



# ***Administrative DRAFT***

## ***Guidelines for Vegetation Management for the Big Sur Coast Highway Management Plan***



Highway 1 along the Big Sur Coast  
From San Carpoforo Creek in San Luis Obispo County  
To the Carmel River in Monterey County  
SLO-1-71.4/74.3  
MON-1-0.0/72.3



Caltrans District 5  
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# Administrative Draft Vegetation Management Guidelines

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# Administrative Draft Vegetation Management Guidelines

## 1.0 PURPOSE

The Big Sur Coast Highway Management Plan (CHMP) Vegetation Management Guidelines are intended to guide Caltrans roadside management activities within the Highway 1 right of way and easement areas that Caltrans works in, such as for construction and maintenance operations. The guidelines seek to adapt the existing structure of management practices from the Caltrans Maintenance Manual to focus on the corridor-specific needs of Big Sur for effective resource management and preservation.

These guidelines were prepared in support of the Big Sur CHMP, which pursues a coordinated management approach for the highway and resources within the corridor, that Highway 1 serves. It's aim is to promote the safe and efficient operation of the highway while ensuring the long-term preservation of the intrinsic (natural, scenic, historic, and recreational) qualities within the corridor.

Specifically, the guidelines will protect and preserve the sensitive plant species, critical plant communities, sensitive wildlife habitats, historical/cultural resources, scenic viewsheds, and waterways located within the corridor. While preserving the native vegetation, the document will also present measures that will aid in the control of invasive weeds, which is a high priority for many stakeholders, including community members, regulatory agencies and a variety of non-governmental organizations. These guidelines will provide a framework for monitoring the success of re-vegetation and weed control efforts within the corridor, as well as provide guidance for maintenance personnel in their daily operations, so that they coincide with the preservation and restoration efforts.

To more efficiently manage Highway 1, Caltrans is taking on a collaborative approach, involving partnerships with various regulatory agencies, governmental bodies and community stakeholders. The guidelines are the product of the collective concerns and ideas expressed by these working groups, an attempt to truly reflect the values and qualities of Big Sur. The result will be guidance to protect the native habitats and sensitive resources through the control of non-native plant species, while preserving the natural, scenic, historic and recreational qualities of Big Sur and the interests of the local community.

## 1.1 BACKGROUND

Highway 1 in Big Sur attracts many visitors (annual traffic on this portion of Highway 1 is over 1.5 million vehicles) because of its dramatic landscapes, towering redwood forests and breathtaking views of the rugged California coastline. The highway was constructed to improve access to the region for residents and to make the Big Sur coastline accessible to tourists. Construction was difficult due to the extreme topography and remoteness of the region, and took over 18 years to complete. In 1937, the highway opened and Big Sur immediately became one of California's premier natural attractions.

As more visitors experienced Big Sur, many recognized the unique qualities that it possessed, such as the abundance and diversity of native plant species and wildlife. In 1965, Highway 1 through Big Sur became the first Designated State Scenic Highway, and in 1996, it was given the status of an All American Road under the National Scenic Byways program by the Federal Highway Administration (FHWA). This was based on the archeological, cultural, historical,

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natural, recreational and scenic qualities that Big Sur offers, which are considered representative, unique, irreplaceable or distinctly characteristic of the area.

After the designations by the FHWA and the State of California, it became more apparent that efforts to preserve the region were increasingly important. The primary goal of the State Scenic Highway program is “to preserve California’s delicate and pristine coastal ecosystems for its natives, visitors, and future generations, while still providing opportunities to experience its wonder.” This became the context for the CHMP and the framework for which the Vegetation Management Guidelines were prepared.

The preservation and protection of intrinsic qualities in the region have become a focus for much of the local, state and federal planning for years. The CHMP, and specifically the Vegetation Management Guidelines, have taken many of the adopted policies into consideration during their development. A significantly relevant document to the management of local vegetation and protection of the intrinsic qualities is the *Big Sur Coast Land Use Plan of the Monterey County Local Coastal Program*, 1986.

### **Monterey County Local Coastal Program**

In 1986, Monterey County developed the Land Use Plan for the Big Sur Coast segment of Monterey County’s Local Coastal Plan, which superseded the Monterey County Coast Master Plan that was adopted in 1976. The document provides standards for development to guide actions by State and local agencies within the region.

The basic goal set by the Big Sur Coast Land Use Plan is to:

*“Preserve for posterity the incomparable beauty of the Big Sur country, its special cultural and natural resources, its landforms and seascapes and inspirational vistas. To this end, all development must harmonize with and be subordinate to the wild and natural character of the land.”*

To accomplish this goal, five basic objectives were set and, of most importance to the CHMP, included sections dedicated to natural resources, coastal scenic resources and Highway 1. These objectives were met by providing policies regarding important aspects within Big Sur. Applicable policies for the Vegetation Management Guidelines are listed below.

- Ocean views from Highway 1 shall not be obscured by artificial berming/mounding or landscaping (3.2.3.B.1)
- Development, including vegetation removal, excavation, grading, filing, and the construction of roads and structures, shall not be permitted in the environmentally sensitive habitat areas if it results in any potential disruption of habitat value (3.3.2.1)
- Land uses adjacent to environmentally sensitive habitats shall be compatible with the long-term maintenance of the resource (3.3.2.7)
- The County shall require the use of appropriate native species in proposed landscaping (3.3.2.9)
- Restoration of native forest resources is encouraged for public agencies and residents as a means of maintaining and enhancing Big Sur’s natural character. Removal of non-native tree species is encouraged (3.5.2.3)

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- A principle objective of management, maintenance, and construction activities within the Highway 1 right of way shall be to maintain the highest possible standard of visual beauty and interest (4.1.2.2)
- Native vegetation that does not obscure the public view should be re-established on bare areas (4.1.3.B.1)
- Specific attention should be given by the State to eradicate non-native plant species that are contributing to a decline in the natural beauty of Big Sur. Pampas Grass, Kikuyu Grass, Broom, Eucalyptus and other species should be removed and replaced with native plants (4.1.3.B.2)

These policies adopted by Monterey County provided guidance for the Vegetation Management Guidelines, so that the environment and its important components can be protected and preserved during Caltrans maintenance and construction activities.

## **Stakeholder Interest**

In addition to these two documents, stakeholder interest and values have played an important role in the development of the guidelines. Caltrans is working in cooperation with a variety of stakeholders, including governmental and non-governmental entities and adjacent landowners, both public and private, to strengthen the protection for native plant communities. By working with the stakeholders, Caltrans can develop comprehensive strategies to preserve and restore the natural environment of Big Sur.

The stakeholder groups interested in vegetation management are broken up into three categories, resource based, land managers and coordination entities. Resource based stakeholders are regulatory agencies that have involvement throughout the corridor, and include the Monterey Bay National Marine Sanctuary, U.S. Fish and Wildlife Service, California Coastal Commission, California Department of Fish and Game, Monterey County Department of Planning and Building, and the California Native Plant Society. Land managers are public and private sector interests that are geographically connected to the Big Sur corridor. Large landowners include the U.S. Forest Service, California Department of Parks and Recreation, El Sur Ranch, Big Sur Land Trust, and the UC Big Creek Reserve. Many smaller parcels along the corridor that remain in private ownership. Groups that are actively seeking a coordinated approach to vegetation management or weed control are considered the coordination entities. These include the California Exotic Pest Plant Council, Big Sur Weed Management Area, and Monterey County Agricultural Commissioner (“War on Weeds Partnership”).

