4 Vegetation Management Plan

4.1 Introduction, Purpose and Need

4.1.1 Background

Vegetation management is the practice of removing or modifying live and dead vegetation to reduce the potential spread of wildland fire ignitions, overall rates of wildland fire spread, flame lengths, and catastrophic fire severity. Vegetation management can be used to reduce dead fuels in areas affected by diseases such as SOD, remove stands of invasive weeds, and remove overly dense vegetation to improve ecological health and reduce competition with native plants that suppresses healthy plant growth. Vegetation management may also aid in the following:

- Reduction of ecological resource impacts from forest disease, invasive species, and wildland fire;
- Maintenance of emergency response and evacuation access roads;
- Minimization of rehabilitation needs associated with fire suppression activities; and/or
- Suppression of fires.

For Midpen, vegetation management for fuels reduction is a complex process that helps further mission-driven ecological resource goals. The best approach for managing fire risk and reducing fuel loads using non-fire vegetation management methods (i.e., without using prescribed burning) on Midpen lands is to focus active management in areas that are affected by disease infestations and/or heavy, dense vegetation, as well as near potential ignition sources, including along roads and adjacent to critical infrastructure.

4.1.2 Purpose and Need

Wildland fire behavior is influenced by three main factors: weather, fuels, and topography. Wind, temperature, and humidity are important weather variables used to predict fire behavior. The arrangement and type of the vegetation, amount and distribution of smaller-diameter fuels, and the ratio of live-to-dead material factor into how fuels affect wildland fire behavior. Slope and angle of sun exposure affects how a fire will burn. A north-facing slope supports lower fire activity than a south-facing slope. However, under very dry and windy conditions north-facing slopes can burn with high intensities due to higher fuel loading found on these hillsides. Fires burn more rapidly uphill than downhill, if sufficient vegetation is available. The steeper the slope, the faster the fire travels in the uphill direction.

Changing climatic conditions, past land uses, and years of fire suppression have increased fuel loads and fire-prone conditions that could contribute to larger, more intense wildland fires. Midpen has the goal of protecting the natural resources on its land and facilitating improved fire suppression capabilities on Midpen land, which in turn supports local and state fire agency efforts to protect public safety.

The primary need for vegetation management is to reduce the presence of unnaturally high fuel loads and secondarily to manage vegetation near ignition sources (e.g., WUI, roads, structures), thus reducing the intensity and harmful impacts of fires.

Vegetation management may help to restore ecosystem fuel loads closer to pre-fire suppression conditions through the removal of dead and accumulated vegetation and treatment of forest disease and invasive species. Prior to the mid to late 20th century, landscapes in the San Francisco Bay Area were either naturally disturbed through lightning-ignited fires or managed through Native American tribal practices of burning that kept fuel loads down. Prior to European contact, the spread of invasive species that alter ecosystems and increases fire risks was also much less of a concern.

The purpose of the VMP is to define the suite of vegetation management activities that Midpen may implement to reduce the potential for and severity of ecologically-catastrophic wildland fires while also preserving biodiversity and minimizing the environmental effects. This VMP identifies the following:

- Historic regional vegetation and fire regimes;
- History of vegetation management on OSPs and current practices;
- Types of vegetation management areas (VMAs) that can be created;
- Process to prioritize VMAs and projects;
- Planning process for undertaking vegetation management projects;
- Methods for creating and maintaining VMAs; and
- Standard best management and environmental protection measures for vegetation management projects.

The VMP focuses on what is referred to as "non-fire" vegetation management. Only manual, mechanical, prescribed herbivory, and limited chemical methods of vegetation management are considered in this VMP. Prescribed fire to reduce fuel loads and restore natural ecological processes ~~in interior areas of OSPs, away from the WUI and other infrastructure~~, will be described in detail in a future PFP (underway, to be presented at a public meeting later in 2020) and is described at a programmatic level in Chapter 5 of this Program.

4.1.3 Overall Plan Structure

Overall Plan Structure

1) Treatments for Ecosystem Resiliency
   a. Fuel Reduction Area
   b. Temporary
   c. Objective to make fire resilient forests by reducing fuel loads (disease)
2) Fuel Treatments for Fire Management
   a. Permanent Fuelbreaks (Shaded, defensible space, landing zone, etc.)
   b. Maintenance every 3 to 5 years

This VMP describes (1) treatments to enhance ecosystem resiliency, and (2) vegetation management work that facilitates fire management, reduces fire ignitions, and minimizes the intensity of wildland fires to reduce the damage to ecological functions, which also serves to enhance public safety. Treatments created solely for ecosystem resiliency will be focused on general fuel reduction and may be maintained less frequently and/or be relocated or modified in response to changing environmental conditions and expanded land holdings. Treatments that help enhance fire management are generally considered semi-permanent and maintained with more regularity as needed.

The VMP will help guide Midpen as it considers how and where to expand its current vegetation management work (e.g., fuelbreaks, defensible space) and Fuel Reduction Areas (FRAs) each year. Midpen employees ~~staff~~, with input from surrounding fire agencies, would prepare an Annual Wildland Fire Resiliency Plan that describes the extent, scope, and location of the VMAs to be created. The annual plan would be dependent upon numerous factors, including annual staffing capacity, funding availability, partnerships, and other resource availability, and be balanced with other Midpen priorities that also further Midpen's mission, as well as annual *Strategic Goals & Objectives*, and the *Vision Plan*.

~~As Midpen continues to expand its land holdings, the amount of vegetation management work within its lands is expected to also increase. Midpen continues to actively acquire new lands to preserve as open space in perpetuity. For example, between 2015 and 2020, Midpen added approximately 1,600 acres to its land holdings.~~

4.2 Vegetation Management History

4.2.1 Historic and Current Vegetation Management and Fire History

Prior to European contact, Native American tribes actively managed vegetation within their communities and surrounding areas using fire. These fires were lit intentionally at various times of the year to enhance vegetation growth, facilitate food collection, and improve forage for animals they hunted. In addition, Native American tribes did not actively suppress lightning ignitions at a landscape scale, which resulted in those fires often burning for days, weeks, and even months, shaping the patterns of vegetation cover and composition over the centuries (Anderson, 2013). A detailed fire history study was conducted in the Santa Cruz Mountains, San Mateo County, Huddart Park, and McGarvey Gulch. These studies found that fires burned redwood forests every 12 years, on average. There were intervals both shorter and longer (2 to 43 years) without fire (Stephens & Fry, 2005). These findings are consistent with studies that have documented extensive human and lightning-caused wildland fire burning in the state of

California. Correspondingly, the vegetation composition in the region had been originally shaped by a variety of disturbance pressures, including fire and grazing by large herds of native ungulate animals.

The arrival of Europeans, including Spanish and Anglo settlers, dramatically changed the management of vegetation communities, particularly grasslands. Major changes included tilling the grasslands for crop production, logging, introduction of cattle herds from Europe, and reduced populations of native grazing animals. The introduction of nonnative plants resulted in changes to grassland species composition from primarily perennial, native plant species to annual, nonnative plant species. Some nonnative species (invasive species) now compete with native plants in the same ecosystems, reducing the abundance and diversity of native species.

Within the last 100 plus years, more recent land use and management practices have resulted in higher fuel loads on and adjacent to natural lands. The policy of fire suppression has further exacerbated the issue, reducing biodiversity on open space lands. Invasive plant species continue to spread within grasslands and other plant communities. Since the 1990s, SOD has infected oak woodlands, resulting in succession of habitats and increased fuel loads. Grasslands and oak woodlands are decreasing due to the spread of brush and forest species in the absence of periodic fires and grazing. Coastal scrub and chaparral habitats are aging with minimal new growth. The understory of redwood and Douglas fir forests, and mature oak woodlands have been converted from low-density plants to denser, taller brush and young trees. Second-growth forests feature higher densities of smaller diameter trees compared to old growth forests.

Today, in the absence of decades of fire, in some areas both live and dead fuels have accumulated creating higher surface fuel loads, vegetation density, and varied species composition from what was seen prior to European contact.

4.2.2 Current Fuels Management Practices

Midpen undertakes several actions and activities on its lands to prepare for fire season. The actions related to fuel maintenance and reduction and fire management include:

- Maintaining existing fuelbreaks in OSPs, including but not limited to Pulgas Ridge, Windy Hill, Sierra Azul, Saratoga Gap, and Monte Bello OSPs;
- Defensible space clearing around 117 Midpen-owned structures;
- Maintaining 47 landing zones;
- Maintaining hundreds of miles of fire roads; and
- Managing over 6,500 ~~8,500~~ acres of grasslands using conservation grazing, in part to manage fuels.

Midpen's IPMP, adopted in 2014 with an EIR addendum certified and adopted in January 2019, prescribes pest management activities on Midpen lands over a 10-year period covering five major categories of work, including ~~vegetation~~ fuel management. Vegetation management prescriptions identified in the IPMP for fire management are focused on vegetation within the WUI and around structures, which under the IPMP is considered a potential "pest" that

warrants control. The prescriptions aim to control this vegetation and reduce the potential rates of spread, and intensity and flame lengths of wildland fires within treated areas. ~~This~~ Prescriptions also address ~~includes~~ the spread of wildland fires that originate in and around buildings. The IPMP specifically stated that no new major fuelbreaks or fuel management activities would be implemented, and the fuel management included as part of the IPMP is not intended to replace a fuel management plan. ~~This~~ While the majority of the fuel reduction work conducted under the IPMP is accomplished primarily through mechanical means, other resources such as hand crews are also employed~~, using handheld power tools or heavy equipment~~. Current treatments, methods, locations, and acreages under the IPMP are identified in Table 4-1. Figure 4-1 shows the percent of each treatment method used in 2018 under the IPMP (Midpen, 2019a). It should be noted that this figure includes all treatment applications and not just the applications for the fuels management category, as shown in Table 4-2.

