

**Marin Manzanita
Restoration and Monitoring Plan**

Drakes View Drive, Inverness, Marin County, CA
AP #114-120-90
Planning ID P2706



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1.0 INTRODUCTION

The owner of the 2.14-acre project site on Drakes View Drive in unincorporated Marin County, near Inverness, California is proposing to construct a single-family home of approximately 1,975 square feet. The 2.14-acre project site is the southernmost portion of a larger 6.07-acre parcel (APN 114-120-90). The remaining 3.93 acres of the parcel are permanently protected from further development by deed restriction. (See Figure 1: Project Location)

A Biological Resources Assessment was completed on June 17, 2020 and found the presence of Marin manzanita (*Arctostaphylos virgata*) on the project site. As part of the project, the property owner is proposing on-site transplanting and planting of Marin manzanitas to offset the required thinning and removal of approximately 40 plants in the County-designated Firesafe Defensible Space Zone, and the removal of 10 small seedlings (*i.e.*, 1-2 years old) within and immediately adjacent to the building footprint. The thinning and removal of these plants is the subject of this Restoration and Monitoring Plan¹. Implementation of this Restoration and Monitoring Plan fulfills the requirements for buffer areas and habitat mitigation as described in the LCP Amendment (Marin County Board of Supervisors, 2018).

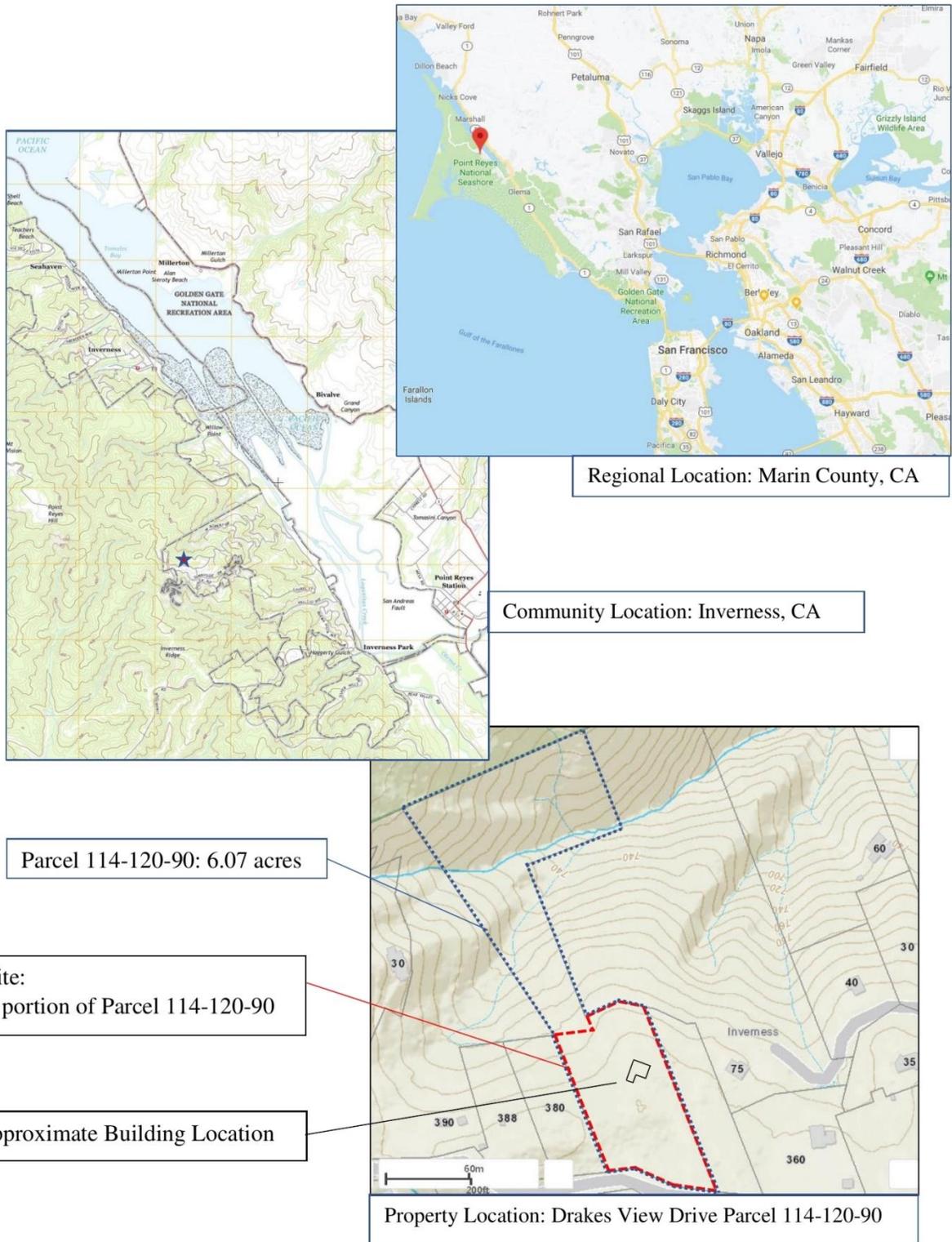
1.1 PROJECT HISTORY

In early 2020, the property owner contracted with Wood Biological Consulting (WBC) to conduct reconnaissance surveys for special status plant and wildlife species within an approximately 2.14-acre residential project site on Drakes View Drive in unincorporated Marin County, near Inverness, California. The biological resources assessment is included in Appendix RMP1 and provides detail on the methodology of the assessment and background on the ecology, distribution and sensitivity of the species surveyed.

One special-status plant species was found onsite – Marin manzanita. Marin manzanita is not listed as rare, threatened or endangered under either the federal or state endangered species acts; however, it has a California Rare Plant Rank (CRPR) of 1B.2 (plants rare or endangered in California and elsewhere), and is moderately threatened in California. An estimated 116 Marin manzanitas were observed on the 2.14-acre project site.