## **1.2 APPLICABILITY AND AUTHORITY**

The Vegetation Management Guidelines are prepared in support of the Big Sur CHMP, a Corridor Management Plan (CMP) under the National Scenic Byways program of the Federal Highway Administration. The study area is 75-mile section of Highway 1 along the Big Sur Coast from San Carpoforo Creek in San Luis Obispo County to the Carmel River in Monterey County (SLO-1-71.4/74.3 to MON-1-0.0/72.3)

The CMP prepared for the 1996 designation is being revised and updated with the development of the CHMP which provides a framework for decision-making and guides overall management to ensure the long-term preservation of the corridor’s intrinsic qualities. The practical use of these Guidelines will institutionalize best practices for roadside maintenance practices and highway construction, whether planned or as part of an emergency action along the corridor.

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These Guidelines are also prepared under the direction provided by *Executive Order #13112 on Invasive Species*. Executive Order #13112 (E.O.) was signed by President Clinton on February 3, 1999 that requires Executive Branch agencies to work to prevent and control the introduction and spread of invasive plant and animal species. Due to the frequency of invasive plant species distributed through highway maintenance and construction projects, the FHWA has been instructed to “not authorize, fund or carry out any action that can likely cause or promote the introduction or spread of invasive species.” Federal Aid and Federal Lands Highway Program funds may not be used for construction, re-vegetation measures, or landscaping projects that may include the use of known invasive plant species.

Under this order, the State Departments of Transportation are encouraged by the FHWA to implement the Executive Memorandum on Beneficial Landscaping whenever possible. These methods, as described in the *Environmentally and Economically Beneficial Practices on Federal Landscape Grounds*, include:

- Use of regionally native plants for landscaping;
- Design, use or promotion of construction practices which minimize adverse effects on natural habitats;
- Prevention of pollution by reducing fertilizer and pesticide use
- Use of Integrated Pest Management (IPM) techniques, green waste recycling, and runoff minimization
- Implementation of water efficient practices
- Creation of outdoor demonstrations to promote public awareness.

Caltrans’ CHMP planning effort, and specifically the Vegetation Management Guidelines, has been guided by this E.O. Under Section 2 of the order, federal agencies are authorized to create programs that will prevent the introduction and spread of invasive species. The program outlines various responsibilities:

- Prevent the introduction of invasive plant species
- Detect and respond quickly to and control the populations of species in an environmentally sound and cost effective manner
- Monitor populations of invasive species accurately and reliably
- Provide for the restoration of native species and habitat condition in affected ecosystems
- Conduct research on invasive species and develop technology to prevent the introduction and provide for environmentally sound control of invasive species
- Promote public education on invasive species and means to address them

As a recipient of federal funds for planning activities and capital improvements, Caltrans efforts to produce and implement these Guidelines is consistent with this E.O.

## **2.0 MANAGEMENT OBJECTIVES**

The Streets and Highways Code 167 establishes the following priorities for Caltrans:

1. Operations, maintenance and rehabilitation of facilities
2. Safety improvements
3. Congestion relief
4. Environmental enhancement and mitigation

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With the possible exception of congestion relief, which is associated more with urban settings, these priorities hold true for the Route 1 corridor along the Big Sur Coast.

For this corridor, the primary issues of concern are for preservation of the highway facility and habitat protection. Several elements of the guidelines, such as weed control, support both of these objectives. The focus of these efforts is to implement environmental enhancement goals in conjunction with facility preservation and highway maintenance/construction.

## 2.1 PRESERVATION OF FACILITY

To ensure highway safety and visual quality along the corridor, vegetation around certain features must be maintained and controlled. Important features include pavement, roadside safety devices, waterways and drainages, signs, sight distance, and historic highway features. Vegetation should be managed to a specified height or removed, depending on specific objectives. The following are management considerations for each highway feature.

### ***Pavement***

- Vegetation should be controlled where space exists for vehicles to pull over
- Control strips along roadside should facilitate maintenance equipment and clearance for both vehicle and bicycle/pedestrian traffic
- Maintain roadsides of traveled way to keep free of any vegetation overgrowth

### ***Roadside Safety Devices***

- Includes guardrails and reflective markers
- Control vegetation to maintain functionality of safety devices
- Clearance may vary depending on maintenance methods used

### ***Waterways and Drainages***

- Includes bridges, culverts and roadside ditches
- Vegetation and debris should be controlled as necessary to facilitate drainage
- Methods include channel clearing, removal of vegetation and sediment, protection and repair from erosion, and removing encroachments that impede drainage

### ***Signs***

- Includes highway signs only
- Vegetation should be controlled to facilitate safety device, based on maintenance method used

### ***Sight Distance***

- Described as the “continuous length of highway ahead visible to the driver”, which includes passing, stopping and decision sight distance<sup>1</sup>
- Vegetation should be pruned and mowed for horizontal curves and intersections as needed to maximize traveler safety

### ***Historic Highway Features***

- Includes rock masonry features, such as parapets, culverts, headwalls and drinking fountains
- Control vegetation around these features as necessary to protect the integrity of the feature

<sup>1</sup> *Highway Design Manual*- Caltrans

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## 2.2 RESOURCE PROTECTION

The diverse native plant communities in Big Sur are becoming threatened by non-native species. The presence of these exotic plants causes the native communities to become less stable, and subsequently have the potential to affect sensitive habitats. To alleviate these potential effects, a heavy focus of these guidelines is on weed control. Preservation of views along the corridor are also important; weeds again are the primary target for this objective as well.

### Protection of Habitat

Numerous native plant communities are found along the corridor. These communities include Coastal Scrub, Oak Woodlands, Riparian, Mixed Evergreen Forest, Redwood Forest, Coastal Dune, Coastal Wetland and Grasslands. Along the corridor, these communities serve as hosts for special focus or sensitive species and habitats that are present. Any negative effects to these communities pose a threat to the plant and wildlife species that rely on them to survive.

Seacliff Buckwheat (*Eriogonum parvifolium*) is of great importance on the central coast of California, as it serves as the host plant for the federally endangered Smith's Blue Butterfly. The buckwheat is prevalent throughout the corridor and is associated with coastal bluff scrub, coastal sage scrub, central coastal scrub and *Ceanothus* scrub communities. One of the greatest threats to the butterfly is the invasion of non-native plant species within these plant communities that contain buckwheat. With a major focus on exotic plant control in the guidelines, the negative effects to the buckwheat stands and the Smith's Blue Butterfly will be reduced. In addition to planting more *E. parvifolium* plants, their seeds will be included in most re-vegetation and erosion control efforts, using only local seed where feasible.

Wetland and riparian zones that contain rare aquatic or amphibious wildlife species also exist along the corridor. These include, but are not limited to, South Central California Coast Steelhead, Tidewater Goby, California Red-Legged Frog and the California Tiger Salamander. Plant communities associated with these are Central Coastal Cottonwood/Sycamore Riparian, Central Coast Riparian Scrub and California Bay Forest. Ephemeral drainages, streams/creeks, rivers, seeps/springs, ponds and wetland are considered riparian zones that require special attention during maintenance and construction activities.

Weeds are a major concern along the highway, as they are spreading and crowding out native species, thus degrading native plant communities and habitats. The Vegetation Management Guidelines concentrate a majority of efforts on weed control, targeting specific weeds that are considered to be of greatest threat to the corridor. These have been broken down into primary threats and secondary threats, based on their prevalence and degree of damage done to the region. The following is a compilation of these threats with a brief description of damage that each could potentially cause.