Table 4-1 2014 IPMP Treatments and Annual Application for Fuels Management

Treatments	Treatment Type	Treatment Method	Locations	Annual Application [a]
Grasslands: Annual mowing **Shrublands:** Thin brush and mow tall grasses, increase spacing between shrub clusters **Forests:** Limb up trees to a height of 8 to 10 feet, thin brush, and mow tall grasses **Agricultural land:** Mowing and brush thinning along roads, discing along borders of agricultural and rangeland properties, conservation grazing	Manual and Mechanical	Mowing and Cutting	Defensible space, fuelbreaks, ~~emergency~~ landing zones	136 acres [b]
		Discing and Cutting	Disclines	75 acres over approximately 30 miles
	Chemical	Glyphosate Round-Up ProMax used for spot treatment or cut-stump	Defensible space, disclines, fuelbreak	2 gallons concentrate per year
			Defensible space	5.2 gallons concentrate over 14 acres per year

Notes:

[a] 1 percent increase annually in treatment is allowed with the value presented as the 2014 allowance.

[b] For 2019, an additional 225 acres of treatments was approved from other programs to increase the vegetation management capacity while the VMP was being prepared.

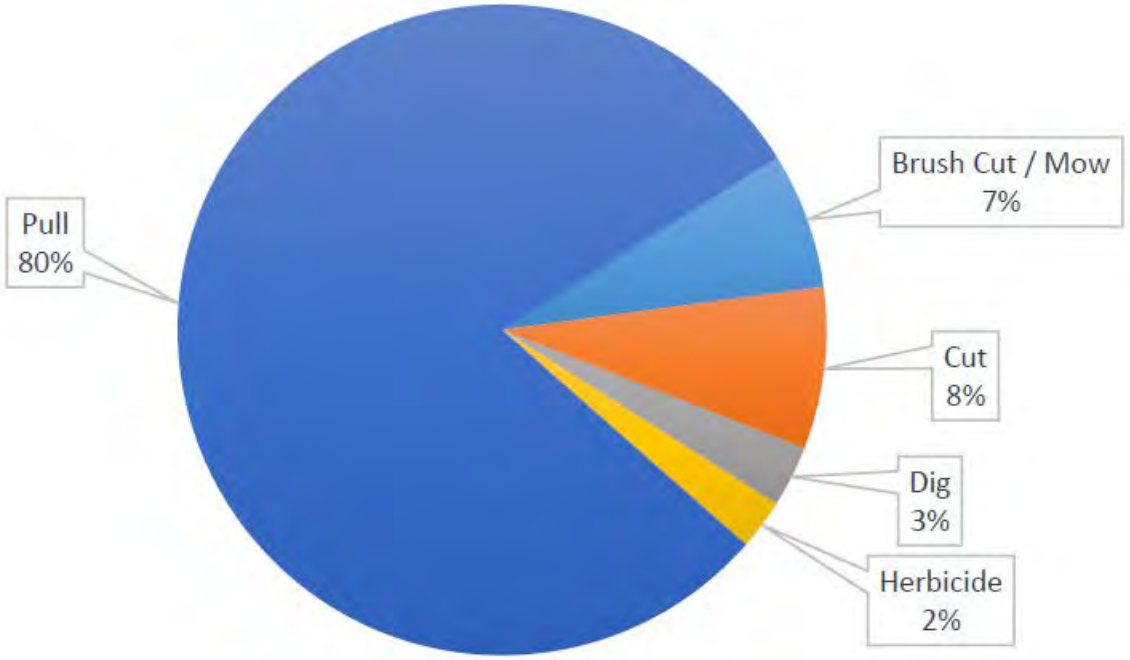
Source: (Midpen, 2014)

Treatments are implemented in grasslands, shrublands, forests, and agricultural land. While the IPMP allows for some degree of vegetation management for fuel reduction, it currently only

covers maintenance of existing fuelbreaks and does not allow for construction of new major fuelbreaks or VMAs. Figure 4-1 summarizes the vegetation management projects conducted Midpen-wide in 2018. Note that conservation grazing on Midpen lands is not included in the IPMP as it is a stand-alone program.

Locations of existing fuelbreaks, defensible space, landing zones, and disclines that have been maintained within the last 5 years are shown in Appendix B. Table 4-3 provides a summary of the existing mowing, disclines, and fuels treatments on Midpen lands by managed land.

Figure 4-1 Hours per Treatment Method from the 2018 IPMP Annual Report



Source: (Midpen, 2019a)

Table 4-2 Summary of IPMP Vegetation Management Projects Across Midpen Land in 2018

Purpose	Acres		Total Area (Acres)
	Foothills OSP	Skyline OSP	
Defensible Space	21.9	33.2	**55.1**
Landing Zones	6.5	5.3	**11.8**
Shaded Fuelbreak	36.8	22.7	**59.5**
Other Fuelbreak	--	14.4	**14.4**
Total	**65.2**	**75.6**	**140.8**

Note:
Conservation grazing is not a part of the IPMP and is covered by the Conservation Grazing Program.

Source: (Midpen, 2019a)

Table 4-3 Existing Treatments on Midpen Lands Under the IPMP (Acres)

Managed Land	Shaded Fuelbreaks	Non-Shaded Fuelbreaks	Ingress/Egress Route Fuelbreaks	Disclines	Defensible Space 100-foot	Defensible Space 30-foot	Fire Management Logistics Areas [a]	Grand Total
Bear Creek Redwoods OSP	~~1.2~~ 1.6	1.0	--	7.0	~~10.1~~ 8.1	~~3.3~~ 2.8	0.8	21.2 ~~23.3~~
Coal Creek OSP	16.9	0.1	--	--	1.0	0.2	--	18.2 ~~18.2~~
El Corte de Madera Creek OSP	2.4	0.1	--	--	~~1.6~~ 1.0	0.2 ~~0.4~~	0.6	4.3 ~~5.2~~
El Sereno OSP	1.5	0.2	--	--	~~0.4~~ --	~~0.1~~ --	2.2	3.9 ~~4.4~~
Felton Station	--	--	--	--	--	--	--	--
Foothills OSP	2.4	--	--	0.1	--	--	--	2.5 ~~2.5~~
Fremont Older OSP	--	0.1	--	14.1	2.3	0.6	1.0	18.1 ~~18.0~~
La Honda Creek OSP	7.0	~~2.5~~ 1.1	--	--	~~16.0~~ 13.1	~~4.5~~ 3.4	1.7	27.8 ~~31.7~~
Long Ridge OSP	19.1	1.7	--	--	~~1.1~~ 0.9	0.2	2.7	24.6 ~~24.8~~
Los Trancos OSP	0.8	--	--	4.9	--	--	--	5.6 ~~5.6~~
Miramontes Ridge OSP	--	~~1.1~~ 1.3	--	--	~~2.2~~ 1.8	~~0.4~~ 0.3	--	3.4 ~~3.7~~
Monte Bello OSP	28.5	0.5	--	4.4	~~3.9~~ 2.9	~~0.8~~ 0.6	2.8	39.6 ~~40.7~~
Picchetti Ranch OSP	0.1	--	--	5.4	~~2.7~~ 2.1	~~0.9~~ 0.8	1.9	10.3 ~~11.0~~

Managed Land	Shaded Fuelbreaks	Non-Shaded Fuelbreaks	Ingress/Egress Route Fuelbreaks	Disclines	Defensible Space 100-foot	Defensible Space 30-foot	Fire Management Logistics Areas [a]	Grand Total
Pulgas Ridge OSP	--	0.1	--	--	--	--	0.7	0.8
Purisima Creek Redwoods OSP	19.8	0.5	--	--	~~7.5~~ 6.8	~~2.0~~ 1.9	0.3	29.3 ~~30.1~~
Rancho San Antonio OSP	2.9	0.1	--	~~9.6~~ 10.1	~~11.8~~ 11.5	~~3.0~~ 2.8	2.8	30.2 ~~30.1~~
Ravenswood OSP	--	--	--	--	--	--	--	--
Russian Ridge OSP	22.5	~~0.9~~ 0.3	--	5.8	10.6	2.4	2.8	45.0 ~~44.9~~
Saratoga Gap OSP	17.7	4.8	--	--	1.0	0.2	--	23.7 ~~23.7~~
Sierra Azul OSP	~~38.3~~ 38.4	~~14.5~~ 14.4	9.1	~~4.7~~ 4.6	~~7.6~~ 5.3	~~1.8~~ 1.4	7.2	80.4 ~~83.0~~
Skyline Ridge OSP	5.6	1.6	--	0.1	~~12.1~~ 10.7	~~3.0~~ 2.8	0.9	21.6 23.3
Saint Joseph's Hill OSP	--	--	--	--	--	--	1.4	1.4
Teague Hill OSP	7.8	--	--	--	--	--	--	7.8 ~~7.8~~
Thornewood OSP	13.8	0.2	--	--	~~3.0~~ 3.1	~~0.7~~ 0.8	--	17.8 ~~17.7~~
Tunitas Creek OSP	--	5.2	--	--	~~5.4~~ 5.2	~~1.3~~ 1.2	--	11.6 ~~11.9~~
Windy Hill OSP	1.3	30.7	--	3.4	~~4.7~~ 4.4	~~1.3~~ 1.2	1.5	42.5 ~~42.9~~

Managed Land	Shaded Fuelbreaks	Non-Shaded Fuelbreaks	Ingress/Egress Route Fuelbreaks	Disclines	Defensible Space 100-foot	Defensible Space 30-foot	Fire Management Logistics Areas [a]	Grand Total
Other Areas Managed by Midpen	--	11.5	--	1.5	--	--	--	13.0
Grand Total	~~**209.5**~~ **210.0**	~~**77.1**~~ **75.2**	**9.1**	~~**61.0**~~ **61.5**	~~**105.0**~~ **91.8**	~~**27.1**~~ **23.8**	**31.2**	~~**520.0**~~ **504.6**

Notes:

Depending on habitat type, maintenance of existing treatment areas is typically completed on a 3- to 5-year rotation.

Numbers may not add up to the total due to rounding.

Appendix J ~~I~~ provides a key for the terms used in this table and the terms used in Appendix B.

[a] Currently maintained emergency staging areas, landing zones, and other fire management logistics areas and associated fuelbreaks are accounted for in this category.

4.3 Vegetation Management Areas

4.3.1 Overview

Midpen would like to expand its ability to create and treat new ecologically-sensitive VMAs as resources allow. Midpen recognizes the need to expand its vegetation management work in the short- and long-term due to higher fire risk, the potential for catastrophic fires, and to manage future new open space acquisitions. This section identifies the types of high priority VMAs and their locations.

