eastern half and southern portion of the study area (HKA 2016), rather than exclusively on the eastern portion as current. The analysis found clay soil over either silty sand, clayey sand, sand with silt or a combination thereof; all soils overlay a hard bedrock formation encountered approximately 25 feet below the ground surface (HKA 2016).

2.1.5 Land Use Activities

The study area is not developed but features some improvements. Within the FMR, there are two benches near the western end of the bluff; the northern of the two benches is installed on an approximately five-foot-by-8-foot concrete pad. The FMR features a Bluff Trail that extends from Juliana Street to the bluff north of the study area. The natural surface path varies in width from just three feet to up to ten feet, with an average width of approximately four feet. Visitors also use smaller (e.g. 1-3 foot) paths to access the western bluff edge and the beach below.

On the MBA parcel, there is a manhole cover to an unused sewer line installed below the proposed road and a domestic well that was drilled in 1999. A natural surface road that extended from the middle of Juliana Street to the Bluff Trail, which is observed in the 1972 aerial image of the site (Figure 2a) is used as a foot path to provide access to the Bluff Trail. Similarly, there is a trail providing access from Vallemar Street in the northeastern portion of the MBA property to the Bluff Trail; a bicycle jump was constructed along this trail through excavation and mounding of soil in an approximately 10-foot-by-10-foot area.

Between 2005 and 2008, the northwestern edge of the Monterey cypress stand that dominates the eastern portion of the study area (Figure 1) was cut back and the biomass was apparently chipped and scattered in the formerly treed area as well as the adjacent grassland (Figure 2). Base rock and wood chips are found along the southern portion of the MBA property where disturbance is also visible in the 2008 image (Figure 2e); perhaps the artificial materials were installed to facilitate access by tree removal equipment or for other purposes.

Activities to construct Vallemar Street last century may have introduced fill material along the eastern portion of the study area, where the slope is steeper and the cover of exotic plants is greater (Section 3.2.3).

2.1.6 Vegetation

The original vegetation characterization and mapping report prepared by Zander Associates (2015) describes the MBA property as featuring two main vegetation types: remnant coastal prairie on the west, and disturbed/ruderal grounds, mostly under a Monterey cypress (*Hesperocyparis macrocarpa*) canopy on the east and without tree cover on the southwest corner. The vegetation was mapped in three categories (Zander Associates 2015):

- **coastal prairie grassland**: dominated (>75% cover) by native perennial bunchgrasses and native forbs found in coastal grasslands;
- **non-native area**: the area under the Monterey cypress canopy, which features largely non-native understory species including ornamental plants (e.g., *Pittosporum* sp.) and areas featuring dense patches of ice plant (*Carpobrotus edulis*) as well as other invasive herbaceous plants; and
- **transitional area**: areas featuring mostly sparse occurrences (<5%) of native species but that are otherwise dominated by exotic herbaceous plants and ice plant.

Smaller areas dominated by coastal terrace prairie species were mapped within the transitional area.

2.1.7 Rare Plant Species

The vegetation classification and mapping study included a floristic survey and plant species list compiled through three spring surveys in 2013 and two spring surveys in 2015. The list and report noted the occurrence of three rare plants within the study area, two of which were observed in 2015 in the MBA parcel. Johnny nip (*Castilleja ambigua* ssp. *ambigua*), which is on the 'watch list' on the California Rare Plant Inventory (California Rare Plant Rank [CRPR] 4.2; CNPS 2018a) was included in the description of species found in the coastal prairie grassland mapped within the MBA property. The report species list includes harlequin lotus (*Hosackia gracilis*), also a CRPR 4.2 plant; however, the report text does not describe its occurrence within the property. Coast yellow leptosiphon, which is a CRPR 1B.1 plant at the time of the survey and is now a candidate for listing as state endangered, was described as occurring on the 'promontory overlooking the ocean just offsite to the west (on public open space lands)' but not within the MBA property (Zander Associates 2015).

The 2016 listing petition for coast yellow leptosiphon (Corelli 2016) described the species as co-occurring with Johnny nip as well as Blasdale's bent grass (*Agrostis blasdalei*) a CRPR List 1B.2 species known from the coastal strand between Santa Cruz and Mendocino counties. The listing petition stated that harlequin lotus and Johnny nip occurred within the MBA property; however, it did not mention the occurrence of coast yellow leptosiphon or Blasdale's bent grass and instead, described it as being confined to a 60-foot-by-30-foot area on the edge of the cliff in the FMR (Corelli 2016).

The *Status Review of Coast Yellow Leptosiphon* (CDFW 2017) reported that "one individual plant was also identified outside of the mapped population on the MBA property on May 16, 2016 (T. Corelli pers. comm. 2016)." The map therein shows this occurrence as approximately 50 feet east of the main patch, or approximately 10 to 20 feet west of the Bluff Trail (CDFW 2017).

2.2 Survey Methods

2.2.1 Floristic Survey

One objective of this study was to compile a comprehensive list of plant species observed within the study area (Appendix A). On April 1, April 5, May 1, May 20, June 3, June 22, and August 1, Dr. Jodi McGraw walked through the project site and used the observations of plant species to compile a list of plant taxa observed. The surveys were timed to observe plants with a range of phenologies (i.e., early to

late season) including primarily during flowering or fruiting, to maximize detectability of species and facilitate identification of plants using flowers or fruits. Specifically, the surveys were timed to observe:

- Early-season species in flower (April);
- Spring-flowering species in flower or early-season species in fruit (May and June); and
- late-season species in flower (July and August).

The surveys were conducted by walking throughout the study area, and noting the occurrences of plant species. Upon completion of the study, the list was compiled with that of the 2015 assessment (Appendix B). An attempt was made to generally characterize the relative abundance of each plant within the two main portions of the study area, the MBA property and the FMR, based on the field observations.

2.2.2 Plant Community Classification and Mapping

On May 20, 2018, Dr. Jodi McGraw examined plant species composition within the study area to classify and map the natural communities. Dr. McGraw walked throughout the study area and examined plant species composition. Areas featuring notable changes in plant species composition were mapped on a hard-copy map featuring 2017 high-resolution (5.2-inchpixel) color aerial imagery, which were printed at a scale of 1 inches equals 50 feet. The locations of the boundaries were determined with a Trimble global positioning system running ArcPad that featured the same aerial imagery (ESRI 2010). Where the boundary of a patch could not be differentiated on the hard copy map using aerial image interpretation, the GPS was used to record the boundary.

Each of the 58 vegetation patches (i.e., polygons) was photographed and the following were recorded regarding plant community structure and species composition:

- **Canopy cover:** whether the vegetation features an overstory of trees;
- **Cover of Plant Species:** Species that occur in one of three main abundance levels;
    - High Cover**:** Species that occur at high cover, which was typically >50% absolute cover. These were referred to as visually dominant species.
    - Moderate Cover**:** Species that occur at moderate levels of cover or from 10-50%.
    - Low Cover: Other species that were observed in the patch but generally covered < 10%.

The boundaries were then heads-up digitized in ArcGIS (ESRI 2010) using the same aerial image base, with the aid of the GPS data collected for the boundaries that were difficult to locate.

The cover data were used to characterize each patch according to the following three factors:

- **Structure**: woody (trees and shrubs) versus herbaceous/succulent;
- **Dominant-Subdominant Species:** assemblages based on the dominant (high cover) and subdominant (moderate cover) species;
- **Species' Origin:** Five categories based on the abundance of species native to California and naturally occurring (excludes the planted Monterey cypress) versus those that are exotic:
    - Native Dominated: patches for which only native species achieved high and moderate cover;

- Native-Exotic Co-Dominated: patches that featured one or more native species in the high cover class, but also had exotic plant species in that class as well;
- Exotic-Dominated, Natives Subdominant: patches that featured only exotic species in the high cover class but featured native species in the moderate cover class;
- Exotic-Dominated, Native Species Present: patches that featured only exotic plants in the high and moderate cover classes, and for which one or more native species were noted as having low cover; and
- Exotic-Dominated, No (or only very low) Natives Present: patches that featured only exotic plants in the high and moderate cover classes and for which no native species were noted in the patch, though they may have occurred at below-detectable levels.

An attempt made to crosswalk the natural communities based on dominant and subdominant species to alliances in *A Manual of California Vegetation* (Sawyer et al. 2009) using the most recent list of California Natural Communities, which also includes pending additions (CDFW 2018a). The natural communities were also generally characterized based on plant community structure and species composition according to vegetation types in the *Terrestrial Vegetation of California* (Barbour and Major 1995), *California Vegetation* (Holland and Keil 1995), and *Preliminary Descriptions of Terrestrial Natural Communities of California* (Holland 1986). All grasslands were broadly classified as coastal terrace prairie for purposes of vegetation classification at the level of the site; however, as described in detail in Section 3.2.3.1, some assemblages might be more appropriately characterized as non-native grassland or ice plant mats.

2.2.3 Rare Plant Survey and Mapping

The objectives of this study element were to: 1) map the occurrences of rare plants, 2) estimate their abundance, and 3) assess factors influencing their distribution within the study area.

To inform the search, JMc compiled a list of rare plant species with the potential to occur on the site (Appendix A). First, a search of the literature and spatial databases was used to identify a draft list based on the following:

1. The California Natural Diversity Database (CDFW 2018d), using records in five United States Geological Survey 7.5-minute quadrangles: Montara Mountain (the quad the site is in) and all adjacent quadrangles to the south (Half Moon Bay), north (San Francisco South), east (San Mateo), and southeast (Woodside);
2. *Sensitive Plants of the California Coastal Prairie* (Hayes 2003), which is a list of rare native plants known to occur in the coastal prairie community; and
3. The Zander Associates (2015) plant species list for the property based on the 2013 and 2015 surveys (Section 2.1.6).

The list was circulated to CDFW, CCC, County Parks, and Toni Corelli, botanist and author of the *Checklist of the Vascular Plants of San Mateo and Santa Clara Counties, California* (Corelli 2011), who is also very familiar with the site. Ms. Corelli provided a list rare plants that she has documented along the San Mateo Coast west of Highway 1. This feedback was appended to the composite list (Appendix A).

The list was annotated to identify the flowering season for each species, which was used to plan the surveys which coincided with the floristic survey, which as noted above were designed to span the phenology of plants at the site (Section 2.2.1).

2.2.3.1 Field Methods

During surveys conducted on May 1, May 20, and June 3, Dr. Jodi McGraw and Assistant Ecologist Nicole Chrislock (May 20 and June 3 only) walked parallel transects approximately six feet apart to search for rare plants.

The initial mapping surveys and abundance estimation were conducted for the four rare plants on the following dates, when the species were in flower:

- harlequin lotus: May 1;
- coast yellow leptosiphon: May 20;
- Johnny nip: May 20 and June 3;
- Blasdale's bent grass: June 3 and 22.

The searches took approximately 4-person hours each, with additional time spent mapping and estimating the abundance of plants in each location, as outlined below.

2.2.3.1.1 Distribution Mapping

Once a rare plant was encountered, the biologists used flags to delimit each occurrence, which was operationally defined as plants that are within four feet of one another. Each occurrence was mapped using the following approach:

1. Individual plants or patches of plants that were less than 10 square feet in area were mapped as points, which were recorded using a Trimble GPS running ArcPad, in which the point was averaged based on 100 readings. The approximate dimensions of the patch were recorded and used to convert the point occurrence to a patch for purposes of area estimation.

2. Patches of plants that were separated by no more than four feet and that occupied an area greater than 10 square feet were mapped as minimum convex polygons by recording the vertices of the outer perimeter of the patch using a Trimble GPS running ArcPad.

All GPS data in this study were recorded in NAD83 datum.

The mapped occurrences were revisited on subsequent surveys to evaluate changes in the boundaries and adjustments were made when appropriate.

2.2.3.1.2 Abundance Estimation

To estimate abundance, the number of plants in each species-specific mapped location was counted and recorded, except for coast yellow leptosiphon which was too abundant and for which a census would have been too destructive.

Notes were recorded about the microhabitat and habitat conditions in which each species occurred, including topography, soils, hydrology, and associated plant species. Photographs were collected to illustrate occurrences and representative habitat conditions.

The abundance of coast yellow leptosiphon individuals was difficult to estimate for three reasons:

- The annual plant was fairly abundant, necessitating sampling rather than a complete census;
- The plant was relatively dense within the mapped area, such that it was difficult to stand in the patch without trampling coast yellow leptosiphon individuals; and
- It is difficult to tell what constitutes an individual, without manually manipulating the plant in a way that may be harmful as well as time consuming.

To estimate plant abundance without trampling the rare plant or causing harm to individuals through extensive probing, Dr. Jodi McGraw implemented a sampling study. On May 20, 20, 0.25 m^2 quadrats were randomly located within the mapped patch using a random number generator to select the flag on the perimeter and the distance into the patch from the perimeter, which was measured using a meter tape. Sample quadrat centers were flagged to avoid resampling the same area.

The quadrat was gently placed on the soil while Dr. McGraw stood in areas lacking coast yellow leptosiphon, which were mostly commonly gopher mounds. Within each quadrat, Dr. McGraw counted the following:

- number of flowers, which included fading flowers (i.e., those with wilted petals);
- the number of buds (unopened flowers);
- the number of leaf clusters lacking both flowers and buds.

To estimate the number of leaf clusters, flowers, and buds associated with each plant, the number of each were carefully counted on 75 haphazardly chosen plants located throughout the patch. These individual morphometric data were used to calculate the total number of buds and flowers per leaf cluster, and the number of leaf clusters per plant. These individual metrics were then used to estimate the number of leaf clusters by dividing the total number of flowers and buds by the mean number of flowers and buds per leaf cluster and then adding that value to the number leaf clusters that were counted in each quadrat. The total number of leaf clusters was then divided by the mean number of leaf clusters per plant to estimate the number of plants per 0.25m^2 quadrat. The value was averaged across all 20 quadrats, and the standard error was used to calculate a 95% confidence interval. This value was then scaled to the area of the mapped patch which was then summed with the estimate for the abundance in the mapped point which was confirmed to be the same as through a thorough count (n=6).

2.3 Project Impact Assessment

The assessment of direct impacts of the proposed development project was conducted in a GIS, by intersecting the data for the areal extent mapping for the rare plants and the community map with a composite layer representing the following proposed aspects of the proposed conservation and development project at the site:

- new parcels (lots);
- new conservation area, to be protected through a conservation easement dedicated to a 501(c)(3) land trust;
- Limits of grading, which encompass the area in which all soil disturbance and most construction activities will occur;
- Infiltration spreader area, where perforated pipes will be installed in trenches below grade to prevent concentrated runoff.

Indirect effects were analyzed qualitatively by evaluating potential effects of the development project on the rare plants and natural communities that can occur, over time, away from the immediate construction footprints (limits of grading and spreader areas).

3 Survey Results

3.1 Floristic Survey

In total, 104 plant species were observed in the study area during the 2018 survey, of which 94 were recorded on the Moss Beach Property and 53 were recorded on the FMR property (Table B-1; Appendix B). An additional 12 species were reported as occurring in the study area in 2015 (Zander Associates 2015), but were not detected in 2018; these species, which were primarily ornamentals, may still occur at low abundance (Appendix B-1). Of the total 116 species observed in 2015 and 2018, 55 are native to California while the remaining 61 are exotic; the latter group includes a mix of naturalized species found in natural lands, and ornamental species that likely spread from nearby plantings/landscapes.

Table B-1 in Appendix B lists the plant species and their general relative abundance in late May and early June within the two properties. This table was prepared based on general recollection of observations rather than systematic separate floristic surveys of the two properties, such that some species may be misclassified. However, the information generally illustrates the variation in species composition and abundance between the two sites which likely results in part to the varying abiotic conditions, as well as land use, between the FMR and the MBA property. Notably, of the 94 species observed in 2018, 41 were observed only in the MBA property, 10 were observed only in the FMR property, and 43 were detected in both properties (Table B-1).

3.2 Plant Community Classification and Mapping

The study area features a mosaic of plant communities that likely reflect its varying soil conditions and land use, as well as perhaps other factors including microclimate.

3.2.1 Plant Community Structure

Of the 3.04 acres in the study area, 1.80 acres (59%) are dominated by low-growing herbaceous plants or succulents while 1.17 acres (38%) are dominated by trees and shrubs; specifically, introduced Monterey cypress, Ngaio tree (*Myoporum laetum*) and Japanese pittosporum (*Pittosporum tobira*; Figure 3). The remaining 0.07 acres (2%) consists of the Bluff Trail and the area adjacent to the two benches, which are largely denuded but feature sparse herbaceous plant cover. The trails connecting Juliana and Vallemar streets to the Bluff Trail are narrower and in places feature relatively high (>25%) plant cover, and therefore were not mapped as bare but herbaceous dominated (Figure 3).

Table 1 provides the breakdown of plant community structure within the properties in the study area. As illustrated, 47% (1.1 acers) of the MBA property is dominated by ornamental/planted shrubs and trees, while the remaining 53% (1.24 acres) supports communities dominated by herbaceous plants and succulents (Figure 3).

3.2.2 Plant Assemblages

The 61 vegetation patches delimited within the study area were classified into 43 assemblages based on their dominant and subdominant plant species, as described in Section 2.2.2 (Table 2, Figure 4). Only ten assemblages were mapped in more than one patch, reflecting both the fine-scale nature of the assessment and the variable species composition in the study area.

As illustrated in Table 3, some of the assemblages defined based on dominant and subdominant species can be cross walked (i.e., matched) to nine associations and eight alliances in the California Natural Communities (Sawyer et al. 2009, CDFW 2018a). The remaining types appear to represent plant assemblages that have not yet been classified to the association or alliance level using this system.

3.2.3 Vegetation Types

While it was not possible to use the Manual of California Vegetation system to comprehensively classify and map the vegetation within the study area, the dominant and subdominant plant species were used to aggregate the mapped patches into one of three vegetation types based on Holland and Keil (1995), and Holland (1986) which are commonly used to classify vegetation on California's coast, with remaining types put in a planted/ornamental category, reflecting the fact that these were planted or spread from plantings.

Based on this, the study area features 1.42 acres (47%) of grasslands that were characterized broadly as coastal terrace prairie, 0.296 acres (10%) ruderal communities, 1.26 acres (41%) of communities dominated by ornamental or planted species, and 0.07 acres (2%) of land that is frequently used for recreation and thus largely lacks plant cover (Tables 2 and 4; Figure 4).

