Biotic Resources Group

Biotic Assessments ♦ Resource Management ♦ Permitting

3M Moody Flats Quarry

Shasta County, CA

Revegetation Plan

Prepared For

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Table of Contents

Table of Contents i
List of Figures iii
List of Tables iii
Chapter 1. Responsible Parties 1
1.1. Applicant 1
1.2. Applicant's Designated Agent (if any) 1
1.3. Preparer of the Revegetation Plan 1
Chapter 2. Project Location and Description 2
2.1. Location 2
2.2. Brief Summary of Overall Project 2
Chapter 3. Revegetation Design 5
3.1. Basis for Design 5
3.2. Constraints and Opportunities 6
3.3. Projected End Use 10
3.4. Proposed Revegetation Site 10
3.4.1 Ownership Status 10
3.4.2 Hydrology/Topography/Geology 10
3.4.3 Soil/Substrate 10
3.4.4 Vegetation 11
3.5. Revegetated/Created Habitats 11
3.5.1 Long-term Goals 11
3.5.2 Water Quality Functions 13
3.5.3 Quarry High Walls 13
3.5.4 Soil/Substrate 14
3.5.5 Vegetation 14
3.5.6 Revegetation Test Plots 15
Chapter 4. Success Criteria and Monitoring 16
4.1 Success Criteria 16
4.2 Monitoring 22
4.2.1 Methods 22
4.2.2 Monitoring Schedule 23
Chapter 5. Implementation Plan 25
5.1 Site Preparation 25
5.2 Planting/Seeding 26
5.3 Irrigation 26
5.4 Implementation Schedule 31
Chapter 6. Maintenance During Monitoring Period 33
6.1 Maintenance Activities 33
6.2 Supplemental Seeding and Planting 30
6.3 Maintenance Schedule 31
Chapter 7. Proposed Monitoring Reports 38
7.1. Due Dates 38
7.2. Monitoring Report Content 38
Chapter 8. Potential Contingency Measures 39
8.1. Initiating Procedures 39

8.2. Contingency Funding Mechanism 39
Chapter 9. Completion of Mitigation Responsibilites 40
9.1. Notification 40
9.2. County Confirmation 40
Chapter 10. Long Term Management Plan 41
10.1. Property Ownership 41
10.2. Management Plan 41

List of Figures

Figure 1. Project Location 4
Figure 2. Site Plan 8
Figure 3. Reclamation Plan 9
Figure 4. High Walls and Catchment Berms 14
Figure 5. Generalized Layout of Successional Foothill Pine Woodland 29
Figure 6. Generalized Layout of Successional Oak Woodland 30

List of Tables

Table 1. Summary of Reference Transect Data 17
Table 2. Performance Standards for Years 1-4 and Final Success Criteria for Year 5 19
Table 3. Species to be Planted 26
Table 4. Typical Revegetation Schedule, Years 0-5 32
Table 5. Invasive Weeds of Management Concern 33
Table 6. Maintenance Schedule 37

Appendices

A Reference Transect Data, North State Resources, 2010

Chapter 1. Responsible Parties

1.1. Applicant

3M Company

1.2. Applicant's Designated Agent (if any)

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1.3. Preparer of the Revegetation Plan

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Chapter 2. Project Location and Description

2.1. Location

The Moody Flats Quarry Project is located north of Redding in Shasta County, California. The elevation of the site ranges from approximately 800 feet to 1,500 feet above MSL. The property is located west of the Mountain Gate exit from Interstate 5 and east of the southern end of Shasta Lake, southeast of Digger Bay. The site encompasses approximately 1,900 acres and is accessed from Wonderland Boulevard to the east, Picard Road on the southwest, and Black Canyon Road on the southeast. The Union Pacific Railroad (UPRR) line traverses the eastern portion of the property. The property location, as depicted on the USGS Project City quadrangle is depicted on Figure 1.

2.2. Brief Summary of Overall Project

3M Company proposes to develop a new hard rock quarry within the approximately 1,900-acre property. The quarry will be located within an approximately 430-acre operations area that will include an approximately 220-acre north pit, 65-acre south pit, 60-acre overburden storage site, 15-acre primary processing area, and 60-acre secondary and ancillary processing and loadout area (Moody Flats Quarry Site Plan, Resource Design Technology, Inc., 2009). In addition to material processing the site will contain asphalt, ready mix, and recycled materials plants. Mining operations would be initiated by the removal of soil and overburden using dozers and scrapers. Topsoil would be removed and stockpiled for future reclamation use or moved to a previously mined area concurrent with reclamation. Quarrying will consist of a series of benches at vertical intervals of up to 80 feet and widths up to 45 feet. The quarry would be excavated with an overall slope of 1:1. The quarry would be developed in a typical hard rock quarry configuration, creating a depression from successively deeper cuts (benches) in the rock. There is no phasing as the mine areas are continuously operated until the design depth is reached. All other operations areas would be continually used throughout the period of the project development, operations and reclamation.

The project will primarily access the UPRR line that traverses the site to ship aggregate products using a rail spur and rail siding. Access to the project site will also occur via a private access/haul road from Wonderland Boulevard via Interstate 5. The maximum proposed annual aggregate production is 2 million tons per year. The operation is planned for 100 years, although mineral resources are identified that could extend operations. Reclamation of the mining and operations areas will occur when mining is completed. The reclamation plan proposes to reclaim approximately 375 acres of the project area to post mining open space. Approximately 132 of these acres will be designated for the

establishment of oak woodland, thus providing compensatory mitigation for the removal of oak trees from the quarry project.