¹ Use of the term “restoration” in this document is meant to conform to the County LCP Amendment requirements. The actions and objectives described herein are more accurately considered “revegetation” to replace removed manzanitas, as opposed to restoring ones that previously occupied the planting site.

Figure 1. Project Site Location



1.2 SETTING

The project site includes the relatively flat ridgetop where the approximately 1,975-square foot single family home is proposed to be sited (building site), with slopes to the north and west approaching 30%, with elevation between 940-980 feet². The soil on site is mapped as Inverness loam, which consists of deep, well drained soils that formed in material weathered from granite (USDA, 2020). In general, soils in the shrub-dominated ridgetop and north-facing upper slopes are coarse and shallow decomposed granite and support the majority of Marin manzanita on the site. The soils in the forested areas are more friable and loamy, but also support scattered Marin manzanitas.

1.3 VEGETATION AND WILDLIFE HABITAT

The biological setting is described thoroughly in a prior biological site assessment (Stott and Estep, 2019), and is summarized below.

Existing herbaceous vegetation is sparse within the building site and along an unpaved roadway from Drakes View Drive into the southernmost portion of the project site. Shrub cover is sparse at the building site with a few Marin manzanita seedlings within the level footprint of the proposed building site. The building site is surrounded by scattered Bishop pines (*Pinus muricata*), coast live oak, wax myrtle, tanoak (*Notholithocarpus densiflorus*), and mature shrubs including large blueblossom (*Ceanothus thyrsiflorus* var. *thyrsiflorus*) and lower growing evergreen huckleberry (*Vaccinium ovatum*) and salal (*Gaultheria shallon*). The project site was within the burn zone of the 1995 Mount Vision wildfire and indicators of post-fire response are evident, including relatively even-aged stands of pine and manzanita.

Vegetation within the 100 foot surveyed buffer surrounding the project site also is a similar mix of forest canopy and shrub understory. On the residential parcel to the east, the trees have been thinned and the understory cleared, while the vacant parcel to the west has not been managed and supports moderately dense forest and understory vegetation.

Maritime chaparral dominated by Marin manzanita occupies the slope to the north of the building site, and continues below Pine Crest Road, an un-paved fire road that cuts along the contour approximately 125 feet north of and below the building site. The stand of manzanitas is mostly even-aged with plants averaging five to eight feet high and fairly densely spaced (*i.e.*, averaging about 8-12 feet between plants). Other co-dominant shrubs and trees include huckleberry, salal, and madrone (*Arbutus menziesii*), all of which are

² Based on Google Earth, 2020.

members of the Ericaceae (heath family), and which are indicative of relatively infertile soils. Some of the shrub canopy has been thinned for wildfire safety.

North of Pine Crest Road, the canyon slope is dominated by Bishop pine with heavy brush, downed trees and branches, and dead standing trees. An intermittent drainage at the bottom of the canyon is densely covered with pine, oak and bay.

