Characterization of Existing Conditions With Respect to Invasive Non-Native Species and Preliminary Recommendations to Minimize their Spread:

Santa Susana Field Laboratory Area IV and Northern Undeveloped Areas

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Preliminary Draft Recommendations

Prepared for:

CDM
Denver, Colorado
Contact: John Wondolleck

and

U.S. Department of Energy
Santa Susana Field Laboratory
5800 Woolsey Canyon Road
Canoga Park, CA 93104
Contact: Stephie Jennings

Prepared by:

Science Applications International Corporation
5464 Carpinteria Avenue, Suite K
Carpinteria, CA 93013

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Introduction

A key biological issue with regard to the planned EPA surveys of Area IV and Northern Undeveloped Areas for radiological and chemical contamination is how to avoid facilitating the dispersal and establishment of invasive non-native plant species while conducting site preparation (vegetation trimming and mulching) for the surveys and while conducting the surveys themselves. Several invasive species currently on the site have the potential to adversely affect the listed and sensitive plant species documented from the site and cause long-term alteration and degradation of wildlife habitat if they spread from their current locations. Areas where woody vegetation is reestablishing after a 2005 wildland fire are more vulnerable to invasion than they would otherwise be because of the relative openness of the vegetation compared to pre-fire conditions.

Three factors create ideal conditions for spreading invasives around Area IV and the Northern Undeveloped Areas as a result of the proposed EPA surveys:

- presence of invasive species in various locations on the site (currently they are mainly confined to roadsides and sites of existing or former facilities),
- spread of seed or other propagules (including movement into remote or inaccessible areas) caused by movement of humans and equipment throughout the site, and
- creating ideal seedbed conditions for establishment of invasives by removing vegetation and disturbing the soil surface as a result of vegetation cutting, mulching, and off-road foot and vehicle traffic.

Although it is well known that many seeds have adaptations enabling them to spread to locations away from the mother plant, the fact is that the vast majority of seeds of most plant species land very close to the mother plant. The distribution of most species seed can be visualized as a tall, narrow bell-shaped curve centered on the parent plant. For most species to establish in a new location, many seeds are usually required because only a small percentage of seeds reaching an area germinate, establish, and successfully reproduce. Furthermore, for many species cross-pollination may be necessary to successfully reproduce, requiring establishment of two or more individuals of the species in the same place before reproduction could occur. Transport of seed by natural means (i.e., wind or animals) is likely a limiting factor in spreading invasive species into natural areas. However, the addition of foot and vehicle traffic combined with disturbance creates conditions that will favor seed movement (the presence of invasives along roadsides is an example). *Therefore, it is important to minimize movement of the seeds of invasive plants around the site even if these plants are well-established on portions of the site.*

Disturbance of the soil and vegetation that would be associated with vegetation cutting and gamma surveying (or other activities involving movement of humans and equipment) creates conditions conducive to establishment of invasive species, making it doubly important to minimize the movement of seed or plant parts capable of resprouting from one part of the site to another.

Overview of Vegetation and Invasive Species at Area IV and the Northern Undeveloped Areas

Most of the woody vegetation onsite, including the Northern Undeveloped Areas, is recovering from a wildland fire that burned through most of the area in September of 2005. The fire skipped over localized areas including patches of oaks and chaparral in the Northern Undeveloped Areas and chaparral in the western corner of the site. The Northern Undeveloped Areas are relatively free of human disturbance and are consequently are relatively free of invasive species. The same is true for most of the hilly area in the

southwestern part of the site, including much of the critical habitat of the Braunton's milk-vetch. The previously developed portions of the site and nearby areas have a higher concentration of invasive species.

Table 1 lists invasive species that are present or expected on SSFL Area IV or the Northern Undeveloped Areas and provides comments on their status by the California Invasive Plant Council (Cal-IPC) and the California Department of Food and Agriculture (CDFA). Cal-IPC evaluates invasive species with regard to the threat they pose to wildlands. CDFA rates invasive species primarily from the perspective of their seriousness as agricultural weeds.

General recommendations

Boeing has provided an initial outline of the cuttings plan proposed to EPA. If agreed upon, this would be in effect for the duration of the project. Boeing has noted to the EPA that avoidance is preferable option and cutting should be minimized as much as technically feasible. The Boeing recommendations follow:

1. Mulching of Native Vegetation

- Requirement: For native vegetation, keep mulching operations and the mulched material to pre-defined localized areas. SAIC will develop a map that will show mulching cells or areas where the mulched material should be returned.