Reclaimed areas include the north pit (floor and benches on high walls), primary processing plant, and south pit. The north pit will not be backfilled. The south pit may be backfilled to the same elevation as the primary plant and revegetated or not backfilled and used as water storage. The revegetation plan specifies revegetation of the south pit if it is backfilled or revegetation of the upper slopes if it is used for water storage. The secondary and ancillary processing, rail spur siding area, and access roads to the loadout area will be retained for post-reclamation uses.

In addition, the revegetation plan identifies the creation of 0.7 acre of freshwater wetlands within the Moody Creek diversion channel and the vegetated sheet drain. The recreated wetlands will provide a 1:1 replacement for in-stream wetlands affected by the mining project.

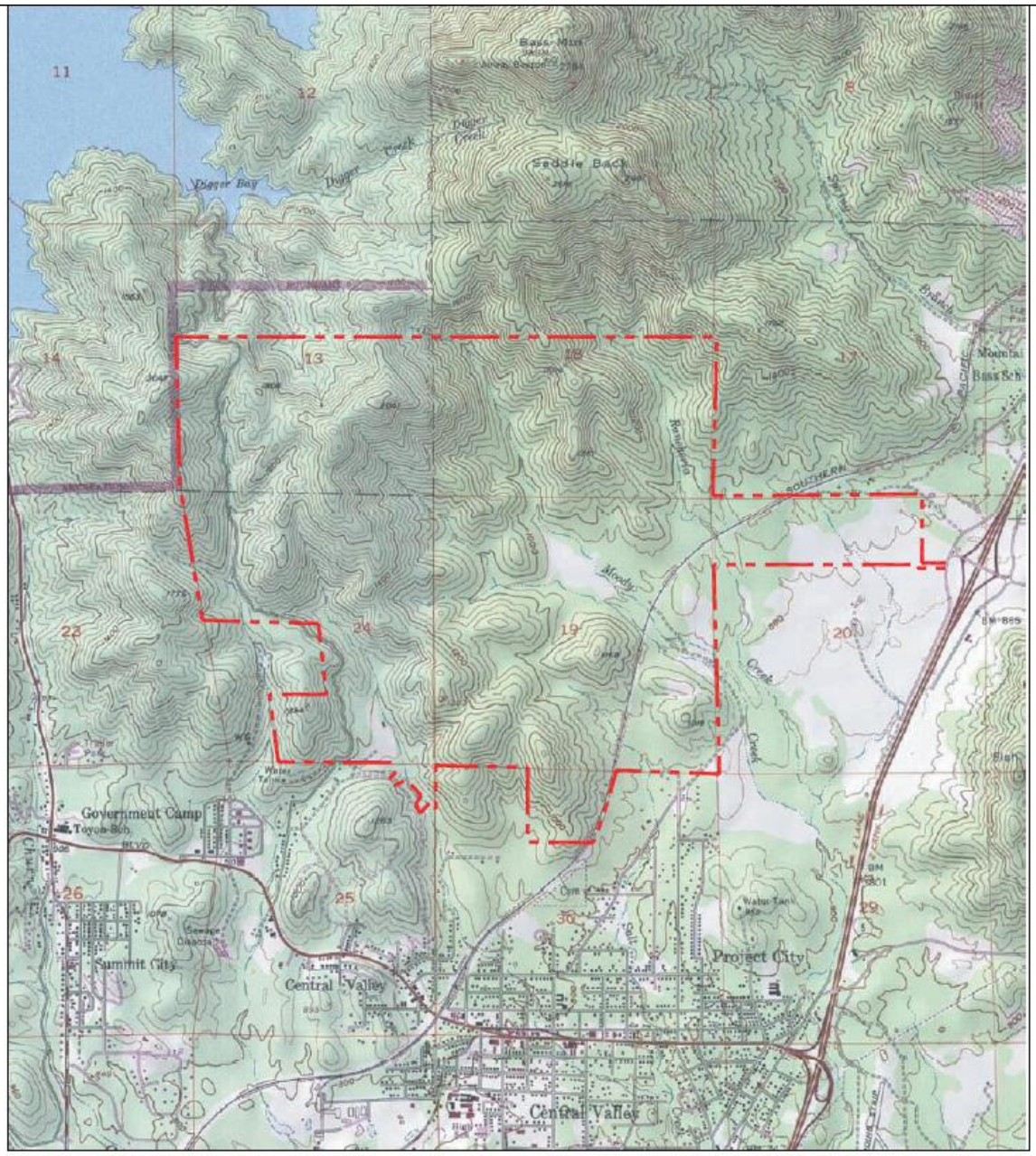

Figure 1. Project Location
(Project City USGS quadrangles)

Chapter 3. Revegetation Design

3.1. Basis for Design

Reclamation plans are required for all mining operations under California Surface Mining and Reclamation Act of 1975, as amended (SMARA) and approval is an action subject to the California Environmental Quality Act (CEQA). The State Mining and Geology Board has regulations for surface mining and reclamations practice. The revegetation plan component of the quarry's reclamation plan identifies revegetation of native plant habitats that occur adjacent to the mined areas. A native plant/seed collection and propagation program will be initiated to provide watershed and/or County-specific plant materials for the revegetation work. Monitoring and performance standards are included to assess project performance and compliance. Revegetation maintenance will occur until planted areas are revegetated and established woody and herbaceous plants are self-sustaining. A test plot program is specified to determine the best methods and techniques to achieve the revegetation objectives.