Vegetation management is intended to decrease the risk of extreme wildland fire behavior, slow the spread of a wildland fire, aid in the suppression and control of a wildland fire, and/or reduce the impacts of wildland fire should it occur. Unnaturally excessive fuel loads are the primary factor that Midpen can change to alter the behavior of a wildland fire. Dead vegetative material on the ground surface, referred to as surface fuels, can be removed.

Key types of VMAs include FRAs, fuelbreaks, and defensible space, which are detailed below. FRAs would be implemented, then maintained as needed based on field inspections by qualified staff and/or consultants, whereas fuelbreaks and defensible space would be more regularly maintained.

4.3.2 Types of VMAs

Overview

VMAs are categorized in two main ways depending upon the general goal of the treatment; ecosystem resiliency VMAs and enhanced fire management VMAs. This section describes the types of VMAs proposed for fire management and improved ecosystem resiliency. VMAs for ecosystem resiliency improve habitat health and includes FRAs. FRAs are less permanent than fuelbreaks and are typically implemented in more natural areas where fuel load reduction achieves a combination of habitat enhancement goals and wildland fire risk reduction. FRAs can also enhance public safety when created near the WUI and/or adjacent to existing fuelbreaks.

VMAs that aid fire management typically involve periodic maintenance to operate as intended. If not regularly maintained, the level of effort and cost required to re-establish the desired conditions of the VMA begins to approach the same level as new construction. Developing design standards and dimensions for VMAs are part of Midpen's strategy to reduce the intensity of wildland fire, should a fire occur. Each of the types of VMAs are described in this section.

Ecosystem Resiliency VMAs

FRAs

~~Ecosystem resiliency~~ FRAs are the type of VMA that enhances ecosystem resiliency, which are locations where fuels are manually or mechanically removed but not to the same extent as fuelbreaks. These areas are typically implemented to achieve a combination of habitat enhancement and wildland fire risk reduction. FRAs can be areas of managed vegetation adjacent to fuelbreaks (as described below and shown in Figure 4-2) and can also occur in areas where fuel loading is particularly problematic, such as areas affected by forest disease. ~~FRAs could be used in oak woodlands adjacent to a non-shaded fuelbreak where understory fuels are removed and over-topping conifers, such as Douglas fir, are removed or in grasslands where shrubs are removed.~~ Fuel ladders and surface fuels are greatly reduced in FRAs, and overstory and understory vegetation is spatially separated so that a ground fire will not, under normal fire conditions, burn too hot and/or climb into the canopy and turn into a crown fire. Examples of where FRAs could be implemented include in oak woodlands adjacent to a non-shaded fuelbreak where understory fuels are removed and over-topping conifers, such as Douglas fir, are removed, or in grasslands where shrubs are removed. FRAs are maintained as needed.

Refugia

Prior to the creation of an FRA, a Midpen ~~designated Biologist~~ approved biologist may designate sites within the FRA as "refugia" areas. These may be single or multiple sites as needed. The purpose of these areas is to give wildlife a place to safely retreat to during implementation of FRA treatment.

Activities prohibited within refugia during FRA implementation include:

- Use of artificial light;
- Creation of new capital improvements or uses, including:
  - Roads,
  - Trails,
  - Structures, or
  - New recreational uses
- Motorized/mechanical equipment; and
- Use of any herbicides (e.g., glyphosate).

Prohibited activities can only be waived or revoked by a Midpen biologist. Prohibited activities in refugia may resume once FRA implementation is complete but is generally discouraged except to resume baseline conditions that were suspended during FRA implementation.

Enhanced Fire Management VMAs

Fuelbreaks

Definitions and Functions of Fuelbreaks

Fuelbreaks are linear strips of land where trees, vegetation, and dead material have been reduced or removed. These areas can slow, and even stop the spread of a wildland fire because fewer fuels are present to combust. Fuelbreaks also provide firefighters with zones to take a stand against or control the spread of a wildland fire, or retreat from fire if the need arises. For the purposes of this VMP, fuelbreaks encompass a range of fuel reduction intensities, depending on the resources being protected and the ecological setting.

Terminology: Target Hazards

According to the Federal Emergency Management Agency, target hazards are "facilities in either the public or private sector that provide essential products and services to the general public, are otherwise necessary to preserve the welfare and quality of life in the community, or fulfill important public safety, emergency response, and/or disaster recovery functions."

Examples include:

- Hospitals
- Assisted living centers
- Community shelters
- Schools
- Airports
- Important government offices
- Emergency operations centers
- Water /sewage treatment facilities

Typically, fuelbreaks are strategically located considering terrain, existing roads, communities, critical infrastructure, presence of potential ignition sources, fire management logistics areas, evacuation routes, target hazards, and sensitive resources. Other locations may be identified by fire agencies or Midpen employees ~~staff~~. Future fuelbreaks on Midpen lands will generally be located along primary and secondary roads and around critical infrastructure. Fuelbreaks can vary in width from approximately 15 feet around minor ingress and egress routes to up to 200 feet around major routes of travel (e.g., highways) or associated with regional vegetation management treatments. Additional areas can be included near fuelbreaks such as FRAs, as described in the above section (under Ecosystem Resiliency VMAs). The maximum fuelbreak widths by habitat type are shown below in Table 4-4. The two broad types of fuelbreak treatments are shaded and non-shaded fuelbreaks, as described below.

Table 4-4 Maximum Fuelbreak Widths by Habitat Type

Habitat Type	Fuelbreak Width (feet)
Grass	100
Shrub	100
Oak woodland	200
Redwood or Douglas fir forest	200

Fuelbreaks function as potential anchor points to control lower intensity fires, flank higher intensity fires, and provide firefighter safety. Vegetation is managed to reduce the continuity of live and dead fuels both horizontally and vertically in fuelbreaks. Fuelbreaks can reduce fire intensity and severity. It should be noted that fuelbreaks typically do not stop fires without fire

department response and fire may still jump a fuelbreak regardless of fuelbreak size during extreme fire weather, intense fire behavior, or other confounding scenarios (e.g., multiple ignition events). Alternative means to protect homes in the WUI, such as home hardening and defensible space, are important for individual landowners to implement.

Shaded Fuelbreaks

A shaded fuelbreak is an area where the tree canopy is thinned to reduce the potential for a fire to move quickly through and/or to reduce fire spread into or through the canopy. Enough tall tree canopy is retained to maintain shade, reduce the potential for rapid re-growth of shrubs and sprouting hardwoods, ~~and~~ minimize erosion, and minimize habitat alteration. Ladder fuels and woody understory vegetation are thinned out. A shaded fuelbreak can be created manually or by using mechanical techniques (heavy equipment). Shaded fuelbreaks require follow-up maintenance along roads that includes annual mowing in grasslands adjacent to the road, clearance of brush and dead vegetation, and removal of ladder fuels to the canopy in forested areas. In addition to manual and mechanical methods, herbicides may also be sparingly applied to control invasive species.

~~Shaded fuelbreaks included in this VMP may be up to 200 feet wide.~~ Width varies depending on the presence of sensitive resources, the location of habitat transitions, slope, expected fire behavior, the features or infrastructure that need protection, and the capacity to create and maintain the fuelbreak.

Non-Shaded ~~shaded~~ Fuelbreaks

A non-shaded fuelbreak is a swath of land where fuels are reduced in areas without a tree canopy, typically at a change in vegetation type, such as from forest or shrubland into grassland, or within grasslands. Heavy equipment is typically used for construction, except on steep slopes, where manual treatments are employed. Non-shaded fuelbreaks ~~are most often maintained in grasslands or shrublands versus wooded areas, although they can be implemented at a transition, particularly~~ often implemented near structures where ~~if~~ professional fire agency personnel deem critical for fire safety or necessary to meet defensible space requirements (see Figure 4-2). Herbicides may also be sparingly applied in non-shaded fuelbreaks to control invasive plants.

Figure 4-2 Example of a Non-Shaded Fuelbreak

Non-shaded fuelbreak treatment conducted along Page Mill Road.

~~A non-shaded fuelbreak (orange outline) implemented between homes and dense trees on El Granada Boulevard in San Mateo County to reduce the risk of wildland fire spread.~~

~~*Source: (County of San Mateo, 2016)*~~

Ingress/Egress Route Fuelbreaks

Due to limited resources, challenging terrain, and/or variable vegetation patterns, it is not always possible to maintain fuelbreaks at an optimal width related to flame length along all routes on Midpen lands. An ingress/egress fuelbreak is a zone located on both sides of roads identified as critical for emergency vehicle passage, typically designed to accommodate a smaller Wildland Type 3 fire engine. Fuelbreaks would also be located at driveways within Midpen land to facility emergency egress, as well as around certain recreational facilities such as parking lots and picnic areas. For easements that cross Midpen lands, the easement holders are typically responsible for fuel management therein, unless contract terms provide for alternate arrangements. ~~Vegetation management on easements over Midpen lands is the responsibility of the easement holder unless there is a cost-share agreement in place.~~ Vegetation management in this zone improves access and reduces radiant heat during a wildland fire, allowing improved firefighter access ~~during a wildland fire~~. These fuelbreaks are typically cleared of all understory vegetation for 10 to 30 feet from road edges (on either side), using primarily manual and mechanical techniques initially, and then mowed annually.

Disclines

Disclines are a type of vegetation treatment that is conducted using a tractor attachment with a series of metal discs to disturb soil 6 to 12 inches deep. By turning over the soil and leaving mostly a dirt surface, a discline is intended to slow or stop fire progression. Midpen employees ~~staff~~ have previously documented disclines stopping ignitions on Midpen lands as shown in Figure 4-3. A discline is typically placed along the perimeter of undeveloped land, ranches, and roadways. Herbicides may be sparingly applied to control invasive species. To avoid or reduce potential impacts to ground-dwelling species and surface erosion, disclines are only installed in limited locations after a thorough evaluation of benefits and consequences.