The following sections describe the plant species composition and factors influencing the distribution of the three mapped vegetation types.

3.2.3.1 Coastal Terrace Prairie

Within the study area, 1.42 acres (47%) of the land supports assemblages that were generally classified as coastal terrace prairie (Holland 1986), which is a short-statured form of Northern Coastal Grassland (Holland and Keil 1995) that occurs on coastal terraces—relatively flat areas along the coast that have been exposed over geologic time through uplift and declining sea level. Coastal terrace prairie occurs patchily between southern Oregon and the Channel Islands, on generally sandy loam soils of marine terraces near the coast that are within the zone of fog incursion, where the climate is cooler and moister (Heady et al. 1995). It typically features dense perennial grasses, including California oatgrass (*Danthonia* californica) coastal tufted hairgrass (*Deschampsia cespitosa* ssp. *holciformis*) as in the study area, and a mix of annual and perennial herbs (Stromberg et al. 2002).

The coastal terrace prairie in the study area is dominated by a mix of native and exotic plant species, which exhibit small-scale variation in their distribution and abundance that may reflect microclimate, variable soil conditions, including development and hydrology, and disturbance regimes, including land use activities as well as natural disturbances.

Overall, the community is dominated by grasses, though the cover of native versus exotic grasses varies greatly among the mapped assemblages (Table 2, Figure 4). Indeed, as described in greater detail below, some of the assemblages are dominated entirely by exotic grasses and lack native perennial grasses characteristic of intact coastal terrace prairie.

Among the native species, coastal tufted hairgrass is the most widespread and abundant, while California oatgrass, maritime brome (*Bromus maritimus*), and meadow barley (*Hordeum* brachyantherum) are patchily dense but occur at far lower cover and frequency, in terms of the number of mapped patches that were occupied. Italian ryegrass (*Festuca perennis*) is the most widespread exotic

grass and is found throughout most of the coastal prairie east of the Bluff Trail; where it achieves high cover (>50%), the cover and diversity of native herbs is greatly reduced. Exotic annual grasses, including rattail fescue (*Festuca myuros*), ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), and hare barley (*Hordeum murinum* ssp. *leporinum*), are also patchily abundant within the coastal terrace prairie.

Native forbs in the coastal terrace prairie are diverse and also patchily abundant. Perennial species, which occur in and among the native perennial grasses, include sea thrift (*Armeria maritima* ssp. *californica*), purple cudweed (*Gamochaeta ustulata*), Pacific gumplant (*Grindelia stricta* ssp. *platyphylla*), and sea thrift (*Armeria maritima* ssp. *californica*). Native annual forbs, which primarily occur in areas of greater exotic plant cover, include coast tarweed (*Madia sativa*), which is patchily very abundant, and Johnny nip (*Castilleja ambigua* ssp. *ambigua*), which preferentially occurs in shorter-statured vegetation such as occurs along the trails.

Among the exotic forbs and within the coastal terrace prairie, rough cat's ears (*Hypochaeris radicata*), cut leaf plantain (*Plantago coronopus*), English plaintain (*Plantago lanceolata*), are fairly widespread and patchily abundant. The community type features freeway iceplant (*Carpobrotus edulis*) and sea fig (*Carpobrutus chilensis*), which form dense mats. The southern portion of the MBA property near the well and along the southern border features higher density of bird's-foot trefoil (*Lotus corniculatus*) prickly ox tongue (*Helminthotheca* echioides), common sow thistle (*Sonchus oleraceus*), and radish (*Raphanus sativus*) than in the north; perhaps these species invaded following disturbances in these areas. The area where a portion of the Monterey cypress stand was removed and chipped between 2005 and 2008 (Section 2.1.5; Figure 2e' Patch 26 in Figure 4) similarly features a higher abundance of annual exotic forbs including California bur clover (*Medicago polymorpha*), sour clover (*Melilotus indicus*), and little hop clover (*Trifolium dubium*), which may have established following the tree work.

As noted above, some areas of the coastal prairie are dominated by dense exotic plant species, including matts of freeway iceplant and sea fig. These assemblages featured one or more native forbs characteristic of coastal prairie, and were therefore classified broadly as part of the coastal terrace prairie community type. However, these grassland patches could also be regarded as non-native grassland or iceplant mats, as they were by Zander Associates (2015). These degraded grassland areas were lumped here along with assemblages that constitute more-intact coastal terrace prairie here as they are part of the more general vegetation mapping and classification for the site.

3.2.3.1.1 Variation in Species Composition

The 0.343 acres of coastal terrace prairie located primarily west of the Bluff Trail, largely within the FMR property, but also on the western edge of the MBA property, supports plant assemblages that differ in species composition from those further inland (Table 2, Figure 4); this may reflect differences in soil conditions, disturbance regimes, and/or the influence of salt spray from the ocean, as described below. Plant cover along the bluff edge is sparser, and short-statured and supports coastal strand species like coast buckwheat (*Eriogonum latifolium*), seaside daisy (*Erigeron glaucus*), sea lettuce (*Dudleya farinosa*), and saltgrass (*Distichlis spicata*) that are not found further inland, where common buttercup (*Ranunculus californicus*), sun cups (*Taraxia ovata*), checker mallow (*Sidalcea malviflora* ssp. *malviflora*), harlequin lotus (*Hosackia gracilis*), and blue eyed grass (*Sisyrinchium bellum*) occur, but are uncommon or not found west of the Bluff Trail. Other species like Pacific gumplant, coyote thistle (*Erygium armatum*), and purple cudweed are more abundant along the bluff edge than further inland. Native perennial grasses, which are much shorter in stature along the bluff edge than further inland, include

primarily coastal tufted hairgrass, maritime brome, and the rare native Blasdale's bent grass (*Agrostis blasdalei*); meadow barley and California oatgrass are far less common here than inland. Finally, the grassland west of the trail includes native annuals not observed further inland, including farewell to spring (*Clarkia amoena*), Chilean trefoil (*Acmispon wrangelianus*), and coast yellow leptosiphon.

In addition to the differences in cover and diversity of native plants noted above, exotic grasses generally occur at only low to moderate cover and lower diversity on the coastal bluff edge; most notably, Italian rye grass, which dominates much of the grassland further inland, occurs at low cover west of the trail. Perennial forbs like cut leaf plantain, rough cat's ears, and English plantain, are fairly widespread and patchily dense along the bluff edge, however, which also features dense patches of as the succulents sea fig and both species of iceplant (i.e., *C. edulis* and *C. chilensis*).

3.2.3.1.2 Ecological Factors Influencing Variation in Species Composition

Differences in plant species composition between the coastal prairie along the bluff edge west of the trail, on the FMR, compared to that further inland, including mostly that on the MBA property, could reflect differences in climate, soils, and disturbance regimes. Because it is closer to the ocean, the grassland vegetation along the immediate bluff edge likely receives more salt-laden moisture (i.e., salt spray) and may also be subject to greater influence of the wind. These factors may limit growth of exotic plants such as Italian ryegrass as well as native perennial species including blue-eyed grass and harlequin lotus found only further inland.

The coastal bluff edge is also subject to more frequent disturbance as a result of its proximity to recreators using the Bluff Trail and benches, and accessing the bluff edge to take in views and go to the beach. The frequently trampled areas support an assemblage dominated by coyote thistle, cut leaf plantain, sea thrift, and coastal tufted hairgrass; these perennial herbs may be relatively resilient to frequent trampling and able to persist in the potentially more compacted soils.

Frequent disturbance by gophers may also play a role in influencing plant species composition differences observed between the bluff edge and further inland. Most notably, the patch of coastal terrace prairie supporting coast yellow leptosiphon (Patch 25 in Figure 4) featured numerous gopher mounds with varying heights and degrees of bare ground versus plant cover, that suggest they were created throughout the growing season. Such chronic disturbance by gophers can prevent dominance by perennial species and create and maintain loose soil that can promote establishment of annual plants, including so called disturbance-adapted species that preferentially occur in areas of recent disturbance and are outcompeted by more dominant perennial species elsewhere.

Finally, observed variation in plant species composition may reflect different soil conditions, as suggested by observations made during the study. The area immediately adjacent to the coast and generally west of the Bluff Trail features light beige soil with a sandier/more gravelly texture than found underlying the coastal terrace prairie in the center of the study area, where the soil appears darker, greyer, and finer textured (i.e., less sand and gravel and more silt and clay). Soil differences within the coastal prairie in the site could be a consequence of the different plant assemblages as a cause; over time, denser plant cover, particularly that from fine-rooted grasses, contributes to soil development.

Differences in soil conditions as well as disturbance, including prior land-use activities, may also explain the differences in plant species composition between the coastal terrace prairie and ruderal assemblages within the study area, as described below.

3.2.3.2 Ruderal

The open, herb-dominated areas north and east of the Monterey cypress and also in the southwestern portion of the study area lack native perennial grasses and most of the other native species found in the coastal prairie. There areas, which total 0.296 acres or 10% of the study area (or 0.265 ac, 11% of the MBA property), were characterized as ruderal, as they are dominated by exotic grasses and forbs including those commonly found in anthropogenically disturbed areas including roadsides. Exotic species composition in these areas differs somewhat from that in the coastal terrace prairie, with species like rattlesnake grass (*Briza maxima*), flax (*Linum bienne*), and panic veldt grass (*Ehrharta erecta*) being common in these communities but virtually absent from the coastal terrace prairie. The ruderal areas on the eastern portion of the study area also feature a fairly high cover of naturalized ornamental species including pincushions (*Scabiosa* atropurpurea), pride of madeira (*Echium candicans*), pine echium (*E. pininana*), and tree houseleek (*Aeonium* sp.). These species may have spread from adjacent landscaping areas, though some also have been historically planted. The ruderal areas feature a low diversity and abundance of native plants, which primarily just include beach strawberry (*Fragaria ciloensis*) and coastal tarweed (*Madia sativa*), which is adapted to chronic disturbance.

Soils underlying the ruderal communities north and west of the Monterey cypress grove are darker and somewhat browner than the light to medium-grey coastal terrace prairie soils. The soils under the ruderal areas along Vallemar Street are also looser, and feature decomposed granite pieces. These soils are likely part of the 'fill wedge' at the site associated with construction of Vallemar Street and Highway 1 (HKA 2016). The absence of native coastal terrace prairie grasses and herbs in the ruderal area may reflect the altered soil conditions, which may be unsuitable; alternatively, or additionally, it may be have resulted from the historic disturbance associated with prior land uses, including road grading and construction and perhaps planting of the Monterey cypress (though these trees may have naturally recruited into the site). These activities may have introduced exotic plants that are more competitive and thus exclude recolonization of the soils by native coastal prairie species.

The patch of ruderal vegetation in the southwestern portion of the study area (Figure 4) may reflect prior vegetation removal or other land use, though no such disturbance is discernable in the historical aerial imagery dating back to 1972 (Figure 2a).

3.2.3.3 Ornamental or Planted Areas

A total of 1.26 acres (41%) of the study area feature trees, shrubs, and herbs that were either planted deliberately, including through seeding, or that spread from other planted/landscaped areas. These include the stand of Monterey cypress, the patch of ornamental shrubs dominated by Ngaio tree on the central, northern border of the MBA property, and the drainage ditch in the County road right-of-way between the southern portion of the MBA property and Juliana Street. Collectively, the ornamental or planted vegetation covers 1.1 acres or 47% of the MBA property (Table 2).

3.2.3.3.1 Monterey Cypress

Within the study area, 1.10 acres (36%) is dominated by Monterey cypress site, which have been present at the site since before 1972 when mature trees were captured in the first-available historical

imager of the site (Figure 2a). Native to just the Monterey Peninsula and Point Lobos in Monterey County, Monterey cypress were widely planted along the coast to create windbreaks and for general landscaping; the species is naturalized outside of its native range as it can naturally recruit in areas where it was not planted (Bartel 2012).

Within the study area, the Monterey cypress understory primarily features a mix of ornamental species, including Japanese pittosporum (*Pittosporum tobira*), Ngaio tree, and *Echium* species, and naturalized exotic plants including panic veldt grass, rattlesnake grass, freeway iceplant, and Cape ivy (*Delairea odorata*). Native plants occur at low diversity and abundance in the understory of the Monterey cypress but include goose grass (*Galium aparine*), beach strawberry, and California blackberry (*Rubus ursinus*).

3.2.3.3.2 Ornamental Shrubs

The northern border of the study area features an 0.7-acre stand of shrubs dominate by Ngaio tree (>60% cover) and that features coyote brush (*Baccharis pilularis* ssp. *consanguinea*) and Monterey pine (*Pinus radiata*), with beach strawberry and California blackberry in the understory. Like Monterey cypress, Monterey pine is narrowly endemic to just four locations on the California and Baja California coasts. While it has been widely planted and has spread along the coast of California, only individuals within the original four locations are protected as special-status species.

3.2.3.3.3 Drainage Ditch

Located entirely within the County road right-of-way, the 0.88-acre drainage ditch north of Juliana Street includes numerous upland and wetland species not otherwise found at the site such as beardless wild rye (*Elymus triticoides*), purple needle grass (*Stipa pulchra*), yarrow (*Achillea millefolium*), and spreading rush (*Juncus patens*). Many of these species were likely seeded or planted as part of work to line the ditch with vegetation that would filter road runoff before it flows to the beach in the southwestern corner of the study area. Much of the cover consists of exotic species including cut leaf plantain, bird's foot trefoil, prickly ox-tongue, sheep sorrel (*Rumex acetosella*).

3.2.3.4 Native and Exotic Dominance

As noted above, the assemblages within each vegetation type vary greatly in terms of their native plant species composition. Table 4 and Figure 5 illustrate the area of mapped patches in each vegetation type according to the five classifications based on whether they are dominated by plants native to California and that naturally occur there (i.e., excludes Monterey cypress and Monterey pine) versus exotic plants or ornamental/planted species, as described in Section 2.2.2.

Of the coastal terrace prairie assemblages within the site, 0.203 acres (7%) are dominated by native plants, 0.432 acres (14%) are co-dominated by native and exotic plants, another 0.368 acre (12%) are dominated by exotic plants but feature native species that are subdominant, and 0.415 acres (14%) are exotic dominated and feature natives at low abundance. As noted in 3.2.3.1.1, assemblages in this latter category could be classified as non-native grassland or alternatively, ice plant mats, as they feature low diversity and cover of native plants. These various conditions occur patchily within the landscape, reflecting the patchy nature of common exotic plants including ice plant and Italian ryegrass.

3.3 Rare Plants

Four plant species that are included on the California Native Plant Society Rare Plant Inventory were observed within the study area during 2018 (Table 5). These include two plant species that are classified as 'rare and endangered in California and elsewhere' (though they are endemic to California), as indicated by their California Rare Plant Rank (RPR) of 1B: coast yellow leptosiphon (CRPR 1B.1) and Blasdale's bent grass (CRPR 1B.2). The other two species, harlequin lotus and Johnny nip, are on a 'watch list' (CRPR 4.2) owing to their limited distributions. All were observed within both the FMR and the Moss Beach Associates property except coast yellow leptosiphon, which was only found on the FMR. None were found in the County right-of-way (Tables 5 and 6).

The following sections describe each species in terms of their distribution and abundance in the study area; they also describe abiotic and biotic habitat factors that appear to be associated with the species, and assess the conditions of the survey and other factors that can influence interpretation of the results. Section 4 describes context for the occurrence within the species' range, while Section 5 assesses the potential impacts, both positive and negative, of the proposed conservation and development project on the species.

3.3.1 Coast yellow leptosiphon

3.3.1.1 Distribution

Coast yellow leptosiphon was mapped within a 746-sf (0.0171-acre) patch and one disjunct point occurrence 6 feet southeast which featured 6 plants in a 2-inch-by-11-inch (22-in^2) area (Table 6, Figure 6). The mapped patch is in the northern portion of the larger (est., 1,800 sf) patch depicted in the listing petition (Corelli 2016); this is consistent with observations by Toni Corelli which suggest that the occurrence is perhaps contracting northward/being eliminated from the southern part of its prior area of occupation (T. Corelli, pers. comm. 2018). The patch in 2018 was larger than that mapped by Dr. McGraw in 2016 when the patch of just 306 square feet (0.007 acres) was delimited (Figure 6). That year, mapping was conducted during a single site visit on May 11, 2018 rather than two visits in mid-May and early June during 2018, which may have underestimated its areal extent, such that the patches are entirely comparable.

3.3.1.2 Abundance

The estimated abundance of coast yellow leptosiphon within the study area in 2018 was 23,750 individuals (Table 6). The 95% confidence interval around the mean is 10,340 such that there is a 95% chance that the population is between 13,410 and 34,091 individuals. This abundance was based on an estimated 85.7 per 0.25^2 quadrat, with a standard deviation of 79.7 individuals. The high standard deviation reflects the range of densities in the 20 quadrats, which had between 6 and 266 plants. The densities were based on plants having an average of 2.32 (SD = 1.24) flowers/buds per leaf cluster, and plants having an average of 1.36 (SD = 1.05) leaf clusters (see Section2.2.3.1.2 for a description of the abundance estimation methods).

The estimated abundance of leptosiphon in 2018 was 27 to 68 times greater than that estimated by Corelli in 2015, when a reported 500 plants were counted through a census. Interannual variability in abundance may also play a role in the difference reported here for 2018 and by Corelli for 2015; notably, the 2015 survey occurred in the fourth year of drought (2012-2015), which may have reduced

the population. Conversely, the high rainfall in 2017 may have increased seed production and promoted establishment and thus density in 2018.

However, the dramatic difference in abundance estimation is likely largely attributable to the different estimation methods. In 2015, plants were counted using binoculars by standing on the perimeter of the patch and counting the number of plants in 10 sections (Corelli 2016). It is unclear how individuals were differentiated using this method. The morphometric approach used in this study to estimate abundance based on counts of flowers and the leaf clusters that subtend them likely contributes greatly to the increased estimate of abundance relative to a complete census when plants growing close together may have been considered one plant. Sampling populations with high spatial variation in density can also tend to result in less precise estimates of abundance.