The revegetation plan is predicated on site conditions following hard rock mining. As quarrying will consist of a series of benches, quarry pit revegetation is limited to the quarry floor and berms created on the benches. Other revegetation areas include the primary processing plant, internal haul roads, and overburden fill area. The site plan is depicted on Figure 2. Areas to be revegetated are depicted on Figure 3. Revegetation will be initiated upon completion of the mining operation, except when safety and geotechnical principles allow revegetation of completed benches in the North and South pits. The plan identifies revegetation of the following areas of the Moody Flats Quarry:

- Floor of north pit (132 acres)
- Floor of south pit (25 acres) (if pit not used for water storage)
- Primary processing area (15 acres)
- Benches on quarry high walls (122 acres)
- Overburden fill area (60 acres)
- Moody Creek diversion channel (0.3 acre)
- Vegetated sheet drain area (0.4 acre)

Habitats to be created on the site include successional pine woodland, oak woodland, and freshwater wetlands. The design utilizes the principles of natural plant succession as well as supplemental revegetation techniques to reclaim the mined areas, the created diversion channel, and the constructed sheet drain area. Early successional (or "pioneer") plant species that are adapted to establishing open disturbed areas will be used to provide early native plant cover and create microhabitats conducive to the growth of later seral species, such as pines and oaks. Please refer to the project's Oak Mitigation Plan for specifics relating to the applicant's mitigation under PRC 21083.4 and County policies relating to mitigation of impacts to oak trees and oak woodland.

Most of the proposed revegetation areas will have upland conditions. Only the Moody Creek diversion channel and the vegetated sheet drain feature will have wetland conditions. Overburden and stockpiled topsoil will be applied to selected revegetation areas, such as benches on the quarry high walls, to aid revegetation. Establishment of the successional pine woodland, oak woodland, and freshwater wetlands will be accomplished through a combination of hydroseed application and container stock plantings. Plant species growing within natural habitats adjacent to mined areas are also expected to naturally colonize the revegetation areas.

All upland area container stock plantings will receive supplemental drip irrigation during a 5-year establishment period, after which the installed plants will rely on natural soil moisture for sustenance. The freshwater wetland revegetation areas are not expected to require supplemental irrigation.

3.2. Constraints and Opportunities

The replacement of organic soils of the pre-mined site to mined rock, overburden, and stockpiles topsoil causes the site to become much more xeric (dry). Bare, exposed rock on soil surfaces can cause surface soil temperatures to heat up to more than 140 degrees F during the summer months. These conditions make site conditions much more difficult to restore. The presence of soils with high rock-to-soil ratios can also restrict revegetation success. Rock fragments reduce the water-holding capacity of the soil. Too high of a concentration of rock creates xeric conditions and also elevates soil temperature. Excessive compaction of slopes and quarry floors also restricts plant growth. In compacted areas, the materials become so compacted that all pores and voids have been eliminated, resulting in very dense, root-restrictive layers.

While the post-mined conditions described previously portray a fairly bleak outlook for successful revegetation of pre-existing climax communities, field observations of successfully colonizing native plants on former reclaimed sites in California indicate that there are successful native plant revegetation efforts that can be prescribed. Various California native species are adapted to harsh, early successional conditions. At several mined and disposal areas, numerous shrubby species are successful invading sites, and do well after planting. These are typically shrubby, drought-tolerant species that are deeply rooted and capable of growing on nutrient-poor soil conditions. Seeding of native grasses has also been successful on these nutrient poor soil conditions. At revegetation sites with better soil development (e.g., quarry floors and overburden stockpiles), foothill pine and oaks are expected to be successful.

The proposed planting palette in this revegetation plan is not based on floristic characteristics of mature, climax conditions of undisturbed soils, as plants found in climax conditions are not generally adapted to growing on highly disturbed sites. Rather, recommendations for revegetating quarry lands at the Moody Flats Quarry are based on evidence of conditions

where native plants are successfully invading disturbed sites similar to those sites that will be revegetated. Further, where site conditions can be altered to improve chances for revegetation success (i.e., placement of overburden), selected climax species, such as foothill pines and oaks will be used.