Defensible Space

Defensible space is the area immediately surrounding a structure where vegetation management measures to reduce fuels are implemented, providing the key point of defense from an approaching wildland fire, or defense against escaping structure fires. ~~This zone is an area where fuel~~ Fuel loads are reduced within 100 feet of the structures. The 100 feet of defensible space is subdivided into ~~, comprised of~~ three zones. Zone 0 involves removal of all vegetation using a variety of methods within 5 feet of structures and allows only non-flammable hardscaping or similar techniques. Zone 1 involves removal of all dead matter and dense fuels within 30 feet of buildings, decks, and other structures typically using manual and mechanical techniques. Zone 2 involves mowing, removal of ladder fuels, and thinning of vegetation extending from 30 to 100 feet out from buildings and structures (California Government Code 51182, and Public Resources Code Sections 4290 and 4291). Midpen has developed a Defensible Space Permit Program and Clearing Guidelines for adjacent property owners, tenants, homeowners' associations, educational institutions, civic groups and other organizations to create defensible space on Midpen lands adjacent to their homes and other qualifying structures.

Figure 4-3 Example of a Discline

Photo of a fire originating from a powerline that was stopped due to an existing discline.

Defensible space surrounding Midpen-owned structures is maintained annually by Midpen and/or its tenants.

Maintenance of defensible space will occur on an annual basis around an estimated 117 Midpen-owned structures. The work will be approved by Midpen and performed by Midpen employees ~~staff~~ and/or by residential, commercial or agricultural/rangeland tenants. Along the perimeter of Midpen lands, additional vegetation treatment may be required by other agency regulations or ordinances. Defensible space around ~~of~~ private property, including private homes located adjacent to Midpen lands, is the responsibility of the person or entity that owns, leases, controls, operates, or maintains the building or structure. Midpen works with communities, fire safe councils, and local fire agencies who wish to perform fuel reduction on Midpen lands to permit ecologically sensitive work by other parties.

~~Emergency Staging Areas, Emergency Landing Zones, and Other~~ Fire Management Logistics Areas

Emergency fire management logistics areas, including emergency staging areas and landing zones, are key during a wildland fire where fire suppression resources may safely park, gather crews, or land a helicopter. Fire management locations may also serve as a temporary refuge area during a wildland fire. ~~Emergency landing~~ Landing zones allow helicopters to land in the event of an emergency. These areas are maintained annually or bi-annually via mowing with a tractor or brushcutter at 47 locations on Midpen lands, as shown in the figures in Appendix B. A~~n additional~~ 200-foot wide fuelbreak around these logistics areas ~~may~~ will be constructed or

existing fuelbreaks expanded out to 200 feet using the methods described ~~according to the fuelbreaks discussed~~ above.

~~Non-Native~~ Eucalyptus and Acacia Removal

Fallen eucalyptus leaves create dense carpets of flammable material, and the tree bark peels off in long streamers that drop to the ground and act as tinder. The debris from eucalyptus provide large amounts of~~, providing additional~~ fuel that draws ground fires up into the leaves, creating massive, fast-spreading "crown fires" in the upper story of eucalyptus forests. The leaves from some species of Acacia contain resin and flammable oils, which can ~~encourage~~ increase the spread of fires. Eucalyptus and Acacia trees may be removed from locations where the trees could pose a fire hazard. These trees are removed using manual and mechanical methods, as well as limited herbicide use to control re-sprouting from cut stumps. Replanting of native trees and vegetation will be conducted as appropriate with consideration for the type of vegetation community that should be in the area. Advisement from fire agencies in regards to fuel loads will also be considered prior to replanting.

Riparian Habitat within Fire Management VMAs

Any enhanced fire management VMAs that fall within or cross riparian areas will be modified such that the vegetation treatments performed will be limited to FRA-level management. A Midpen-approved biologist will evaluate any areas where enhanced fire management VMAs (e.g., fuelbreaks) cross into riparian habitat and design the treatments to avoid loss of riparian habitat function and retain or improve habitat functions. Considerations could include, but are not limited to:

- Retain at least 75 percent of the overstory and 50 percent of the understory canopy of native riparian vegetation within the limits of riparian habitat. Retain native riparian vegetation in a well distributed multi-storied stand composed of a diversity of species similar to that found before the start of treatment activities.
- Limit treatments to removal of uncharacteristic fuel loads (e.g., removing dead or dying vegetation), trimming/limbing of woody species as necessary to reduce ladder fuels, and select thinning of vegetation to restore densities that are characteristic of healthy stands of the riparian vegetation types.
- Avoid removal of large (greater than 12 inches diameter at breast height [DBH]), native riparian hardwood trees.
- Trees to be removed will be directed away from adjacent streams or waterbodies when cut and piled outside of the riparian vegetation zone (unless there is an ecological reason to do otherwise that is approved by applicable regulatory agencies, such as adding large woody material to a stream to enhance fish habitat,
- Avoid vegetation removal that could reduce stream shading and increase stream temperatures.

Typically, work in riparian corridors would be conducted by hand methods. Limited equipment may be used in cases where it would cause less disruption and/or is needed to achieve habitat and fire management objectives.

4.4 Creation of New VMAs

4.4.1 Overview

Generally, vegetation management techniques implemented to create new VMAs involve reducing the density of vegetation and strategically opening areas to reduce spread and improve fire management and response. At key locations, shrubs, small trees, and grass that can act as fuel ladders, allowing a surface wildland fire to travel up into the tree canopy, can be removed or reduced in density. Grasses can be mowed or grazed to manage fuel loads. Small trees and shrubs can be thinned, leaving larger diameter trees with often thick fire-resistant bark and promoting late-seral forests.

4.4.2 Mapping and Description of Potential New VMA Areas

The potential areas within which new VMAs could be established in the future are identified in maps (refer to Appendix B), and tabulated in Table 4-5. The acreages and areas shown are meant to represent the "envelope" within which the VMAs can be built. The actual acreages and areas of VMAs built are likely to be less than the full envelope shown~~, particularly in the first few years of Program implementation~~.

FRAs are not tabulated in Table 4-5; however, Appendix B includes maps showing stands greater than 100 acres of oak woodland, Douglas fir, and redwood forest that represent potential areas where FRAs for ecosystem resiliency may be constructed.

VMA areas (including FRAs) are prioritized in accordance with the methods described in Section 4.4.3. Although Midpen intends to gradually increase the amount of VMAs created annually, this will depend on staffing capacity, funding resources, partnerships, and other resource factors with consideration and weight given to other Midpen priorities that further its mission. Only areas within the very highest VMA priorities that can be accommodated in Annual Work Plans and can be adequately maintained over the long-term, are expected to be implemented each year.

Prior to creation of any new VMAs, a Midpen-approved biologist will perform a field visit to determine any environmental factors that need to be taken into consideration prior to treatment, such as the presence of invasive species, impacts to wildlife, or presence of bodies of water.

Table 4-5 Potential Areas within which New VMAs Could be Established (Acres)

Type of Treatment	Shaded Fuelbreaks	Non-Shaded Fuelbreaks	Evacuation Routes, Critical Infrastructure, and Fire Management Logistics Fuelbreaks [a]	Target Hazards Fuelbreaks [b]	Fire Agency Recommended Fuelbreaks	Ingress/Egress Route Fuelbreaks	Disclines [d]	Midpen Structures and Facilities Defensible Space [f]	~~Emergency Staging Areas, Emergency Landing Zones, and Other~~ Fire Management Logistics Areas [e]	Eucalyptus and Acacia Removal
Treatment Size	**≤100-foot Fuelbreak**	**≤60-foot Fuelbreak**	**200-foot Fuelbreak**	**300-foot Fuelbreak**	**Variable [c]**	**≤30-foot Fuelbreaks**	**Variable [c]**	**30-foot and 100-foot Defensible Space**	**Variable [c]**	**Variable [c]**
Bear Creek Redwoods OSP	17.5	--	~~255.5~~ 255.8	--	--	--	--	--	~~5.3~~ 4.9	--
Coal Creek OSP	--	--	61.6	--	1.0	3.9	--	--	--	--
El Corte de Madera Creek OSP	--	--	~~175.1~~ 175.8	--	--	--	--	--	1.8	~~--~~ 0.1
El Sereno OSP	--	--	79.4	--	--	39.3	--	--	9.3	0.4
Felton Station ~~OSP~~	--	--	0.4	--	--	--	--	--	--	--
Foothills OSP	--	--	48.5	--	--	--	--	--	--	--
Fremont Older OSP	~~<0.1~~ 0.01	--	~~25.7~~ 25.4	--	--	35.4	--	--	~~4.8~~ 4.7	~~2.2~~ 0.9
La Honda Creek OSP	2.5	11.7	~~238.4~~ 240.5	9.6	~~99.7~~ 94.2	98.9	0.4	--	~~9.7~~ 10.2	4.0
Long Ridge OSP	--	--	~~403.7~~ 405.3	0.3	--	0.2	--	--	~~8.4~~ 7.3	--
Los Trancos OSP	0.1	15.6	26.7	--	--	--	--	--	0.6	0.2
Miramontes Ridge OSP	--	--	~~29.0~~ 27.5	--	--	1.8	--	--	--	~~72.3~~ 90.3
Monte Bello OSP	0.9	0.8	~~151.5~~ 145.5	4.1	--	34.3	--	--	9.5	0.1
Picchetti Ranch OSP	--	--	~~48.8~~ 48.6	--	--	--	--	--	~~5.6~~ 5.7	0.5
Pulgas Ridge OSP	~~8.3~~ 7.0	--	5.1	1.8 ~~0.5~~	10.0	--	--	--	~~1.6~~ 1.5	~~30.6~~ 37.9
Purisima Creek Redwoods OSP	~~1.3~~ 0.1	6.0	~~185.9~~ 173.3	--	--	1.4	--	--	0.6	~~3.2~~ 21.4
Rancho San Antonio OSP	--	--	~~74.3~~ 72.4	~~12.3~~ 17.9	--	1.0	--	--	~~7.2~~ 7.5	0.1
Ravenswood OSP	--	--	--	--	--	--	--	--	--	--
Russian Ridge OSP	~~144.3~~ 65.2	~~19.2~~ 3.3	~~264.3~~ 269.7	--	--	9.3	--	--	9.1	--
Saratoga Gap OSP	--	--	~~185.5~~ 185.8	--	--	--	--	--	0.5	--
Sierra Azul OSP	0.2	--	~~534.4~~ 526.8	--	29.1	148.5	--	--	29.8	~~6.3~~ 6.7
Skyline Ridge OSP	~~<0.1~~ --	--	~~290.2~~ 269.0	~~2.9~~ 2.8	--	2.4	--	--	4.7	--
St. Joseph's Hill OSP	--	--	75.3	--	--	--	--	--	4.6	--