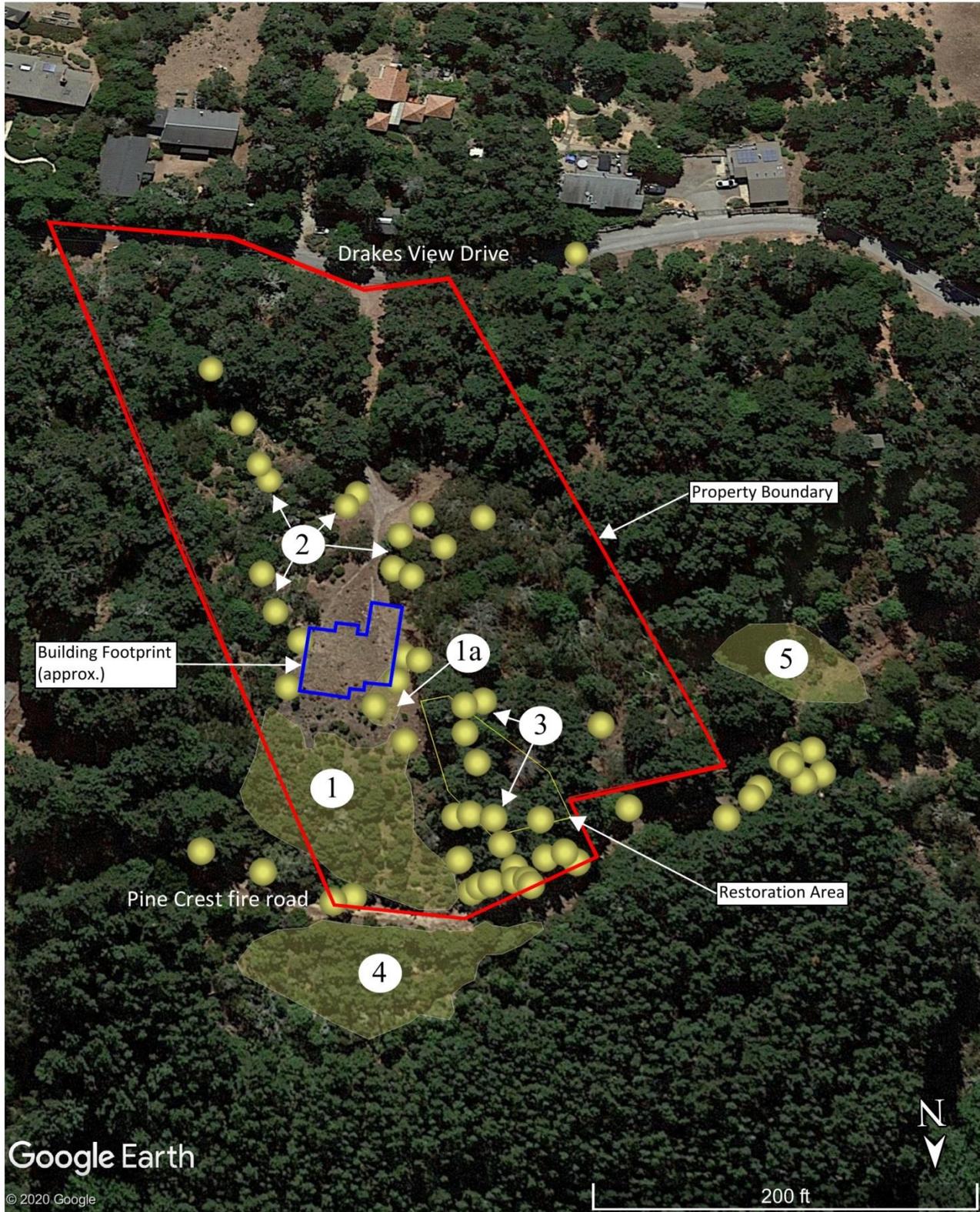
1.4 EXISTING CONDITIONS

Inverness Ridge supports the largest number of Marin manzanita plants compared with other places where it is locally abundant (i.e. Bolinas Ridge and Mt. Tamalpais). Estimates of the total Inverness Ridge population, where it was prolific in reestablishing following the Vision Fire, range from 11,000 to 15,000 plants (T. Gaman, pers. comm.; Parker 2005).

An estimated 116 Marin manzanitas are present on the 2.14-acre project site. The plants occupy six distinct clusters of varying size and density within the project site as described below (see Figure 2: Marin Manzanita Plants on or Adjacent to Project Site) and also in Appendix RMP1: Biological Resources Assessment.

1. The densest cluster of approximately 80 Marin manzanitas on the north slope occupies approximately 0.15 acre (7,200 sf), extending from the ridgetop down to Pine Crest Road (see Figure 2, Cluster ①).
- 1a. This area includes a small number (*i.e.*, about 10) of seedlings of Marin manzanita within 10 ft. of the proposed building footprint, an indication that the species can germinate in disturbed soils without fire. Bishop pines have been systematically removed from this area to reduce fuel and hazard (see Figure 2, Cluster ①a)
2. Approximately 15 Marin manzanitas are scattered among the dense trees south of the proposed residence and near the entrance road (see Figure 2, Cluster ②).
3. Approximately 21 Marin manzanitas are located on the slope that falls off to the northwest from the building site (see Figure 2, Cluster ③). In the absence of dense tree canopies nearby, these plants have grown quite large and exhibit excellent health and vigor. Manzanitas growing under forest trees tend to be “leggy”, with long stems and branches supporting relatively fewer crowns of leaves, and more likely to show signs of stress or disease.
4. An additional 35 Marin manzanitas were observed within the 100’ surveyed buffer outside the project site north of Pine Crest Road in an area that was part of a tree thinning effort (see Figure 2, Cluster ④).

Figure 2: Marin Manzanita Plants On and Adjacent to Project Site
(oblique view, looking south). See text for explanation of numbered clusters.



A semicircular swath extends north from the fire road to the edge of the Bishop pine forest, which consists of very dense even-aged trees extending down the slope. The cleared swath supports a dense and diverse mix of shrubs, including Marin manzanita, huckleberry, coffee berry, blueblossom, toyon, coast live oak, and a few small Bishop pines.

5. A fifth cluster of approximately 85 Marin manzanita are located in a gap in the tree canopy on the adjacent vacant property to the west (see Figure 2, Cluster ⑤) of the project site and north of Pine Crest Road. These plants are uniformly smaller (approximately 3-4 ft. tall) and appear to have established as a group following a disturbance, possibly the removal of pine trees. This site provides a possible model for establishing a new Marin manzanita cluster away from the building envelope to offset thinning for fuel management.

1.5 SUMMARY OF IMPACTS

The proposed project results in three distinct impacts to Marin manzanita which this Restoration and Monitoring plan will address:

1. The requirement to thin and remove approximately 50 dense and overgrown Marin manzanita plants within the Marin County designated Firesafe Defensible Space Zone;
2. The need to remove 10 plants within and adjacent to the building footprint; and
3. Potential damage to Marin manzanita from the proposed removal of 26 Bishop pine trees located north and south of the building site.

1.6 SUMMARY OF RESTORATION AND MONITORING ACTIVITIES

This Restoration and Monitoring Plan divides the project site into four Management and Restoration Areas, which are consistent with the project's landscape plan zones and with the Marin County designated Firesafe Defensible Space Zones (see Figure 3):