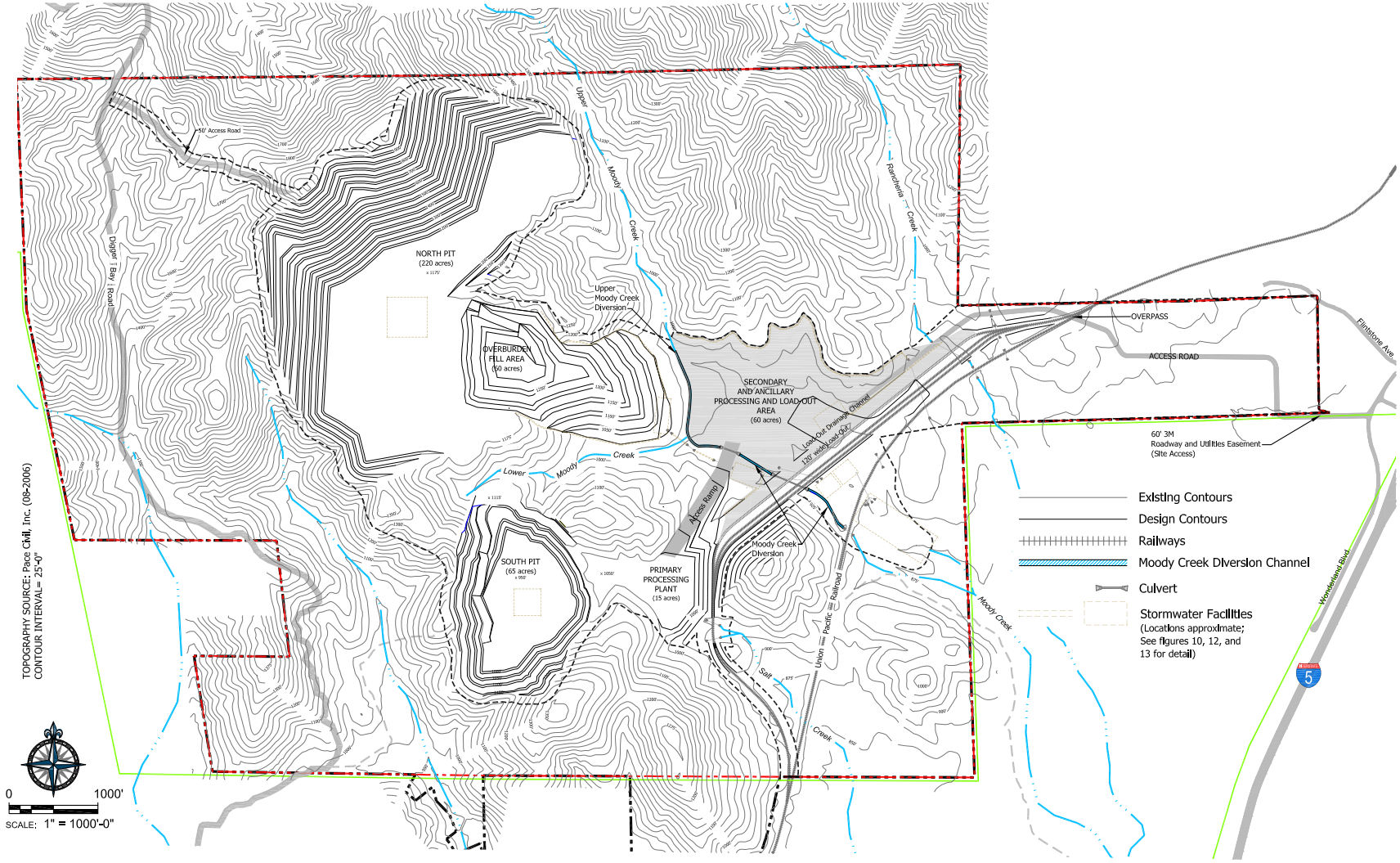

Figure 2. Site Plan

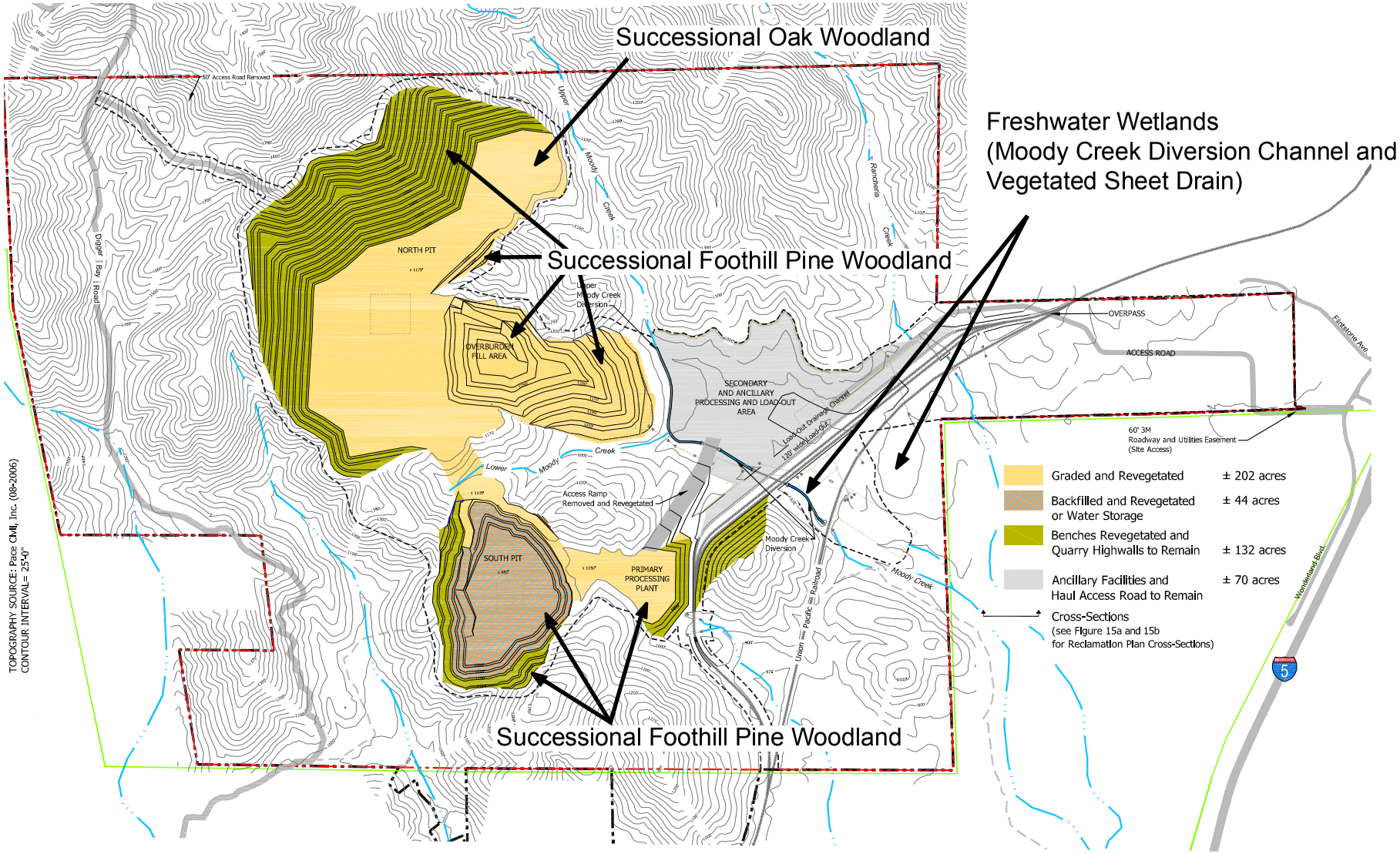

Figure 3. Revegetation Plan

3.3. Projected End Use

Reclamation of the north pit, south pit, overburden fill area and primary processing areasm Moody Creek diversion channel and the vegetation sheet drain area will be reclaimed for open space uses. The south pit may be used for water storage. Other portions of the quarry, such as the secondary and ancillary processing and loadout area and access road will be retained for other post reclamation uses.