Type of Treatment	Shaded Fuelbreaks	Non-Shaded Fuelbreaks	Evacuation Routes, Critical Infrastructure, and Fire Management Logistics Fuelbreaks [a]	Target Hazards Fuelbreaks [b]	Fire Agency Recommended Fuelbreaks	Ingress/Egress Route Fuelbreaks	Disclines [d]	Midpen Structures and Facilities Defensible Space [f]	~~Emergency Staging Areas, Emergency Landing Zones, and Other~~ Fire Management Logistics Areas [e]	Eucalyptus and Acacia Removal
Treatment Size	**≤100-foot Fuelbreak**	**≤60-foot Fuelbreak**	**200-foot Fuelbreak**	**300-foot Fuelbreak**	**Variable [c]**	**≤30-foot Fuelbreaks**	**Variable [c]**	**30-foot and 100-foot Defensible Space**	**Variable [c]**	**Variable [c]**
Stevens Creek Shoreline Nature Study Area	--	--	--	--	--	--	--	--	--	--
Teague Hill OSP	--	--	1.8	--	20.9	--	--	--	--	--
Thornewood OSP	~~36.1~~ 34.7	--	~~38.1~~ 37.7	--	--	--	--	--	--	--
Tunitas Creek OSP	--	--	~~98.3~~ 96.1	--	--	--	--	--	--	~~42.6~~ 43.6
Windy Hill OSP	1.2	280.7	~~208.9~~ 208.8	~~30.5~~ 26.8	--	0.3	--	--	0.6	--
Other Areas Managed by Midpen	--	--	~~106.4~~ 115.1	3.4	--	--	0.7	--	9.6	--

Notes:

Appendix~~I~~ J provides a key for the terms used in this table and the terms used in Appendix B.

[b] Includes some smaller ≤40-foot fuelbreaks around driveways for emergency egress.

[c] Target hazards include schools, hospitals, and care facilities.

[d] Treatment area determined by staff or fire management recommendation.

[e] Includes bladed firelines, which are up to 20 feet wide.

[f] Emergency staging areas, landing zones, and other fire management logistics areas and associated fuelbreaks are accounted for in this category. ~~The 200-foot fuelbreak around emergency staging areas, emergency landing zones, and other fire management logistics areas are accounted for under "Evacuation Routes, Critical Infrastructure, and Fire Management Logistics"~~

[g] Defensible space around Midpen structures and facilities are currently maintained. No new defensible spaces are part of the potential treatment areas but could be created in the future.

4.4.3 Method of Prioritizing the Establishment of New VMAs

Methodology for Locating Potential Fuel Reduction Areas for Ecosystem Resiliency

The location of new FRAs on Midpen lands are confined to native forests or woodland areas of at least 100 acres in size. Areas classified as "water" or "wetland" are excluded from treatment. Ecosystem health and condition factor into the locating of new FRAs. FRAs will be identified by Midpen or other professional fire management or vegetation management staff as important areas for ecosystem health and resiliency.

Methodology for Prioritizing Fuel Reduction Areas

Prioritization is established by assigning points for each of the following factors. The areas with the most points receive the highest priority ranking.

- Within 300 feet of sensitive natural resources (e.g. rare, threatened and/or endangered species; degraded habitats due to invasive species) that would benefit from and/or respond favorably to treatment;
- Within high fire risk areas (Priority zones: CAL FIRE Very High, Santa Cruz High C-Fire M-Fire);
- Within 500 feet of points designated as having mortality due to forest disease, such as SOD;
- Identified by professional Midpen or vegetation management staff as important fuel treatment areas for ecosystem resiliency, including but not limited to:
  - High road density
  - Topography (such as slope and aspect, especially box canyons);
- Where past land use history (e.g., timber harvesting) has increased the number of trees per acre to unnatural conditions;
- Identified as an area for prescribed fire for natural resource benefits;
- Promotes late-seral habitat conditions; and
- Site is experiencing vegetation encroachment that is changing the fuel regime or converting the vegetation type.

Methodology for Locating Potential VMAs for Enhanced Fire Management

Potential new VMAs on Midpen lands will be located using the following criteria:

a) Areas that enhance and facilitate fire suppression activities (e.g., fire management locations, disclines) and ingress/egress safety for fire responding agencies, their personnel, and fire suppression equipment;
b) Adjacent to or near existing or planned fuel treatment areas as identified by fire agencies;
c) Identified by state or local fire management agency professional staff as important areas for fuels treatment;
d) Within 10 to 25 feet (depending on flame length) of primary Midpen-designated emergency access roads accessible by a Wildland Type 3 fire engine; ~~Up to 300 feet from target hazards (school, hospital, nursing home);~~

e) Within ~~Up to~~ 100 feet from existing Midpen structures;
f) Within ~~Up to~~ 200 feet from emergency response infrastructure (communications tower, fire station, medivac location, water tank);
g) Within ~~Up to~~ 200 feet from a state or local fire management agency-designated expanded fire response/fire monitoring clearing zone (parking area, staging area, ~~helicopter~~ landing zone);
h) Within 200 feet of Midpen employee ~~staff~~-identified sensitive resources or other Midpen High Value Asset that would benefit from and/or respond favorably to treatment or may be at risk of loss in the event of a wildland fire;
i) Within 200 feet of a state or local fire agency-designated Midpen evacuation route; and
j) Within 300 feet from target hazards (school, hospital, nursing home).~~Within 10 to 25 feet (depending on flame length) of primary Midpen-designated emergency access roads accessible by a Wildland Type 3 fire engine.~~

Methodology for Prioritizing VMAs

Prioritization of VMAs is established by assigning points for each of the following factors. The areas with the most points receive the highest priority ranking. VMAs that are currently in the Conservation Grazing Program will be reduced by 1 point recognizing the beneficial reduction of fuel loads that already occurs through conservation grazing activities.

- Within 100 feet of Midpen structures;
- Within 200 feet of sites designated as having SOD outbreaks; ~~and~~
- Within 300 feet of target hazards (schools, hospitals, nursing homes);
- Within 300 feet of designated Midpen evacuation routes;
- ~~Within 100 feet of Midpen structures;~~
- Within 300 feet of critical emergency response infrastructure (communications tower, fire station, medivac location, pre-planned Incident Command Post, water tank);
- Within 300 feet of Midpen-designated fire response/fire monitoring clearing zones (parking area, staging area, landing zones);
- Within 300 feet of sensitive natural resources that would benefit from and/or respond favorably to treatment;
- Within 300 feet of other high value Midpen assets or potential treatment areas identified by Midpen employees;
- Within high fire risk areas – i.e. CAL FIRE Very High (shown in Figure 2-3);
- Within 500 feet ~~or adjacent to~~ of current and planned fuel management treatments (including strategic regional fuelbreaks and cooperative efforts with neighboring property owners);
- ~~Within high fire risk areas – i.e. CAL FIRE Very High (shown in Figure 2-3);~~
- Within 1,000 feet of current and planned fuel management treatments; and
- ~~Within 300 feet of other high value Midpen assets or potential treatment areas identified by Midpen staff (including strategic regional fuelbreaks and cooperative efforts with neighboring property owners);~~
- ~~Within 200 feet of sites designated as having SOD outbreaks; and~~

- Vegetation treatments identified in the field by professional fire staff.

The fuelbreak prioritization criteria will be integrated into a Geographic Information Systems (GIS) for primary and secondary public paved roads, around critical emergency response infrastructure, and adjacent to communities in the WUI, focusing on the CAL FIRE-designated Very High Fire Hazard Zones. Fuelbreaks are mapped per the "Methodology for Locating Potential VMAs for Enhanced Fire Management". Fuelbreaks are assigned as shaded, non-shaded, or ingress/egress fuelbreaks with a maximum width indicated in the GIS. FRAs are also identified in/adjacent to each fuelbreak, where applicable for each OSP, as are existing and any new areas of defensible space.

4.4.4 Prioritized VMAs

Priority VMAs, based on the methods described in Section 4.4.3, are summarized in Table 4-6 and shown in Appendix B. With new land acquisitions and/or changing environmental factors, actual annual priorities may change year to year. Midpen anticipates targeting as many of the higher priority VMAs as possible based on available resources. Initially, Tier 1 and Tier 2 VMAs will be prioritized for creation first. Dependent upon logistics, proximity, and economy of scale, contiguous lower prioritized VMAs may be created simultaneously with Tier 1 and Tier 2 VMAs for efficiency.

Table 4-6 Priority VMAs on Midpen Lands (Acres) – Excludes Ecosystem Resiliency FRAs[1]

Managed Land	Tier 1	Tier 2
Bear Creek Redwoods OSP	~~24.9~~ 23.4	~~38.5~~ 37.5
Coal Creek OSP	~~38.6~~ 38.5	~~22.8~~ 21.7
El Corte de Madera Creek OSP	~~2.2~~ 0.8	~~7.7~~ 9.1
El Sereno OSP	1.3	~~12.8~~ 5.4
Felton Station ~~OSP~~	--	--
Foothills OSP	--	0.3
Fremont Older OSP	--	~~4.2~~ 0.8
La Honda Creek OSP	~~19.7~~ 19.5	~~30.2~~ 30.2
Long Ridge OSP	~~112.6~~ 114.1	~~96.0~~ 96.7
Los Trancos OSP	--	3.7
Miramontes Ridge OSP	0.3	~~1.4~~ 0.4
Monte Bello OSP	~~26.6~~ 25.1	~~45.0~~ 36.9

[1] The prioritization of FRAs will be determined according to the methods described in Section 4.4.3.

Managed Land	Tier 1	Tier 2
Picchetti Ranch OSP	--	0.8
Pulgas Ridge OSP	~~3.0~~ 0.2	~~6.4~~ 6.8
Purisima Creek Redwoods OSP	~~3.0~~ 2.9	~~74.8~~ 76.4
Rancho San Antonio OSP	~~0.6~~ 0.4	~~19.3~~ 14.8
Ravenswood OSP	--	--
Russian Ridge OSP	~~74.6~~ 74.3	~~39.8~~ 38.8
Saratoga Gap OSP	~~--~~ 0.5	~~1.9~~ 2.2
Sierra Azul OSP	~~30.2~~ 0.9	~~23.6~~ 38.5
Skyline Ridge OSP	~~50.6~~ 49.3	~~52.6~~ 50.5
St. Joseph's Hill OSP	--	0.3
Stevens Creek Shoreline Nature Study Area	--	--
Teague Hill OSP	18.6	4.1
Thornewood OSP	~~45.6~~ 43.8	4.2
Tunitas Creek OSP	--	~~1.4~~ 0.4
Windy Hill OSP	~~105.1~~ 98.8	~~48.6~~ 50.1
Other Areas Managed by Midpen	1.5	~~7.6~~ 6.8
Note: Numbers may not add up to the total due to rounding.		