Refining the methods to estimate the abundance of coast yellow leptosiphon accurately yet without impacting individuals or their habitat, will help track changes in the population over time and relate them to changes in habitat conditions and interannual variation in weather (e.g., precipitation), herbivory, or other factors that could influence individual demographic performance and thus population density.

3.3.1.3 Abiotic and Biotic Habitat Factors

Coast-yellow leptosiphon co-dominants the coastal terrace prairie assemblage in which it occurs west of the Bluff Trail (#25 in Table 2 and Figure 4) with two exotic perennial forbs, cutleaf plantain and rough cat's ear. Johnny nip, coastal tarweed, coastal tufted hairgrass, and sea thrift occur at moderate cover. Other notable native species include Blasdale's bent grass, purple cudweed, coyote thistle, farewell to spring, maritime brome, meadow barley, and Chilean trefoil; additional exotic plants include Italian ryegrass and English plantain. Plant height within this area is generally low (<15 cm), and roughly 5-10% of the area featured open soil lacking plant cover (bare ground).

The patch occurs approximately 20 feet from the bluff edge to the south, 10 feet from the bluff edge to the west, 17 feet from the northern bench, and immediately adjacent to the Bluff Trail to the east (Figure 6); the patch is at an elevation of 48 feet above mean sea level.

Soil examined just outside of the patch (to avoid impacting coast yellow leptosiphon) was a relatively light colored, as characteristic of the coastal bluff soils compared to the darker, greyer soils underlying the coastal terrace prairie in the middle of the study area. The coast yellow leptosiphon patch featured high incidence of gopher mounds; an estimate 25% of the patch featured bare or nearly bare ground created from the gopher burrow castings. Such disturbances can promote populations of some native plants, particularly annual species, by creating and maintaining open sand soil which disturbance-adapted species require for germination and early seedling establishment (i.e., as a safe site *sensu* Fowler 1988).

On its western border, the patch abuts a dense mat of sea fig that extends to the bluff edge; the patch was not observed in the 1972 or 1986 aerial images and instead, first appears in the 2002 image since which time the size of the patch does not appear to have expanded inland appreciably (Figure 2).

3.3.1.4 Factors Affecting the Survey

The survey was carefully timed to occur when coast yellow leptosiphon was in flower. On May 20, 2018, when the distribution was first mapped and when abundance was sampled, most plants featured

flowers; however, 10 of the 75 individuals (13%) that were randomly chosen for the morphometric analysis did not feature flowers, which make them very easy to locate, and 3 of these did not feature buds that can aid in the location. For this reason, a second search of the entire study area was conducted on June 3, 2018 when the patch was then remapped and the disjunct point location was recensused (resulting in the same count of 6 individuals). The geometry of the two patches was examined in GIS and were very similar, though the patch mapped on June 3 extended further north and east than the patch mapped on May 20. The composite patch was used to depict the distribution (Figure 6). No other flowering or vegetative plants were observed outside of the two mapped locations during the two intensive survey days (May 20 and June 3) or during the other surveys conducted at the site. Given the conspicuous nature of the plant (i.e., bright yellow flowers) and the thorough surveys conducted throughout the season, it is unlikely that the species occurs outside of the two mapped locations.

3.3.2 Blasdale's bent grass

3.3.2.1 Distribution

Blasdale's bent grass was mapped in five locations on the western third of the study area, that range between 0.17 and 365 sf and total 451.7 sf (0.0104 acres; Table 6, Figure 6). Four of the occurrences, which total 374 sf (0.009 acres), were near the bluff edge west of the Bluff Trail on the FMR property, between the northern of the two benches and the coast yellow leptosiphon patch. The fifth patch (78 sf or 0.002 acres) is on the MBA property where the trail from Juliana Street ties into the Bluff Trail (Figure 6).

3.3.2.2 Abundance

A total of 221 Blasdale agrostis plants were counted in the census of the five patches, which had between 5 plants (in the point occurrence) and 116 plants in the large polygon mapped in the coast yellow leptosiphon area. The patch on the MBA property featured 65 plants while the four patches mapped within the FMR featured the remaining 156 individuals (Table 6, Figure 6).

3.3.2.3 Habitat Factors

Within the Study Area, Blasdale's agrosis occurs in short-statured coastal terrace prairie dominated by coastal tufted hairgrass, cut leaf plantain, and sea thrift. Native plants that co-occur with Blasdale's bent grass at moderate cover include Johnny nip, sea thrift, and coastal tarweed, while the exotic rough cat's ears occurs at moderate abundance as well. All occurrences featured a fair amount of bare ground (~10-30%). The open soil conditions are created and maintained by gopher mounds in the largest patch where Blasdale's bent grass co-occurs within coast yellow leptosiphon, and trampling from recreational use, which occurs in the area next to the northern bench in the FMR and in the trail providing access to the Bluff Trail from Juliana Street through the MBA property (Figure 6). This distribution pattern suggests the species may be competitively excluded in areas of denser plant cover, though it is possible that it requires some aspect of the disturbance to complete its life history (e.g., to create a safe site for seedling establishment).

3.3.2.4 Factors Affecting the Survey

All plants censused were in flower during the June 3 survey and mapping of Blasdale's bent grass. The presence of the inflorescence greatly aided detection of the species, which grows in areas of moderate cover from co-occurring species though some bare ground. The patches on the MBA property and the two small patches on the FMR property were recensused on June 22, with the same densities recorded as on June 3.

3.3.3 Johnny Nip

Johnny nip was mapped within 16 locations (10 patches and six point occurrences) in the western half of the study area that total 0.171 acres (Table 6, Figure 6). Of the total area supporting this rare plant, 0.046 acres or 62% is within the MBA Property while 0.066 acres or 38% is in the FMR (Table 6).

3.3.3.1 Abundance

A total of 1,703 Johnny nip plants were counted within the study area. Of these, approximately 931 (55%) were in the MBA property and 772 (45%) were in the FMR. For patches that straddled the two properties, the density in each property was estimated using the proportion of the mapped patch within each property, such that the actual density of plants in each site may differ somewhat from that estimated.

3.3.3.2 Habitat factors

Johnny nip generally occurs in shorter-statured coastal terrace prairie that features bare ground created/maintained by gopher disturbance and/or trampling from recreational use. The species primarily occurs in the western portion of the study area (Figure 6), where soils appear generally lighter and coarser than in the center and east where they are darker and browner. Plant species that occur at high cover in areas occupied by Johnny nip include the natives coyote thistle and coastal tufted hairgrass, and the exotic species cut leaf plantain and rough cat's ears. Species found at moderate cover with Johnny nip include sea thrift and Italian rye grass. The distribution of Johnny nip may be influenced by that of its host plants, as the species is a hemi-parasite; however, *Castilleja* species can be generalist parasites, not host-specific, and parasitize a variety of grasses, legumes, and sagebrush. Moreover, the species may be able to establish and persist without a host if sufficient water is available (Les 2017).

3.3.3.3 Factors Affecting the Survey

Johnny nip was largely in flower during the survey on May 20th though some patches featured up to 50% vegetative plants. Though more difficult to detect than flowering plants, the vegetation plants feature purple pigmented leaves that make them relatively easy to discern from the predominantly green biomass in the grasslands, such that the abundance estimate is likely relatively close to the actual population. To increase accuracy of the mapping and census, the patches mapped on May 20 were re-examined on June 3 and modified slightly based on adjustments observed then. All patches where re-examined on June 22 as well to evaluate changes in distribution, though patch abundance was not recensused. Small vegetative plants may have been missed such that the abundance could be greater than reported; however, no additional plants were found outside of the mapped patches and points from May 20 and June 3, suggesting the abundance estimate as well as distribution is fairly accurate.

3.3.4 Harlequin Lotus

3.3.4.1 Distribution

Harlequin lotus was mapped in 31 locations that total 2,050 sf (0.047 acres; Table 6, Figure 6). Patches ranged between 1 sf (1 plant) and 727.9 sf and were located entirely within the MBA property (Table 6, Figure 6).

3.3.4.2 Abundance

A total of 133 harlequin lotus plants were counted in the patches and points mapped (Table 6).

3.3.4.3 Habitat Factors

Within the study area, harlequin lotus was generally observed in the center and eastern portion of the coastal terrace prairie (Figure 6), where soils appeared to be darker grey suggesting greater development. Unlike the other three rare plants in the study area, which occur in areas of greater bare ground and shorter-statured vegetation, harlequin lotus occurred in areas of dense cover which may reflect its preferential occurring in moister microsites. Plant species that occur at moderate abundance with harlequin lotus include cut leaf plantain, Italian rye grass, rough cat's ears, and Pacific gumplant. Other fairly abundance species include English plantain, purple cudweed, coastal tarweed, California oatgrass, softchess, and freeway iceplant. Harlequin lotus was often found around the skirt of the Monterey cypress, where the species may benefit from partial shade and/or greater soil moisture from fog and rainfall collecting on the tree branches and then falling on the plants and soil below.

3.3.4.4 Factors Affecting the Survey

The survey for harlequin lotus was conducted on May 1 when the plants were largely in flower. The mapped occurrences were rechecked against the distribution on May 20, when two additional point occurrences representing two total plants were added. Individual plants of this species exhibited only limited overlap in their canopies and thus were fairly easy to differentiate from one another, such that the estimate of adult (i.e., flowering plant) abundance is likely fairly close. No vegetative plants lacking flowers were observed; however. If plants in this species require more than one year to reproduce, the abundance estimate would be low as it excluded seedlings and juveniles.

4 Special-Status Plants and Communities

4.1 Rare Plants

According to the Department's *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFW 2009), special-status plants are those that meet one or more of the following criteria:

- Listed or proposed for listing under the federal Endangered Species Act;
- Listed or candidates for listing by the State of California as threatened or endangered under the California Endangered Species Act (CESA; Fish and Game Code Section *2050 et seq*.)
- Listed as rare under the California Native Plant Protection Act (Fish and Game Code Section 1900 et seq.)
- Meet the definition of rare or endangered under the California Environmental Quality Act Section 15380(b) and (d). Species that may meet the definition of rare or endangered include the following:
    - Species considered by the California Native Plant Society (CNPS) to be "rare, threatened, or endangered in California" (Lists 1A, 1B, and 2);
    - Species that my warrant consideration on the basis of local significance or recent biological information; and
    - Some species included on the California Natural Diversity Database's (CNDDB's) *Special Plants, Bryophytes, and Lichens List* (California Department of Fish and Game 2018);
- Considered a locally significant species, that is, a species that is not rare from a statewide perspective but is rare or uncommon in a local context, such as within a county or region, or is so designated in local or regional plans, policies, or ordinances (CEQA Guidelines Appendix G). Examples include a species at the outer limits of its known range or a species occurring on an uncommon soil type.

Based on the criteria above, the study area features two special-status plants: coast yellow leptosiphon and Blasdale's bent grass. The following section discusses them as well as the two watch list plant, harlequin lotus and Johnny nip.

4.1.1 Special-Status Plants

4.1.1.1 Coast Yellow Leptosiphon

4.1.1.1.1 Status

Coast yellow leptosiphon is endemic to California where it is only known from the single occurrence within the study area (CDFW 2017). In recognition of the threat posed by such a limited distribution, the species is a candidate for listing as endangered under the California Endangered Species Act (CESA). It has been assigned a Global Rank of G1 and a State Rank of S1, indicating that it is critically imperiled in California and thus the word, since it is narrowly endemic. The species is listed a California Rare Plant

Rank CRPR rank of 1B.1, which means it is rare or endangered in California and elsewhere (Rank 1B.x) and is seriously threatened (x.1; CNPS 2018a)

4.1.1.1.2 Regional Context and Significance

The occurrence of coast yellow leptosiphon within the study area is the utmost high significance for the persistence of the species, given that it is the only known occurrence for this species in the world (CDFW 2017).

4.1.1.2 Blasdale's bent grass

Blasdale's bent grass is endemic to the coastal strand of California where it is known from 58 element occurrences between Mendocino and Santa Cruz counties (CDFW 2018d). It has been assigned a Nature Serve State Rank of S2 and a Global Rank of S2, both of which indicate its imperiled status (CDFW 2018d). Blasdale's bent grass has a rank of 1B.2 on the California Rare Plant Inventory (CNPS 2018a), meaning it rare, threatened, or endangered in California and elsewhere, and it is fairly threatened in California (x.2). It is regarded as threatened by agriculture, recreation, development, and competition from non-native plants (CNPS 2018a).

4.1.1.2.1 Regional Context and Significance

The occurrence of within the study area is just one of three reported in San Mateo County (CalFlora 2018, CDFW 2018d), the others are located near Pigeon Point Lighthouse and in Bean Hollow State Beach. There is some potential for unreported occurrences to be found in other coastal strand communities in San Mateo County, particularly on private land which may have been less studied than public lands. Other documented occurrences of Blasdale's bent grass occur in the Swanton region in Santa Cruz County to the south, and in Point Reyes National Seashore in Marin County to the north. Given the relatively limited distribution and low number of known occurrences for this species in San Mateo County, which may be more widespread and abundant in counties further north (Marin to Mendocino), this occurrence within the study area is considered of high local importance for persistence of the species south of the Golden Gate. This assumes the species is not found in other protected lands featuring coastal grasslands in San Mateo County, which have been fairly intensively botanized without observation of the species (Corelli 2011).

4.1.2 "Watch List" Plants

4.1.2.1 Johnny Nip

Johnny nip is found along the Pacific Coast between British Columbia and northern Monterey County in California. It has a State Rank of S4 and a Global Rank of G4T5, which mean the species is apparently secure considering populations outside of California and the variety is common, widespread, and abundant. The species is regarded as threatened by development (CNPS 2018a), perhaps owing to its narrow distribution along the coast, which is subject to intensive habitat conversion.

4.1.2.1.1 Regional Context and Significance

Johnny nip has been collected or observed in 28 reported locations dotting much of the length of the San Mateo County coast (CalFlora 2018)[3]. Relatively recent observations have been reported at Bean Hollow, Pomponio, and Montara state beaches, as well as Año Nuevo State Park, which protect coastal strand habitat. Johnny nip has been collected on the coastal terrace prairie grassland in and near the University of California at Santa Cruz campus in Santa Cruz County, with numerous observations reported for coastal Marin County (CalFlora 2018). Given this species' fairly widespread distribution from Canada to northern Monterey County, and the numerous occurrences in protected habitat elsewhere in San Mateo County, the occurrence with the study area is likely of only limited local importance to the species persistence.

4.1.2.2 Harlequin Lotus

Harlequin lotus is a CRPR 4.2 plant, reflecting that it has a limited distribution in California (Rank 4.x) and that is fairly endangered in California (x.2). It has a state rank of S3, vulnerable, and a global rank of G3G4, reflecting uncertainty as to whether it is at moderate risk of extinction due to a restricted range, very few populations, steep declines or other factors (G3) or apparently secure (G4), a ranking assigned to species that are uncommon but not rare, though there is some cause for long-term concern due to declines or other factors, considering populations outside of California. Within California, harlequin lotus is found primarily in the coastal strand between Del Norte and northern San Luis Obispo counties. It is Designated as Endangered in Canada, and reportedly threatened in California by development, grazing, feral pigs, habitat alteration, and competition (CNPS 2018a).

4.1.2.2.1 Regional Context and Significance

Harlequin lotus has been collected/observed in 29 locations in San Mateo County (CalFlora 2018), with occurrences reported found in the following protected lands in San Mateo County: Año Nuevo State Park, Butano State Park, Bean Hollow State Beach, Pescadero State Beach and Marsh Natural Preserve, and the Peninsula Watershed lands (Corelli 2011). Additional collections/observations have been reported from the coastal terrace prairie in Santa Cruz County, with numerous observations found in the Marin County coastal grasslands (CalFlora). Given this species' fairly widespread distribution from Canada to northern San Luis Obispo County, and the numerous occurrences in protected habitat elsewhere in San Mateo County, the occurrence with the study area is likely of only limited local importance to the species persistence.

4.2 Special-Status Natural Communities

4.2.1 Definition

Special-status natural communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. These communities, which may or may not contain special-status species or their habitat, are listed on the *List of California*

[3] Some of these collections/observations come from the same occurrence and not all are extant; the California Natural Diversity Database (CNDDB) does not track occurrences for California Rare Plant Rank 4.2 plants (only CRPR 1B and 2).

Terrestrial Natural Communities (CDFW 2018a), which provides the current state of the California classification.

As discussed previously here and further described by CDFW (2017), the communities within the study area have not fully been classified and described in the Manual of California Vegetation (Sawyer et al. 2009) including on-line edition (CNPS 2018b) or reflected in the *List of California Terrestrial Natural Communities*. Table 3 lists the natural communities that were cross walked to the types mapped within the study area, of which four are classified as sensitive by CDFW (2018a). One of these, Monterey cypress, refers only to natural occurrences found in two locations in Monterey County, and therefore does not apply to planted (or naturalized) stands such as occur within the study area (Section 3.2.3.3.1). The three other sensitive communities can be applied to the coastal terrace prairie, in the case of the California oatgrass prairie and tufted hair grass meadows (Table 3).

Coastal Terrace Prairie is also classified as rare in the *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986), which was superseded by the *California Manual of Vegetation* (Sawyer et al. 2009) and *List of California Terrestrial Natural Communities* (CDFW 2018a).

As described in Section 3.2.3.1.1, 0.415 acres of the coastal terrace prairie within the study area is dominated by exotic plants and features native plant species at low diversity and abundance. Though treated as part of coastal terrace prairie, which as a broad classification type for vegetation in the site, the assemblages dominated by ice plant as well as those dominated by exotic grasses and forbs could be classified as ice plant mats, and non-native grassland, respectively, and therefore would not be considered sensitive habitat.

4.2.2 Regional Context and Significance

As a vegetation type, coastal grasslands are rare both as a consequence of their limited distribution in regions featuring a maritime climate, and as a result of the widespread land use conversion those regions. Coastal terrace prairie communities such as found in the study area, which are underlain by soils with greater silt and clay content and that occur on flat terraces, generally feature a greater diversity and abundance of coastal grassland-dependent species than grasslands found on more erosive, sandier soils in the southern part of San Mateo County (R. Morgan, pers. comm. 2012). These more diverse coastal terrace prairies may have been disproportionately converted, owing to their more fertile soils and gentler terrain which make them more suitable for both agriculture and development. As a result of their rich diversity of native plants and habitat for multiple rare plants, including coast yellow leptosiphon which is found nowhere else in the world, the remnant patch of coastal terrace prairie within the study area is of important regional conservation value.