3.4. Proposed Revegetation Site

3.4.1 Ownership Status

The revegetation site is owned by 3M Company, the project applicant.

3.4.2 Hydrology/Topography/Geology

The post-mining elevations within the revegetation area range from approximately 1,000 feet MSL in the processing area to approximately 1,300 feet MSL along the edge of the south pit. Within the two quarry pits the overall topography will have a slope of 1:1 (1 horizontal to 1 vertical). Benches will be established within the quarry faces at vertical intervals of up to 80 feet, with widths up to 45 feet. Catchment berms will be constructed on the benches. These berms will use overburden material to mange stormwater flow and, with revegetation, provide aesthetic screening of the high walls.

The floor of the two pits and the processing area will be relatively level upon reclamation. The overburden storage area will be dome-shaped (see Figure 3). Stockpiled overburden, topsoil, and fines/waste will be placed within this areas and revegetated.

Drainage through the reclaimed areas will be primarily sheet flow, with flow directed into Upper Moody Creek, and the Moody Creek diversion channel. Surface flows will also be directed to the vegetated sheet draina, located southeast of the railroad tracks.

3.4.3 Soil/Substrate

The project area supports diverse soil types. The oak-pine woodland and chaparral areas are mapped as Auburn very stony clay loam, 30-60 percent slopes and Boomer gravelly loam, 30-50 percent slopes. These two soils are not considered hydric.

The eastern portion of the project area is mapped as Churn gravelly loam, 0-3 percent slopes (CeA) and Red Bluff loam, 3-8 percent slopes (RbB). The soils along Rancheria Creek are mapped as Anderson gravelly sandy loam (Ad). The soils along Moody Creek and its major tributaries are mapped as Churn gravelly loam, deep, 0-4 percent slopes. These soils are

considered non-hydric, yet may contain hydric inclusions in areas subject to frequent flooding and/or long duration ponding.

Topsoil from the mining areas will be stockpiled for use in revegetation when available. This topsoil will be a mixture of Auburn very stoney clay loam and Boomer gravelly loam, as well as any inclusions of other soil types that are encountered during soil stripping.

3.4.4 Vegetation

Six vegetation types have been documented on the 1,900-acre quarry property: interior live oak – foothill pine woodland, white leaf manzanita chaparral, mixed oak woodland, grassland, seasonal wet meadow and riparian woodland. The project area also includes several intermittent drainages, one man-made in-stream pond, and a man-made drainage channel. Approximately 40 acres along the existing railroad is bare. Please refer to the project environmental document and other supporting reports for additional information on the quarry site's existing vegetation.

The proposed project will remove live oak-foothill pine woodland through the excavation of the north and south pits and the creation of the overburden storage area, plant site, load out area and processing areas. Quarry activities will remove several large-sized (i.e., greater than 24" dbh) native oaks that occur within the oak-foothill pine woodland. Quarry operations will also impact sections of Lower and Upper Moody Creeks, and other intermittent and ephemeral drainages that support wetland vegetation. The wetlands are comprised on freshwater emergent wetlands, riparian wetlands and spring-seep wetlands (NSR, Inc., 2010). The proposed project will affect approximately 0.7 acre of freshwater wetlands.

3.5. Revegetated/Created Habitats

3.5.1 Long-term Goals

The overall goal of the revegetation effort is to enhance the recovery of mined areas and through natural succession processes, create viable habitats that are genetically and ecologically compatible with the undisturbed surrounding vegetation.

The revegetation plan identifies the following goals and objectives for each of the habitat types created within the revegetation area:

1) Implement mining reclamation and revegetation in a manner that stabilizes soil and minimizes soil erosion.
2) Establish successional foothill pine woodland on the benches of the north pit and south pit (if south pit is not used for water storage), overburden fill area, primary processing area and floor of south pit (if south pit is not used for water storage) . Achieve this goal by implementing the following objectives:

a) Install successional foothill pine woodland vegetation that can persist in winter-wet and summer-dry site conditions that will create approximately 239 acres of pine woodland.
b) Achieve plant cover in five years that represents 60% of the pine woodland reference site data.
c) Utilize native pine woodland plant species that can grow within overburden materials on excavated benches and within stockpiled overburden areas.
d) Utilize both hydroseed and container stock planting techniques to establish grass, forb and woody plant species.
e) For woody plant species, utilize site-specific plant propagules or those collected from the Moody Creek watershed and/or Shasta County in the revegetation efforts.
f) Maintain 60% survival of installed container stock plants each year for a minimum period of five years. Install replacement plants if needed to meet survival rates, density rates, and/or to achieve plant cover requirements.
g) Control cover of target invasive weeds (e.g., thistles and others) to less than 10% each year.