4.5 Cyclical Maintenance of VMAs

4.5.1 Overview

Vegetation management is performed periodically to keep ~~fuelbreaks and other~~ VMAs (e.g., FRAs, fuelbreaks, and defensible space) functional over time. Maintenance of existing VMAs and new VMAs would occur under the Program. The time between treatments depends on how fast the vegetation in the fuelbreak grows, if invasive species colonize the disturbed area (Midpen, 2014; Midpen, 2019b), the likelihood of an ignition and fire spread, and/or the proximity to buildings and other high value assets. For example, areas such as defensible spaces around structures with grassy fuels, or ingress/egress road corridors with rapidly growing woody weeds, typically need to be treated annually. Similarly, areas adjacent to picnic facilities also require regular maintenance. Cyclical maintenance is performed using combinations of different treatment techniques to ensure that the maintenance work is efficient and performed in a timely manner while minimizing ecological impacts. Techniques include a combination of cutting with heavy equipment, mowing, and/or hand tools as well as on-site mastication,

mulching, and pile burning. Some chemical methods may also be used in very limited circumstances and in most circumstances is not intended for cyclical maintenance activities. These techniques are described in detail in Section 4.7.

4.5.2 Maintenance Strategies for VMAs

VMAs Maintained by Midpen

The maintenance requirements of Midpen's VMAs (e.g., FRAs, fuelbreaks, and defensible space) is related to the structure and composition of the vegetation retained within and surrounding it. VMAs with large numbers of perennial, fast-growing weeds in or adjacent to them require more frequent maintenance than those without. Should invasive species take hold in the VMAs, they can compromise surrounding natural areas by serving as a seed source for invasive, non-native species that may spread.

VMAs that border or traverse largely intact ecosystems still dominated by native species can be maintained with low-intensity brushing, performed as needed based on field inspections. Frequency of maintenance can vary from annual for VMAs in grass-dominated vegetation types, to approximately once every 3 to 10 years depending on vegetation type, the fuel conditions, and regrowth. Larger cut vegetative material (e.g., trees and limbs) is chipped or cut up and scattered on-site. Other vegetative material may be left in place or trucked out to the work area to another location on Midpen lands, as determined acceptable in light of best management measures intended to exclude *Phytophthora* and other plant pathogens to the extent possible. VMAs bordering intact ecosystems will likely be absent of invasive species or show signs of persistent but small populations of perennial weeds. In intact ecosystems, the likelihood for the spread of invasive species into surrounding areas is not a significant concern; however, all VMAs will be treated as determined appropriate by Midpen employees ~~staff~~ (typically after the first year of creation and then every 3 to 5 years thereafter) with Early Detection Rapid Response (EDRR). The goal of EDRR practices is to detect invasive species problems earlier and to take control actions when populations are still relatively small and eradication is feasible.

VMAs that are bordered or traversed by degraded ecosystems dominated by weeds need a different and more intensive maintenance prescription to reduce the spread of weeds in the VMA and into surrounding areas. VMAs with non-native species are maintained with annual brushing of the fuels and dominant weeds; disposal of brush is accomplished via chipping, pile burning, or hauling. Invasive species treatment is addressed in Midpen's IPMP. The types and methods of invasive species treatment are stipulated in the IPMP and IPMP EIR. The IPMP, however, does not address the acreages of mowing and the quantities of ~~pesticides~~ herbicides needed for VMA creation and maintenance; these are therefore included in this VMP and discussed under Section 4.6. Disclines will typically be maintained annually through tractor discing.

Midpen currently mows over 100 miles of roadside to eliminate weeds and encroaching vegetation and, where applicable, to allow access for Wildland Type 3 fire engines. These

activities will continue on an annual basis, as defined in the IPMP and covered under that Program. The VMP would potentially expand on this existing treatment by creating and maintaining fuelbreaks along Wildland Type 3 ingress and egress routes and major routes, and widen the area of treatment, as appropriate.

Fuelbreaks Maintained by Others

Fuelbreaks completed by other individuals or entities may or may not be on lands owned by Midpen. An outside party, such as private landowners, owners of leases or easements, non-governmental organizations (NGOs), or public landowners, retain the responsibility to maintain these fuelbreaks.

Midpen enters into lease and easement agreements with communication and utility companies, such as PG&E[2], that have infrastructure (e.g., powerlines, water tanks) on Midpen land. Easements are typically managed by the easement holder, with Midpen having limited input on the location, timing, and intensity of vegetation management pursued under that easement by the easement holder. For leases, the responsibility of vegetation management to help protect private assets lie with the leaseholder, and the requirement for vegetation management and defensible space are written into the lease or lease renewal. In all cases, the leaseholder's vegetation management activities that occur on Midpen lands must be reviewed and approved by Midpen to ensure that they meet standards for natural resource protection, fuel reduction, and other policies.

Many fuelbreaks along the perimeter of OSPs span ownership boundaries and are jointly managed by adjacent public and/or private landowners, or private entities. For example, Midpen would manage one side of the road while the adjoining landowner(s) manages the other side, even though the property line may not exactly follow the road. Midpen and its adjoining landowners would continue to rely on existing relationships, communication, and partnerships to maintain effective management of these areas.

4.6 Annual Planning and Reporting

4.6.1 Annual Work Plan

Midpen employees ~~staff~~, with input from surrounding fire agencies, will annually prioritize areas for treatment and prepare an Annual Work Plan. Midpen employees ~~staff~~ will then bring the anticipated budgets to the Board for review and approval as part of the annual capital improvement and action plan development process.

[2] Standards for vegetation management and clearance requirements under PG&E utility lines are governed by General Order 95, Section III of the California Public Utilities Commission.

The maximum annual acreages of VMAs to be created and maintained are identified in Chapter 8: Maximum Annual Treatment Areas and Annual Planning. Midpen's objective is to gradually expand its acreage of VMAs, depending on numerous factors, including funding sources and availability of work crews, while minimizing negative impacts to the natural resources. At least initially, Midpen will focus on creating VMAs for enhanced fire management within the priority VMAs shown in Table 4-6. Annual VMP priorities may change over time based on new land acquisitions and changing environmental conditions; priorities are expected to be periodically reevaluated using the methods presented in Section 4.4.3.

4.6.2 Annual Reporting

The Annual Vegetation Management Report will describe the vegetation management activities undertaken the previous year and to make recommended modifications to the Program, as needed, using adaptive management strategies. The draft Annual Vegetation Management Report will be prepared by the appropriate Vegetation Management Coordinator or staff Coordinator, forwarded to the General Manager for review and finalization, and then presented to the Board of Directors for acceptance. The Annual Vegetation Management Report may be combined with or an appendix to the Annual Monitoring Report (refer to Section 7.5 and 7.6).

At a minimum, the Annual Vegetation Management Report will include the following basic information:

- A summary of the areas treated for the year by vegetation treatment category, including habitat type, acreages, and methods used by type of control (e.g., mowing, brushcutting, pulling, flaming, herbicide). A cost per acre will be provided for major treatment types.
- A qualitative assessment of effectiveness of Midpen's Vegetation Management Program, and suggestions for increasing future effectiveness. This assessment will be based in part on follow up discussions with staff, contractors, and stakeholders involved in the overall vegetation treatment process.
- A summary of ~~pesticide~~ herbicide use (e.g., herbicide application within a fuelbreak~~, insecticide use within a VMA~~), active ingredient (e.g., glyphosate, imazapyr) or ~~pesticide~~ herbicide formulation (e.g., Roundup ProMax™) used. This information would also be presented in the annual IPM report.
- A brief summary of public notifications, inquiries, and responses about vegetation management on Midpen lands.
- Assessment of compliance with the VMP including:
  - An evaluation of the effectiveness of any changes in practices implemented in the past 12 months.
  - A description of any experimental vegetation management projects (test studies) and the results, including a cost/benefit analysis.
  - Suggested changes to the Program or the vegetation management practices proposed for adoption within the next 12 months, including:

- Any changes in acreages, focus treatment areas to adapt to changing conditions; and
- Any changes in methods or funding.

4.7 Vegetation Management Methods

4.7.1 Vegetation Management Toolbox

Vegetation will be managed primarily manually, mechanically, with prescribed herbivory (using goats, sheep, or other livestock to reduce fuels in a specific area), and to a significantly limited extent, ~~pesticides~~ herbicides. Invasive species are prioritized over removal of native species. Table 4-7 identifies the treatment actions and estimated maximum annual application of each vegetation management treatment, including creation and maintenance of VMAs. Midpen will also employ a series of best management practices (BMPs) for each management activity. ~~Pesticides~~ Herbicides allowed are only those identified in the IPMP EIR and Addendum (Midpen, 2014; Midpen, 2019b), or subsequently approved by Midpen through further addendum processes. Specific vegetation management treatments are determined by Midpen employees ~~staff~~ who take into consideration location of treatment, the biology of the species being treated, availability of resources, and/or presence of non-target species.

It should be noted that under the IPMP, the current treatments result in 80 percent of vegetation management performed through pulling and 7 percent through brush cutting and mowing. This plan will result in a larger increase in the percent of work performed by brush cutting and mowing.

Midpen will evaluate the possibility of setting up permanent composting sites ~~and~~ for stock piling of chipped material. These sites will be located at or near field offices for vegetation removed during treatment. Compost may be used at other project sites to amend soils and chips used as mulch.