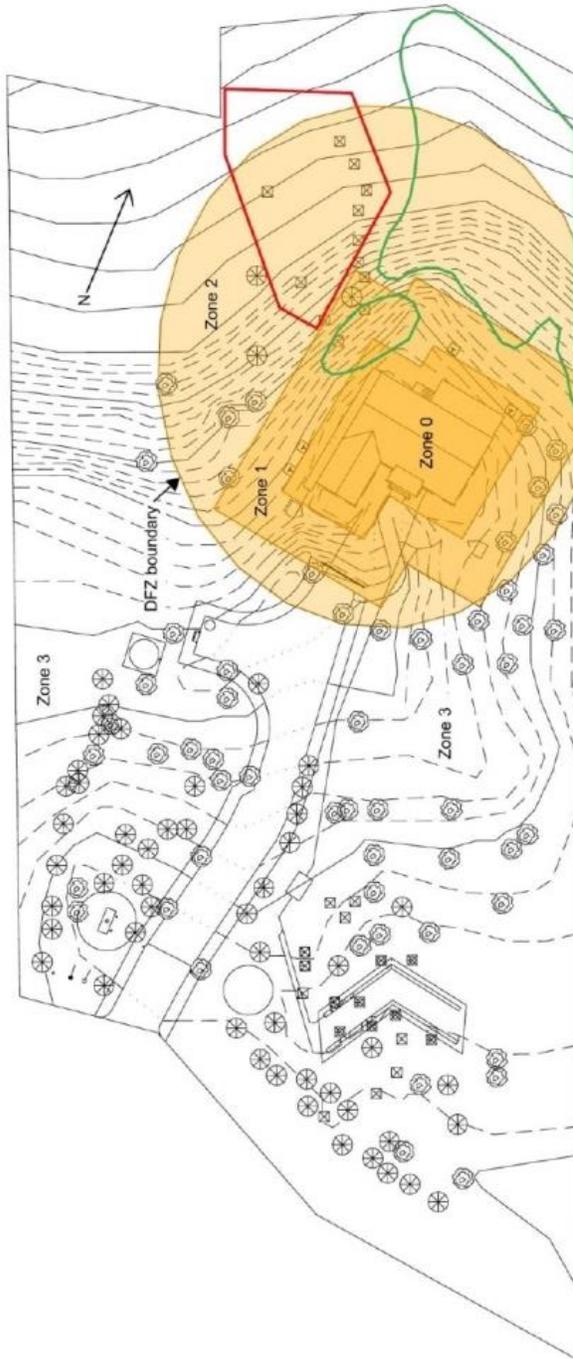
Zone 0: The area within five feet of the house, from which all plants will be removed for fire safety.

Zone 1: The area adjacent to the house (5' to 30') from which all dead wood will be removed.

Zone 2: The area within the Firesafe Defensible Space Zone (30' to 100'), as identified in the Vegetation Management Plan, but excluding Zones 0 and 1. Pruning and thinning of Marin manzanita will occur in this zone.

Zone 3: The area south of the house, adjacent to Drake's View Drive and the proposed residence driveway. This area also corresponds with the "Driveway Side Fuel Management Zone" described in the Vegetation Management Plan.

Figure 3 - Marin Manzanita Restoration and Treatment Areas



Treatment Area	Action
Zone 1	P-3 Flag and protect all Marin manzanita within and adjacent to the building footprint to protect from disturbance.
Zone 1	R-1 Salvage small Marin manzanita plants from Zone 1 and relocate to the Restoration Area.
Zone 2	P-2 Flag and protect all Marin manzanita to avoid damage during tree removal.
Zone 2	F-1 Flag and protect all Marin manzanita from construction damage.
Zone 2	VM-3 Following tree removal prune or thin shrubs to separate shrub crowns by two times their height, or create shrub clusters of not more than 18 feet in diameter, with shrub clusters separated by no less than two times the canopy height.
Zone 3	P-2, F-1 Flag and protect all Marin manzanita to avoid damage during tree removal and construction.
Restoration Area	R-1, R-2 Transplant the small Marin manzanita from Zone 1 and the seedlings and propagated plants to the Restoration Area.

See Table 1 for full text of each action and all required related actions.

Restoration Area: This area is north and west of the building site and lies partly within and partly to the north and west of Zone 2.

This Restoration and Monitoring Plan describes how the property owner will complete the following:

- Protect Marin manzanita prior to the removal of 26 Bishop pine trees identified in the Vegetation Management Plan;
- Prune and thin the dense stand of Marin manzanita within Zone 2, the Marin County designated Firesafe Defensible Space Zone;
- Propagate Marin manzanita from onsite sources to use in the restoration;
- Relocate plants from within and adjacent to the building footprint (Zone 1) to the 0.09-acre Restoration Area;
- Plant the Marin manzanita seedlings at the Restoration Area; and
- Monitor the plantings to ensure successful revegetation of Marin manzanita on the project site.

This plan addresses site preparation, plant germination, planting methods, and temporary irrigation as well as monitoring and maintenance requirements. Restoration and monitoring activities to be completed by the qualified Restoration Biologist are detailed in Section 4.0: Restoration Actions and Section 5.0: Restoration Design.

2.0 RESTORATION GOALS

The goals of the Restoration and Monitoring Plan are to:

- Thin and prune Marin manzanita within the Firesafe Defensible Space Zone (Zone 2) in accordance with Marin County Firesafe Regulations and Marin manzanita management guidelines established by the National Park Service (Appendix RMP2);
- Revegetate an approximately 3,900 sf (0.09 ac) area on the northwest portion of the project site with Marin manzanita, representing a 2:1 impact-to-replacement ratio. Restoration will relocate 10 Marin manzanita plants located within the building footprint and Zones 0 and 1 and plant approximately 90 Marin manzanita seedlings propagated from seeds or cuttings harvested on-site;
- Contribute to an un-even aged stand of Marin manzanita;
- Establish a self-sustaining stand of Marin manzanita that will not require long-term irrigation or maintenance;
- Construct the project in an environmentally sensitive manner, minimizing adverse effects to native plant and wildlife species; and
- Perform survivorship and growth monitoring for three years following planting.
- Submit annual monitoring reports to Marin County.

3.0 RESTORATION APPROACH

This Restoration and Monitoring Plan provides measures to ensure the long-term protection of Marin manzanita on the project site and management of vegetation for fire safety. These measures are consistent with Marin County Standard 220, the Marin County Local Coastal Program and Implementation Plan, and the recommendations of the Vegetation Management Plan (VMP) for the property (Urban Forestry, 2019). The VMP prescribes fuel modifications to reduce the risk of ignition of the proposed house, including removal and/or trimming of fire-prone shrubs within the Defensible Space Zone of 100 feet to the north and west of the building, and 50 feet to the south and east. Additionally, the VMP recommends removal of 26 trees, removal of dead wood, removal of shrubs from under trees, and separation of tree and shrub canopies, among several other fire risk reduction strategies.