### Primary Threats

French Broom (*Genista monspessulana*) is a woody perennial that is widespread throughout the corridor. It has a wide tolerance of soil conditions and thrives in the sandy soils of the Big Sur region. Seed production is prolific, which stay viable in the soil for years, creating a threat of re-infestation after many years. Broom forms dense, impenetrable thickets that invade and crowd out

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native vegetation. In summer months, plants dry out and become an increased fire hazard, which is especially dangerous in areas where thick stands have developed. Broom is currently present in communities that are associated with the Seacliff Buckwheat, which may further pose a threat to the Smith's Blue Butterfly.

Another widespread problematic invasive plant is Jubata or Pampas Grass (*Cortaderia jubata*). This plant becomes highly competitive with native plants when seedlings are established, thus threatening ecological qualities of coastal and grassland sites, including areas with the Seacliff Buckwheat and Smith's Blue Butterfly. The rapid growth, in addition to the above- and below-ground biomass, outcompetes natives for light, water, and nutrients. Due to the prolific production of small, light seeds, this plant is spread rapidly by wind or when disturbed by animals or humans.

Fennel (*Foeniculum vulgare*) is a common invasive plant in the Big Sur region that quickly occupies highly disturbed areas, such as highway roadsides. When established, it can exclude almost all other vegetation. This plant is difficult to control because it can reproduce from the root crown, as well as from seed. As an annual weed, at the end of its life cycle it leaves a large skeleton that becomes a fire hazard and an obstruction of the viewshed. This species has also become well established in areas that contain Seacliff Buckwheat and Smith's Blue Butterfly.

### Secondary Threats

Sticky Eupatorium (*Ageratina adenophora*) is a species that grows successfully in almost all communities present in Big Sur. Areas that are most commonly infested are disturbed roadsides, Coastal Scrub and wetlands. In summer months, Eupatorium occupies the wet areas and displaces the native riparian species. This plant is also a threat due to the aggressive nature of spread, which is primarily by seed.

Another species that invades sensitive riparian and wetland communities is Cape Ivy (*Delairia odorata*). This plant forms a dense mat that completely smothers all underlying native vegetation. Cape Ivy spreads very rapidly by vegetative means. If there are any viable root fragments left in the soil, they will re-root themselves and grow. This becomes a problem when attempting to remove the plant.

Purple Star Thistle (*Centaurea calcitrapa*) invades and thrives in disturbed roadside areas and adjacent pastures, crowding out native vegetation. It produces a seed bank that is viable in the soil for years. The seeds can also remain dormant in the soil for long periods of time, giving rise to future infestations. The seedheads themselves pose a further problem, as they are easily broken off and dispersed by animals, moving water and vehicles. In addition, the seeds are well suited for sticking to rubber tires, which makes them easily spread along the roadsides of Highway 1.

An invasive species seen along the beach and dune areas of the corridor is Iceplant (*Carpobrotus edulis*), which is commonly planted for erosion control on sandy slopes. This very hardy plant clings to the sandy soils along the roadside and spreads over the entire surface, outcompeting any native vegetation. As with Cape Ivy, Iceplant also spreads very easily by vegetative means, creating a problem when using removal techniques.

Vinca (*Vinca* spp.) is an invasive plant that becomes established primarily in shady, riparian areas. It forms a dense carpet that nearly excludes all other species from growing in the area. Vinca can grow up and down trees, threatening their survival. It can also become a problem in drainage areas, where it grows in and out of drainage facilities, preventing proper drainage flow.

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This plant can become a problem when attempting removal, as it re-sprouts quickly after damage and spreads rapidly by stolons.

Yellow Star Thistle (*Centaurea solstitialis*) easily establishes itself in areas that are disturbed by road construction and maintenance. The seeds are produced in large amounts and can stay viable in the soil for years, giving rise to future infestations. Since road maintenance equipment and the undercarriages of vehicles easily transport the seeds, they pose a threat to the Big Sur corridor. Yellow Star Thistle has an extensive root system that reaches far into the soil profile and will out-compete shallow rooted native annuals in the summer. Common control practices, such as mowing, can become a problem since the tops of these plants re-grow very easily after they have been removed.

Fountain Grass (*Pennisetum setaceum*) is a common landscape perennial grass that, when growing outside the garden, crowds out other species, reducing the chance for native establishment. It produces large numbers of wind dispersed seeds that can remain viable in the soil for well over six years. When dormant or dead, the leaves become dry and act as fuel for wildfires. And if wildfires do occur or if prescribed burning is used as a control method, Fountain Grass will rapidly reestablish itself after burning.

A species that is well adapted to the coastal climate of Big Sur is Kikuyu Grass (*Pennisetum clandestinum*), a common landscape plant that has escaped to the roadsides. This plant has rapid stolon growth and thatch formation. Kikuyu Grass is very difficult to control because the stems re-grow very easily after common maintenance practices such as mowing. Each piece that is broken off and left on the soil can produce new shoots and root from the nodes. This plant can spread by seed in addition to spreading by stem sections left behind after cultivation.

Poison Hemlock (*Conium maculatum*) is a common species found on roadsides and invades native communities in riparian woodlands and open flood plains of rivers and streams. Once established, plants colonize quickly, degrading the quality of sensitive habitats. This plant has invaded roadside areas because it is easy for the seeds to adhere to machinery and vehicles.

Italian Thistle (*Cardus pycnocephalus*) colonizes already disturbed habitats and displaces desirable forage and cover plants. This plant can germinate rapidly and in large numbers, creating breakouts of infestations. Like many of the other invasive plants seen along the corridor, Italian Thistle's seeds are dispersed easily by wind and can stay viable in the soil for many years.

Caltrans is taking the most effective measures possible to help control the spread of these weeds. Several manual, mechanical and chemical techniques have been considered as methods of management. These methods of control are described in detail in section 3.1.

### **Protection of Views**

Attention to views from the highway is especially important. Open vistas, framed views of specific visual elements, and screening of certain man-made elements all contribute to the overall visual quality that has earned this section of coastline so many accolades. Federal, state and county policy emphasizes the importance of the preservation of views throughout the corridor.

The following section describes the objectives of visual preservation and the measure taken to accomplish it. The *Scenic Qualities Inventory* prepared for the CHMP, concentrates on the positive and negative features within a series of viewsheds along the highway. This methodology supports a defensible rating system for assessing visual quality at given locations. The Vegetation

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Management Guidelines look more at large scale views and the methods utilized to enhance the overall quality of the visual environment, while identifying particularly sensitive locations that may require extra attention.

The *Scenic Qualities Inventory* characterizes the quality of views that exist along the corridor. The inventory analyzes the corridor by sections referred to as viewsheds, which are further broken down into landscape units. A viewshed is the visual envelope that a person can see while travelling on the road, encompasses different visual elements and is often defined by topographic features. This is the overall view that is seen, and overgrown or unwanted vegetation detracts from this experience. A landscape unit is the sub-section of a viewshed exhibits a consistent or cohesive visual character primarily based on vegetation, topographic or man-made elements. Elements that may be characteristic of a landscape unit might be the historic masonry, a group of buildings, rocky slopes and distinctive vegetation.

Many elements have been noted to potentially cause view obstruction at many locations, including vegetation and maintenance or construction elements. As noted in the *Scenic Qualities Inventory*, problems with vegetation include tall weeds along the ocean side of the highway, dead or dying trees and stumps, non-native trees screening views, overgrown vegetation, and even lack of vegetation in areas that see high use by people. The *Scenic Qualities Inventory* also found rubble or berms along the shoulder on the ocean side or at view locations, left over debris from landslides and the contemporary features that contrast with the natural landscape as elements which detract from the overall visual quality.