Table 4-7 VMA Treatment Methods and Estimated Maximum Annual Application

Treatment Type	Treatment Method	Typical Method of Application	Purpose	Maximum Annual Application
Manual and Mechanical	Mowing and Cutting	Tractor, brushcutter, chainsaw, skid steer with mounted head, jawz implement, pole pruner	Removal of vegetation for VMA treatment; Invasive species treatment in VMA	See Table 8-1
	Discing and Cutting	Tractor, pole pruner	Discline creation	
	Masticating	Tractor, skid steer with mounted head	Removal of vegetation for VMA treatment	

Treatment Type	Treatment Method	Typical Method of Application	Purpose	Maximum Annual Application
	Pulling	Backhoe, excavator	Removal of vegetation for VMA treatment; Hazard tree removal	
	Chipping	Chipper	Biomass disposal	
	Pile Burning	Water truck, leaf blower, drip torch	Biomass disposal	
	Flaming	Propane torch	Invasive non-native species treatment in VMAs	
Chemical Application	Glyphosate Round-up Promax	Cut-stump	Invasive species or SOD removal in VMAs; Removal of vegetation for VMA treatment	2 gallons concentrate
		Spot spray	Treatment of defensible space	5 gallons concentrate
	Clethodim, Aminopyralid, and Clopyralid	Spot spray	Invasive plant control in VMAs	2 gallons concentrate per chemical type
	Imazapyr	Spot spray	Invasive plant control in VMAs	0.5 gallons concentrate
		Cut-stump	Invasive plant control/SOD in VMAs	0.25 gallons of concentrate
	Triclopyr BEE/TEA	Cut-stump	Invasive species or SOD removal in VMAs; Removal of vegetation for VMA treatment	5 gallons of concentrate
		Spot Spray	Invasive species in VMAs or treatment of defensible space	10 gallons of concentrate
Prescribed herbivory	Livestock	Livestock foraging	Pre-treatment of VMAs	100 acres

4.7.2 Treatment Types and Methods

Manual

Manual methods using power and non-powered hand tools to implement the VMP will be consistent with those described in Midpen's IPMP and focused on VMA creation and maintenance. Non-powered hand tools used for cutting are most commonly loppers, hand pruners, hand saws, and hatchets, and may also include pulaskis, machetes, brush hooks, and brush axes. Powered hand tools are also used, including brushcutters (metal blade), string trimmers (monofilament plastic line), and chainsaws, and may also include power pole saws and hedge trimmers. These tools are powered by two-stroke engines that use a mix of gas and engine oil or electric power. Ground crews of 3 to 15 persons with brushcutters and chainsaws work where heavy equipment cannot reach, generally more than 30 feet from a road edge and on slopes exceeding 30 percent. Chainsaws are used to limb or remove individual trees or shrubs. Brush-cutters are used where stem diameters are less than 5 inches at cut level, or the vegetation is predominately herbaceous. Cutting of herbaceous vegetation, including grasses and very young seedlings, is done with string trimmers. Vegetation management tasks include lopping, pruning, and girdling trees or large single-stem shrubs. Push mowers, leaf blowers, and weed-whips are also used.

Tasks where manual treatments are implemented include lopping and pruning. Hand tools are used in virtually all management areas to perform fine-scale tasks and finish work following use of heavy equipment. Invasive species may be encountered during creation of the VMAs. Handling of invasive species is covered under this VMP, and methods will be consistent with the IPMP (see Table 10-7 [Annual and Biennial Invasive Plants] and 10-8 [Perennial Invasive Plants] of the September 2014 IPM Guidance Manual). For herbaceous weeds, without viable seed heads, or woody weeds with small diameter twigs, slash is scattered on-site. Larger diameter woody material or very large volume of seedless herbaceous material may be piled for burning. State-regulated noxious weeds with viable seeds, including goatgrass and starthistles, are bagged and either composted and/or solarized on-site or landfilled off-site. Vining weeds, such as periwinkle and cape ivy, may be bagged and landfilled off-site or piled between tarps and solarized to prevent re-rooting while the vegetation decomposes.

Mechanical

Mowing and brushcutting are the primary categories covered under mechanical ~~removal~~ vegetation treatment. Motorized heavy machinery is mounted with various mowing, mulching, chipping, and masticating heads for larger scale vegetation removal projects and cyclical maintenance tasks. Grass is typically mowed with tractors. Heavy, renewable diesel-powered equipment includes excavators, backhoes, skid-steers, and tracked chippers, and tractors.

Equipment operates both on-road and off-road. Any equipment used off-road is typically track-mounted to minimize soil disturbance and compaction. The mowing or grinding heads and chippers reduce material to a size that does not require pile burning. Articulating arms are used to extend reach both outward and up so equipment can primarily stay on existing roads. A backhoe or excavator may push or pull down individual small trees (typically less than 8 inches

~~diameter at breast height (~~DBH~~)~~ either with the arm or with a cable or chain attached to the arm.

Heavy equipment is typically transported to an access point along an existing service road. Use of traditional heavy equipment is generally restricted to sites with 30 percent slopes or less and unsaturated soils. Special equipment may be able to work on slopes up to 60 percent. To maintain public safety, road guards, signage, and temporary closures are used when equipment operates in close proximity to recreational roads and trails.

Biomass disposal can be conducted through several methods. A masticator is a high-rotation drum with fixed teeth mounted on the hydraulic arm of an excavator that pulverizes vegetation. A masticator is used primarily for fuelbreaks, but also sometimes for brushing around structures, roads, parking lots and brush removal in grasslands. The masticator cuts vegetation ranging from grass to 6-inch diameter trees and can reach up to 22 feet horizontally. Masticators leave behind mulch and pieces of shattered wood up to approximately 12 inches long and can require, depending on vegetation, follow-up use of chainsaws by field staff. Use of a masticator is limited by terrain and soil moisture (i.e., soft ground).

Chipping is another method of biomass disposal that uses a chipper to reduce branches and other woody material to chips (usually 1 to 2 inches long and less than an inch thick) and dispersed on site in brush or forest covered areas. Most chippers are tow-behind models, but a tracked chipper may be used as a standalone piece of equipment as needed. Chippers vary in size and weight, largely depending on the maximum diameter of material it can chip, but all are renewable diesel equipment. Chipping differs from mulching in two ways: chips are generally larger in size than mulch and are dispersed widely and shallowly with no intent to smother or suppress vegetation. Chips generally should not be piled more than 3 inches deep in most instances, and should not be placed in drainages, grasslands, or against tree trunks. Chips may also be hauled off-site and utilized as ground cover or erosion control in other areas.

Green flaming (propane flaming) is also used during ~~vegetation management area creation~~ VMA maintenance to address broom and other invasive non-native species seedlings. Consistent with the IPM methods, specially designed small, hand-held propane torches are used in small areas to kill dense and newly emerged green seedlings. Flaming is usually conducted during light rains or on wet days when forest litter or grassland thatch is not likely to catch fire. Additional ~~and additional~~ precautions are implemented at the time of use, including bringing truck-mounted or backpack water tanks, and operating with more than one person on site. It is only appropriate for vegetation with low ignition potential per the IPMP.

Other methods to eliminate cleared biomass using mechanical methods is through pile burning. Pile burning is a method of biomass disposal that uses fire to eliminate piles of dried plant material. Piles vary in size from 5 to 10 feet in diameter and 4 to 8 feet in height. Piles are ~~constructed~~ created in concert with brush or weed removal and are placed in openings, away from power lines, and tree canopies to allow for safe ignition at a later date. The composition of piles varies with vegetation type. Piles could consist of chaparral species, broom, as well as

hardwoods, conifer limbs, and tanoak resprouts. The total volume of material burned in piles in a year will not exceed 500 tons. Pile burning occurs between November and May under the direction of Midpen employees ~~staff~~ on days when weather conditions meet the specifications and permitting of the Bay Area Air Quality Management District (BAAQMD) ~~permit~~ and the Monterey Bay Air Resources District (MBARD). Multiple piles may be burned on a single day. Prior to burning, a biological monitor will inspect slash piles prior to ignition to determine whether the pile needs to be taken apart and put back together again, or if wildlife are unlikely to be present ~~piles are rebuilt to ensure that wildlife have not begun using the piles~~. Drip torches or other approved ignition devices are used to start pile ignitions.

Chemical Application

Limited chemical control (herbicide) is used ~~in vegetation treatment~~ for stump and spot spray treatment during creation and maintenance of the VMAs. Broadcast spraying and burrow fumigation is not allowed under the IPMP nor the VMP. Chemical treatment methods used within VMAs include any method approved under the IPMP (including, but not limited to stump spray and/or spot spray). As shown in Figure 4-1, chemical use in 2018 was 2 percent of the total labor hours for vegetation management. The IPMP notes that typical annual use accounts for 10 percent of labor hours. This percentage may increase slightly given the greater acreages that can be treated under the VMP. Chemical control methods and requirements will follow the IPMP EIR and Addendum (Midpen, 2014; Midpen, 2019b) and Guidance Manual requirements; however, the acreage and amounts of herbicides needed specifically for vegetation system maintenance are covered under the VMP. Invasive species are prioritized for removal over native species on District lands.

Environmental and public protection measures, certification, the requirements to have a Pest Advisor, and other best management practices identified in the IPMP Guidance Manual and EIR are incorporated by reference into the VMP. The IPMP Guidance Manual is included as Appendix C. As BMPs are updated in the IPMP, they will also apply to the VMP.

Use of herbicide in a cut-stump method is used to maintain treatment areas that contain decadent woody vegetation. Trees or large shrubs that require removal within the inner 30 feet of defensible space are likely to be treated with an application of herbicide to the cut stump ~~by cut-stump method with herbicide to permanently remove them from this high hazard zone~~. Although brush encroaching into disclines and fuelbreaks will be primarily removed with chainsaws, more stubborn woody plants may require treatment with herbicide by cut-stump method. Spot treatments of vegetation within VMAs with other herbicides, as identified in Table 4-7, may also be used to the volume limits specified.

To meet legal requirements for defensible space, flammable vegetation may be spot-sprayed within the inner 30 feet of a structure with herbicide. Spot-spraying with herbicide is sometimes conducted within this zone, especially next to buildings and fences where it is difficult to operate a brushcutter or mower safely without damaging the structure or equipment.

Prescribed Herbivory

Midpen has employed both sheep and goats on a small-scale experimental basis for weed control purposes with limited success (prescribed herbivory). Prescribed herbivory under the VMP, with sheep, goats, or cattle, can be used as pre-treatment, typically in shrubland and forest understory, prior to using other techniques described further above. Prescribed herbivory for pre-treatment may require the installation of temporary fencing where natural barriers are not present and temporary or permanent water facilities and other infrastructure (tanks, corrals, fences etc.) as well as the deployment of guard animals and/or a shepherd.