- Rationale: Keeping the mulch in localized areas will provide some assurance that localized native habitat will remain largely intact as a result of this activity. It will minimize the spread of non-native invasive species and will also preclude the movement of native seeds from one localized area into areas not currently found at the facility thus ensuring the localized native habitats retain their unique characteristics.

2. Poison Oak

- Requirement: Poison oak cuttings should be separated and stored in a bin for offsite disposal.

- Rationale: This process will preclude any health hazards for worker that may result from mulching the position oak, and will minimize the spread of poison oak into other areas.

3. For Nonnative Invasive Species

- Requirement: Invasive species are not to be mulched, but removed (including the root structures), containerized, and disposed of offsite. SAIC will provide a map of these locations and the species of concern.

- Rationale: Mulching and returning these cuttings to localized areas would significantly spread these nonnative plants to otherwise undisturbed habitats.

It is expected that by keeping mulching to localized areas and the eradication of the non-native invasive species, this process will meet biological mitigation requirements and address concerns expressed by involved community members.

For the purposes of this document, a localized area is defined as 0.25 acre if not otherwise defined. Based on site-specific considerations the onsite biological monitor may adjust this upward or downward.

Table 1. Invasive Plant Species Present on SSFL Area IV and their ratings by the California Invasive Plant Council (Cal-IPC) and the California Department of Food and Agriculture (CDFA).

Common name	*Scientific name*	*Cal IPC Overall Rating*	*CDFA rating*	*Comments*
Castor bean	*Ricinus communis*	Limited		Not noted during surveys but would be a high priority to contain and eradicate if discovered.
Fountain grass	*Pennisetum setaceum*	Moderate	non-rated	Becoming widespread along roads and facilities sites. Occupies same habitat in sandstone boulders as Santa Susana Tarplant.
Giant reed or Arundo	*Arundo donax*	High	B	Not noted during surveys but would be a high priority to contain and eradicate if discovered.
Horehound	*Marrubium vulgare*	Limited		Numerous localized occurrences.
Italian thistle	*Carduus pycnocephalus*	Moderate	C	Localized occurrences on site in formerly disturbed areas
Mexican fan palm	*Washingtonia robusta*	Moderate		Volunteer plants of this or a similar species occurring chiefly along roadsides
Milk thistle	*Silybum marianum*	Limited	C	Localized occurrences on site in formerly disturbed areas north of critical habitat
Puncture vine	*Tribulus terrestris*		C	Localized
Purple star thistle	*Centaurea calcitrapa*	Moderate	B	Localized on access road to water tank. Adjacent to critical habitat
Russian thistle	*Salsola tragus*	Limited	C	Localized
Shortpod mustard, summer mustard	*Hirschfeldia incana*	Moderate		Widespread on previously disturbed areas
Smilo grass	*Piptatherum miliaceum*	Limited		Numerous localized occurrences mostly on previously disturbed sites.
Tamarisk	*Tamarix ramosissima*	High	B	On some remediated sites
Tocalote, Malta star thistle,	*Centaurea melitensis*			Widespread on site with weedy annual grasses.
Tree tobacco	*Nicotiana glauca*	Moderate		Common at previously disturbed sites
Tree-of-heaven	*Ailanthus altissima*	Moderate	C	Several localized occurrences
Wild mustard	*Brassica spp.*	Limited to High depending on species		Very dense populations noted at previously disturbed areas north of critical habitat
Wild radish	*Raphanus sativus*	Limited	B	
Yellow star thistle	*Centaurea solstitialis*	High	C	Localized

Notes:

California Invasive Plant Council (Cal-IPC) Ratings:

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

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

Limited – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. These species may already be extensively naturalized limiting potential for further spread. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

California Department of Food and Agriculture (CDFA)Ratings:

"**A**" rated weeds are normally limited in distribution throughout the state. Eradication, containment, rejection or other holding action at the state-county level. Quarantine interceptions to be rejected or treated at any point in the state.

"**B**" rated weeds are more wide spread. Eradication, containment, control or other holding action at the discretion of the commissioner. State endorsed holding action and eradication only when found in a nursery.