3) Establish successional oak woodland within the floor of the north pit to provide partial compensatory mitigation for the removal of oak trees from the quarry project. Achieve this goal by implementing the following objectives:
   a) Install successional oak woodland vegetation that can persist in winter-wet and summer-dry site conditions that will create an approximately 132 acres of oak-dominated woodland,
   b) Achieve plant cover that represents 60% of the oak woodland reference site data in five years.
   c) Utilize both hydroseed and container stock planting techniques to establish grass, forb and woody plant species.
   d) For woody plant species, utilize site-specific plant propagules or those collected from the Moody Creek watershed and/or Shasta County in the revegetation efforts.
   e) Maintain 60% survival of installed trees each year for a minimum period of five years. Install replacement plants if needed to meet survival rates, density rates, and/or achieve plant cover requirements.
   f) Control cover of target invasive weeds (e.g., thistles and others) to less than 10% each year.
4) Hydroseed access road to north pit and perimeter of south pit (if pit is used for water storage) at completion of quarry operations.
   a) Install native grasses and forbs along decommissioned roadbed to stabilize the area(s) and to facilitate natural colonization of native species from the adjacent pine woodland.
   b) Achieve plant cover that represents 60% of the pine woodland and chaparral reference site data in five years.

5) Establish freshwater wetlands within the Moody Creek diversion channel and vegetation sheet drain area to provide compensatory mitigation for the removal of wetlands by the quarry project. Achieve this goal by implementing the following objectives:
    a) Install freshwater wetland vegetation that represents fresh-emergent wetlands, riparian wetland and seep-spring habitat types that can persist in intermittent flow conditions.
    b) Create approximately 0.3 acres of wetlands within the Moody Creek diversion channel on minimum 3-foot wide low elevation benches adjacent to a low-flow channel.
    c) Create approximately 0.4 acres of wetlands within the vegetated sheet drain area, creating low elevation benches adjacent to meandering low-flow channels.
    d) Install native grasses, forbs, and subshrubs within designated wetland revegetation areas using hydroseed and container stock material.
    e) For woody plant species, utilize site-specific plant propagules or those collected from the Moody Creek watershed and/or Shasta County in the revegetation efforts.
    f) Achieve 50% plant cover by wetland indicator plant species in five years.
    g) Control cover of target invasive weeds to less than 10% each year.

3.5.2 Water Quality Functions

Successful revegetation of the mined and operation areas will provide storm water quality benefits by reducing sediment transport from post-mined areas to downstream receiving waters (i.e., Moody Creek). Wetland creation within the Moody Creek Diversion Channel and vegetated sheet drain area will also provide water filtering functions to benefit downstream water quality.

3.5.3 Quarry High Walls

A cross-section of the benches on the quarry high walls is depicted in Figure 4. This plan shows the location of the catchment berms. These berms will be constructed with overburden materials and stockpiled topsoil then revegetated with successional foothill pine woodland plant species. Pine trees and other vegetation will provide screening of the high walls.

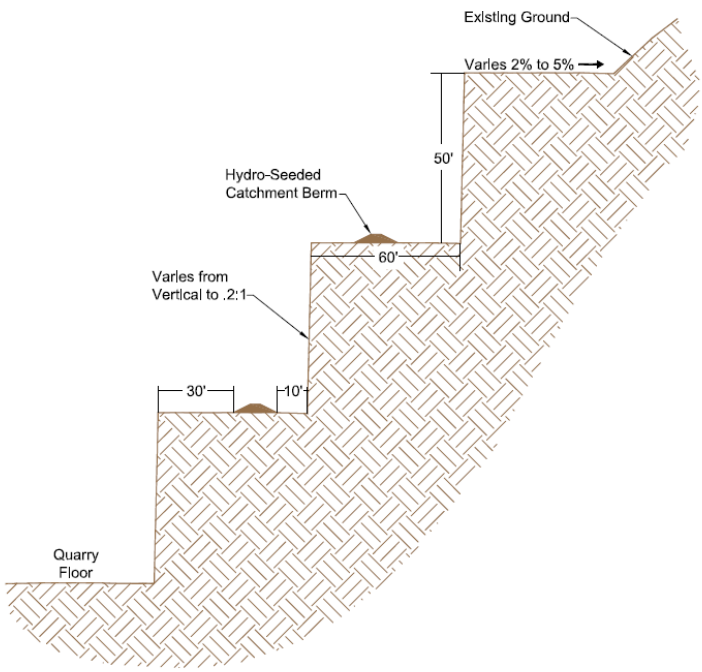

Figure 4. High Walls and Catchment Berms

3.5.4 Soil/Substrate

The revegetation area will support and/or receive applications of overburden and stockpiled topsoil. Overburden will be used to backfill the north pit and the south pit (if the south pit is not used for water storage). The bottom elevation of the pit(s) will be graded to have natural undulations. In all areas, salvaged topsoil will be placed on the overburden to facilitate plant growth. The amount of overburden available for placement onto the revegetation area will be based on the volume remaining after mining. Similarly, the amount of topsoil available will depend upon the amount removed during the initial stripping. Topsoil stockpiles will be retained on site until needed for revegetation.

3.5.5 Vegetation

Three habitat/vegetation types will be created on site. These types are successional foothill pine woodland, successional oak woodland, and freshwater wetlands.

3.5.6 Revegetation Test Plots

A test plot program will be established concurrent with mining until a determination is made as to the most appropriate planting procedure to be followed for each plant community to ensure successful implementation of the revegetation plan.

Test plots will be located in soils and locations that are representative of the quarry floor and cut benches within the north and south pits. The plots will be planted with representative mixes of native seeds and plants of each plant community type to be restored. The purpose of the program is to test seeding rates and planting methods. This program will develop the best management practices (BMP's) to be used at the quarry upon completion of mining.

The goals of the revegetation test program are:

1. To determine the efficacy of erosion control methods and the seeding rates of the selected grass and plant species to be utilized.
2. To develop the best management practices for establishing successional foothill pine woodland and successional oak woodland from seed and container stock.
3. To compare direct seed versus propagule planting methods (plugs, bare roots, other container stock sizes) of revegetation species.
4. To compare plant medium additives, such as mychorizae, water-absorbent gels, and other inoculants, on plant survival.
5. To evaluate plant performance within overburden, topsoil, and amended topsoil applications.
6. To assist in developing cost estimates for collections, propagation, establishment and monitoring of the planned restoration program for future planning and allocation of resources.