5 Assessment of Potential Project Impacts and Benefits

This section assesses the potential benefits as well as negative impacts associated with the conservation and development project proposed for the MBA property.

5.1 Existing Project Measures to Limit Impacts

Recognizing the occurrence of sensitive natural resources within the MBA property, the project proponents developed a combined conservation and development project that was designed and will be implemented following measures that will limit impacts to the special-status plants and sensitive natural communities. The following sections describe the existing measures.

5.1.1 Project Design

1. Site the project largely within the degraded habitat, including primarily the ruderal and planted/ornamental vegetation on the east side of the property.
2. Minimize alteration of the site's hydrology, including by using permeable pavers to increase infiltration of rainfall, and installing overflow spreaders in trenches to diffuse runoff.
3. Landscape with plant species native to the San Mateo Coast, to limit the potential for the spread of non-native species into the adjacent habitat, and limit the need for irrigation and pesticide use, which could influence nearby natural communities.

5.1.2 Project Construction

1. Prior to commencement of construction, all limits of construction will be delineated with temporary construction fencing, and environmentally sensitive areas will be clearly flagged.
2. Entrance and exit from the construction site by construction equipment and other vehicles will occur from Vallemar Street, and the point of access will be clearly identified.
3. An excavator with a swivel bucket will be used during construction. The excavator will have "street" tracks to minimize site disturbance.
4. Construction lay down areas will be located on the building envelopes not under active construction or within other portions of the construction footprint.
5. Spoil material that will be hauled away may first be stored either on the building envelopes not in active construction or on the paved parking area on Vallemar Street, subject to an encroachment permit from San Mateo County Public Works.
6. A biological monitor will be present during ground disturbing activities to ensure that encroachment into the flagged environmentally sensitive areas does not occur. The biological monitor will have the authority to stop work in the event construction activities are encroaching into environmentally sensitive areas.
7. The erosion control plan for the project includes the following best management practices (BMPs):

a. Control and prevent the discharge of all potential pollutants, including pavement cutting wastes, paints, concrete, petroleum products, chemicals, washwater or sediments, rinse water from architectural copper, and non-stormwater discharges to storm drains and watercourses.

b. Store, handle, and dispose of construction materials/wastes properly to prevent contact with storm water.

c. Do not clean, fuel, or maintain vehicles on-site, except in a designated area where wash water is contained and treated.

d. Train and provide instruction to all employees/subcontractors RE: construction BMPs.

e. Protect all storm drain inlets in vicinity of site using sediment controls such as berms, fiber roles, or filters.

f. Limit construction access routes and stabilize designated access points.

g. Perform clearing and earthmoving activities only during dry weather.

h. Use sediment controls or filtration to remove sediment when dewatering and obtain all necessary permits.

i. Trap sediment on site, using BMPs such as sediment basins or traps, earthen dikes or berms, silt fences, check dams, soil blankets or mats, covers for soil stockpiles, etc.

j. Divert on-site runoff around exposed areas; divert off-site runoff around the site (e.g. swells and dikes).

k. Protect adjacent properties and undisturbed areas from construction impacts using vegetative buffer strips, sediment barriers or filters, dikes, mulching, or other measures as appropriate.

l. No land clearing operations where grading operations may take place between October 15 and April 15 unless a separate winter erosion control plan is approved prior to beginning such construction.

m. Erosion is to be controlled at all times. The specific measures shown are to be implemented at all times. Additional measures will be required for construction between October 15 and April 15.

n. Erosion control measures shall be monitored, maintained, and replaced as needed to prevent escape of sediment from the site. No turbid runoff shall be allowed to leave the construction site.

5.2 Direct Impacts

Grading and construction of the four proposed residences will impact 0.900 acres within the MBA property while infiltration spreaders will temporarily disturb an additional 0.015 acres (Table 7, Figure 7. In total, of 0.915 acres or 39% of the 2.35-acre MBA Property and 30% of the entire 3.045-acre Vallemar Bluffs Study Area (all within the MBA property), will be directly affected by construction (Table 7, Figure 7).

The impacts within the limits of grading are generally anticipated to be permanent. Following completion of the project, much of the area within the limits of grading will feature the buildings and hardscapes (i.e., driveways and decks) and will be affected by these features and uses. While landscaping will incorporate native plants from the San Mateo Coast, the landscaped area will be available for residential use by the residences, rather than conserved, and is not considered restored. However, a 0.0069-acre (303 sf) area on the western edge of the limits of grading that is within the conservation area will be restored (Section 5.2).

In contrast, the area that will be disturbed through installation of the infiltration spreaders designed to diffuse run off from the development is regarded as temporarily impacted. This area, which will be entirely within the proposed conservation easement area, will be restored using active revegetation techniques designed to establish coastal terrace prairie plants native to the site (Section 5.2).

5.2.1 Impacts to Special-Status Communities and Rare Plants

The two impact areas, the limits of grading and the infiltration spreader trenches, will occur within and thus directly, negatively impact 0.075 acres of land that supports degraded coastal terrace prairie, a special-status natural community, and 339 sf of habitat occupied by harlequin lotus. Though this species does not meet the CDFW criteria for special-status plant (CDFW 2009), impacts to this rare plant were evaluated as part of this analysis to facilitate the design of its conservation element. Based on the 2018 survey, the proposed project is unlikely to directly impact the other three rare plants, which occupy areas outside of the project development footprint (Figure 6).

5.2.1.1 Coastal Terrace Prairie

5.2.1.1.1 Limits of Grading

The limits of grading include 2,831 sf or 0.065 acres of vegetation classified broadly as part of the coastal terrace prairie vegetation type mapped on the site (Table 7, Figure 7). Most (74%) of this area, 0.048 acres, is within Lot 1, where the area of grassland extends further east than in land within the other three proposed lots (Figure 7). Within Lot 1, the vegetation that will be impacted by the development is highly degraded and dominated by exotic plants including freeway ice plant mats and dense cover of exotic grasses and forbs. Specifically, 0.45 acres or 95% of the area is exotic dominated and features native plants at only low diversity and abundance. This area completely lacks native perennial grasses and thus might not be classified as coastal terrace prairie by some. Most of the remaining 0.002 acres (5%) features some native plants as subdominant to more dominant exotic plants (Table 7).

The limits of grading in lots 2, 3, and 4 include 0.005 acres, 0.007 acres, and 0.006 acres of coastal terrace prairie grassland, respectively (Table 7). As in Lot 1, most of these areas are dominated by exotics and feature natives at only low abundance (Table 7). The only exception is in Lot 3 where the grading area includes just over 0.002 acres of coastal terrace prairie vegetation that is dominated by native plants including coastal tufted hairgrass.

5.2.1.1.2 Infiltration Spreaders

Installation of the infiltration spreaders to diffuse runoff will temporarily disturb 420 sf (0.010 acres) of coastal terrace prairie habitat: 0.0034 acres in Lot 1, 0.0028 acres in Lot 2, 0.0035 acres in Lot 4 and <0.00001 acres in Lot 3 (Table 7, Figure 7). Of this area, 0.0038 acres (39%) is in patches where native and exotic plants codominate, 0.003 acres (36%) is in areas dominated by exotics but with native subdominant, and the remaining 25% (0.002 acres) is dominated by exotics with low cover of natives (Table 7, Figure 7).

5.2.2 Harlequin Lotus

As noted above, the project impact areas do not feature coast yellow leptosiphon, Blasdale's bent grass, or Johnny nip, but do feature a small area mapped as supporting harlequin lotus. Although it is not a special-status species as defined by CDFW (2009), as further described in Section 4.1, the direct impacts to this rare plant were evaluated to facilitate the design of conservation element of the project.

The limits of grading overlap small portions of patches of habitat occupied by harlequin lotus in Lot 3 (82 sf) and Lot 4 (202 sf), where a total of 284 sf of habitat occupied aboveground in 2018 would be permanently impacted by the proposed development. These habitat patches contained an estimated 15 plants in 2018: 3 in Lot 3 and 12 in Lot 4. These densities are approximate as they were calculated by multiplying the proportion of the patch that is inside the limits of grading by the total patch density.

An additional 55.3 sf of occupied supporting approximately 5 harlequin lotus are located in the infiltration spreader areas (Table 7, Figure 7). These occur primarily in Lot 4 where part of a patch as well as two point occurrences within five feet of the spreaders were assumed to be impacted during digging to install the spreaders.

5.3 Indirect Impacts

The proposed project has some limited potential to impact the two special-status plants and coastal prairie habitat located outside of the project disturbance envelope. Such indirect effects could occur via one of three interrelated mechanisms:

1. Promoting the invasion and spread of exotic plants;
2. Altering soil moisture conditions; and
3. Increasing trampling associated with human activities including recreational use.

The following sections describe these potential indirect effects, which will be address in the project design (Section 5.1) and proposed mitigations (Section 5.4).

5.3.1 Exotic Plants

Construction and maintenance of the houses and associated improvements including landscaping and, drainage facilities, has some potential to promote the invasion and spread of exotic plants not present at the site. This can occur through a variety of mechanisms including:

1. Introduction of exotic plant seed on equipment and materials during construction and/or use of the houses, including landscaping materials (e.g., mulch and container plants);

2. Disturbances that remove established plant cover and perhaps disturb the soil in ways that can promote establishment of exotic plants that are adapted to open soil conditions;
3. Alteration of soil conditions that make them directly more favorable for exotic plants, such as through the addition of off-site soil, irrigation or altered drainage that can increase soil moisture, and addition of fertilizers that increase nutrient availability; and
4. Deterioration of soil conditions for native plants, as could occur if soil moisture is reduced due to inappropriate drainage, or if soil fertility is reduced through addition of off-site soil, resulting in declines in native plant populations that can invite colonization of the area by exotic plants.

Although already abundant within the study area, exotic plants can further degrade the coastal terrace prairie community and potentially reduce populations of the special-status plants within the study area if their abundance is further increased, through a variety of mechanisms including:

1. Competing for resources aboveground (i.e., light) and belowground (i.e., soil moisture and nutrients);
2. Altering soil conditions, including nutrient availability (e.g., from nitrogen-fixing plants) in ways that can promote other exotic plants, and tip the competitive balance further toward exotic plant species; and
3. Increasing the amount of litter or thatch on the soil surface, which can degrade habitat for many herbaceous plants, particularly annual forbs.

Section 5.4 describes the measures recommended to prevent the invasion and spread of exotic plants and avoid the impacts associated with their proliferation in the site in addition to the BMPs included in the project design (Section 5.1).

5.3.2 Altering Drainage and Soil Moisture Conditions

Construction and habitation of the residences, along with their associated infrastructure, could negatively impact coastal terrace prairie community and the rare plant populations by altering the hydrology of study area in ways that influence soil moisture. Availability of water in the soil may play a role in the variation in plant species composition; it can affect the abundance of the rare plants directly, by influencing their soil-water relations, and also indirectly, by altering their competitive environment as could occur if increased soil moisture promotes plants with greater water demands that are also more competitive (e.g., grow larger). Soil moisture conditions in the site could be altered if the buildings and hardscapes concentrate precipitation into a small area, leaving some areas wetter and other areas drier. Residential water use including landscape irrigation and hoses (e.g., used to wash cars in driveways) could increase soil moisture availability.

Increased or channelized runoff could also hasten coastal bluff erosion, which has occurred at a rate of 0.45 feet per year since 1908 (HKA 2016) and may have reduced the amount of coastal blufftop habitat available for coast yellow leptosiphon, Blasdale's bent grass, and Johnny nip, as well as perhaps harlequin lotus, though that species occurs further inland.

To minimize these potential indirect effects of altered drainage, the project features the following design elements (MME 2016):

1. Infiltration trenches with overflow spreaders, that disperse the runoff over wide areas and maintain the existing hydrology and soil moisture distribution within the site;

2. Pervious pavers for driveways and parking areas, to minimize the impervious area on the site to just 10, 850 sf (0.25 acres); and
3. Connections to the existing two-foot deep drainage channel on Juliana Street.

These measures are anticipated to minimize alterations to soil moisture conditions within the site.

5.3.3 Trampling

The development has some potential to increase trampling of the special-status plants and native plants within the coastal terrace prairie, by increasing the frequency of:

1. Recreation during and after construction; and
2. Other human activities that would entail walking atop the bluff, including infrastructure maintenance and vegetation management.

The study area experiences relatively high frequency use for recreation, including hiking, dog walking, bicycling, off-leash dog exercising (e.g., throwing balls and frisbees), and picnicking, as well as access for fishing, surfing and kayaking in the ocean below. These and other activities were all observed to occur on the FMR and MBA properties during the course of plant survey. Visitors to the site included those walking in from the adjacent neighborhoods north and south, as well as many who drove to the site, parking along the north side of Juliana Street which provides a *de facto* parking area for access to the bluff and beach. Bicycles and pedestrians also access the site from Vallemar Street.

Areas of concentrated use, including the Bluff Trail and the trails accessing it from Juliana and Vallemar streets, as well as the two benches on the FMR bluff edge, all feature sparser, and shorter-statured plants. This altered community structure and species composition results from direct trampling, which can kill or reduce the size of plants, as well as soil compaction, which can limit the species that are able to establish and persist.

Construction workers involved in development of the new residences could increase the frequency of use of the property, as could occur following completion of the four new single-family residences. The project could also intensify the use in the coastal terrace prairie in the MBA property, portions of which would be located in each of the new lots. For example, residents seeking to use these areas for their outdoor enjoyment might, for example, conduct vegetation management, such as weed whacking, or install outdoor furniture (e.g., chairs).

Although the incremental increase in trampling associated with the addition of four residences to the site is anticipated to be limited, relative to the high frequency of use already at the site, Section 5.4 identifies measures that are recommended to avoid and minimize human activity and associated trampling of the sensitive communities and special-status rare species.

5.4 Measures to Minimize and Mitigate Impacts

The following measures are recommended to avoid, minimize, or mitigate the direct and indirect impacts of the project. They are in addition to the existing project elements to protect sensitive communities and rare species (Section 5.1).

1. **Site all construction materials and staging areas in converted (i.e., paved), ruderal, or planted, areas within the portion of the property proposed for development, to avoid impacts to special-status communities and species.**

2. **Implement measures to prevent indirect effects of the development project on the adjacent coastal terrace prairie community and rare species during construction.**
    a. Fence the project disturbance envelop during construction using ESA fencing to clearly delimit the area of work;
    b. Erect signs on the fences and in other areas to prevent workers from entering them during construction;
    c. Conduct worker awareness training to educate construction personnel about the sensitive communities and special-status species, as well as the measures that must be implemented to protect them;
    d. Prevent erosion and manage drainage during construction to prevent concentrated runoff and sediment deposition in the coastal terrace prairie, including by installing, silt fences where needed;
    e. Monitor compliance with the protection measures during construction, to ensure that fences and signage remain in places, and that the areas outside of the disturbance envelope are not disturbed or otherwise utilized during construction;
    f. Monitor the site throughout construction period (and in perpetuity, per mitigation measure 5 below) and using early-detection/rapid response to eradicate any new occurrences of exotic plant species.

3. **Prior to disturbance within any portion of the project area that supports coastal terrace prairie dominated or co-dominated by native plants (Figure 6), including the spreader areas and limits of grading, salvage the sod, topsoil, seed, and individual native plants, where appropriate and feasible. Use the salvaged material to restore areas of temporary disturbance; if the salvaged area is to be permanently impacted, use the material to restore other highly degraded habitat on site (e.g., ice plant mats) where appropriate.**

4. **Minimize the potential for indirect impacts to coastal terrace prairie and rare plant species that could result from landscaping, by:**
    a. Avoiding landscaping elements that could degrade adjacent habitat, including pesticides, herbicides, fertilizers, and irrigation beyond that required to establish plantings; and
    b. Installing plants native to the coastal terrace prairie, coastal strand, and coastal scrub communities in San Mateo County. For plant species found in the native communities in

the study area, use container stock from local (coastal San Mateo County) sources to avoid disrupting locally adapted genetic complexes (i.e., causing genetic erosion or outbreeding depression) within the adjacent remaining habitat onsite and in the FMR.

5. **Compensate for the impacts of the project on coastal terrace prairie by implementing the following measures.**

    a. **Permanently protect 0.92 acres of coastal terrace prairie**, through dedication of a perpetual conservation easement to a tax–exempt nonprofit organization qualified under Section 501(c)(3) of the Internal Revenue Code and qualified to do business in California that has as its primary purpose the preservation, protection, or enhancement of land in its natural, scenic, historical, agricultural, forested, or open–space condition or use.

    b. **Restore an estimated 0.71 acres within the conservation easement area** that feature planted/ornamental species (i.e., Monterey cypress), are dominated by exotic plant species, and/or have been previously disturbed and feature unnatural topography or materials (e.g. wood chips. Table 9 and Figure 8 illustrate the acreages and approximate locations of restoration treatment areas. The restoration should follow a specific restoration plan that addresses the anthropogenic factors that have degrade native plant community structure and species composition. The restoration plan will also describe how the areas in the conservation easement area that were graded and installed with spreaders will be restored. It will critically evaluate and use, where appropriate, the following approaches:

        i. Removing the planted/ornamental plant species and ice plant mats;

        ii. Removing wood chips, base rock, or other non-native material covering the soil;

        iii. Recreating the natural topography in areas where mounds or swales were created through prior excavation;

        iv. Controlling other invasive plants (e.g., Italian rye grass and prickly sow thistle) that outcompete native plant species;

        v. Managing the abundance of disturbance-adapted native plants such as coastal tarweed, where they are dominant (e.g., in the southeastern corner of the property) to promote the establishment and growth of a broader diversity of native grasses and forbs;

        vi. Establishing native plants in areas previously used as trails to access the bluff trail;

        vii. Salvaging seed and topsoil from coastal terrace prairie and areas supporting harlequin lotus prior to any ground-disturbing activities and using the material in on-site restoration, where appropriate; and

        viii. Increasing the cover and diversity of native coastal terrace prairie plant species by sowing native plant seed (or spreading topsoil, where available) into restoration areas.

    c. **Manage and monitor, in perpetuity, the entire 0.92-acre conservation area** to address anthropogenic factors that degrade native plant community structure and species composition. Management elements should be identified in a management plan

developed for the conservation area based on the site conditions and the literature documenting relevant conservation and management strategies, which are anticipated to include the following:

i. Controlling exotic plants, and preventing the invasion and spread of new exotic plant species;

ii. Managing recreation and access on and adjacent to the conservation area, including by:

    1. Installing fencing and signage to deter public access within the conservation area;

    2. Recording in the CC&Rs for the site and in the conservation easement, prohibitions against recreational use and access that are not compatible with conservation and management natural community structure and species composition in the coastal terrace prairie and populations of rare native plants. Installation of permanent or semi-permanent infrastructure and play equipment such as law chairs, umbrellas, trampolines, or any other items that intensify use in one area should be prohibited.