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## 3.0 GUIDELINES

These guidelines provide a framework for maintenance and construction related activities within the corridor. These guidelines describe both current and modified practices that would best manage the roadsides, conduct repair and restoration practices in support the overall goals of the CHMP.

Specifically, this section addresses two main activities, general roadside practices as well as restoration activities, where construction is necessary (including erosion control and revegetation).

## 3.1 GENERAL ROADSIDE PRACTICES

### Roadside Vegetation Management

Along the highway corridor, maintenance crews will be guided to control vegetation in all areas along the right of way. These include cut ditches, the pavement edge, and unpaved areas such as drainage inlets, culverts, guardrails, vista points and safety apparatus. Consideration will be given to mechanical, manual, cultural, and chemical control methods.

#### Mechanical Methods

Mechanical methods of vegetation management include activities such as mowing, burning and scraping. These practices are all performed with mechanical equipment that is not considered a hand tool. A majority of these practices can be done with equipment that allows for less labor-intensive work, making it more efficient. Burning roadside vegetation is not used as a roadside vegetation control practice, however, fires do help to renew soils, remove unwanted species and encourage the growth of native species, which compliments efforts of a restoration program.

#### Manual Methods

Control methods under this designation are those that require the use of hand tools, mechanical or non-mechanical. These can include, but are not limited to, string trimmers, chainsaws, hand hoeing, grubbing, pruning and hand pulling. Manual methods not using mechanized hand tools can be more labor intensive, however they are very useful and efficient when working close to sensitive resources that must not be disturbed.

#### Cultural Methods

Cultural methods are those that manipulate the environment so that plant growth may be improved. These can be preventative measures to ensure that no invasive species are introduced and that during projects, sensitive species and habitats are given special consideration. Examples of these types of activities include thorough maintenance equipment cleaning, transplanting sensitive species out of the way of projects and identification/flagging of sensitive resources prior to work.

#### Chemical Methods

Caltrans is committed to reducing overall use of pesticides on a statewide basis. However, herbicides remain a necessary component of effective vegetation management. Careful application can focus on target species. Herbicide application must balance successful results with the least impacts on surrounding desirable vegetation and environment, which can be achieved through selective spot spraying. Maintenance crews should exercise caution around sensitive species and habitats/communities and adjacent property owners.

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## Weed Control

The following are tables that illustrate various mechanical, manual and chemical control practices for weeds. Each target species is identified with specified procedures that take into consideration various elements of each plant, such as the life cycle and growth habit.

### ***French Broom***

<b>Manual</b>	<p><u>Hand pulling:</u> used to destroy seedlings; most easily done after a rain when the soil is loose; plants should be pulled as soon as they are large enough to grasp but before seeds have been produced</p> <p><u>Hand hoeing:</u> do while plants are still small by cutting off tops or stirring the surface soils to expose seeds and facilitate drying; objective is to cut off weeds without going too deep in ground, causing damage to roots of desirable vegetation; plants that are larger can be removed using a claw mattock</p> <p><u>Cutting:</u> use of brush cutters, machetes, loppers, etc.; removes above ground portion of plant; cut plants before seeds are produced to prevent dispersal; not as effective, as the crowns can re-sprout</p> <p><u>Hand digging:</u> removal of rootstock; suitable for small infestations or around sensitive species; all parts of roots must be removed to prevent re-sprouting</p>
<b>Mechanical</b>	<u>Chopping or mowing:</u> plants can be trimmed back in areas of flat ground; faster and more economical way of removal; causes less soil disturbance; requires removal of rootstock to prevent re-sprouting
<b>Chemical</b>	In areas with small stands use selective spraying; for areas with severe infestations, use broadcast spray methods

### ***Jubata Grass***

<b>Manual</b>	<p><u>Hand pulling:</u> pull or dig out seedlings or small plants; remove entire crown to prevent re-sprouting</p> <p><u>Hand hoeing:</u> for larger plants, use a pulaski, mattock, or long bladed shovel to remove clumps</p>
<b>Mechanical</b>	<u>Chopping or mowing:</u> use a chainsaw or weedeater to expose base of plant; this can allow for better access to the crown for manual removal; cutting of the inflorescence is important to prevent seed dispersal; cut or mow before the plant has set seed
<b>Chemical</b>	Spot treat with a post-emergent herbicide; it may be necessary to apply in late summer prior to maturation of viable seeds; once the plant is killed, remove clumps when possible/practical

### ***Fennel***

<b>Manual</b>	<u>Hand hoeing:</u> employ deep cultivation in the area by use of a mattock to loosen soil and remove small infestations
<b>Chemical</b>	Spot spray when the plant is actively growing but prior to flowering stage; thoroughly wet the crowns of the plant

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### *Sticky Eupatorium*

<b>Manual</b>	<p><u>Hand pulling</u>: hand pull or dig out the smaller infestations</p> <p><u>Hand hoeing</u>: use a mattock to dig out plants, including the crown to prevent re-growth</p> <p><u>Cutting</u>: can be done by slashing with a machete on heavy infestations; this can help reduce flowering and seedset</p>
<b>Chemical</b>	Spot spray during Spring months, being sure to thoroughly spray crowns

### *Cape Ivy*

<b>Manual</b>	<p><u>Carpet rolling</u>: turn vegetation over using a trowel and roll the mat over; remove roots from soil to prevent re-sprouting</p> <p><u>Hand pulling</u>: utilize in areas with woody vegetation or when desirable native species are present; remove duff layer to help remove small pieces of ivy; native species may need to be mowed to effectively remove heavy ivy infestations</p>
<b>Chemical</b>	Spray with a surfactant added to penetrate waxy cuticle; spray until the leaves and vines are wet but not dripping

### *Purple Star Thistle*

<b>Manual</b>	<u>Hand hoeing</u> : use a pulaski to sever the roots of the plant; chop the root deep enough so that the crown is cut out (at least 3" below the base of the plant); remove the plant before seeds are formed
<b>Mechanical</b>	<u>Mowing</u> : less effective measure; if mowing must be done, do so when the re-sprouting ability is low
<b>Chemical</b>	Apply when plant is most susceptible before seeds are produced, which is just after the plant bolts but before flowers set seed in May; apply selective herbicides for use on large populations; be sure to apply directly to top of plant and careful to avoid dripping

### *Iceplant*

<b>Manual</b>	<p><u>Hand pulling</u>: hand pull individual plants in small infestations, removing any buried stems</p> <p><u>Carpet rolling</u>: large mats can be removed by loosening them from soil and rolling them up</p>
<b>Chemical</b>	Spray herbicides in the Fall, and mix with a surfactant to penetrate the plants waxy cuticle

### *Vinca*

<b>Manual</b>	<u>Hand pulling</u> : effective on small infestations; most beneficial to remove all roots from soil to prevent re-rooting
<b>Mechanical</b>	<u>Mowing</u> : raise up runners by lifting with a rake and mow close to ground; remove all left over debris and roots by hand pulling
<b>Chemical</b>	Spray herbicides in early or late Spring when plant is actively growing; most successful when sprayed after plants have been damaged by mowing; use a surfactant to penetrate the waxy cuticle of the leaves

### *Yellow Star Thistle*

<b>Manual</b>	<u>Hand pulling and hand hoeing</u> : most effective on small patches of infestation after plants have bolted but before viable seed is produced; detach all above ground stem material
<b>Mechanical</b>	<p><u>Tillage</u>: most effective on roadsides where no desirable plants are present</p> <p><u>Mowing</u>: best on plants with a high branching pattern; should be used as a late season management tool, conducted at early flowering stage before viable seed production</p>
<b>Chemical</b>	Spray before flowering in the early rosette stage; most successful when used on seedling plants