Chapter 4. Success Criteria and Monitoring

4.1 Success Criteria

The final success criteria for the revegetation are outlined below. When these criteria are fulfilled, the revegetation area will be determined to be progressing toward the habitat type and values that constitute the long-term goals of this project. These final success criteria will be monitored for compliance at the end of the 5-year monitoring period. Final success criteria for the revegetation area will be documented by monitoring by a qualified botanist, ecologist, or revegetation specialist.

Performance standards have been established for the successional foothill pine woodland and successional oak woodland based on data collected from reference transects and the project goals for creating a mosaic of mature, self-sustaining native plant communities on the quarried lands. The revegetation area will meet species diversity (i.e., number of plant species) and relative plant cover values as a percentage of reference transect data (using data from mature habitats). The revegetation areas will also achieve a minimum number of trees and shrubs per acre based on density values recorded in the reference transects, yet adjusted to reflect higher initial planting rates and expected mortality of installed plants.

Reference transects were established within several plant community types within the project site in July 2010 to document existing plant cover and density (North State Resources, Inc., 2010) This data is presented in Appendix A. Table 1 summarizes the data collected from the foothill pine, oak woodland, chaparral, and grassland-dominated communities. Within the reference plots, percent cover was calculated by visual estimates of foliar cover for each vascular species, with total cover not-to-exceed 100%. Plant density was calculated from a total count of individuals for each shrub and tree species present with the 15 x 40 meter plot. Shrub species with multiple stems arising from several locations, such as Himalaya berry (*Rubus procerus)*, or poison oak (*Toxicodendron diversilobum)* were excluded from density estimated due to the inaccuracy of attempting to count individual plants (North State Resources, Inc., 2010).

Available data on plant cover, species diversity, and tree/shrub density was used to develop the performance standards. For successional foothill pine woodland revegetation data from plot #2 (oak/pine woodland) and plot #4 (montane hardwood-conifer woodland) was used. For the oak woodland revegetation data from plot #1 (blue oak woodland) and plot #6 (montane hardwood) was used. Successional pine woodland created by only hydroseed application (i.e., access road to the north pit and rim of south pit [if pit is used for water storage]) and the high wall benches also have performance standards. Reference data for these areas was obtained from plot #9 (annual grassland) and plot #8 (mixed chaparral).

A delineation of wetlands was conducted in 2010 (North State Resources, Inc., 2010). Plant cover data from wetland sample points and wetland criteria in the *Corps of Engineers Wetlands Delineation Manual* was used to develop the performance standards for the created freshwater wetlands.

Table 1. Summary of Reference Transect Data (Source: North State Resources, Inc.)

Plant Community Type	Plant Cover (%)	Plant Cover (%)	Average Cover Value (%)	Average Density per 600 m^2 Plot	Approximate Density per Acre
FOOTHILL PINE AND PINE/OAK DOMINATED WOODLANDS					
	Plot #2	**Plot #4**			
Total Plant Cover	**45%**	**49%**	**47%**		
Tree Cover					
• Foothill Pine	<1%	6%	3%	5	38
• Blue Oak	19%	<1%	10%	6	41
• Interior Live Oak	13%	14%	14%	18	122
• Black Oak	0%	1%	<1%	1	1
Tree Cover Total	**32%**	**21%**	**27%**	**30**	**202**
Shrub/Vine Cover (all species)					
• White Leaf Manzanita	6%	28%	17%	21	142
• Toyon	0	1%	<1%	1	7
• Buck Brush	1%	0%	<1%	1	7
• Holly-leaved Redberry	<1%	0%	<1%	1	7
• Poison Oak	2%	<1%	1%	1	7
Shrub/Vine Cover Total	**7%**	**28%**	**18%**	**25**	**169**
Herb Cover (all species)	**5%**	**0%**	**3%**	**-**	**-**
Native Species Diversity	14 species	7 species	11 species	-	-
OAK DOMINATED WOODLANDS					
	Plot #1	**Plot #6**			
Total Plant Cover	**92%**	**84%**	**88%**	**-**	**-**
Tree Cover					
• Blue Oak	50%	0%	25%	18	122
• Black Oak	0%	46%	23%	14	95
• Canyon Live Oak	0%	10%	5%	4	27
• Foothill Pine	0%	<1%	<1%	1	7
• Interior Live Oak	0%	<1%	<1%	1	7
Tree Cover Total	**50%**	**56%**	**53%**	**38**	**257**

Table 1. Summary of Reference Transect Data (Source: North State Resources, Inc.)