    3. Siting, constructing, and managing any public trails that are all or partially within the conservation area so that the recreational use is compatible with the protection of coastal terrace prairie and adjacent costal bluff habitat;

    4. Monitoring compliance with the measures to prevent trampling associated with recreational use and taking steps to increase compliance when/if negative impacts are observed.

iii. Monitoring natural community structure and species composition and rare plant populations within coastal terrace prairie, to gauge the effectiveness of management and inform adjustments as part of the adaptive management framework.

5.5 Summary of Net Effects of the Project

Implementing the measures designed to avoid and minimize project impacts will limit the negative effects on the project on coastal terrace prairie and rare plants. With mitigation, these impacts of the special-status species and communities are anticipated to be outweighed by the benefits of the conservation and mitigation measures, including protecting and managing and monitoring, in perpetuity, the.92 acres of habitat and restoring 0.71 acres that have been degraded (Sections 1.2.1 and 5.2).

Table 10 summarizes the analysis of direct and indirect effects of the conservation and development elements of the project, and then assesses their net effects for each rare species and community (i.e., coastal terrace prairie). The following provides some of the general rationale for conclusions outlined in in the table.

- **Project Impacts are Largely Avoided through the Project Design:** By siting the improvements on the eastern portion of the property, in planted/ornamental and ruderal plant communities (Figure 7), the project avoids most direct impacts to the special-status species and sensitive natural communities. The project will protect 89% (0.874 acres) of the 0.978 acres that were broadly classified as coastal terrace prairie within the MBA property, though a large proportion of this area (0.068 acres or 92%) is dominated by exotic plants and native plants are subdominant (0.011 acres) or occur at only low abundance (0.057 acres).

  In terms of rare plants, it will protect 100% of the 78-sf area occupied by Blasdale's bent grass, 100% of the 0.105-acre area occupied by Johnny nip, and 83% (1,711 sf) of the total 2,050 sf area occupied by harlequin lotus; coast yellow leptosiphon was not observed in the property in 2018 and instead, its entire 746-sf patch is protected within the adjacent Fitzgerald Marine Reserve.

- **A Suite of Avoidance and Minimization Measures will Further Limit Impacts:** Aspects of project description, combined with measures identify in this report, will further limit the impacts of the project on the sensitive natural community and special-status species, including any indirect effects (Section 5.1). Generally speaking, these elements include:

  - Salvaging top soil, sod, and individual plants for use in restoration prior to construction;
  - Implementing species protection measures and best management practices during construction, including installing fencing and signage and conducting trainings and monitoring by a biologist, to prevent the area of disturbance from expanding beyond the designated impact areas (limits of grading and spreader installation areas); and
  - Installing permeable pavers and infiltration spreaders to avoid altering the hydrology in ways that could negatively affect the sensitive community and special-status species directly or indirectly, by altering plant species composition or causing bluff erosion.

- **The project compensates for its limited impacts to degraded coastal terrace prairie and also harlequin lotus, a watch list species, at high mitigation ratios, while avoiding direct impacts to all other sensitive resources in the study area.** The 0.92-acre on-site conservation area, which will be protected through a conservation easement dedicated to a 501(c)(3) land trust, will protect 0.874 acres of coastal prairie, offsetting the direct project impacts to just 0.074 acres of exotic-dominated coastal terrace prairie at a ratio of more than 11:1. Likewise, the conservation area will protect harlequin lotus habitat at a ratio of 5:1; for every one of the 339 square feet impacted by development, 5 square feet (or a total of 1,711 sf) of habitat occupied by the rare herb will be protected. The ratio for individuals is nearly 6:1, as 113 individuals will be protected for the 20 in the development area; this ratio could be increased through the salvage of seed, sod, and/or topsoil prior to development for use in onsite restoration. As noted above, the project will not directly impact Blasdale's bent grass and Johnny-nip, the entire 78 sf and 4,589 sf occupied by each within the property, respectively, will be protected in the conservation easement area.

- **The restoration and management of the conservation area will buffer and expand habitat protected within the FMR, and enhance habitat condition within the coastal terrace prairie community atop Vallemar Bluffs.** Protecting the 0.874 acres of coastal terrace prairie will more than triple the current 0.427-acre area of coastal terrace prairie habitat protected in the FMR

within the study area. Restoration of 0.71 acres with the conservation area, by restoring planted/ornamental areas to prairie and reducing the dominance by exotic plant species such as ice plant, will promote the diversity and abundance of native plants within the MBA property. Increasing their populations can enhance those within protected habitat in the FMR. Land in the FMR is also expected to benefit from active management and monitoring of the 0.92-acre conservation area pursuant a habitat management plan that will address exotic plants and prevent recreation that is not compatible with the coastal terrace prairie and the rare plants that it supports.

For these and other reasons more specifically described for the individual species and community in Table 10, implementation of the proposed conservation and development project may have a net benefit for the coastal terrace prairie community and rare species atop Vallemar Bluffs, when compared to the current conditions, in which the site is unmanaged and impacted by a variety of anthropogenic stressors including exotic plants.

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Tables

Table 1: Community structure

	FMR		MBA Property		ROW		Total	
Community Structure	**Acres**	**%**	**Acres**	**%**	**Acres**	**% of Total**	**Acres**	**%**
Herbs (incl. Succulents)	0.44	87%	1.24	53%	0.12	64%	1.80	59%
Shrubs and Trees		0%	1.10	47%	0.07	36%	1.17	38%
Mostly Bare	0.07	13%	0.00	0%		0%	0.07	2%
Total	**0.50**	**100%**	**2.35**	**100%**	**0.19**	**100%**	**3.04**	**100%**

Table 2: Plant Assemblages by Dominant and Subdominant Species in Three Community Types

Plant Assemblages by Community Type	Map Label (Fig. 3)	FMR		MBA Property		ROW		Total	
		Acres	%	Acres	%	Acres	%	Acres	%
Coastal Terrace Prairie									
Bromus diandrus	1		0.00%	0.031	1.33%		0.00%	0.031	1.0%
Bromus maritimus	2	0.008	1.64%	0.018	0.76%		0.00%	0.026	0.9%
Carpobrotus chilensis	3	0.081	16.04%		0.00%		0.00%	0.081	2.7%
Carpobrotus chilensis-Grindelia stricta/Bromus maritimus	4	0.002	0.42%	0.058	2.45%		0.00%	0.060	2.0%
Carpobrotus edulis (CTP species present)	5	0.035	6.90%	0.038	1.60%	0.007	3.42%	0.079	2.6%
Carpobrotus edulis/Carpobrotus chilensis-Lupinus variicolor	6		0.00%	0.046	1.95%		0.00%	0.046	1.5%
Carpobrotus edulis-Bromus diandrus	7		0.00%	0.017	0.71%		0.00%	0.017	0.6%
Carpobrotus edulis-Grindelia stricta/Bromus mariitimus	8		0.00%	0.017	0.74%		0.00%	0.017	0.6%
Deschampsia cespitosa/Armeria maritima-Festuca perennis/Plantago coronopus	9		0.00%	0.005	0.23%		0.00%	0.005	0.2%
Deschampsia cespitosa/Dantonia californica	10	0.002	0.37%	0.147	6.28%		0.00%	0.149	4.9%
Deschampsia cespitosa-Plantago coronopus	11	0.061	12.19%	0.021	0.90%		0.00%	0.083	2.7%
Eriogonum latifolium-Festuca perennis	12	0.037	7.40%		0.00%		0.00%	0.037	1.2%
Eryngium armatum/Deschampsia cespitosa-Plantago coronopus	13	0.030	5.92%	0.001	0.03%		0.00%	0.031	1.0%
Eryngium armatum-Plantago lanceolata	14	0.007	1.44%		0.00%		0.00%	0.007	0.2%
Festuca perennis	15	0.006	1.14%	0.052	2.20%		0.00%	0.057	1.9%
Festuca perennis/Brachypodium distachyon	16		0.00%	0.037	1.59%		0.00%	0.037	1.2%
Festuca perennis/Bromus diandrus	17		0.00%	0.026	1.12%		0.00%	0.026	0.9%
Festuca perennis/Plantago coronopus	18		0.00%	0.030	1.27%		0.00%	0.030	1.0%
Festuca perennis-Bromus maritimus	19	0.025	4.90%		0.00%		0.00%	0.025	0.8%
Festuca perennis-Hordeum brachyantherum/Madia sativa	20	0.015	2.89%	0.007	0.29%		0.00%	0.021	0.7%
Festuca perennis-Madia sativa/Grindelia stricta	21		0.00%	0.036	1.53%	0.003	1.45%	0.039	1.3%
Festuca perennis-Plantago coronopus-Danthonia californica	22		0.00%	0.151	6.42%		0.00%	0.151	5.0%
Helminthotheca echioides-Madia sativa	23		0.00%	0.017	0.71%	0.002	0.87%	0.018	0.6%
Hypochaeris radicata-Eriogonum latifolium	24	0.011	2.14%		0.00%		0.00%	0.011	0.4%
Leptosiphon croceus-Plantago coronopus	25	0.060	11.96%		0.00%		0.00%	0.060	2.0%

Table 2: Plant Assemblages by Dominant and Subdominant Species in Three Community Types

Plant Assemblages by Community Type	Map Label (Fig. 3)	FMR		MBA Property		ROW		Total	
		Acres	%	Acres	%	Acres	%	Acres	%
Lupinus variicolor-Festuca perennis	26		0.00%	0.031	1.30%		0.00%	0.031	1.0%
Madia sativa	27	0.009	1.73%	0.016	0.70%	0.002	1.23%	0.028	0.9%
Madia sativa-Festuca perennis	28	0.006	1.17%	0.034	1.44%		0.00%	0.040	1.3%
Madia sativa-Festuca perennis/Hypochaeris radicata	29	0.000	0.05%	0.112	4.79%		0.00%	0.113	3.7%
Madia sativa-Hypochaeris radicata	30		0.00%	0.026	1.11%		0.00%	0.026	0.9%
Plantago coronopus-Eriogonum latifolium	31	0.009	1.80%		0.00%		0.00%	0.009	0.3%
Plantago coronopus-Eriogonum latifolium/Grindelia stricta	32	0.017	3.38%		0.00%		0.00%	0.017	0.6%
Raphanus sativus/Festuca perennis	33	0.007	1.34%	0.004	0.19%		0.00%	0.011	0.4%
Subtotal: Coastal Terrace Prairie Assemblages		**0.427**	**84.8%**	**0.978**	**41.6%**	**0.013**	**7.0%**	**1.418**	**46.6%**
Ruderal									
Briza maxima/Festuca perennis	34		0.00%	0.072	3.06%		0.00%	0.072	2.4%
Briza maxima/Scabiosa atropurpurea	35		0.00%	0.070	2.99%	0.015	8.02%	0.086	2.8%
Carpobrotus edulis (no CTP Species Present)	36		0.00%	0.025	1.05%		0.00%	0.025	0.8%
Festuca myuros/Festuca perennis	37		0.00%	0.047	2.02%		0.00%	0.047	1.6%
Raphanus sativus/Avena barbata	38	0.009	1.75%		0.00%		0.00%	0.009	0.3%
Scabiosa atropurpurea/Carpobrotus edulis	39		0.00%	0.051	2.18%	0.007	3.55%	0.058	1.9%
Subtotal: Ruderal Assemblages		**0.009**	**1.8%**	**0.265**	**11.3%**	**0.022**	**11.6%**	**0.296**	**9.7%**
Planted									
Heperocyparis macrocarpa	40		0.00%	1.034	44.01%	0.069	35.77%	1.103	36.2%
mixed upland/wetland	41	0.000	0.03%		0.00%	0.088	45.68%	0.088	2.9%
Myoporum laetum-Baccharis pilularis	42		0.00%	0.069	2.93%		0.00%	0.069	2.3%
Subtotal: Planted Assemblages		**0.000**	**0.03%**	**1.103**	**47.0%**	**0.157**	**81.5%**	**1.260**	**41.4%**
Bluff Trail									
Trail and Adjacent Disturbed Areas (largely denuded)	43	0.067	13.41%	0.003	0.12%		0.0%	0.070	2.3%
Total		**0.503**	**16.5%**	**2.349**	**77.2%**	**0.193**	**6.3%**	**3.045**	**100.0%**

Table 3: California Natural Communities (CDFW 2018a, CNPS 2018b) found within the Study Area

Association Scientific Name	Alliance Scientific Name	Common Name	Mapped Vegetation Types within the Study Area	Alliance Rank		Association Global Rank	Sensitive
				Global	State		
Hesperocyparis macrocarpa	Hesperocyparis macrocarpa	Monterey cypress stands	Non-Native Stands (Planted)	G1	S1		Yes
Brachypodium distachyon	Bromus (diandrus, hordeaceus) – Brachypodium distachyon	Annual brome grasslands	Coastal Terrace Prairie (exotic-dominated areas)				No
Bromus diandrus	Bromus (diandrus, hordeaceus) – Brachypodium distachyon	Annual brome grasslands	Coastal Terrace Prairie (exotic-dominated areas)			G5	No
Danthonia californica	Danthonia californica	California oat grass prairie	Coastal Terrace Prairie	G4	S3		Yes
Deschampsia cespitosa – Eryngium armatum	Deschampsia cespitosa	Tufted hair grass meadows	Coastal Terrace Prairie	G5	S4?		Yes
Deschampsia cespitosa var. holciformis	Deschampsia cespitosa	Tufted hair grass meadows	Coastal Terrace Prairie	G5	S4?		Yes
Lolium perenne	Lolium perenne	Perennial rye grass fields	Coastal Terrace Prairie				No
Lolium perenne	Lolium perenne	Perennial rye grass fields	Coastal Terrace Prairie				No
Carpobrotus (edulis)	Mesembryanthemum spp. – Carpobrotus spp.	Ice plant mats	Coastal Terrace Prairie (exotic-dominated areas)	Unranked	Unranked		No
Briza maxima	Avena spp. – Bromus spp.	Rattlesnake Grass	Ruderal				No

Table 4: Plant Communities by Native/Exotic Dominance Categories

	FMR		MBA Property		ROW		Total	
Plant Communities and Dominance Categories	**Acres**	**% of Total**	**Acres**	**% of Total**	**Acres**	**% of Total**	**Acres**	**%**
Coastal Terrace Prairie								
Native Dominated	0.019	4%	0.182	8%	0.002	1%	0.203	7%
Native-Exotic Co-dominated	0.202	40%	0.230	10%		0%	0.432	14%
Exotic Dominated-Natives Subdominant	0.078	16%	0.286	12%	0.004	2%	0.368	12%
Exotic Dominated-Natives Present at Low Abundance	0.128	25%	0.281	12%	0.007	3%	0.415	14%
Subtotal: Coastal Terrace Prairie Assemblages	**0.427**	**85%**	**0.978**	**42%**	**0.013**	**7%**	**1.418**	**47%**
Ruderal								
Exotic Dominated-Natives Present	0.009	2%	0.144	6%		0%	0.153	5%
Exotic Dominated-No (or only very low) Natives Present		0%	0.121	5%	0.022	12%	0.144	5%
Subtotal: Ruderal Assemblages	**0.009**	**2%**	**0.265**	**11%**	**0.022**	**12%**	**0.296**	**10%**
Planted								
Native-Exotic Co-dominated	0.0001	0.03%		0%	0.088	46%	0.088	3%
Exotic Dominated-Natives Subdominant		0%	0.069	3%		0%	0.069	2%
Exotic Dominated-Natives Present at Low Abundance		0%	0.925	39%	0.061	32%	0.986	32%
Exotic dominated-No (or only very low) Natives Present		0%	0.109	5%	0.008	4%	0.116	4%
Subtotal: Planted Assemblages	**0.000**	**0%**	**1.103**	**47%**	**0.157**	**81%**	**1.260**	**41%**
Bluff Trail (Largely Denuded)	0.067	13%	0.003	0.1%		0%	0.070	2%
Total	**0.503**	**100%**	**2.349**	**100%**	**0.193**	**100%**	**3.045**	**100%**

Table 5: Summary of Rare Plants Observed in the Vallemar Bluff Study Area[1]

Species	Status[2]	Life History	Distribution and Habitat	Moss Beach Associates Property	Fitzgerald Marine Reserve
Blasdale's bent grass (*Agrostis blasdalei*)	CRPR 1B.2	perennial grass	coastal strand between Santa Cruz and Mendocino counties	Present	Present
harlequin lotus (*Hosackia gracilis*)	CRPR 4.2	perennial forb	coastal communities, British Columbia to central California	Present	Present
Johnny nip (*Castilleja ambigua* ssp. *ambigua*)	CRPR 4.2	annual forb	coastal communities, British Columbia to central California	Present	Present
coast yellow leptosiphon (*Leptosiphon croceus*)	California Candidate for Listing as Endangered, CRPR 1B.1	annual forb	Moss Beach Bluff (single known location)	Absent	Present

[1] No rare plant species were observed in the County right-of-way on the perimeter of the study area.

[2] California Candidate for Listing as Endangered: Identified as a candidate for listing as endangered under the California Endangered Species Act

California Rare Plant Rank (CRPR): 1B =Rare or endangered in California and elsewhere, 4 ="Watch List" plants with limited distributions or infrequent presence throughout California.

Decimals after the Status categories represent the Threat rank (e.g., "List 1B.1"): X.1 = Seriously threatened populations, X.2 = Marginally threatened populations, X.3 = Populations with limited threats.