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### ***Fountain Grass***

<b>Manual</b>	<u>Hand pulling</u> : remove entire plant when possible; best used in areas with small infestations <u>Cutting</u> : remove seed heads to reduce dispersal; immediately dispose to prevent further spread
<b>Chemical</b>	Spray infestations in the fall, as the chemical will be drawn down to the roots more efficiently at this time; this will help to kill the following year's shoots as well

### ***Kikuyu Grass***

<b>Manual</b>	<u>Hand pulling</u> : remove entire plant and dispose of debris immediately to reduce spread
<b>Chemical</b>	Most effective to control new growth by spraying in spring of fall; if re-growth is seen, spot spray in fall

### ***Poison Hemlock***

<b>Manual</b>	<u>Hand pulling</u> : most effective when done prior to flowering; removal of entire root system is not necessary
<b>Mechanical</b>	<u>Mowing</u> : mow plants just before flowering; this will remove bolting material and prevent seed production
<b>Chemical</b>	To control the emergence of new sprouts, spray when plant is in a dormant stage; spray in early spring to control weeds that have already emerged; to control plants in the rosette stage, spot spray in early spring or late fall

### ***Italian Thistle***

<b>Manual</b>	<u>Hand hoeing</u> : most effective for small patches; be sure to sever the root 10cm below ground level; conduct in spring or early summer before seeds are produced <u>Slashing</u> : can be more effective than mowing because it destroys the aerial portion of the plant; conduct in spring to early summer
<b>Chemical</b>	Spot spray in February to March, being sure to wet plants thoroughly; most effective on larger infestations where there are no existing desirable plants

### **Best Practices**

A set of best practices for vegetation management was developed to ensure that all maintenance and construction practices are completed under the highest safety standards, for the traveler and maintenance personnel, and with the least impact to the environment. Best practices for vegetation management were designed for trees, brush and weeds:

<b>Trees</b>
<ul style="list-style-type: none"> <li>• Prune for stopping sight distance, visibility of highway signs and safety devices, and to provide overhead clearance at shoulder and traveled way.</li> <li>• Pruning should be done in conformance with ANSI (American National Standards Institute) A300-1995, which are "intended as guides for federal, state, municipal and private authorities including property owners, property managers, and utilities in the drafting of their maintenance specifications<sup>2</sup>".</li> <li>• Dead trees within the right of way should be removed when required for safety or protection of property; this may include trees that have become unsafe due to a structural defect or that need to be removed to protect property or the traveling public.</li> </ul>

<sup>2</sup> American National Standard for Tree Care Operations- Tree, Shrub, and Other Woody Plant Maintenance- Standard Practices- National Arborist Association

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## **Trees (cont'd)**

- Topping of trees is discouraged and shall only be used if extreme height has made them a hazard. Removal should be considered as an alternative to topping, which in most cases would be the least desirable option
- Volunteer seedlings within 9 feet from the edge of pavement should be removed promptly

## **Brush**

- Brush should be controlled up to 9 feet from the edge of pavement where possible
- Control brush for sight distance, to clear unpaved shoulder areas, and to protect the viewshed
- Trim and remove brush selectively to encourage a natural appearance
- Remove dead shrubs in right of way if sight distance and/or safety are jeopardized or for fire safety
- Mowing should be utilized as the preferred method of control, unless other constraints require another method
- Mowing should be scheduled after native plants have dropped their seed, so they may not be sacrificed

## **Weeds**

- Control of weeds will be done by means of manual, mechanical or chemical measures, depending on what best suits the specific maintenance area and plants to be managed
- Use herbicides to control weeds where necessary
  - Select a spot spray or broadcast application depending on the percentage of weeds and presence of desirable vegetation
  - When near riparian or wetland areas, use chemicals approved for those uses or as directed by regulators and as directed by the District Pest Control Advisor (PCA)
  - Use chemicals in accordance to EPA labels to make sure they are being handled properly and safely
  - An Agricultural Pest Control Advisor's written recommendation must be acquired prior to any pesticide applications made on State right of ways
- Clean all maintenance and construction equipment thoroughly to reduce the spread and introduction of weeds

## **Area-Specific Practices**

Application of the best vegetation management practices along the 75-mile long corridor provides for area specific strategies or practices. These will address the objectives, the constraints, and the treatments for each segment of the highway, based on post-mile location. This output will be produced as a set of maps as a tool for Maintenance, identifying areas of particular sensitivity and highlight constraints.

Information will include identification of features along the corridor that require special attention (objectives), and areas of special sensitivity including sensitive habitat, historic features, riparian areas and special needs for compatibility with adjacent properties. The available range of treatments corresponds to the combination of the objectives and constraints along the corridor.

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## 3.2 SITE RESTORATION

Restoration speaks to the work required at a site to facilitate recovery after construction activity; this may include erosion control and revegetation. The focus is on cost-effective, site-specific, sustainable restoration after a site disturbance.

Consistency and quality are guided with some generally guidelines. Yet, accounting for the differences among sites, individual restoration plans are also needed to address the unique set of conditions.

### Program Goals

- Management of slope instability
- Consistency in restoration efforts
- Restoration of mature, native habitat to the maximum extent possible
- Compliance with environmental regulations and permits

### Program Objectives

- Control soil erosion and prevent water pollution
- Preserve intact wildlife habitat along the Big Sur coast
- Manage sites for sensitive or important biological resources that need protection, enhancement, or restoration
- Manage disturbed sites to promote natural succession and limit the spread of noxious weeds
- Ensure compatibility with adjacent land use practices and land management objectives
- Involve local expertise throughout the planning and implementation stages

### Erosion Control and Site Planning

The objectives are to control surface erosion while recognizing the physical limitations of controlling natural geologic-scale processes, ensure compliance with statewide National Pollutant Discharge Elimination System (NPDES) permit, and prevent further aggravation of unstable conditions.

To ensure that the best measures are taken to help control erosion, physical conditions must be assessed, and will involve Caltrans Construction, Maintenance, Environmental Planning, Geotechnical and Landscape Architecture Departments, as well as the local expertise in the site evaluation process. With this assessment, Caltrans can determine the nature and severity of existing erosion, identify the causes of existing erosion, identify measures to correct conditions, and determine the influence of future landslide or debris flow activity. This will also allow for the classification of areas according to the erosion control strategies (see Appendix E) and to determine duff and topsoil collection and plant salvage opportunities.

In order to select site specific measures, crews will need to assess biological conditions along the corridor, which will identify important biotic resources, allowing for proper response. Soil tests should be done to determine the soil type, ascertain re-vegetation potential, and identify the need for possible soil development. In addition, to determine whether the recruitment of native or exotics can be expected and to adjust re-vegetation intensity accordingly, conditions of surrounding plant communities must be assessed as well.

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A site management plan will also be developed that includes storm water management, erosion control, duff/topsoil collection and plant salvage, and establishment of weed control measures.

## Storm Water Management

Before any erosion control measures are implemented on a site, there will be a Storm Water Pollution Prevention Plan (SWPPP) developed in accordance with the Caltrans NPDES permit. This plan helps create a program that will reduce the discharge of pollutants associated with the storm water drainage systems that serve highways and highway related properties, facilities and activities. The SWPPP includes Best Management Practices (BMP's) that will be adhered to at all times to reduce the potential for a non-storm water discharge. The BMP's will be implemented to the maximum extent practicable for municipal storm water activities and will satisfy the Best Available Technology/Best Conventional Technology requirement for construction activities that propose to disturb 5 or more acres (1 acre after March 2003).