"**C**" rated weeds are generally widespread throughout the state. Action to retard spread outside of nurseries at the discretion of the commissioner. Reject only when found in a crop seed for planting or at the discretion of the commissioner.

"**Q**" rated species are treated as temporary "A" weeds. Denoting action outside nurseries at the state-county level pending determination of a permanent rating.

"**D**" rated weeds are organisms considered to be of little or no economic importance. No action. Anything not rated as an "A", "B", "C" or "Q" weed is given a "D" rating. In other words, the plant is not considered a significant weed. (California Noxious & Invasive Weed Action Plan, 2005)

Site-specific conditions and recommendations

Much of the previously developed portion of the site is in some stage of vegetation recovery following removal of structures and remediation of the individual building sites at various times over the years. The vegetative cover of these areas varies dramatically from site to site related to a variety of factors including conditions related to the year and seasonal timing of remediation, type of previous use, type of restoration activities, and characteristics of adjacent sites. Abundance of invasive species varies considerably from site to site within this area. Some sites support high abundance of invasive species and other sites support a prevalence of native species.

Figure 1 is a vegetation map of the site. The map highlights previously developed areas and adjacent areas and identifies the location of forty specific units of land in this area with reference numbers. Table 2 provides site-specific information and recommendations concerning vegetation and invasive species on these forty identified units shown in Figure 1.

Table 2. Comments on specific units or subareas identified within the developed portion of SSFL Area IV

Unit Number[1]		***Vegetation Classification[2]***	***Comments[3]***
Map #	**Field #**		
1	5	MF	Similar to map unit 2 with some mule fat and short weedy annual grasses.
2	1	MF	Fenced area by trailers. Site not entered because of fence. Mostly weedy annual grasses with mule fat (*Baccharis salicifolia*), and at least one laurel sumac (*Malosma laurina*) in the southeast corner. Invasives noted: tree tobacco (*Nicotiana glauca*), fountain grass (*Pennisetum setaceum*) around edges. **Recommendation:** Remove tree tobacco and fountain grass and dispose of offsite prior to any other manipulation. Implement precautions to prevent spread of fountain grass seed while removing the plants.
3	2	RV	The eastern half this site is relatively barren but the western half supports a good cover of mule fat.
4	3	RV	This is a flat, recently cleared site with a dense stand of deerweed (*Lotus scoparius*). Bordered by gunite-covered embankments on south and west. These embankments support mature laurel sumac, mule fat, brickell bush (*Brickellia californica*), and other native shrubs.
5	4	WD	Sparsely vegetated with summer mustard (*Hirschfeldia incana*) and filaree (*Erodium* sp.). Invasives noted: fountain grass, tamarisk (*Tamarix ramosissima*). **Recommendation:** Remove tamarisk and fountain grass and dispose of offsite prior to any other manipulation. Implement precautions to prevent spread of fountain grass seed while removing the plants.
6	15a	C-B	Resprouting chaparral with laurel sumac, coyote brush, thickleaf yerba santa and other native shrubs. Openings, especially near small access road separating units 6 (15a) from 8 (15b) support weedy non-native species including summer mustard and tocalote. Unit 6 (15a) is bounded on the northwest by a sandstone outcrop.

Table 2. Comments on specific units or subareas identified within the developed portion of SSFL Area IV