4.7.3 Vegetation Management Strategies for Creation and Maintenance

Grasslands

~~Fire fuels treatment (grass mowing)~~ Mowing will be used to reduce potential fire spread and increase suppression efficiency in grasslands. Grasses in VMAs will be reduced in height to less than 4 to 6 inches and not cleared to mineral soil to minimize soil erosion. Non-native and/or non-local shrubs and trees, decadent native trees and shrubs (i.e., old plants with a substantial number of dead limbs and twigs), and conifers under 8 inches DBH may be removed entirely. In some instances, limited dead and or downed material may be left in place as a habitat feature if it poses little overall fire risk. Cyclical mowing of grasses in defensible space areas and other ignition zones (around parking lots and picnic areas) will typically be performed annually; ~~elsewhere grasses will not be mowed~~.

Removal of encroaching woody material will typically occur once every 3 to 5 years in fuelbreaks depending on the rate of regrowth. The maintenance of VMAs will be based on site-level assessments and implemented to maintain vegetation within the range of desired conditions using previously described tools and techniques. The work will be accomplished by top-cutting with power tools, such as string trimmers and brushcutters, with the infrequent use of chainsaws and heavy equipment with mower heads mounted on articulating arms. Disposal of woody cut material (slash) less than 1-inch DBH will be performed by lopping and scattering. Larger stemmed material will be chipped on-site and removed from the work area or piled and burned on-site after curing for a minimum of 60 days. Removed vegetation would remain within Midpen land, but may be trucked out of the area in which the work was conducted in. In some instances, limited dead and or downed material may be left in place as habitat features if it poses little overall fire risk. Herbaceous vegetation is not mowed during the creation of FRAs.

Shrublands (Coastal Scrub, Chaparral)

Shrubs will be removed or thinned until spacing between individual shrubs or shrub islands is more than double the height of the canopy (e.g., for shrub canopies 6 feet in height, 12-foot gaps will be created). Along property boundaries, shrubs may be completely removed to a width that reduces direct flame contact from adjacent developed properties, to a maximum of 100 feet. To create or maintain the required gap size, all target invasive species, dead shrubs, conifers, and chamise will be removed only as necessary. In some instances, limited dead and or downed material may be left in place as habitat features if it poses little overall fire risk (e.g., dusky footed woodrat middens, single snags, logs). Rare native species may be pruned, but not

removed in their entirety. Removal of shrubs will be accomplished by top-cutting with hand tools such as chainsaws and brush cutters, and with cutting or masticating heads mounted on heavy equipment. All stumps will be flush cut as low as possible parallel to the slope of the ground surface. Only resprouting target weed species will be completely uprooted, if herbicides are not applied. ~~; this uprooting~~ Uprooting will be minimized on steep slopes. Disposal of the cut material will be ~~done~~ performed by chipping, pile burning, or lopping and scattering. Cyclical maintenance in shrublands will typically be performed once every 3 to 4 years, though high densities of weeds may necessitate annual maintenance. The maintenance of VMAs will be based on site-level assessments and implemented to maintain vegetation within the range of desired conditions using previously described tools and techniques.

Oak Woodlands and Mixed Hardwood Forests

Understory shrubs, target weeds, and target conifers less than 12 inches DBH will be removed by the means described above. Depending on the site, more trees may need to be removed to reduce unnatural high ~~density~~ densities of trees and to promote late seral conditions. For retained trees, dead limbs up to 12 feet above ground may be removed. Live limbs up to 12 feet above the ground or up to one third of the tree's total live foliage may also be removed. Select snags (standing dead trees) or limited downed woody debris may be retained for wildlife habitat, but snags or other material that ~~are judged to~~ pose a high risk of firebrand production in a fire event may be removed. Fuel reduction will be accomplished with hand tools, and with cutting or masticating heads mounted on heavy equipment. Disposal of the cut material will be performed by chipping, pile burning, or scattering. Downed trees over 6 inches in diameter will be bucked in place; limbs will be removed; and the main trunk will be cut into lengths sufficient to ensure contact with the ground, chipped, or removed from the work area, if feasible. Cyclical maintenance in woodlands or forests will typically be performed once every 5 years (5 to 10 years or more in FRAs, if needed), though high densities of weeds may necessitate annual maintenance.

These treatments are aimed at removing the flammable understory vegetation to reduce the overall fuel load, as well as to decrease the chance of a crown fire and to preserve the woodland by removing ladder fuels. This treatment type creates a more open, shaded site as shrubs are removed and smaller herbaceous plants and ferns are retained.

Coniferous Forests

In some coniferous areas, mainly in dense Douglas fir and mixed hardwood forests, reducing the fuel load may require thinning of smaller, mid-canopy trees where densities are high. ~~In these cases, the~~ The trees will be felled and their branches removed for chipping, hauling, or pile burning. The trunks, if small enough, will be chipped, hauled, or pile burned as well. If trunks cannot be chipped or hauled, they may be left standing and pruned for wildlife habitat or cut trunks would be left on the ground. The number of trees to be removed will depend upon the particular location and site characteristics.

Agricultural Landscapes

Mowing and brush thinning will occur along agricultural service roads that could ~~provide~~ become ignition sources for adjacent natural areas. Conservation grazing (under the existing Conservation Grazing Program) will continue to be used to reduce fuel loads in grassland areas.

Tree Removal

Individual tree removal may be considered in specific locations to reduce the production of firebrands and spotting during wildland fires and thus reduce risks to public safety. Non-native trees may be removed if they compromise the integrity of a native tree. The IPMP allows for 50 to 100 hazard trees to be removed per year. The VMP would allow up to 50 additional trees to be limbed or removed entirely per year for fire hazard reduction as well as the eucalyptus and acacia tree removal described above. For example, scattered live trees (<10 inches DBH) or SOD-killed trees may be removed at ridgetop locations that are vegetated mainly with ~~by~~ grass or chaparral. The removal and disposal of these trees would be conducted as previously described. In some instances, trees may be left in place as a habitat feature until its use by a native species is complete (e.g., wait to fell a tree with a known raptor nest until fledglings have left the nest). Midpen will adhere to local regulations regarding heritage, significant, or protected trees.

4.7.4 Equipment

Table 4-8 below lists the types of equipment used to implement vegetation management actions. While much of the equipment listed is conservatively showed to be run on gas or renewable diesel, Midpen is incrementally increasing its use of electric equipment to replace as much gas-powered equipment as possible. All of the equipment in Table 4-8 could eventually be electric powered, when suitable equipment and technology is made available.

4.7.5 Access

Access will be entirely from existing roads and trails. No new access roads are included as part of this VMP. In some cases, access to work sites will not be accessible directly from maintained trails and roads and will be achieved by creating skid trails, which include foot trails or using former trails that have grown over and can be cleared for access. Sensitive habitats, creeks, and wetlands will be avoided. Clearing of skid trails will not occur when soils are wet. The skid trails will not be graded or scraped. Skid trails will be rehabilitated following use, which involves de-compacting soils, removing skid lines, distributing surrounding litter/duff back on-site, and obscuring entrance points with brush.

Table 4-8 Typical Equipment Used for Vegetation Management Activities

Vehicle/Equipment Type	Fuel Type [a]
Light duty automobile (car/light truck)	gasoline
Heavy truck	gasoline or renewable diesel
Water truck	renewable diesel
Van/medium truck	gasoline

Vehicle/Equipment Type	Fuel Type [a]
Wildland Type 3 fire engine	renewable diesel
Wildland Type 6 fire engine	renewable diesel
ATV	gasoline or renewable diesel
Chainsaw/brushcutter	gasoline (25:1 or 50:1 with 2-stroke oil) or electric
Leaf blower	gasoline or electric
Chipper	renewable diesel
Skid steer loader [b]	renewable diesel
Backhoe [b]	renewable diesel
Excavator [b]	renewable diesel
Tractor [c]	renewable diesel
Generator	gasoline or renewable diesel
Driptorch	gasoline and diesel (1:4)
Propane torch	propane

Notes:

[a] Any of this equipment could also be electric powered, where available.

[b] May be used with masticator or mower head.

[c] May be used with disc harrow attached.

4.7.6 Personnel

Personnel needed to conduct various vegetation management actions depends upon the project and the year of implementation. The number of workers on any given project will depend upon the activity. Crews of up to 20 people may be required for some project types. Up to 60 workers may be conducting vegetation management activities in a single day, but generally, only a few crews will be operating simultaneously. The amount of vegetation management work that can be completed each year will depend on annual staff capacity, funding, partnerships, and other resource availability and will need to be balanced with other Midpen priorities that further the mission, annual Board-approved Strategic Goals and Objectives, ~~and~~ Vision Plan and Annual Budget and Capital Improvement and Action Plan.

4.7.7 Schedule and Timing for Implementation

Work generally occurs during daylight hours, typically from 7:00 am to 7:00 pm. Vegetation management activities will occur year-round with certain tools and techniques confined to specific months due to limitations such as the wet season, species protection requirements, permitting restrictions, and official fire season as determined by Midpen's Chief Ranger or Area Superintendent, as detailed in Table 4-9. Scheduling and timing will be dependent on annual staff capacity, funding, partnerships, and other resource availability and will need to be

balanced with other Midpen priorities that further the mission, annual Board-approved Strategic Goals and Objectives, ~~and~~ Vision Plan and Annual Budget and Capital Improvement and Action Plan.

Table 4-9 Summary of Typical Timing for Each Treatment Method

Treatment Type	Treatment Method	Typical Timing of Work
Manual and Mechanical	Mowing and Cutting	April through December
	Discing and Cutting	April through July
	Masticating	April through December
	Pulling	April through December
	Chipping	April through December
	Pile Burning	October 31 to Mid-May (wet season)
	Flaming	December through March
Chemical Application	Glyphosate Round-up Promax; Clethodim; Aminopyralid; Clopyralid; Imazapyr; Triclopyr BEE/TEA	Spring and Summer
Prescribed Herbivory	Livestock	Year-round

4.8 Best Management Practices Incorporated into the VMP

Midpen has developed BMPs for the IPMP, which apply to the VMP as well. All BMPs apply to this Program and are incorporated here by reference. The most recently updated BMPs will apply to this Program in any given year.