Table 6: Rare Plant Occurrences within the Study Area

	FMR			MBA			Total		
	sf	ac	Density	sf	ac	Density	sf	ac	Density
Blasdale's bent grass	374	0.009	156	78	0.002	65	452	0.010	221
coast yellow leptosiphon	746	0.017	13,416 - 34,097 [1]	0	0.000	0	746	0.017	13,416 - 34,097 [1]
Johnny nip	2,877	0.066	772	4,589	0.105	931	7,466	0.171	1,703
harlequin lotus	0	0.000		2,050	0.047	133	2,050	0.047	133

[1] No rare plant species were observed in the County right-of-way on the perimeter of the study area.

[2] Coast yellow leptosiphon abundance estimated coarsely through sampling of reproductive structures, and may not be accurate

Table 7: Acres within the limits of grading (LOG) and infiltration spreader area (spreader) in each Proposed MBA Parcel

	Lot 1		Lot 2		Lot 3		Lot 4		All Parcels		
Vegetation Type by Condition	**LOG**	**Spreader**	**LOG**	**Spreader**	**LOG**	**Spreader**	**LOG**	**Spreader**	**LOG**	**Spreader**	**Total**
Coastal Terrace Prairie											
Native Dominated					0.002	<0.001			0.002	<0.001	0.002
Native-Exotic Co-dominated	<0.001	0.003		<0.001	0.000				<0.001	0.004	0.004
Exotic dominated-Natives Subdominant	0.002		<0.001				0.006	0.003	0.008	0.003	0.011
Exotic Dominated-Natives Present	0.045		0.005	0.002	0.005				0.055	0.002	0.057
Subtotal: Coastal Terrace Prairie	**0.048**	**0.003**	**0.005**	**0.003**	**0.007**	**0.000**	**0.006**	**0.003**	**0.065**	**0.010**	**0.074**
Ruderal	0.111		0.028		0.000		0.064		0.204	0.000	0.204
Planted	0.053		0.166	0.001	0.240	0.003	0.173	0.000	0.632	0.005	0.637
Total	**0.212**	**0.003**	**0.199**	**0.004**	**0.247**	**0.003**	**0.243**	**0.004**	**0.901**	**0.015**	**0.915**

Table 8: Harlequin Lotus Habitat (in square feet) and Plants Within the Proposed Impact Areas

	Lot 3		Lot 4		Total	
Impact Area	**sf**	**Est. Plants[1]**	**sf**	**Est. Plants[1]**	**sf**	**Est. Plants[1]**
Limits of Grading	81.5	3	202.0	12	283.5	15
Spreader Area	2.8	0	52.5	5	55.3	5
Total	**84.3**	**3**	**254.5**	**17**	**338.8**	**20**

[1] Density estimated based on the proportion of the total patch in the impact area and rounded to the nearest individual.

No occupied habitat or individuals mapped in lots 1 and 2

Table 9: Potential Restoration Areas (Figure 8)

Restoration Treatments	Square Feet	Acres
Address Unnatural Topography (Mound)	1,358	0.0312
Address Unnatural Topography (Swale)	1,297	0.0298
Control Dense Exotic Grasses and Forbs	10,568	0.2426
Control Invasive Plants	1,700	0.0390
Manage Native Disturbance-Adapted Plants	6,747	0.1549
Remove Ice Plant Mats	5,991	0.1375
Remove Planted/Ornamental Species	1,867	0.0429
Remove Wood Chips	1,366	0.0314
Total	**30,894**	**0.7092**
Establish Native Plants on *De Facto* Trails[1]	270 lineal feet	

[1] The trails overlap other restoration areas so their area was not included in the total treatment area

Table 10: Summary of the Effects of the Proposed Conservation and Development Project

Special-Status Resource	Direct Negative Effects of Project	Indirect Negative Effects of Project	Benefits of Conservation and Mitigation	Net Effects of the Project with Mitigation
Coastal Terrace Prairie (sensitive natural community)	• 0.065 ac. of permanent impacts to largely degraded (i.e., exotic dominated) coastal terrace prairie located on the western perimeter of development footprint • 0.01 ac. or temporary impacts to largely degraded coastal terrace prairie resulting from installation of the infiltration spreaders; the habitat will be restored following installation and described at right.	• Potential to promote the invasion and spread of exotic plants, though they will be controlled during implementation of the restoration and management plans. • Potential to affect plant species composition by altering drainage and thus soil moisture, though this will be limited through use of permeable pavers and installation of infiltration spreaders for runoff. • Potential to promote trampling through additional recreational use, though impacts will be limited through active recreation management which is anticipated to actually improve habitat conditions relative to current conditions due to unmanaged public use.	• Permanently protect 0.874 acres of coastal terrace prairie. • Restore 0.71 acres of habitat by addressing a suite of anthopogenic factors that have degraded habitat (Table 9, Figure 8) • Active manage and monitor habitat in the conservation area to address factors that could degrade it, including exotic plants, incompatible recreation, and unanticipated indirect effects of development.	The project will have a net beneficial effect for coastal terrace prairie by: • Protecting coastal terrace prairie habitat at a ratio of more than 11:1. For every square foot of habitat that will be permanently or temporarily impacted, 11.7 square feet will be protected and managed in perpetuity. • Restoring coastal terrace prairie habitat at a ratio of more than 9:1. For every 1 square foot of coastal terrace prairie habitat to be impacted by the project, 9.5 acres will be restored to increase native plant cover and diversity. • Managing and preventing further degradation of habitat that would otherwise be expected to occur if the site is not actively managed to address anthropogenic impacts including unrestricted public access.

Table 10: Summary of the Effects of the Proposed Conservation and Development Project				
Special-Status Resource	**Direct Negative Effects of Project**	**Indirect Negative Effects of Project**	**Benefits of Conservation and Mitigation**	**Net Effects of the Project with Mitigation**
Coast Yellow Leptosiphon (CE, CRPR 1B.1)	Likely None. This species was not observed on the project property during 2018 or during most prior years (Corelli 2016). Habitat in the development area is highly unsuitable due to the dense cover, including woody vegetation; soils are darker and browner and many not be suitable as well. The single plant observed on the property in 2016 (CDFW 2017) may have resulted from mediated dispersal by neighbors who reported dispersing seed atop Vallemar Bluffs to expand the population.	There is a low likelihood of negative indirect effects, which will be mitigated as described. • Potential to promote exotic plants (i.e. through disturbance and introduction of seed in developed areas) will be mitigated through implementation of the restoration and management plans. • Potential for altered drainage to affect soil moisture in ways that could impact the species directly or indirectly, through increased competition, will be reduced through use of permeable pavers and installation of infiltration spreaders. • The addition of four homes is unlikely to increase the frequency or intensity of recreation on the FMR, which already receives high public use. Recreation management, as outlined in the management plan, and enforcement of the easement, as necessary, can help address incompatible recreation uses.	Permanently protecting and managing the 0.92-acre conservation area, and restoring 0.71 acres, including by controlling exotic plants, will enhance coastal terrace prairie and may facilitate expansion of this rare plant; however, much of the coastal terrace prairie in the conservation area supports taller, denser grasses and forbs and features darker soils than observed in the currently occupied area, such that it may not ultimately be suitable for this diminutive rare plant found in light colored soils with sparser plant cover.	The project may have a net beneficial effect for this rare plant by reducing the abundance of exotic plants, which likely compete with the native plant, promoting management of recreation atop Vallemar Bluffs, may also benefit this species, though some level of disturbance by recreators may help maintain suitable habitat.

Table 10: Summary of the Effects of the Proposed Conservation and Development Project				
Special-Status Resource	**Direct Negative Effects of Project**	**Indirect Negative Effects of Project**	**Benefits of Conservation and Mitigation**	**Net Effects of the Project with Mitigation**
Blasdale's bent grass (CRPR 1B.2)	Likely None. This species was not observed in the development area during the 2018 survey; the only patch on site is on the western edge of the conservation area where habitat is more open and short-statured, as on the FMR property which supports the larger occurrence. The species generally occurs in shorter-statured grasslands that are largely absent from the impact area; therefore, it is unlikely to be present in a below-ground seed bank in the impact area.	Same as for coast yellow leptosiphon	• Permanently protecting the 0.92-acre conservation area, which includes a 78-sf occurrence of Blasdale's bent grass featuring 65 plants in 2018, will expand the 374-sf area of protected, occupied habitat supporting 156 plants in 2018 in the FMR. • Restoring 0.71 acres of coastal terrace prairie and managing the entire 0.92-acre conservation area, to address factors that degrade habitat for Blasdale's bent grass, including incompatible recreation and dense exotic plants, will enhance habitat for the rare plant and expand the population, provided the coastal terrace prairie habitat within the site is suitable.	The project will benefit Blasdale's bent grass, by completing avoiding impacts to the species during development, protecting and managing 78 sf of occupied habitat and an additional 0.92 acres of potentially suitable habitat. Restoration of the 0.71 acres of coastal terrace prairie in the conservation area may provide additional opportunities for species expansion, though some of the habitat in the conservation area may have unsuitable soils or otherwise prove unsuitable for this taxon.

Table 10: Summary of the Effects of the Proposed Conservation and Development Project				
Special-Status Resource	**Direct Negative Effects of Project**	**Indirect Negative Effects of Project**	**Benefits of Conservation and Mitigation**	**Net Effects of the Project with Mitigation**
Harlequin Lotus (CRPR 4.2)	• Permanent loss of 284 sf of occupied habitat supporting ~15 individuals on the western edge of the limits of grading. • Temporary loss of 55 sf of supporting ~5 individuals within the areas where infiltration spreaders will be installed.	Same as for coast yellow leptosiphon (and Blasdale's bent grass), though the potential for indirect impacts is arguably higher for this taxon owing to its closer proximity to the proposed development. Nonetheless, implementation of the mitigation measures recommended here, including development and implementation of management and restoration plans prepared for the site, is anticipated to limit the potential for indirect, negative effects of the development to impact this species of limited distribution.	• Permanently protecting the 0.92-acre conservation area, which includes a 1,711 sf of occupied harlequin lotus habitat supporting 113 plants in 2018. • Restoring 0.71 acres of coastal terrace prairie and managing the entire 0.92-acre conservation area to address factors that degrade habitat for this species, including incompatible recreation and dense exotic plants, may enhance habitat for the rare plant and expand the population, provided the coastal terrace prairie habitat within the site is suitable.	The project will have a net benefit for harlequin lotus. • The conservation area will protect harlequin lotus habitat at a ratio of 5:1; for every one of the 339 square feet impacted by development, 5 sf (1,711 sf total) will be protected. • The ratio for individuals is nearly 6:1 (113 individuals will be protected for the 20 in the development area); this could be increased through the salvage of seed, sod, and/or topsoil prior to development for use in onsite restoration. Management and restoration of 0.92 acres and 0.71 acres within the site, respectively, will create opportunities for population expansion including by reducing competition with dense exotic plants that may outcompete the native plant.
Johnny Nip (CRPR 4.2)	Likely None. This species was not observed in the	Same as for coast yellow leptosiphon (and Blasdale's bent grass), though the potential for indirect impacts is	• Permanently protecting the 0.92-acre conservation area, which features 0.105	The project will benefit Johnny nip by completing avoiding impacts to the species during

Table 10: Summary of the Effects of the Proposed Conservation and Development Project				
Special-Status Resource	**Direct Negative Effects of Project**	**Indirect Negative Effects of Project**	**Benefits of Conservation and Mitigation**	**Net Effects of the Project with Mitigation**
	development area during the 2018 survey; the only occurrences are all within the 0.92-acre conservation area. The species generally occurs in shorter-statured grasslands that are largely absent from the impact area; therefore, it is unlikely to be present in a below-ground seed bank in the impact area.	arguably somewhat higher for this taxon owing to its closer proximity to the proposed development. Nonetheless, implementation of the mitigation measures recommended here, including development and implementation of management and restoration plans prepared for the site, is anticipated to limit the potential for indirect, negative effects of the development to impact this species of limited distribution.	acres of habitat occupied by Johnny Nip and an estimated 931 plants in 2018. Will expand and buffer the 0.066 acres of occupied habitat supporting 772 acres in the FMR. • Restoring 0.71 acres of coastal terrace prairie and managing the entire 0.92-acre conservation area to address factors that degrade habitat for this species, including incompatible recreation and dense exotic plants, may enhance habitat for the rare plant and expand the population.	development, protecting, managing and in some places restoring 0.105 acres of occupied habitat; the project will also protect and manage an additional 0.815 acres of habitat potentially suitable for this species. Restoration of the 0.71 acres of coastal terrace prairie in the conservation area may provide additional opportunities for expansion of this species, which occurs in both short and medium-statured grasslands in the study area.

Figures

Figure 1: Study Area

Figure 2: Historical Aerial Imagery of the Study Area, showing**:** a) 1972 b) 1979, c) 2002, and d) 2005.

Figure 2 (cont.): Historical Aerial Imagery of the Study Area, showing: e) 2008, f) 2009, g) 2010, and h) 2013.