Unit Number[1]		*Vegetation Classification*[2]	*Comments*[3]
Map #	**Field #**		
7	30	RV	Recently disturbed portions of this site have been recently hydromulched. Most of the site supports a variety of mature native shrubs, many likely from revegetation seed mix including coast goldenbush, deerweed, and coastal bush sunflower (*Encelia californica*). Several individual tree of heaven (*Ailanthus altissima*) are located at the southern end of the site adjacent to decomposing sandbags. At northern end of site are a variety of surviving plantings of succulents including jade plant, cotyledon, and Mission cactus. The site is surrounded by mostly native habitat. **Recommendations:** Remove tree of heaven by pulling out of ground, with roots if possible. Haul away from site. May produce sucker shoots from surviving roots. Remove and haul away remaining cultivated cacti and succulent plants at the northern end of site.
8	15b	C-B	Resprouting chaparral with laurel sumac, coyote brush, thickleaf yerba santa and other native shrubs. Openings, especially near small access road separating units 6 (15a) from 8 (15b) support weedy non-native species including summer mustard and tocalote.
9	14	RV	Formerly disturbed site dominated by coyote brush with some mule fat, California buckwheat, deerweed, coast goldenbush, and native grasses (*Nassella* sp.). Some Santa Susana tarplant . Invasives include fountain grass, tamarisk and tree tobacco. The fountain grass is located on the sandstone outcrop at the NW side of this unit adjacent to unit 13. **Recommendation:** Remove tamarisk, tree tobacco, and fountain grass and dispose of offsite prior to any other manipulation. Implement precautions to prevent spread of fountain grass seed while removing the plants.
10	11d	WD	Weed dominated small area in the southeast corner similar to 15 (11a). At the eastern end of this unit associated with a wooden power pole is a small stand of native shrub and herbaceous perennial species, including laurel sumac, thickleaf yerba santa (*Eriodictyon crassifolium*), coyote brush, mule fat, and branching phacelia (*Phacelia ramosissima*). This small area would be classified as C-B but was below the minimum mapping unit (see methods) in size.
11	13	WD	Recently disturbed site with lots of tamarisk and tree tobacco. Some native mule fat is present along with planted oaks. Native vegetation is present at the boundary between this site and site 11b. **Recommendation:** Remove tamarisk and tree tobacco and dispose of offsite prior to any other manipulation.
12	12	UDD	This is a paved lot with Santa Susana tarplant and other native and non-native species growing through cracks in the pavement. The Santa Susana tarplant is principally at the south end adjacent to a sandstone outcrop (Unit 11 b) that also supports Santa Susana tarplant. An unpaved area with compacted soil supports some native shrubs, principally mule fat, and had ponded water for a week following heavy rains in October. Gunited embankments on the north and east side of this site support some native shrubs (e.g., brickell bush) but also dense growth of the invasive fountain grass. Tree tobacco is also prevalent on this site, typically growing through cracks in the pavement. **Recommendation:** remove tree tobacco and fountain grass and dispose of offsite prior to any other manipulation. Implement precautions to prevent spread of fountain grass seed while removing the plants. A stand of planted juniper opposite the south end of the building on the west side of the site can be left in place until the site is remediated

Table 2. Comments on specific units or subareas identified within the developed portion of SSFL Area IV

Unit Number[1]		***Vegetation Classification[2]***	***Comments[3]***
Map #	**Field #**		
13	11b	C-S	Large sandstone outcrop in northeastern part of the site. Supports several Santa Susana tarplant *(Deinandra minthornii)* and other native species.
14	11c	RV	Rectangular scraped area in the southwestern part of this subdivision. Has sparse cover of native species including a considerable amount of native needlegrasses (*Nassella* sp.), deerweed, California buckwheat (*Eriogonum fasciculatum*), coast goldenbush (*Isocoma menziesii*).
15	11a	WD	Weed dominated formerly disturbed area. Summer mustard, tocalote, and horehound (*Marrubium vulgare*) are prevalent weedy species.
16	7a	WD	This is a small area between a building and substation dominated by weeds, including summer mustard and tocalote.
17	7b	CLO	This unit includes a large coast live oak and stand of coast goldenbush (*Isocoma menziesii*) (RV) and rock outcrops to the south with some mature native shrubs. There is a dense stand of native needlegrass (*Nassella* sp.) east of the oak and north of a concrete retaining wall north of a power transmission line tower.
18	7c	WD	This area is weedy, dominated by summer mustard. Lots of tree tobacco growing through the pavement on the west side of the building.
19	6	RV	Coyote brush (*Baccharis pilularis*) with scattered mule fat. Planted coast live oaks. An individual Braunton's milk-vetch was located in this unit. Lots of native needlegrass (*Nassella* sp.). Not weedy in the western portion. Considerable cover of weedy species such as summer mustard and tocalote (*Centaurea melitensis*) in the eastern portion. **Recommendation**: Monitor to help direct trimming/mulching efforts to confine weedy cut vegetation to the already weedy areas and to avoid impacting the Braunton's milk-vetch.
20	26	RV	Stand of large coast goldenbush with mule fat in western part.
21	8	WD	Weed dominated with some native species. **Recommendation:** Remove volunteer fan palms (*Washingtonia* sp.) and haul off site.
22	10	WD	Generally weedy vegetation however native species including coast live oak are associated with a sandstone outcrop.
23	16	C-B	This site is dominated by coyote brush in a matrix of weedy annual grasses. Two corrugated metal pipe culverts (24" and 36") conveying drainage from both sides of 17th Street and the north side of G Street pass under G Street into an intermittent drainage in the northern part of this unit. There are several resprouting, previously burned willows (*Salix* sp.) along this drainage along with herbaceous species such as branching phacelia (*Phacelia ramosissima*) and chaparral nightshade (*Solanum xantii*). The intermittent drainage runs roughly from north to south in this unit but was not mapped separately.
24	17	WD	This unit is primarily vegetated with weedy annual grasses.
25	18	WD	This small triangular unit is vegetated by low annual grasses and weeds.
26	19	WD	Unit 26 is dominated by weedy annual grasses with considerable cover of native shrubs including laurel sumac. A ditch conveys drainage diagonally across this unit and continues offsite into Area III.
27	9	WD	Low weedy vegetation with native silverleaf lotus (*Lotus argophyllus*) growing from an otherwise barren low sandstone outcrop.