## Erosion Control

Erosion control measures will first consider individual site conditions (including the composition of adjoining sites), erosion severity, public safety, and threat to roadway. All actions will evaluate the potential for aggravating larger slope instability. Erosion control evaluation will consider mechanical corrective measures first, followed by vegetative measures.

Mechanical measures can include jute netting/erosion control blanket, fiber rolls, straw bales, silt fences, and willow wattles, depending on individual site conditions<sup>3,4</sup>. In addition, measures that manage surface water runoff, such as detention basins and diversion structures will be considered. Vegetation measures may consist of container planting and planting of cuttings and/or seedlings, depending on individual site conditions.

## Duff/Topsoil Collection and Plant Salvage

Determine the potential for plant salvage and duff collection; beneficial duff would be free of undesirable weed species. Storage locations for both duff and salvaged plants must be identified. If necessary, temporary erosion control measures to duff stockpiles may be required.

## Establishment of Weed Control Measures

Weed species and seasonal control efforts should be identified and prioritized. Section 3.1 (Weed Control) of the guidelines can be followed, as they were formulated to include restoration efforts.

## **Re-vegetation**

Re-vegetation efforts are intended to facilitate the recovery of a native habitat type. Successful efforts create environments suitable for natural and managed plant succession; employ methods that are the best fit for site conditions and adjacent land use practices; are cost effective; ensure purity of seed and plants materials; use sound planting methods and practices. Procedures include:

- 1) Determine the appropriate re-vegetation approach
- 2) Collect seed and cuttings

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<sup>3</sup> Chapter 3: Erosion Control and Re-vegetation Methodology- WSI Report

<sup>4</sup> Caltrans Storm Water Quality Handbook- Construction Site BMP's Manual

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- 3) Implement appropriate soil enhancement techniques
  - 4) Initiate site preparation and planting.
- 1) Determine approach to re-vegetation
- *Natural Succession Promotion*: to utilize low intensity re-vegetation methods that encourage natural succession and rely primarily on working with existing on-site amenities with no soil or seed importation. This method may include allowing the temporary establishment of non-native, non-invasive weedy species in order to encourage site stability while native species begin to emerge and reestablish themselves
  - *Managed Succession*<sup>5</sup>: To manipulate the introduction of pioneer species to develop site conditions that are conducive to eventual climax species establishment.
  - *Accelerated Climax Community Development*<sup>6</sup>: To restore a site to a desirable climax (or near climax) native plant community, in a reduced time from what natural processes would take. This method is generally more expensive than managed succession because it often involves more intensive plant propagation, planting and irrigation work.
- 2) Collect seed and cuttings

Identify appropriate species composition for the desired plant community. Resources to be consulted for initial guidance will include the corridor-level vegetation mapping and recommendations from the Vegetation Establishment and Management Study (VEMS)<sup>7</sup>. Site-specific evaluations of flora and fauna must be conducted to confirm species composition for plant and seed selection. The site-specific information is critical to ensure a systematic and ecologically sound approach to the selection and placement of specific plant species at different restoration sites.

Collection of seeds and cuttings should rely on local sources from undisturbed areas adjacent to restoration sites. In addition, seeds and seed mixes should be selected based on purity, adaptability, performance and suitability for sustaining site-specific succession<sup>8</sup>. Often, site and soil conditions that require re-vegetation are much different than those that existed on site prior to disturbance. Therefore, plant material best adapted to perform at the site should be chosen. When a higher level of re-vegetation (i.e. accelerated climax community development) is deemed appropriate for a site, native seed will be collected from areas adjacent to the site. Whether these seeds are used to propagate seedling plants or are applied as seeds, the Wildland Certification program run by the California Crop Improvement Association will be enlisted to verify the source and purity of the seed.

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<sup>5</sup> *Roadside Manual*- Washington State Department of Transportation

<sup>6</sup> *Roadside Manual*- Washington State Department of Transportation

<sup>7</sup> *VEMS- Caltrans District-Level Guides to Plant Specifications for Erosion Control*

<sup>8</sup> *Chapter 3: Erosion Control and Re-vegetation Methodology*- WSI Report

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## 3) Soil enhancement

If determined appropriate for an individual site, soil enhancement techniques will be implemented. Importing topsoil is discouraged and will occur only if no other viable options remain. The use of any soil development methods will be based on their suitability to the site habitat and the composition of adjoining plant communities. Suggested soil development methods include soil amendments and legumes. Organic matter (compost) to improve soil structure, organic compounds such as humates and mycorrhiza to improve plant nutrient uptake, and gypsum, sulfur, iron and other amendments to correct soil chemistry, can all be considered soil development methods. Legumes are plants that fix nitrogen in the soil, improve permeability of the soil, and provide cover on sites typically devoid of vegetation in order to increase nutrient availability at disturbed sites. The use of legumes is a practical and less time consuming method for harsh sites that equipment cannot access, or for sites where soil amendments alone cannot adhere to steep slope faces. A list of appropriate nitrogen fixing species, along with their application rates, can be found in Appendix C.

## 4) Initiate site preparation and planting

The intensity of any efforts aimed at establishing plants on disturbed sites will depend on which of the above re-vegetation approaches has been deemed appropriate for site conditions. However, plant establishment may include, and is not limited to the following:

- Use stored material from the site, if pre-construction conditions were determined appropriate for duff and topsoil collection, this material can be spread over disturbed ground
- Use pioneer species in order to assist soil improvement and control surface erosion
- Assess needs of specific plant, such as:
  - Water, light and nutrient requirements
  - Plant spacing requirements
  - Physiological characteristics
  - Responses to competition
  - How different species respond to proposed management techniques
- Install temporary (surface drip) irrigation systems at more intensively managed sites

## **Site Maintenance**

Meeting the goals for site restoration requires an ongoing level of maintenance that will vary based on the selected approach. Generally, the focus is on managing against an invasion of weeds while desirable plants become established at the site. The important elements of maintenance are

- plant establishment
- weed control program
- monitoring and reporting

Plant establishment is a requirement to maintain plant health and promote plant establishment. This step is also important to control species performance, such as minimizing exotic species invasion with the appropriate weed control, proper irrigation, pruning, fertilizing, and plant replacement to encourage native plant establishment.

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A weed control program must be implemented in order to support the reestablishment of native species by limiting competition from invasive exotic species. It has been identified as one of the most important initial steps for the success of re-vegetation plantings, as well as for the successful reintroduction of species from adjacent native plant populations. In order to successfully eradicate undesirable plant species on a site we must first determine the primary target species at each site along with the perimeter of the weed control area and level of weed control required. Timing and continuity of weed control measures are especially critical to successful eradication. Roadside compatibility is another issue that will need to be considered when determining the appropriate control method. Weed presence and abundance on adjacent vegetative communities will be used to determine the approach and intensity of weed control.

Various weed control methods will be utilized and the application of these methods will vary based on site conditions and adjacent land use practices. These methods may include, but are not limited to, mowing, pulling, and selective spot spraying or approved, non-persisting, post-emergent pesticides where necessary. If herbicides are proposed, a recommendation from a licensed Pest Control Advisor will be required. In order to prevent the spread of exotics into new areas, all equipment will be cleaned to remove any seed or stem sections before mowing it from infested areas.

Monitoring and reporting is used to document re-vegetation success, identify problems experienced at each restoration site, and provide ongoing recommendations for corrective measures, if necessary, to meet site restoration goals. Site-specific re-vegetation goals must be established, as well as re-vegetation goal-achievement timelines, mapping resources and report findings.