The measures included in this Plan are similar to those that have been proposed in other nearby locations, specifically for reconciling Marin manzanita conservation and fuel management objectives within the County's watershed and the Golden Gate National Recreation Area (MMWD, 2019; Parker, 2005). The Seahaven Firesafe Interface and Paradise Ranch Estates Firesafe Interface projects both included pruning of up to 1,000 Marin manzanitas within fuel breaks (T. Gaman, pers. comm.), using pruning methods developed by the National Park Service (Parker, 2007; Poinot, 2003). Positive response to the reduction of competition from neighboring manzanitas and other species has been observed. Similar efforts have been implemented on a smaller scale by private landowners throughout the Inverness Ridge area.

This Plan is intended to accommodate fuel reduction and wildfire safety objectives as well as conservation objectives for Marin manzanita, a special-status species. The approach will result in removal and thinning of not more than 50 plants, which is a small percentage of the estimated 5,000 Marin manzanita on private lands on Inverness Ridge and over 6,000 on federal lands within Point Reyes National Seashore according to surveys conducted by Phytosphere Research for the NPS (T. Gaman, pers. comm.).

This applicant-proposed Plan includes a commitment to transplant small Marin manzanitas and additional Marin manzanitas established from seed or cuttings at a ratio of 2:1 on the project site. The benefit of this approach would be to contribute to an uneven aged stand. This increases the resilience of this species in an area where the plants are relatively uniform in age, with many individuals nearing senescence, with greater susceptibility to disease, leading to attrition of the larger population.

Planting would occur primarily within an area where Bishop pines and other shrub cover will be removed, since canopy removal is a prerequisite for establishment of young

manzanitas. The planting area would be within and outside of the Firesafe Defensible Space Zone. All plantings within the Firesafe Defensible Space Zone would be in clusters, to facilitate future maintenance of the stand in a manner consistent with the County standards.

This plan is consistent with LCP Amendment (Marin County Board of Supervisors, 2018), which requires that Restoration and Monitoring Plans include:

- a. a statement of the restoration goals
- b. sampling of reference habitat (*i.e.*, the retained manzanita stand) for comparison with the restored area
- c. a description of the restoration area
- d. a weed management plan
- e. a planting plan that describes the methods for cultivating and planting of manzanita seedlings, and for salvaging and transplanting of small manzanitas
- f. performance criteria and procedures for judging success, and reporting procedures
- g. remedial actions to be undertaken if the initial restoration effort is unsuccessful

4.0 RESTORATION ACTIONS

4.1 MARIN MANZANITA MANAGEMENT AND RESTORATION AREAS

This Restoration and Monitoring Plan divides the project site into four Management and Restoration Areas, which are consistent with the project's landscape plan zones (see Figure 3) and with the Marin County designated Firesafe Defensible Space Zones:

Zone 0: The area within five feet of the house, from which all plants will be removed for fire safety.

Zone 1: The area adjacent to the house (5' to 30') from which all dead wood will be removed.

Zone 2: The area within the Firesafe Defensible Space Zone (30' to 100'), as identified in the Vegetation Management Plan, but excluding Zones 0 and 1. Pruning and thinning of Marin manzanita will occur in this zone.

Zone 3: The area south of the house, adjacent to Drake's View Drive and the proposed residence driveway. This area also corresponds with the "Driveway Side Fuel Management Zone" described in the Vegetation Management Plan.

Restoration Area: This area is north and west of the building site and lies partly within and partly to the north and west of Zone 2.

4.2 RESTORATION AND VEGETATION MANAGEMENT ACTIONS

Restoration and vegetation management actions are summarized in Table 1.

4.3 RESTORATION REQUIREMENTS

Requirement 1: Provide Worker Environmental Awareness Program (WEAP) to all workers and their supervisors engaged in manzanita salvage, transplantation, preparation of transplantation sites, and fuel reduction (thinning and pruning). The training will include, at a minimum, a presentation on the objectives of the proposed fuel reduction, the status and conservation goals for Marin manzanita on the project site, and the environmental commitments made by the project proponent. The training will include explicit instructions about the flagging and demarcation of Marin manzanitas to be preserved, pruned or removed. The training also will address the vegetation management requirements for contractors to ensure and demonstrate use of clean vehicles and equipment to prevent the spread of invasive weeds and forest pathogens (*e.g.*, Sudden Oak Death (SOD)).

Requirement 2: The qualified biologist will use three different colors of flagging to indicate plants to be preserved, those to be pruned, and those to be removed. The limit of the Restoration Area, also will be clearly demarcated.

Table 1. Restoration and Vegetation Management Actions

Action #	Timing	Action	Location	Completion
P-1	Prior to all site work and tree removal	Qualified biologist to provide Worker Environmental Awareness Program (see Section 4.3: Requirement 1)	Zones 0-3	
P-2	Prior to all site work and tree removal	Flag and protect all Marin manzanita to avoid damage during tree removal as described in Section 4.3: Requirement 2.	Zones 2-3	
P-3	Prior to all site work and tree removal	Flag and protect all Marin manzanita within and adjacent to the building footprint to protect from disturbance, as described in Section 4.3: Requirement 2. These young plants should not be disturbed until they are transplanted as part of the Restoration in late fall 2020.	Zone 1	
D-1	During tree removal	The qualified biologist will be on site during thinning and pruning of Marin manzanita. See also VM-3, VM-4 and VM-5	Zones 0-3	
D-2	During tree removal	Count all Marin manzanita individuals pruned and removed.	Zones 0-3	