Figure 3: Plant Community (Vegetation) Structure

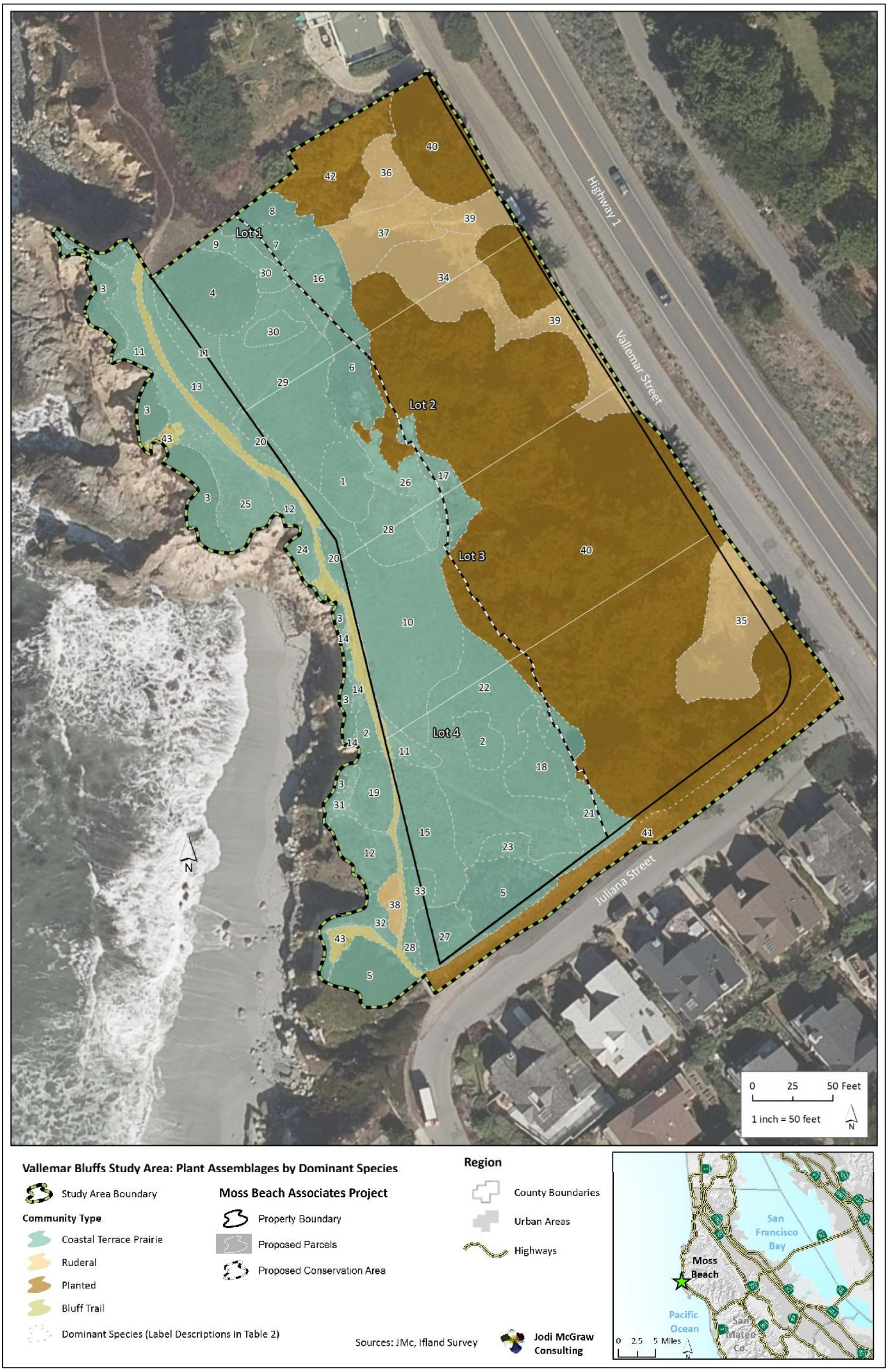

Figure 4: Plant Communities and Assemblages

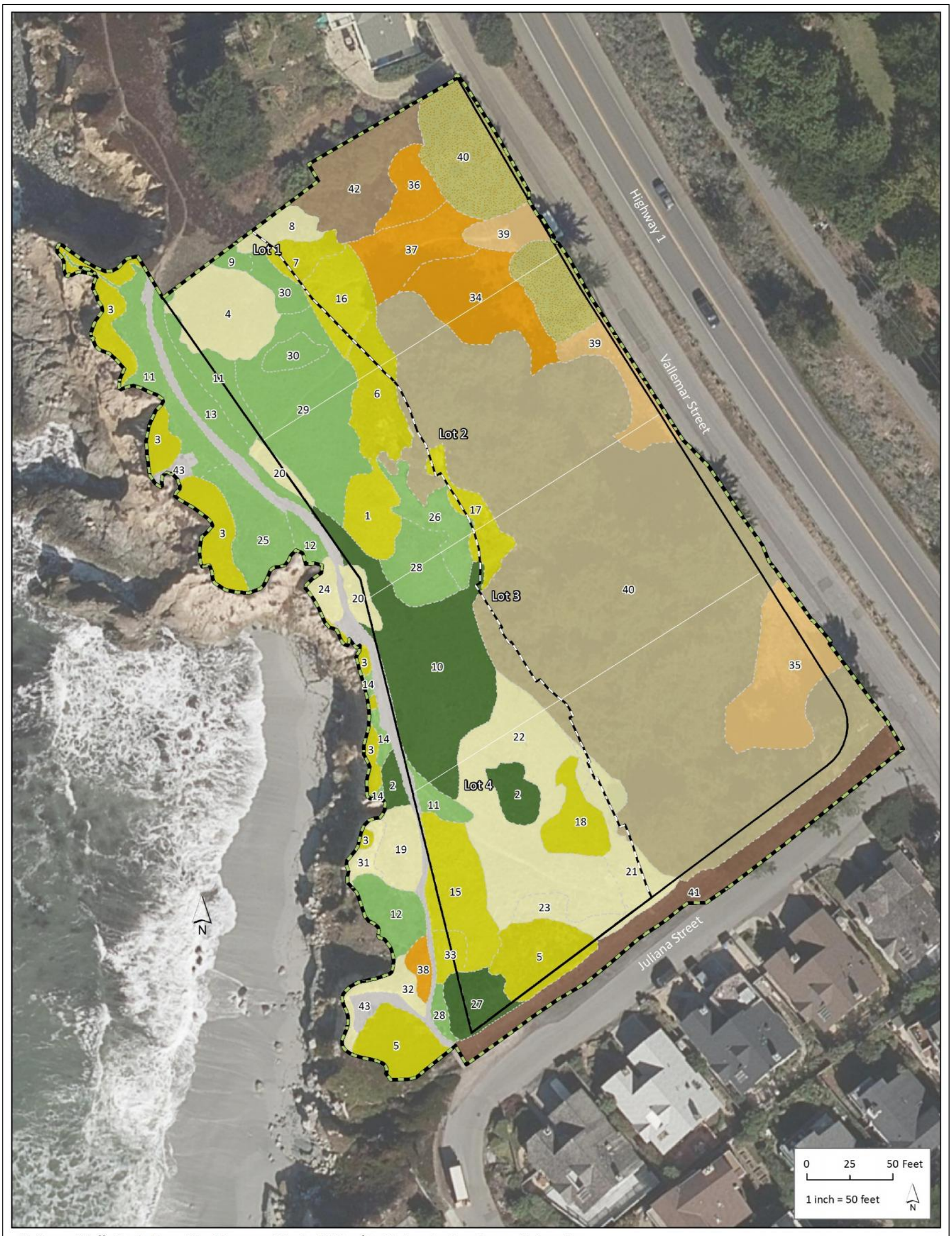

Figure 5: Plant Communities by Native/Exotic Dominance Categories

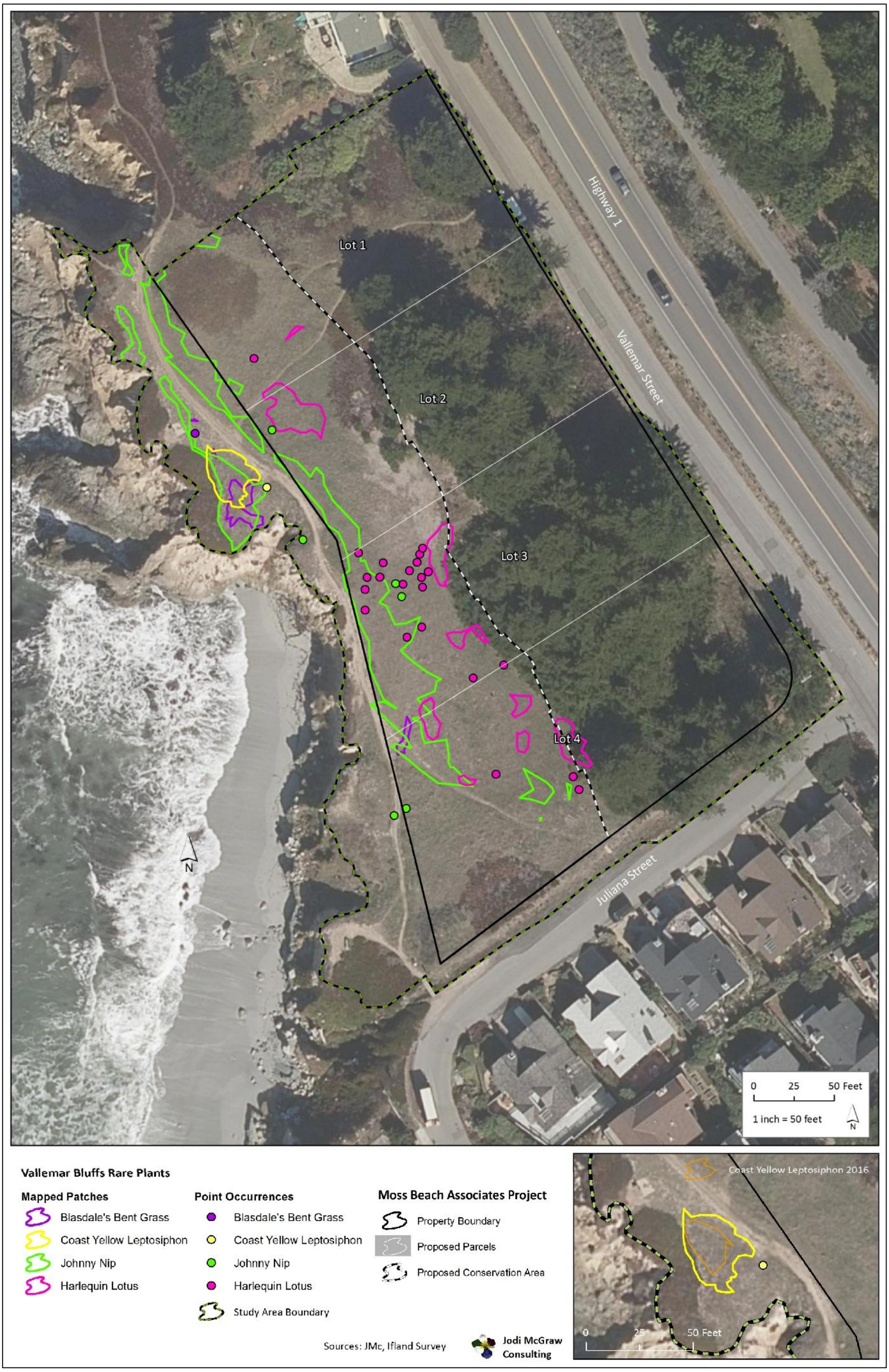

Figure 6: Rare Plants

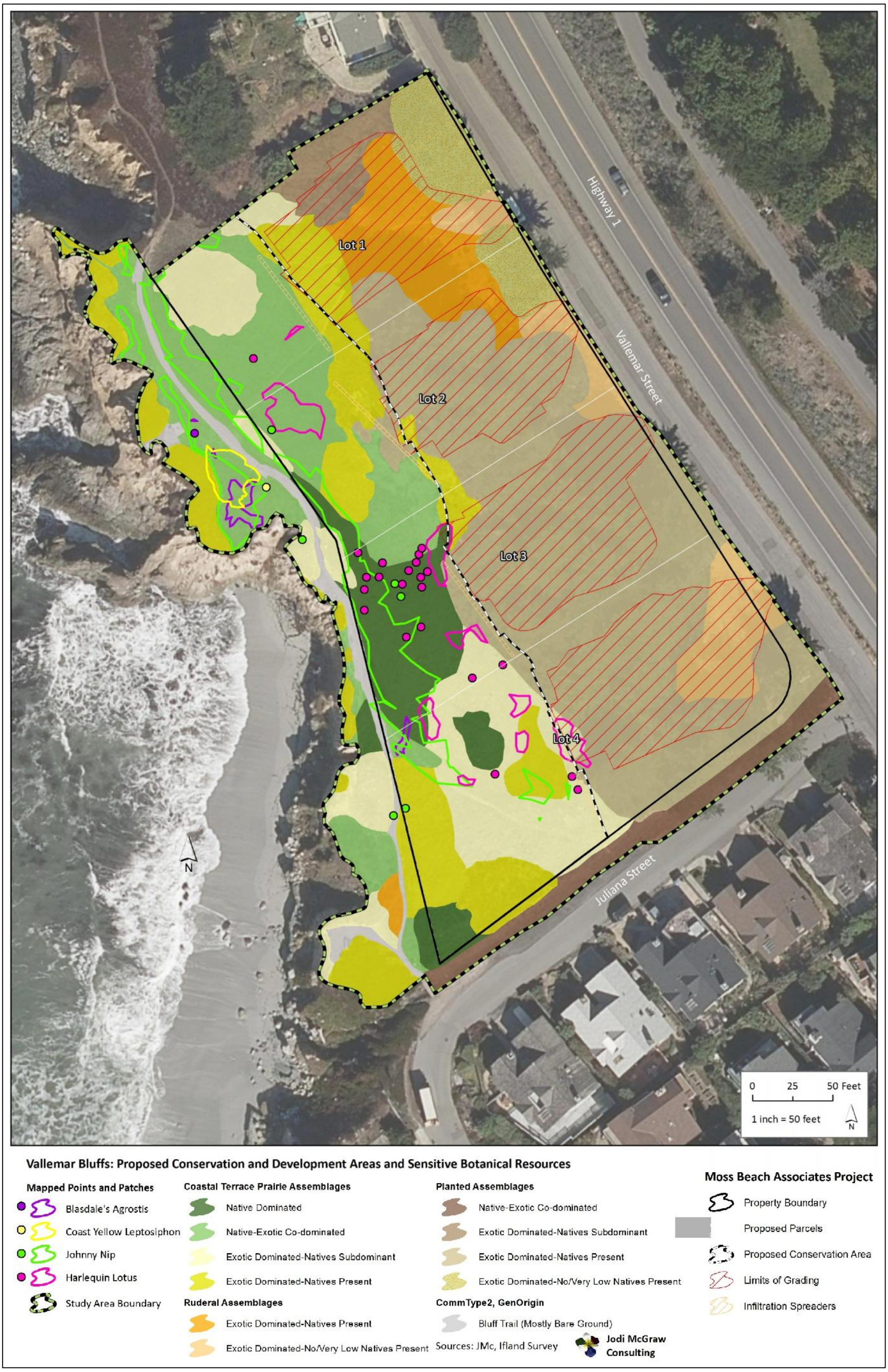

Figure 7: Impact Areas (showing communities and rare plants)

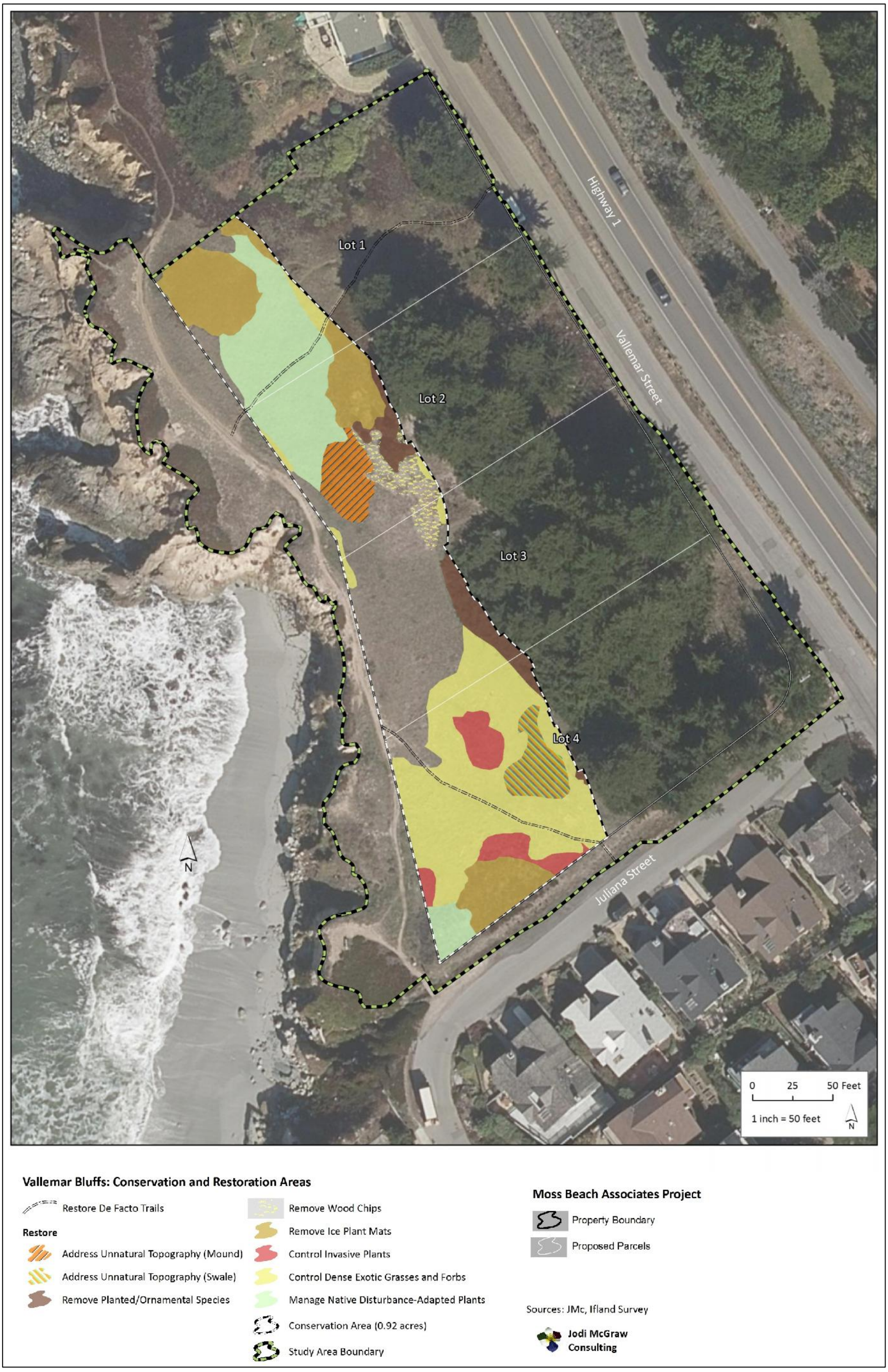

Figure 8: Conservation and Restoration Areas

Appendix A: Rare Plant List

Table A-1: Rare plant species targeted in the survey based upon database searches (CDFW 2018, Corelli 2018) and literature (Hayes 2003)

		Status[1]			Presence in Survey Properties[2]	
Scientific Name	**Common Name**	**State**	**Federal**	**CRPR**	**Moss Beach Assoc. Property**	**Fitzgerald Marine Reserve**
Acanthomintha duttonii	San Mateo thorn-mint	CE	FE	1B.1		
Agrostis blasdalei	Blasdell's bent grass			1B.2	Present	Present
Allium peninsulare var. franciscanum	Franciscan onion			1B.2		
Alopecurus aequalis var. sonomensis	Short-awn Foxtail		FE	1B.1		
Arabis blepharophylla	coast rock cress			4.3		
Amsinckia lunaris	bent-flowered fiddleneck			1B.2		
Arctostaphylos andersonii	Anderson's manzanita			1B.2		
Arctostaphylos franciscana	Franciscan manzanita		FE	1B.1		
Arctostaphylos imbricata	San Bruno Mountain manzanita	CE		1B.1		
Arctostaphylos montana ssp. ravenii	Presidio manzanita	CE	FE	1B.1		
Arctostaphylos montaraensis	Montara manzanita			1B.2		
Arctostaphylos pacifica	Pacific manzanita	CE		1B.1		
Arctostaphylos regismontana	Kings Mountain manzanita			1B.2		
Astragalus pycnostachyus var. pycnostachyus	coastal marsh milk-vetch			1B.2		
Blennosperma nanum var. robustum	Point Reyes Blennosperma	CR		1B.2		
Campanula californica	Swamp harebell			1B.2		
Castilleja ambigua var. ambigua	Johnny-nip			4.2	Present	Present
Centromadia parryi ssp. congdonii	Congdon's tarplant			1B.1		
Centromadia parryi ssp. parryi	pappose tarplant			1B.2		
Chloropyron maritimum ssp. palustre	Point Reyes salty bird's-beak			1B.2		
Chorizanthe cuspidata var. cuspidata	San Francisco Bay spineflower			1B.2		
Chorizanthe cuspidata var. villosa	woolly headed spineflower			1B.2		
Chorizanthe howellii	Howell's spineflower	CT	FE	1B.2		

Table A-1: Rare plant species targeted in the survey based upon database searches (CDFW 2018, Corelli 2018) and literature (Hayes 2003)

		Status[1]			Presence in Survey Properties[2]	
Scientific Name	Common Name	State	Federal	CRPR	Moss Beach Assoc. Property	Fitzgerald Marine Reserve
Chorizanthe robusta var. hartwegii	Scott's Valley spineflower		FE	1B.1		
Chorizanthe robusta var. robusta	robust spineflower		FE	1B.1		
Chorizanthe valida	Sonoma spineflower	CE	FE	1B.1		
Cirsium andrewsii	Franciscan thistle			1B.2		
Cirsium fontinale var. fontinale	Crystal Springs fountain thistle	CE	FE	1B.1		
Cirsium occidentale var. compactum	compact cobwebby thistle			1B.2		
Collinsia multicolor	San Francisco collinsia			1B.2		
Dirca occidentalis	western leatherwood			1B.2		
Eriogonum luteolum var. caninum	Tiburon buckwheat			1B.2		
Eriophyllum latilobum	San Mateo woolly sunflower	CE	FE	1B.1		
Erysimum franciscanum	San Francisco wallflower			4.2		
Fritillaria biflora var. ineziana	Hillsborough chocolate lily			1B.1		
Fritillaria liliacea	fragrant fritillary			1B.2		
Gilia capitata ssp. chamissonis	blue coast gilia			1B.1		
Grindelia hirsutula var. maritima	San Francisco gumplant			3.2		
Helianthella castanea	Diablo helianthella			1B.2		
Hemizonia congesta ssp. congesta	congested-headed hayfield tarplant			1B.2		
Hemizonia congesta ssp. tracyi	Tracy's tarplant			4.3		
Hesperevax sparsiflora var. brevifolia	short-leaved evax			1B.2		
Hesperocyparis macrocarpa	Monterey cypress			1B.2	Present*	
Hesperolinon congestum	Marin western flax	CT	FT	1B.1		
Holocarpha macradenia	Santa Cruz tarplant	CE	FT	1B.1		
Horkelia cuneata var. sericea	Kellogg's horkelia			1B.1		
Horkelia marinensis	Point Reyes horkelia			1B.2		
Hosackia gracilis	harlequin lotus			4.2	Present	