In addition to working towards the overarching goal of establishing intact native habitat along the corridor, each site will have a specific set of re-vegetation goals and a corresponding timeline. Goals will be determined by the Project Development Team (PDT) in consultation with permitting agencies and local experts. Goals may be modified, as needed, to respond to changing site conditions. Qualitative goals are to be developed in restoration areas with minimal environmental sensitivity and limited permit requirements. Examples of site-specific qualitative goals may include visual continuity and habitat continuity. Quantitative goals are to be developed in restoration areas containing sensitive habitat or other specific biological concerns. These goals may include percent cover, density, species diversity, and percent survival.

A re-vegetation goal-achievement timeline should also be developed. Personnel should establish dates to indicate when re-vegetation should conform to the quantitative goals established for each restoration site. By creating this timeline, it can be determined if restoration efforts need to be continued in certain areas.

Geographic Information Systems (GIS) mapping technology may be used to develop base sheets for projects, either for storm repair, site restoration or maintenance design work. Problem slopes, drainage patterns and current vegetation cover (especially Environmental Sensitive Areas) can be delineated on the plans. Subsequent GIS surveys can be compiled into a comprehensive database for restoration sites on the coast, assisting in determining the success of restoration measures at each location. All project mapping, including base sheets developed from aerial photos, should be annotated to show Environmentally Sensitive Areas.

Reports from monitoring activities should be submitted on a regular basis depending on the goals set for each restoration site, site sensitivity, and the phase of activity. For example, reporting may be more frequent during periods of high activity, decreasing during plant establishment and

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maintenance stages. Reports will be kept on file at Caltrans District 5 and made available to stakeholders and the public.

### **Site Restoration Implementation Strategies**

The objective of these implementation strategies is to ensure that adequate resources and support structures are in place to fully implement the recommendation of the site restoration portion of the guidelines. Special expertise may be needed in addition to assignment of environmental monitors; local expertise should be enlisted as part of the implementation.

Monitoring and care of new plantings, including the elimination of undesirable weeds, throughout the establishment period is critical to the success of re-vegetation projects. The nature of work at some restoration locations may require a more focused effort than typically provided for by traditional construction, maintenance or storm damage repair contracts. The intent of the following recommendations is to provide a platform from which to launch further evaluation and discussion of the creative funding, contracting, and staffing opportunities that will be necessary for the implementation of these guidelines.

Special landscape and restoration may extend over several years to ensure the success of approaches for managed succession and accelerated climax development. Services will also be required to provide for the ongoing care and maintenance of restoration sites. Possible services provided include annual native seed collection resulting in a viable seed bank, plant propagation with the establishment of an accessible nursery stock, and site maintenance including watering, weeding and replacement planting.

A dedicated environmental monitor acts as a liaison within the core units of Caltrans including Construction, Maintenance, Environmental Planning, Geotechnical and Landscape Architecture Departments, and will provide external communication with the various permitting agencies. The monitor would be engaged in all stages of the project. Pre-project stage activities include the help to delineate Environmentally Sensitive Areas, provide information about necessary permit compliance, and serve as an advisor to the resident engineer. During construction, the monitor will ensure that there are no discrepancies between environmental plans, restoration management goals and on ground activities, be able to make defensible decisions in the field, and serve as an advisor to the resident engineer. After the project is complete, the monitor will continue to supervise the plant establishment at re-vegetation sites, serve as a liaison between Caltrans and private re-vegetation contractors, and assist in meeting reporting requirements.

Consistent with objectives for collaborative planning, local expertise will be enlisted as an important resource for effective site restoration. The department may request the local chapter of the California Native Plant Society (CNPS) designate a representative.

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## APPENDIX A

### GLOSSARY

***Accelerated Climax Community Development:*** re-vegetation approach that restores a site to a desirable climax (or near climax) native plant community, in a reduced time from what natural processes would take; this is generally more expensive than managed succession because it often involves more intensive plant propagation, planting and irrigation work

***Certified Seed:*** source specific seed that has been tested for purity and germination rates

***Chemical Control:*** application of herbicidal chemicals that either prevent the growth of or destroy existing plants

***Climax Species:*** plant species representative of the adjacent plant community that indicate relatively stable site conditions and the restoration of native habitat

***Control:*** the eradication, prevention or suppression of weeds

***Duff:*** topsoil, leaf litter and surface organic matter that can help re-establish horticulturally suitable soils for re-vegetation efforts

***Eradication:*** a control measure that completely eliminates a weed from a designated area

***Environmentally Sensitive Areas (ESA's):*** areas identified as containing sensitive biological, historic, visual or cultural resources

***Headwall:*** a type of inlet structure on a culvert that consists of a rigid vertical wall, usually of concrete or, if dating back to original construction in the 1920's and 1930's, rock masonry construction; headwalls provide a critical function for aiding smooth flow of water through the pipe

***Managed Succession:*** re-vegetation approach that manipulates the introduction of pioneer species to develop site conditions that are conducive to eventual climax species establishment

***Manual Control:*** removal and prevention of undesirable plants by activities such as weed pulling (by hand or with tools) or mulching; this can include the use of hoes, pruning shears and power operated hand tools such as chainsaws and string trimmers

***Mechanical Control:*** techniques to remove the above ground portions of weeds such as mowing, brush cutting and weed cutting

***Natural Succession Promotion:*** re-vegetation approach that utilizes low intensity methods that encourage natural succession and rely primarily on working with existing on-site amenities with no soil or seed importation; may allow the temporary establishment of non-native, non-invasive weedy species in order to encourage site stability while native species begin to emerge and reestablish themselves

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**Parapet:** a low rock (or rubble) masonry wall; along the Big Sur Coast, there are three styles of parapet walls and usually on top of rubble masonry retaining walls that were built with locally available materials during the original highway construction in the 1920's and 1930's

**Pioneer Species:** fast growing plants including grasses, forbs, perennials and legumes that control erosion and help set the stage for larger woody native plant encroachment

**Plant Salvage:** Collection, maintenance and transplanting of desirable plant species prior to construction activities

**Post-Emergent Herbicides:** chemicals to control weeds that are applied on established or actively growing plants; may include contact and systemic herbicides

**Prevention:** a control measure that stops weeds from becoming established in non-infested areas

**Seedling:** a woody perennial plant with less than a 4" diameter of at breast height (dbh)

**Sensitive Species:**

Wildlife: species listed as threatened or endangered under the federal Endangered Species Act and California Endangered Species Act; those identified as a species of concern and protected by the California Department of Fish and Game

Plants: species listed as threatened or endangered under the federal Endangered Species Act and the California Endangered Species Act; species considered by California Native Plant Society to be rare, threatened or endangered in California and elsewhere

**Suppression:** a control measure that severely reduces weed populations to below non-economic or environmentally acceptable levels and stops or significantly reduces its spread

**Tree:** a woody perennial plant with a dbh 4" or greater

**Weed:** any undesirable, invasive species found in, but not native to a particular area; also referred to as an exotic species