Table 2. Comments on specific units or subareas identified within the developed portion of SSFL Area IV

Unit Number[1]		*Vegetation Classification*[2]	*Comments*[3]
Map #	**Field #**		
28	25	RV	This site has a heavy cover of mule fat in the southern portion, sparse and weedy in the north and western portions. Site has at least one large tamarisk, several volunteer fan palms (along roadside) and tree tobacco. **Recommendation:** Remove tamarisk, tree tobacco, and fan palms and dispose of them offsite.
29	19a	WD	This site is recently cleared and dominated by Russian-thistle (*Salsola tragus*), a highly invasive species, with filaree (*Erodium* sp.) and doveweed (*Eremocarpus setigerus*). **Recommendation:** Treat this area separately and remove all vegetation from the site. Decontaminate clothes and equipment to ensure seeds or plant parts of Russian-thistle aren't tracked to other areas.
30	20	WD	Recently cleared area dominated by Russian-thistle. **Recommendation:** Treat this area separately and remove all vegetation from the site. Decontaminate clothes and equipment to ensure seeds or plant parts of Russian-thistle aren't tracked to other areas. This unit can be treated along with Unit 29 (19), which is across the street and is also dominated by Russian-thistle.
31	23	WD	This is dominated by weedy annual grasses with some mule fat and coyote brush. A large individual of tree tobacco is located at the intersection of 24th and L Streets in the southwest corner of this unit. **Recommendation:** Remove tree tobacco and dispose of offsite prior to any other manipulation.
32	24	WD	The northeastern part of this unit adjacent to J Street is dominated by weedy annual grasses.
33	21	WD	Disturbed area vegetated by tall weedy mustards (*Brassica, Hirschfeldia, Raphanus*) with localized patches of thistles, including tocalote, milk thistle (*Silybum marianum*) and Italian thistle (*Carduus pyncnocephalus*). A localized infestation of yellow star thistle (*Centaurea solstitialis*) is located at the site of recent roadside work at 24th St. and J St. This is a highly invasive species and the only infestation noted on site. A localized infestation of purple star thistle (*Centurea calcitrapa*) is present along the road leading to the water tank and the gate to the Amundsen Ranch. The southern part of this unit is within the boundaries of the designated critical habitat for Braunton's milk-vetch and special considerations defined by USFWS may apply. The purple star thistle location is adjacent to or within the critical habitat. **Recommendations:** Remove all yellow star thistle and seed/plant debris in the immediate area from the site prior to doing any other work. Decontaminate clothes and equipment to ensure seeds or plant parts aren't tracked to other areas. After approval by USFWS, remove all purple star thistle and seed/plant debris in the immediate area from the site prior to doing any other work. Decontaminate clothes and equipment to ensure seeds or plant parts aren't tracked to other areas.
34	27	WD	Similar to the following site with weedy annual grasses. Fountain grass and horehound present. **Recommendation:** Remove fountain grass and dispose of offsite prior to any other manipulation. Implement precautions to prevent spread of fountain grass seed while removing the plants.
35	28	WD	Weedy annual grasses and Italian thistle with a couple of mule fat, cudweed aster (*Lessingia filaginifolia*), and telegraph weed (*Heterotheca grandiflora*). Mounds of earth (excavated from elsewhere?) are revegetated.