Table A-1: Rare plant species targeted in the survey based upon database searches (CDFW 2018, Corelli 2018) and literature (Hayes 2003)

		Status[1]			Presence in Survey Properties[2]	
Scientific Name	Common Name	State	Federal	CRPR	Moss Beach Assoc. Property	Fitzgerald Marine Reserve
Lasthenia californica ssp. macrantha	perennial goldfields			1B.2		
Leptosiphon acicularis	Linanthus acicularis			4.2		
Leptosiphon croceus	coast yellow leptosiphon	CC		1B.1		Present
Leptosiphon grandiflorus	large-flower linanthus			4.2		
Leptosiphon rosaceus	rose leptosiphon			1B.1		
Lessingia arachnoidea	Crystal Springs lessingia			1B.2		
Lessingia germanorum	San Francisco lessingia	CE	FE	1B.1		
Limnanthes douglasii ssp. ornduffii	Ornduff's meadowfoam			1B.1		
Limnanthes douglasii ssp. sulphurea	Point Reyes meadowfoam	CE		1B.2		
Limnanthes vinculans	Sebastopol meadowfoam	CE	FE	1B.1		
Lupinus arboreus var. eximius	San Mateo tree lupine			3.2		
Malacothamnus aboriginum	Indian Valley bush-mallow			1B.2		
Malacothamnus arcuatus	arcuate bush-mallow			1B.2		
Malacothamnus davidsonii	Davidson's bush-mallow			1B.2		
Malacothamnus hallii	Hall's bush-mallow			1B.2		
Micropus amphibolus	Mt. Diablo cottonweed			3.2		
Monardella sinuata ssp. nigrescens	northern curly-leaved monardella			1B.2		
Monolopia gracilens	woodland woollythreads			1B.2		
Pentachaeta bellidiflora	white-rayed pentachaeta	CE	FE	1B.1		
Perideridia gairdneri ssp. gairdneri	Garirdner's yampa			4.2		
Pinus radiata	Monterey pine			1B.1	Present*	
Piperia michaelii	Michael's rein orchid			4.2		
Plagiobothrys chorisianus var. chorisianus	Choris' popcornflower			1B.2		
Plagiobothrys diffusus	San Francisco popcornflower	CE		1B.1		
Polemonium carneum	Oregon polemonium			2B.2		

Table A-1: Rare plant species targeted in the survey based upon database searches (CDFW 2018, Corelli 2018) and literature (Hayes 2003)

		Status[1]			Presence in Survey Properties[2]	
Scientific Name	Common Name	State	Federal	CRPR	Moss Beach Assoc. Property	Fitzgerald Marine Reserve
Polygonum hickmanii	Scotts Valley Polygonum	CE	FE	1B.1		
Potentilla hickmanii	Hickman's cinquefoil	CE	FE	1B.1		
Psilocarphus tenellus var. globiferus	Round Woolly Marbles					
Sanicula maritima	adobe or maritime sanicle	CR		1B.1		
Sidalcea calycosa ssp. rhizomata	Pt. Reyes Checkerbloom			1B.2		
Silene verecunda ssp. verecunda	San Francisco campion			1B.2		
Stebbinsoseris decipiens	Santa Cruz microseris			1B.2		
Trifolium amoenum	showy rancheria clover		FE	1B.1		
Trifolium buckwestiorum	Santa Cruz clover			1B.1		
Trifolium hydrophilum	saline clover			1B.2		
Trifolium polyodon	Pacific Grove clover	CR		1B.1		
Triphysaria floribunda	San Francisco owl's-clover			1B.2		
Triquetrella californica	coastal triquetrella			1B.2		
Usnea longissima	Methuselah's beard lichen			4.2		

[1] Status Designations

State: Status under California Endangered Species Act (endangered and threatened) or California Native Plant Protection Act (rare)

CE: Endangered

CT: Threatened

CR: Rare

Federal: Status under Federal Endangered Species Act

FE: Endangered

FT: Threatened

California Rare Plant Rank (CRPR):

1B: Rare or endangered in California and elsewhere

2B: Plants rare, threatened, or endangered in California but more common elsewhere

3: Review List: Plants about which more information is needed

Table A-1: Rare plant species targeted in the survey based upon database searches (CDFW 2018, Corelli 2018) and literature (Hayes 2003)

		Status[1]			Presence in Survey Properties[2]	
Scientific Name	Common Name	State	Federal	CRPR	Moss Beach Assoc. Property	Fitzgerald Marine Reserve

4 ="Watch List" plants with limited distributions or infrequent presence throughout California.

Decimals after the Status categories represent the Threat rank (e.g., "List 1B.1"):

X.1 = Seriously threatened populations

X.2 = Marginally threatened populations

X.3 = Populations with limited threats.

[2] Presence in Survey Properties

Present: Found on site as part of a naturally occurring population

Present*: Found on site but almost certainly planted or spread from prior planted area as individuals located outside of natural range

All blank cells represent species not observed on the property in question during the survey in 2018, or in the 2015 survey (Zander Assoc. 2015)

Appendix B: Results of Floristic Survey of Vallemar Bluffs

Table B-1: List of plant species observed in survey area

Name	Family	Origin, Life Form, and Special Status	Moss Beach Assoc. Property	Fitzgerald Marine Reserve
Achillea millefolium (Yarrow)	Asteraceae	Native Per. forb	L	N
Acmispon wrangelianus (Chilean trefoil)	Fabaceae	Native Ann. Forb	L	L
Aeonium sp. (tree houseleek)	Crassulaceae	Exotic succulent	L	N
*Agrostis blasdalei (*Blasdale's bent grass)	Poaceae	Native Per. Grass (rhizome) (CRPR 1B.1)	L	L
Allium triquetrum (White flowered onion)	Liliaceae	Exotic Per. bulb	N/R	N
Aptenia cordifolia (baby sun-rose)	Aizoaceae	Exotic Succulent	N/R	N
Armeria maritima ssp. *californica* (Sea thrift)	Plumbaginaceae	Native Per. Forb	M	M
Avena barbata (Slim oat)	Poaceae	Exotic Ann. Or per. Grass	L	L
Avena fatua (Wild oat)	Poaceae	Exotic Ann. grass	L	L
Baccharis pilularis (Coyote brush)	Asteraceae	Native Shrub	L	N
Brachypodium distachyon (False brome)	Poaceae	Exotic Ann./per. Grass	L	L
Briza maxima (Rattlesnake grass)	Poaceae	Exotic Ann. grass	M	N
Briza minor (Annual quaking grass, small quaking grass)	Poaceae	Exotic Ann. grass	L	N
Bromus carinatus var. *carinatus* (California brome)	Poaceae	Native Per. Grass	N/R	N
Bromus diandrus (Rip gut brome)	Poaceae	Exotic Ann. Grass	M	L
Bromus hordeaceus (Soft chess)	Poaceae	Exotic Ann. grass	L	L
Bromus maritimus (maritime brome) [formerly B. carinatus var. maritimus]	Poaceae	Native per. Grass	M	M
Calandrinia ciliata (red maids)	Montiaceae	Native Ann. forb	L	L
Carduus pycnocephalus (Italian thistle)	Asteraceae	Exotic Ann. Herb	L	N
Carex sp.	Cyperaceae	(likely) native per. herb	L	N
Carpobrotus chilensis (Sea fig)	Aizoaceae	Exotic Per. Forb (succulent)	M	M
Carpobrotus edulis (Hottentot-fig)	Aizoaceae	Exotic Per. Forb (succulent)	H	H
Castilleja ambigua ssp. *ambigua* (Johnny nip)	Orobranchaceae	Native Ann. Forb (CRPR 4.2)	M	M
*Cerastium glomeratum (*Sticky mouse-ear chickweed)	Caryophyllaceae	Exotic Ann. Forb	L	N
Chasmanthe floribunda (chasmanthe)	Iridaceae	Exotic Per. Herb	N/R	N
Clarkia amoena	Onagraceae	Native	N	L

Table B-1: List of plant species observed in survey area

Name	Family	Origin, Life Form, and Special Status	Moss Beach Assoc. Property	Fitzgerald Marine Reserve
Conium maculatum (poison hemlock)	Apiaceae	Exotic Per. Herb	L	N
Cortaderia jubata (Jubata grass)	Poaceae	Exotic Per. Grass	L	N
Crocosmia crocosmiiflora (Montbretia)	Iridaceae	Exotic Per. Herb	N/R	N
Danthonia californica (California oatgrass)	Poaceae	Native Per. Grass	L	N
Daucus pusillus (wild carrot)	Apiaceae	Native Ann. Herb	L	L
Delairea odorata (Cape Ivy)	Asteraceae	Exotic Per. Herb (vine)	L	N
Deschampsia caespitosa ssp. *holciformis* (Pacific hairgrass or coastal tufted hairgrass)	Poaceae	Native Per. Grass	H	H
Dudleya farinosa (bluff lettuce)	Crassulaceae	Native Per herb (succulent)	N	L
Echium candicans (pride of Madeira)	Boraginaceae	Exotic Shrub	L	N
Echium pininan) pine echium	Boraginaceae	Exotic Shrub	L	N
Ehrharta erecta (Panic veldt grass)	Poaceae	Exotic Per. Grass	M	N
Elymus triticoides (beardless wild rye)	Poaceae	Native Per. Grass	L*	N
Erigeron canadensis (Canada horseweed)	Asteraceae	Native Ann. Herb	N/R	N
Erigeron glaucus (seaside daisy)	Asteraceae	Native Per. Herb (subshrub)	N	L
Eriogonum latifolium (coast buckwheat)	Polygonaceae	Native per. Herb or subshrub	N	M
Eryngium armatum (coastal eryngo or coyote thistle or coastal button celery)	Apiaceae	Native per. Herb	M	M
Epilobium cf. brachycarpum (annual fireweed)	Onagraceae	Native Ann. Herb	L	N
Euphorbia peplus	Euphorbiaceae	Exotic Ann. Herb	L	N
Festuca myuros (rattail fescue)	Poaceae	Exotic Ann. grass	L	L
Festuca perennis (Italian rye grass)	Poaceae	Exotic Ann./per. grass	H	M
Fragaria chiloensis (Beach strawberry)	Rosaceae	Native Per. Forb	M	M
Fumaria parviflora (fine leaved fumitory)	Papaveraceae	Exotic Ann. forb	L	N
Galium aparine	Rubiaceae	Native ann. Herb	L	N
Gamochaeta ustulata (purple cudweed, or featherweed)	Asteraceae	Native Ann. Biennial. Or short-lived per. forb	M	M
Geranium dissectum (cut leaf geranium*)*	Geraniaceae	Exotic Ann. herb	L	L
Grindelia stricta var. *platyphylla* (gumplant)	Asteraceae	Native Per. Forb	M	M
Helminthotheca echioides (Picris echioides; Bristly ox tongue)	Asteraceae	Exotic	M	L
Hesperocyparis macrocarpa	Cupressaceae	Native Tree (though not native to the site)	H	N
Holcus lanatus (velvet grass)	Poaceae	Exotic Per. Grass	L*	N

Table B-1: List of plant species observed in survey area

Name	Family	Origin, Life Form, and Special Status	Moss Beach Assoc. Property	Fitzgerald Marine Reserve
Hordeum brachyantherum (meadow barley)	Poaceae	Native Ann. Grass	L	L
Hordeum murinum ssp. *leporinum* (hare barley)	Poaceae	Exotic Ann. Grass	L	L
Hosackia gracilis (Harlequin lotus)	Fabaceae	Native Per. Forb CRPR 4.2)	L	N
Hypochaeris radicata (Hairy cat's ears)	Asteraceae	Exotic Per. Forb	H	H
Juncus bufonius (Common toad rush)	Juncaceae	Native Ann. Graminoid	L*	N
Juncus effusus (common bog rush)	Juncaceae	Native Per. Graminoid	L*	N
Juncus patens (spreading rush)	Juncaceae	Native Per. Graminoid	L*	N
Kickxia elatine (sharp point fluellin*)*	Plantaginaceae	Exotic per. Herb	N/R	N
Lepidium didymum (Lesser swine cress)	Brassicaceae	Exotic Ann. Herb	N/R	N
Leptosiphon croceus (Coast yellow leptosiphon)	Polemoniaceae	Native Ann. Herb (CPRP 1B.1), CE	N	M
Linum bienne (flax)	Linaceae	Exotic biennial Herb	L	N
Lotus corniculatus (Birds foot trefoil)	Fabaceae	Exotic Per. Herb	M	N
Lupinus versicolor	Fabaceae	Native per. Herb or low-growing subshrub	M	M
Lysimachia arvensis (*Anagallis arvensis;* Scarlet pimpernel)	Myrsinaceae	Exotic Ann. Forb	M	L
Madia gracilis (slender tarweed; gumweed)	Asteraceae	Native Ann. forb	N/R	N
Madia sativa (Coastal tarweed)	Asteraceae	Native Ann. forb	H	M
Malva arborea Tree mallow)	Malvaceae	Exotic biennial to subshrub	N	L
Malva pseudolavatera (Cretan mallow)	Malvaceae	Exotic ann, biennial, or subshrub	N	L
Medicago polymorpha (Ca. bur clover)	Fabaceae	Exotic Ann. Forb	M	M
Melilotus indicus (sour clover)	Fabaceae	Exotic Ann. herb	M	M
Myoporum laetum (Ngaio tree)	Myoporaceae	Exotic Shrub/Tree	M	N
Nasturtium officinale (Watercress)	Brassicaceae	Native per herb (aquatic)	L	N
Oenothera cf. *glazioviana*	Onagraceae	Exotic per. Herb	L	L
Pinus radiata (Monterey pine)	Pinaceae	Native Tree (though not native to the site)	L	N
Pittosporum tobira (Japanese pittosporum)	Pittosporaceae	Exotic Shrub/Tree	M	N
Plantago coronopus (Cut leaf plantain)	Plantaginaceae	Exotic Ann. Or biennial Forb	H	H
Plantago lanceolata (English plantain)	Plantaginaceae	Exotic Per. Forb	H	H
*Poa annua (*Annual blue grass*)*	Poaceae	Exotic ann. grass	L	L
Poa douglasii (sand dune blue grass)	Poaceae	Native per. Grass	N/R	L

Table B-1: List of plant species observed in survey area

Name	Family	Origin, Life Form, and Special Status	Moss Beach Assoc. Property	Fitzgerald Marine Reserve
Poa unilateralis ssp. *unilateralis* (San Francisco bluegrass)	Poaceae	Native per. Grass	N/R	L
Polygonum paronychia (dune knotweed)	Polygonaceae	Native per. Herb to subshrub	N/R	N
Polypogon monspeliensis (rabbitsfoot grass)	Poaceae	Exotic ann. Grass	L	N
Pseudognaphalium stramineum (Annual cudweed or Cottonballing plant)	Asteraceae	Native ann. or biennial Herb	Y	N
Ranunculus californicus (California buttercup)	Ranunculaceae	Native per. Herb	M	N
Raphanus sativus (wild radish)	Brassicaceae	Exotic ann. or biennial herb	M	M
Rubus ursinus (California blackberry)	Rosaceae	Native Vine, shrub	L	N
Rumex acetosella (common sheep sorrel)	Polygonaceae	Exotic per. Herb	L	N
Rumex crispus (curly doc)	Polygonaceae	Exotic per. Herb	L	L
Rumex salicifolius (willow leaved dock)	Polygonaceae	Native per. Herb	L	N
Sagina apetala (dwarf pearlwort)	Caryophyllaceae	Native ann. herb	N/R	L
Scabiosa atropurpurea (pincushion flower)	Dipsaceae	Exotic Ann. herb	M	N
Scandix pecten-veneris Venus' needle)	Apiaceae	Exotic ann. herb or vine	N/R	N
Senecio vulgaris (common groundsel)	Asteraceae	Exotic ann. herb	N/R	N
Sequoia sempervirens (coast redwood)	Cupressaceae	Native Tree (though unlikely native to the site)	L	
Sidalcea malviflora ssp. *malviflora* (dwarf checkerbloom)	Malvaceae	Native per. Herb	L	L
Silene gallica (windmill pink, common catchfly)	Caryophyllaceae	Exotic ann. herb	L	N
Silybum marianum (milk thistle)	Asteraceae	Exotic ann. or per. Herb	L	L
Sisyrinchium bellum (blue eyed grass)	Iridaceae	Native Per. Herb	L	N
Sonchus asper (spiny sowthistle)	Asteraceae	Exotic ann. forb	L	N
Sonchus oleraceus (Common sowthistle)	Asteraceae	Exotic Ann. forb	L	N
Spergularia macrotheca var. *macrotheca (sticky sand spurrey*)	Caryophyllaceae	Native per. Herb	L	L
Stebbinsoseris decipiens (Stebbins microseris)	Asteraceae	Native Ann. herb CRPR 1B.2	L	N
Stellaria media (chickweed)	Caryophyllaceae	Exotic ann. forb	L	N
Stipa pulchra (purple needle grass)	Poaceae	Native per. Grass	L*	N
Symphyotrichum chilense (California aster) [formerly Aster chilensis]	Asteraceae	Native per. Herb	L	N
Taraxacum officinale (dandelion)	Asteraceae	Exotic per. Herb	L	N

Table B-1: List of plant species observed in survey area

Name	Family	Origin, Life Form, and Special Status	Moss Beach Assoc. Property	Fitzgerald Marine Reserve
Taraxia ovata (sun cups) [formerly Oenothera ovata]	Onagraceae	Native per. Herb	L	L
Trifolium dubium (little hop clover)	Fabaceae	Exotic ann. herb	L	N
Vicia sativa ssp. *sativa* (common vetch)	Fabaceae	Exotic ann. herb/vine	L	N
Zeltnera davyi (Davy's centaury)	Gentianaceae	Native ann. herb	L	L

Presence Indications

High (H): Present at relatively high abundance
Moderate (M): Present at moderate abundance
Low (L): Present at relatively low abundance
Not Present (N): Species not present or not observed during survey
Not Present but Previously Recorded (N/R): Species not observed in 2018 survey by recorded by Zander Associates (2015)

* Observed only in County Right-of-Way adjacent to MBA property; separate column for the ROW was not included to simplify the table