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## **APPENDIX B**

EXECUTIVE ORDER #13112

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## APPENDIX C

<b>NITROGEN FIXING SPECIES LIST AND RATES<sup>9</sup></b>			
<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>APPLICATION RATE</b>	<b>APPLICATION</b>
<i>Lupinus albus</i> *	Silver bush lupine	8-10 pounds/acre	Perennial, upright large stature grows in disturbed places associated with coast sage scrub. Used for re-vegetation on harsh sites and loose soil and fill sites.
<i>Lupinus arboreus</i> *	Tree lupine	8-10 pounds/acre	Perennial, large stature grows in disturbed places associated with coast sage scrub. Used for re-vegetation on harsh sites and loose soil and fill sites.
<i>Lupinus nanus</i>	Sky lupine	4-6 pounds/acre	Annual, fast growing, diminutive flowering plant. Re-vegetation of roadside berms, cut and fill slopes.
<i>Trifolium wildenovii</i>	Tomcat clover	2-3 pounds/acre	Annual, fast growing. Re-vegetation of roadside berms, cut and fill slopes. Performs well on poor soil sites.
<i>Trifolium gracilentum</i>	Pinpoint clover	2-3 pounds/acre	Annual, fast growing. Re-vegetation of roadside berms, cut and fill slopes. Performs well on poor soil sites.
<i>Lotus stigosus</i>	Bishops lotus	2-3 pounds/acre	Short-lived annual. Grows well on disturbed cut slope locations and poor soils.
<i>Lotus purshianus</i>	Spanish clover	4-5 pounds/acre	Short-lived annual. Grows well on disturbed cut slope locations and poor soils in wooded locations.
<i>Lotus benthamii</i>	Bentham's lotus	4-5 pounds/acre	Perennial, low growing. Grows well on cut slopes and roadside berms.

\*The use of these species should be exercised with caution. While they are successful as nitrogen fixing species, these large fast-growing lupines, if not properly managed, can crowd out smaller, more slow-growing plants that are also important for re-vegetation.

<sup>9</sup> Chapter 3: Erosion Control and Re-vegetation Methodology, Table 3.6. Amended by Caltrans March 2003- WSI Report

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## APPENDIX D

<b>EROSION CONTROL STANDARDS<sup>10</sup></b>	
<b>CLASSIFICATION</b>	<b>SUGGESTED REMEDIATION</b>
<u>Class 1</u> : No soil loss or erosion; topsoil layer intact; well dispersed accumulation of litter from past year's growth plus smaller amounts of older litter	No action required
<u>Class 2</u> : Soil movement slight and difficult to recognize; small deposits of soil in form of fans or cones at end of small gullies or fills, or as accumulations at back of plant crowns or behind litter; litter not well dispersed or no accumulation from past year's growth obvious	-Re-seed (as per temporary erosion control or specific habitat) -Apply loose straw and/or "flakes" as needed, only to gullies and/or accumulation -Control or divert source of erosion
<u>Class 3</u> : Soil movement or loss more noticeable; topsoil evident, with some plants on pedestals or in hummocks; rill marks evident; poorly dispersed litter and bare spots not protected by litter	-Re-establish and compact surface grade in eroded areas -Re-seed (as per temporary erosion control or specific habitat) -Apply loose straw and/or "flakes" as needed -Control or divert source of erosion -Install straw wattles and/or silt fences
<u>Class 4</u> : Soil movement and loss readily recognizable; topsoil remnants with vertical sides and exposed plant roots; roots frequently exposed; litter in relatively small amounts and washed into erosion protected patches	-Re-apply and compact soil -Re-establish surface grade in eroded areas -Re-seed (as per temporary erosion control or specific habitat) -Apply loose straw and/or "flakes" as needed -Control or divert source of erosion -Install straw wattles and/or silt fence
<u>Class 5</u> : Advanced erosion; active gullies with steep sidewalls; well-developed erosion pavement on gravelly soils; litter mostly washed away	-Re-apply and compact soil -Re-establish surface grade in eroded areas -Haul in and place fill materials/rock -Apply loose straw and/or "flakes" as needed -Control or divert source of erosion -Install straw wattles and/or silt fence

<sup>10</sup> Chapter 3: Erosion Control and Re-vegetation Methodology, Table 3.3. Amended by Caltrans March 2003- WSI Report

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## APPENDIX E

### NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PROGRAM

On July 15, 1999, the State Water Resource Control Board (SWRCB) issued the “National Pollutant Discharge Elimination System (NPDES) Permit, Statewide Storm Water Permit and Waste Discharge Requirements (WDR’s) for the State of California, Department of Transportation (the Department)” (Order No. 99-06-DWQ, NPDES No. CA000003). The NPDES Permit regulates storm water discharges from the Department’s properties, facilities and activities, and requires the Department’s Construction program to comply with the requirements of the NPDES General Permit (Order No. 99-08-DWQ, NPDES No. CAS000002) issued by the SWRCB, to regulate discharges from construction sites that disturb 5 acres (ac) or more (in March 2003, the acreage threshold decreases to 1 acre). The NPDES Permit required the Department to develop and implement a Storm Water Management Plan (SWMP) (approved May 2001) that describes a program to reduce the discharge of pollutants associated with the storm water drainage systems that serve highways and highway related properties, facilities and activities.

The NPDES Permit does not prescribe numerical effluent limits for the Department’s storm water discharges. Instead it requires the Department to implement Best Management Practices (BMPs) to reduce pollutants to the Maximum Extent Practicable (MEP) for industrial activities and the employ BMPs that meet the Best Conventional Technology (BCT)/Best Available Technology (BAT) criteria for regulated construction activities. Additionally, if it is determined that the Department’s discharges are causing or contributing to an exceedance of an applicable water quality standard the Department will implement control measures to reduce pollutants in accordance with the SWMP and the NPDES Permit. The Department has identified three categories of BMPs for use:

- Category I BMPs- Technology-based pollution prevention controls to meet the MEP requirements for designing and maintaining roadways and related facilities

Group A Maintenance BMPs: Applicable to all maintenance operations (i.e., litter pickup, street sweeping, etc.)

Group B Design Pollution Prevention BMPs: Applicable to the design of new facilities or major renovations of existing facilities (i.e. permanent soil stabilization, ditch channel lining systems, etc.)

- Category II BMPs- Controls to meet BCT/BAT requirements on regulated construction sites
- Category III BMPs- Treatment BMPs to meet MEP requirements

The General Construction Permit requires the Department to develop and implement a Storm Water Pollution Prevention Plan (SWPPP) for all construction activities that will disturb five acres or more of soil (1 acre as of March 2003). The SWPPP must address and evaluate the minimum required BMPs specified in the SWMP and the General Construction Permit. BMPs are implemented as determined appropriate during construction to reduce or eliminate the potential for a non-storm water discharge to occur to a surface body of water or the storm drainage system. For projects that do not meet the acreage criteria for a SWPPP designation, the Department requires the development and implementation of a Water Pollution Control Program (WPCP). The WPCP evaluates and identifies BMPs necessary to protect water quality during construction activities.

The Department’s NPDES Permit and SWMP require the Maintenance Division to incorporate storm water quality management into its maintenance activities. The Department has developed guidelines that address the implementation of storm water BMPs during highway maintenance activities and activities conducted at maintenance facilities. BMPs are implemented during activities to reduce the potential for a non-storm water discharge to surface bodies of water or to the storm drainage system to the MEP requirements prescribed by the Department’s NPDES Permit and SWMP.

All vegetation control activities are conducted in compliance with the requirements of the Department’s Vegetation Control Program. Activities conducted under the Vegetation Control Program include chemical weed control, mechanical weed control, tree and shrub pruning and tree and shrub removal. Each District is required to develop a vegetation management plan. The plan is developed to address the Department’s need to eradicate noxious and invasive weeds and maintain fire control strips. The main components of the vegetative management plan include: 1. Enhance the use of appropriate native vegetation. 2. Apply herbicides in a manner that minimizes or eliminates the discharge of herbicides to receiving waters. 3. Restrict the application of nutrients to rates necessary to establish and maintain vegetation without causing significant runoff to surface waters.