Table 2. Comments on specific units or subareas identified within the developed portion of SSFL Area IV

Unit Number[1]		*Vegetation Classification*[2]	*Comments*[3]
Map #	**Field #**		
36	22c (northern part)	WD	This is an area of tall weedy mustards similar to those described for site 33 (21).
37	22c (southern part)	WD	This is an area of tall weedy mustards similar to those described for site 33 (21). There is a localized roadside infestation of purple star thistle along the unpaved road that separates Unit 37 (22c) from Unit 33 (21) and leads to the water tank. The precise location of this infestation is not available but it is adjacent to or within the critical habitat. **Recommendation:** After approval by USFWS, remove all purple star thistle and seed/plant debris in the immediate area from the site prior to doing any other work. Decontaminate clothes and equipment to ensure seeds or plant parts aren't tracked to other areas.
38	22b	WD	This is an area dominated by native shrubs including laurel sumac and coyote brush. Tree tobacco and smilo grass are present. **Recommendation:** Remove tree tobacco and smilo grass and dispose of offsite prior to any other manipulation.
39	22a	WD	This is a graded former facility site with a steep cut slope at the southern end resulting from the earthmoving to make a flat pad. The site is vegetated by weedy annual grasses, with native shrubs coyote brush and laurel sumac. Tree tobacco and smilo grass (*Piptatherum miliaceum*) are present. **Recommendation:** Remove tree tobacco and smilo grass and dispose of offsite prior to any other manipulation.
40	29	RV	Site dominated by a dense stand of coyote brush with a couple of planted coast live oaks. Western part and understory of shrubs is weedy annual grasses, summer mustard, and tocalote.

Notes:

1. The units were initially assigned individual reference numbers ("field numbers") for the purpose of correlating notes and photographs. As the analysis progressed it became necessary to subdivide certain areas and add others, leading to a difficult-to-follow numbering system. For ease of reference on a map, the sites have been renumbered ("map numbers").
2. See legend of Figure 1 for vegetation classification.
3. At first mention of a plant both common and scientific names are used, thereafter common names are used. A list of selected plant species listed by common and scientific names is included as Attachment A.
4. Map number of subdivision is followed by field number in parentheses: For example, in 39 (22a), 39 is the map number and 22a is the field number. See Note 1.

Vegetation Units within developed portions of Santa Susana Field Laboratory Area IV
Code
Vegetation Type
AS Non-native Annual Grassland
C-B Burned Northern Mixed Chaparral
C-S Burned Southern Mixed Chaparral
C-UB Unburned Northern Mixed Chaparral
CLO Coast Live Oak Woodland and Savanna
CWW California Walnut Woodland
DR Disturbed Riparian
MF Mulefat-dominated Formerly Disturbed
RV Revegetated Formerly Disturbed
WD Weed-dominated Formerly Disturbed
SDG Steep Dystlope Grassland
UDD Unvegetated Disturbed/Developed
VCS Ventunan Coastal Scrub
Portions of units within critical habitat
Site Boundaries
Vegetation units within the developed portion
0 50 100 200 Meters
0 125 250 500 Feet
DRAFT
AREA III
AREA IV
Undeveloped
AREA I
AREA II
Undeveloped Land
NASA
Date: 11-12-2009
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Additional Recommendations

1. Implement Best Management Practices (BMPs)**:**

    - As a general practice, workers must clean plant material and soil from pants, gaiters, boots or shoes, vehicles (including tires), and other equipment when moving from one vegetation treatment area to another or when leaving a weed-infested area.
    - Consult references and experts to identify the best way to remove and control specific invasive species that would be applicable to the project site.
    - Mowing of non-native vegetation (e.g. weed-dominated areas) could be timed to improve the habitat for natives and more desirable non-native grasses (in some cases this would be done by cutting when weeds start to elongate or bolt).
    - Consider a planting a seed mix of fast-growing native species indigenous to the site or non-persistent non-natives (e.g., sterile barley) where noxious species such as the star thistles have been removed to suppress reestablishment of the invasive species.
    - Monitor and conduct follow up treatment during and following EPA's site preparation and surveys.