Action #	Timing	Action	Location	Completion
D-3	During tree removal	The qualified biologist will be on site during tree removal to ensure protection of Marin manzanita.	Zones 0-3	
D-4	During tree removal	Use only non-powered or powered hand tools.	Zones 0-3	
D-5	During tree removal	Remove all cut vegetation from the site, and dispose in an appropriate location for green waste composting.	Zones 0-3	
D-6	During tree removal	Implement BMPs during work conducted within and adjacent Marin manzanita to minimize the spread of invasive species, including: retaining vehicles and equipment on site during the duration of fuel reduction work, washing of vehicles and equipment (including footwear) that leave the site for more than one night during the duration of fuel reduction work, avoiding unnecessary or excessive soil disturbance or establishment of trails, and vegetation disposal.	Zones 0-3	
F-1	Following tree removal and Marin manzanita removal/pruning	Qualified biologist to flag and protect all Marin manzanita from construction damage as described in Section 4.3: Requirement 2.	Zones 2, 3	
F-2	Following tree removal and Marin manzanita removal/pruning	The qualified biologist and applicant will demarcate the extent of the Restoration Area.	Zone 2	
S-1	Summer 2020	Harvest Marin manzanita seeds or cuttings	Zones 2, 3	
S-2	Summer 2020	Begin propagation according to the steps set forth in Section 5.4.4	Off site	
B-1	During building construction	Protect and preserve manzanitas to be retained to avoid accidental damage or removal. Mark the preserved plants and Restoration Area using visible colored flagging, or orange construction fencing secured with temporary t-stakes. No entry is permitted in these areas, including no construction, storage of vehicles, equipment or material, discharge of waste or water, breaks for workers, or other use.	Zones 2, 3 Restoration Area	
B-2	During building construction	The construction foreman shall be informed about the importance of maintaining these areas undisturbed, and shall be responsible for ensuring the visual and physical barriers are intact and adhered to.	Zones 2, 3 Restoration Area	

Action #	Timing	Action	Location	Completion
R-1	Restoration	Under the supervision of the qualified biologist, salvage small Marin manzanita plants from Zone 1 and relocate to the Restoration Area. Whole plants will be excavated by hand with intact root balls and soil. Planting sites will be prepared in advance, located in gaps in forest canopy and cleared of neighboring competing shrubs and herbaceous plants.	Zones 1 Restoration Area	
R-2	Restoration	Under the supervision of the qualified biologist, transplant the seedlings and propagated plants to the Restoration Area. Planting sites will be prepared in advance, located in gaps in forest canopy and cleared of neighboring competing shrubs and herbaceous plants.	Restoration Area	
R-3	Restoration	Implement the monitoring plan, including annual assessment of the transplant and seedling sites to assess survival, health and vigor, and size of the transplants, encroachment by other plants, and needs for maintenance thinning or weeding to ensure success.	Restoration Area	
R-4	Restoration	If the new population is not matching the pre-removal population data, more seeding or planting shall be conducted until pre-removal population is met. The relocation site will be re-evaluated, and the causes of failure documented, to the extent possible, and a plan for remedial action determined.	Restoration Area	
VM-1	Vegetation Management	Following relocation of the small Marin manzanita plants, remove all other vegetation within 30 ft. of the proposed building footprint according to the VMP.	Zone 1	
VM2	Vegetation Management	Flag all Marin manzanita using three flag colors indicating plants to be preserved, pruned or removed.	Zone 2	
VM-3	Vegetation Management	Prune and thin manzanita located within the Firesafe Defensible Space Zone based upon Marin County Firesafe guidelines and manzanita pruning protocols (see Appendix RMP2 page 73). Marin manzanita in the Firesafe Defensible	Zone 2	

Action #	Timing	Action	Location	Completion
		Space Zone identified in the VMP shall be treated according to Marin County Fire Protection Standard 220: prune or thin shrubs to separate shrub crowns by two times their height, or create shrub clusters of not more than 18 feet in diameter, with shrub clusters separated by no less than two times the canopy height. This will result in the removal of not more than half of the ~80 manzanitas on the north slope. As an alternative to the 18-ft diameter clusters, and depending on the distribution of the existing plants, thinning and removal may result in rows of shrubs oriented along the contour with gaps between the rows equal to two times the height of the shrub canopy.		

5.0 RESTORATION DESIGN

5.1 CONCEPTUAL DESIGN

This Restoration and Monitoring Plan describes revegetation of Marin manzanita within approximately 3,900 sf (0.9 ac) near the proposed residence on Drakes View Drive, to offset the required removal and pruning of manzanitas to comply with County fire safety guidelines. Site preparation, planting methods, and temporary irrigation also are addressed in this plan, as are the monitoring and maintenance requirements. All work is anticipated to be completed during fall of 2020, and is projected to take two weeks to complete.

5.2 RESTORATION BIOLOGIST

Monitoring of the implementation and establishment of all installed plantings shall be performed by a qualified Restoration Biologist. The Restoration Biologist shall also be responsible for the performance of site monitoring, habitat monitoring, and the preparation of annual monitoring reports, as outlined in Section 6.3, below. At a minimum, the Restoration Biologist shall have demonstrated expertise in restoration ecology and at least three years of experience in restoration design and implementation, and monitoring habitat restoration projects, performing habitat sampling and data collection. The Restoration Biologist shall have the authority to stop work or request change orders as necessary to comply with this plan.

5.3 SITE PREPARATION

The proposed work will occur following removal of twelve Bishop pines in Zone 2 on the Project Site. Removal of these trees, along with a portion of the understory shrub layer, will provide habitat suitable for the Marin manzanita by scarifying the soil, increasing light, and reducing competing understory shrubs.

Soil onsite is native to the site and suitable for Marin manzanita, which are already growing within the restoration area. No soil amendments (*i.e.*, topsoil or fertilizers) are necessary for planting.