2. For localized infestations of the following invasive species, remove plants, including root structures, containerize, and dispose of offsite. Clean plant material and soil from equipment, clothing, gaiters, and footwear before moving to next area. SAIC will identify known locations. Other locations may be identified by biological monitor.

    - Purple star thistle (*Centaurea calcitrapa*) –one localized occurrence observed.
    - Yellow star thistle (*Centaurea solstitialis*) –one localized occurrence observed.
    - Russian thistle (*Salsola tragus*)—localized occurrences noted at two sites
    - Puncture vine (*Tribulus terrestris*)—one localized occurrence noted.
    - Fountain grass (*Pennisetum setaceum*) – currently found mostly along roadsides and margins of facilities pads right now. Occupies rock cracks in sandstone outcrops—same habitat as Santa Susana Tarplant. Precautions are needed to avoid dispersing seed while removing the plants.
    - Tamarisk (*Tamarix ramosissima*)—noted at several formerly developed sites; can be identified for removal by biological monitor..
    - Tree-of-heaven (*Ailanthus altissima*)—several localized occurrences noted; can be identified for removal by biological monitor.
    - Giant reed or Arundo (*Arundo donax*) and castor bean (*Ricinus communis*)—not observed by SAIC but very important to eradicate if encountered.
    - Fan palms (probably *Washingtonia robusta, but possibly W. filifera*)—principally found along roadsides in the previously developed areas.
    - Tree tobacco (*Nicotiana glauca*) localized in disturbed areas in several locations; can be identified for removal by biological monitor.

3. For broader-scale infestations, avoid moving these around the site by limiting the area within which vegetation is cut, stockpiled, and potentially mulched and by cleaning plant material and soil from equipment, clothing, gaiters, and footwear before moving to next area.

    - Horehound (*Marrubium vulgare*)
    - Wild radish (Raphanus sativus)
    - Wild mustards (*Brassica* spp. or *Hirschfeldia incana*)—especially concentrated in solid stands in portions of the site.
    - Milk thistle (*Silybum marianum*)
    - Italian thistle (*Carduus pycnocephalus*)
    - Malta star thistle (tocalote) (*Centaurea melitensis*)
    - Smilo (*Piptatherum miliaceum)*

4. The following are measures targeting specific invasive plant species that may be particularly problematic for the state and federally listed plant species on the site. These could be identified as offsets to potential impacts on these species from the site preparation and surveys in addition to the other measures identified in this document.

    - With USFWS concurrence, remove horehound (*Marrubium vulgare*) from northern portion of the Braunton's milk-vetch habitat and control its spread where it has invaded areas occupied by the milk-vetch and other native species and likely adversely affects milk-vetch and its habitat.
    - Remove fountain grass (*Pennisetum setaceum*) and control its spread into habitats occupied by Santa Susana tarplant (with CDFG concurrence). Precautions need to be taken to avoid spreading the seed of this species while cutting and removing it.

Attachment

Attachment—Names of plant species mentioned in Table 2 alphabetized by common name (see also Table 1 for names of invasive species).

Branching phacelia	*Phacelia ramosissima*
Brickell bush	*Brickellia californica*
California buckwheat	*Eriogonum fasciculatum*
Chaparral nightshade	*Solanum xantii*
Coast goldenbush	*Isocoma menziesii*
Coast live oak	*Quercus agrifolia*
Coastal bush sunflower	*Encelia californica*
Coyote brush	*Baccharis pilularis*
Cudweed aster	*Lessingia filaginifolia*
Deerweed	*Lotus scoparius*
Fountain grass	*Pennisetum setaceum*
Horehound	*Marrubium vulgare*
Laurel sumac	*Malosma laurina*
Mule fat	*Baccharis salicifolia*
Santa Susana tarplant	*Deinandra minthornii*
Smilo grass	*Piptatherum miliaceum*
Summer mustard	*Hirschfeldia incana*
Tamarisk	*Tamarix ramosissima*
Telegraph weed	*Heterotheca grandiflora*
Thickleaf yerba santa	*Eriodictyon crassifolium*
Tocalote	*Centaurea melitensis*
Tree tobacco	*Nicotiana glauca*
Weedy annual grasses	Includes *Avena* spp, *Bromus* spp.

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