5.4 PLANTING

This Restoration and Monitoring Plan calls for establishment of Marin manzanita in disturbed areas of the project site. It is intended to result in the establishment of a younger stand of Marin manzanita thus addressing potential senescence of the plant due to its location beneath the densely spaced Bishop pines elsewhere on the project site.

5.4.1 RESTORATION AREA

The Restoration Area is located northwest of the proposed residence, and west of the existing stand of Marin manzanita that requires thinning (see Figure 3). The Restoration Area is mostly located within Zone 2 of the landscape plan, and mostly within the Firesafe Defensible Space Zone identified in the Vegetation Management Plan, but a portion of it extends beyond the Firesafe buffer. The Restoration Area includes a stand of twelve Bishop pine trees that will be removed for fire safety as prescribed by the Vegetation Management Plan.

5.4.2 PLANT PALETTE

Marin manzanita will be the only plants planted in the Restoration Area. Plants in two different stages will be used:

1. Up to ten (10) existing seedling Marin manzanita plants located in Zone 1
2. Marin manzanita seedlings propagated from seeds or cuttings harvested on site.

The goal is to compensate for the removal or thinning of up to 50 Marin manzanita plants with establishment of 100 plants, but the plan will include propagation and planting of additional plants to account for attrition during the monitoring period. Any remaining harvested seeds may also be planted in the Restoration Area to assess on-site propagation from seed.

5.4.3 PLANT PROCUREMENT

All plants and seeds or cuttings will be procured from the project site.

5.4.4 STORAGE AND HANDLING OF PLANT MATERIALS

1. Existing Marin manzanita will be transplanted immediately from Zone 1 to the Restoration Area using the following techniques.
 - a. Planting holes within the Restoration Area will be excavated in advance. Holes should be approximately 18 inches in width and depth. Excavated soil shall be retained next to the hole.
 - b. Each seedling in Zone 1 will be individually excavated by hand. A root ball of not less than 12 inches diameter will be excavated, to include all roots of the seedling. If initial excavations indicate very deep tap roots are present, then the root ball depth will be increased.
 - c. Seedlings with intact root balls will be transplanted immediately to the pre-excavated planting sites using a tarp or bucket.
 - d. Native soil will be backfilled around the transplants and gently tamped.
 - e. The transplants will be lightly watered.
2. Seeds or cuttings of Marin manzanita will be harvested on site and propagated according to standard nursery practices.
 - a. Seeds will be sown in nursery soil in liners and watered with an extract of charred wood to stimulate germination (this technique is a standard procedure for chaparral fire-following shrubs).
 - b. Alternatively, cuttings will be treated with rooting hormone and rooted in rooting medium until ready to transplant to pots.
 - c. The seedlings will be cultivated until ready for out-planting, ideally during winter. Propagation lead time will be determined by the successful establishment of seedlings of suitable size and vigor for out-planting.

At the time of delivery for installation, the Restoration Biologist shall inspect plants for quantities, health, vigor, root growth, growth and form; all plant materials shall be visibly free from pests and diseases.

5.4.5 CONTAINER PLANTING TECHNIQUES

Container plants shall be installed in clusters of up to 10 plants with each plant spaced 3 to 4 ft. apart. Clusters shall be distributed evenly throughout the Restoration Area to leave unplanted areas between the clusters. Each plant will be removed from its container and placed in prepared planting holes, lightly tamped into place and a watering basin formed. Each planting well shall be then filled with a layer of clean mulch to inhibit weed growth and conserve soil moisture. On the day of planting, all plants shall be thoroughly watered, regardless of soil moisture conditions. All container plantings shall be inspected for signs of water stress no more than three days after installation.

Native plantings are most successful when installed in during winter, when temperatures are low, solar radiation is low, and the rainy season is underway. The physiological state

of the plants is optimal during the fall and winter; therefore overall success is enhanced by adhering to appropriate planting schedules.

5.4.6 PLANT PROTECTION

Although the project site may be subject to browsing by deer, the need for the installation of anti-browse cages is not expected to be needed given the local abundance of preferable browse. The need for plant protection will be determined during monitoring events, and may be specified as a remedial action to ensure survival of planted manzanitas.

5.4.7 IRRIGATION

No irrigation system will be installed. Marin manzanita is particularly susceptible to pathogens that are promoted by application of summer irrigation.

5.5 AS-BUILT CONDITIONS

Upon completion of the planting, a post-construction “as-built” report shall be prepared and submitted to Marin County within 45 days of completion of work. The as-built report shall include before and after photographs; a final planting plan showing the as-built condition, number of transplants and seedlings planted; and shall provide verification by the Restoration Biologist that the plan was properly implemented.

5.6 ESTABLISHMENT MAINTENANCE

5.6.1 INSPECTION

Establishment maintenance of installed plantings includes plant replacement, plant protection, pest management, and other remedial actions necessary to ensure survival and health of the plants. Establishment maintenance is the responsibility of the parcel owner during the duration of the monitoring period.

During the establishment period, the Restoration Biologist shall inspect site conditions affecting plant establishment and make periodic reports to the Owner. Inspections shall be performed at regular intervals during the first year after completion of installation of all plant materials.

5.6.2 WEED CONTROL

The restoration effort will be undertaken on a recently disturbed site (following tree and brush removal). Weed eradication prior to planting is not warranted. However, over the course of the monitoring period, the need for weed control may be recommended by the Restoration Biologist. Highly invasive non-native plant species can inhibit the successful establishment of slower-growing manzanitas and lower their survival rate. Weed control

will consist of manual thinning or removal of invasive plants around the planting clusters. No herbicides or mowing are allowed.

6.0 RESTORATION MONITORING

Monitoring of the restoration effort will be conducted for a total of three years. The restoration and monitoring effort includes the following elements:

- Establishment Monitoring
- Site Monitoring
- Annual Reporting

Monitoring of the restoration effort shall be conducted by the qualified Restoration Biologist. A monitoring schedule is provided in Table 2, below.

The Restoration Biologist will monitor the implementation and establishment maintenance of the restoration effort. The Restoration Biologist will conduct establishment and site monitoring tasks, as outlined below, and prepare annual reports documenting the restoration effort for submittal to Marin County (see Section 6.5, below).

Table 2. Monitoring Schedule

Task (Responsible Party)	Time Period
As-built drawing and report (Restoration Biologist)	To be submitted to Marin County 45 days after completion of planting
Establishment Monitoring (Restoration Biologist)	30, 60, 90, 180, 270, 360 days after construction
Site Monitoring (Restoration Biologist)	Spring and summer years 1 - 3
Annual Reporting (Restoration Biologist)	To be submitted to Marin County no later than Dec. 31, years 1-3

6.1 ESTABLISHMENT MONITORING

It will be the responsibility of the Owner, assisted by the Restoration Biologist, to ensure that this Restoration and Monitoring Plan is properly implemented, that the specified species, container sizes and quantities of plant materials have been properly installed, and that all reasonable measures have been taken to ensure the successful establishment of

plantings. The Owner shall be responsible for the maintenance of the Restoration Area for duration of the monitoring period. Maintenance includes but is not limited to the control of invasive non-native plant species, removal of debris, and replacement of dead plantings. The Restoration Biologist shall conduct site inspections during the first year to evaluate the need for any remedial measures prior to the end of the one-year maintenance-monitoring period.

6.2 SITE MONITORING

The objectives of site monitoring are to evaluate survival and growth of the plantings during the establishment period, identify conditions that threaten the success of the restoration effort, and identify the need for remedial measures. The Restoration Biologist will perform site monitoring twice annually. Annual site visits will be conducted during the spring and summer over the three-year monitoring period.

During site monitoring visits, the Restoration Biologist shall note plant mortality, vandalism, damage from wildlife and invasive species, and other issues potentially affecting the success of the restoration plan. Photographs shall be taken periodically from established points for annual comparison. The Restoration Biologist shall prepare a summary of observations and submit written recommendations to the Owner.

Observations and recommendations shall be included in the annual monitoring reports (see Section 6.3: Annual Reporting).

6.3 ANNUAL REPORTING

Site monitoring observations and the results of the monitoring effort will be presented in annual reports. Reports will be prepared annually and submitted to Marin County no later than December 31 of each year. The reports will describe conditions on site, present a summary of the monitoring data, identify problems, and outline any remedial measures implemented or needed. The reports will include photographs of the Restoration Area and representative plantings. The first annual monitoring report will include a copy of the as-built report, as well as verification that all plantings have been properly installed.

6.4 PERFORMANCE STANDARDS

The restoration effort shall be considered successful if, at the end of the three-year establishment period, the plantings are self-sustaining (*i.e.*, without human intervention), and plant survivorship and growth observations illustrate a positive trend. A summary of the performance standards is presented in Table 3, below.

If performance standards have been met by the end of the three-year monitoring period, the restoration effort shall be considered successful and no further monitoring shall be

required. If performance standards have not been met, remedial measures may be required. Marin County will make the final determination as to whether or not the Restoration plan has been successful or what type of remedial actions may be necessary.

Table 3. Performance Standards

Performance Standard	Performance Standard Assessment	Remedial Actions
Survivorship		
<u>Interim</u> Marin manzanita in the Restoration Area shall equal at least 50% of the shrubs specified in the plans (50 of 100 planted) at the end of year 3.	All trees and shrubs will be counted once annually. The location of each dead plant will be mapped and noted.	All plants that die during the one-year establishment period may be replaced to meet the final survival performance standard.
<u>Final</u> Marin manzanita in the Restoration Area shall equal at least 50% of the shrubs specified in the plans (50 of 100 planted) at the end of year 3.	Marin manzanita in the Restoration Area will be counted once annually. Volunteer shrubs that are native will be credited toward meeting the survival standard.	If, at the end of the three-year monitoring period, the performance standard is not met, sufficient Marin manzanita will be planted to bring the total to at least 50% of the Marin manzanita originally planted (50 of 100 planted).

7.0 RESPONSIBILITY AND FUNDING

The responsible party for implementation, maintenance and monitoring of this Restoration and Monitoring Plan is the property owner of Marin County APN 114-120-90. Should the property be sold, the monitoring requirements will transfer to the new owner upon sale of the property. The current owner is:

Mr. Stephen Ryan
 PO Box 520
 Point Reyes Station, CA 94956
 (707) 490-9591
stephenryan272@gmail.com

8.0 REFERENCES

- Parker, V.T. 2007. Status and Management Recommendations for *Arctostaphylos virgata* (Marin Manzanita) in Point Reyes National Seashore. In coop. with Nat. Park Service staff. August. 82 pp.
- Stott Planning Associates and Estep Environmental Consulting. 2018. *Final Biological Assessment, Drakes View Drive, Inverness, CA*. Prepared for Stephen Ryan, Point Reyes Station. January 8.
- Urban Forestry Associates. 2019. Vegetation Management Plan / Tree Removal Plan for Parcel 114-120-90, Drakes View Dr., Inverness. Prepared for Stephen Ryan. Dec, 26.
- Wood Biological Consulting. 2020. *Biological Resources Assessment, Drakes View Drive, Inverness, Marin County, CA, AP #114-120-90, Planning ID P2706*. Prepared for Stephen Ryan. June 17.

9.0 APPENDICES

Appendix RMP1: Biological Resources Assessment, June 2020

Appendix RMP2: Status and Management Recommendations for *Arctostaphylos virgate* (Marin Manzanita) in Point Reyes National Seashore.

APPENDIX RMP1

BIOLOGICAL RESOURCES ASSESSMENT

JUNE 17, 2020