Plant Community Type	Plant Cover (%)	Plant Cover (%)	Average Cover Value (%)	Average Density per 600 m^2 Plot	Approximate Density per Acre
Shrubs/Vines					
• White Leaf Manzanita	2%	4%	3%	2	14
• Toyon	0%	15%	8%	1	7
• Holly-leaf Redberry	0%	4%	2%	1	7
• Dogwood	0%	4%	2%	1	7
• Poison Oak	0%	<1%	<1%	1	7
Shrub/Vine Total Cover	**2%**	**27%**	**15%**	**6**	**41**
Herb Cover (all species)	**40%**	**0%**	**20%**	**-**	
Native Species Diversity	4 species	9 species	7 species	-	
SUCCESSIONAL COMMUNITIES (MIXED CHAPARRAL AND ANNUAL GRASSLAND)					
	Plot #8	**Plot #9**			
Total Plant Cover (all species)	**81%**	**81%**	**81%**		
Tree Cover					
• Interior Live Oak	8%	0%	4%	7	47
• Foothill Pine	<1%	0%	<1%	1	7
Tree Cover Total)	**8%**	**0%**	**4%**	**8**	**54**
Shrub/Vine Cover					
• White Leaf Manzanita	71%	0%	36%	11[1]	74
• Toyon	<1%	0%	<1%	3[1]	20
Shrub/Vine Cover Total	**71%**	**0%**	**36%**	**-**	**-**
Herb Cover (all species)	**<1%**	**81%**	**41%**	**-**	**-**
Native Species Diversity	4 species	1 species	3 species		
FRESHWATER WETLANDS (INTERMITTENT SWALE AND RIPARIAN WETLAND)					
	Wetland Delineation Data		**Average Value**		
Total Plant Cover	35-100%		65%		
% of Dominant Species OBL, FACW, FAC	75-100%		96%		
• Black willow	Obligate		>20%		
• Narrow-leaved Willow	Obligate		>20%		
• California Button Willow	Obligate		>20%		
• Pale Spikerush	Obligate		<20%		
• Willow Dock	Obligate		<20%		
• Perennial Ryegrass	Facultative		<20%		
• Seep Monkey Flower	Obligate		<20%		

[1-] Data for these species from plots #2 and #4

Performance standards will be measured during Years 1-5. The standards (as listed in Table 2) for the successional foothill pine and oak woodlands are based on achieving an increasing percentage of the reference transect data each monitoring year, reaching 60% of the reference transect data by Year 5. The standard for the freshwater wetlands is to achieve a minimum 50% cover by dominant species that have a wetland indicator status of OBL, FACW, or FAC in five years.

As depicted on Table 2, percent survival, plants per acre, plant cover, and presence of invasive, non-native species will be monitored. Monitoring will include calculating percent plant cover by visual estimates of foliar cover for each vascular species, with total cover not-to-exceed 100%. Plant density will be calculated from a total count of individuals for each shrub and tree species present with a 15 x 40 meter plot, with data extrapolated to plants per acre. The performance standards for tree and shrub density represent a yearly 60% survival rate from the initial planting rates (the initial planting rates are listed on Table 3 in Chapter 5). Performance standards for tree and shrub cover are presented as a percentage of the reference plot data, such that by Year 5 plant cover is 60% of the reference plot data. This rate of growth was selected to reflect the young condition of the revegetation area compared to the mature conditions documented by the reference plots.

Remedial measures will be implemented by the project applicant if the stated standards are not achieved in any of the monitoring years. Examples of remedial actions include re-planting failed plants, re-seeded bare areas, increasing weeding sessions, and/or modifying the irrigation system.

Table 2. Performance Standards for Revegetation Areas, Years 1-4 and Final Success Criteria for Year 5

	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
	Success Criteria				
SUCCESSIONAL FOOTHILL PINE WOODLAND					
Species Diversity, native species	>8 species	>8 species	>8 species	>8 species	>8 species
Total Plant Cover	**>5%**	**>12%**	**>16%**	**>21%**	**>28%**
Tree Cover					
• Foothill Pine	1%	2%	3%	6%	7%
• Interior Live Oak	2%	2%	4%	6%	6%
• Black Oak	1%	1%	2%	2%	3%
Tree Cover Total	**4%**	**4%**	**9%**	**14%**	**16%**
Tree Density (# trees per acre)					
• Foothill Pine	85	85	85	85	85
• Interior Live Oak	24	24	24	24	24
• Black Oak	12	12	12	12	12
Tree Density Total	**121**	**121**	**121**	**121**	**121**
Tree Survival (%)	60%	60%	60%	60%	60%
Approximate Tree Spacing (feet)	20’	20’	20’	20’	20’

Table 2. Performance Standards for Revegetation Areas, Years 1-4 and Final Success Criteria for Year 5

	Year 1	Year 2	Year 3	Year 4	Year 5
	Success Criteria				
Shrub/Vine Cover					
• White Leaf Manzanita	1%	1%	1%	1%	1%
• Buck Brush	1%	1%	1%	1%	1%
Shrub/Vine Cover Total	**5%**	**6%**	**8%**	**9%**	**11%**
• Holly-leaved Redberry	1%	1%	1%	1%	1%
• CA Sagebrush	1%	2%	3%	3%	4%
• Coyote Brush	1%	1%	2%	3%	4%
Shrub Density (# shrubs per acre)					
• White Leaf Manzanita	20	20	20	20	20
• Buck Brush	10	10	10	10	10
• Holly-leaved Redberry	10	10	10	10	10
• CA Sagebrush	30	30	30	30	30
• Coyote Brush	30	30	30	30	30
Shrub Density Total	**100**	**100**	**100**	**100**	**100**
Approximate Shrub Spacing (feet)	20’	20’	20’	20’	20’
Herb Cover (all species)	**40%**	**40%**	**30%**	**30%**	**30%**
Cover by Invasive, Non-native Plant Species	<10%	<10%	<10%	<10%	<10%
OAK WOODLAND					
Species Diversity, native species	8 species	8 species	8 species	8 species	8 species
Total Plant Cover	**>8%**	**22%**	**31%**	**40%**	**53%**
Tree Cover					
• Blue Oak	2%	4%	7%	9%	10%
• Black Oak	1%	2%	6%	8%	9%
• Interior Live Oak	1%	2%	3%	5%	8%
• California Buckeye	1%	2%	2%	3%	5%
Tree Cover Total	**5%**	**10%**	**18%**	**24%**	**32%**
Tree Density (# trees per acre)					
• Blue Oak	46	46	46	46	46
• Black Oak	46	46	46	46	46
• Interior Live Oak	46	46	46	46	46
• California Buckeye	15	15	15	15	15
Tree Density Total	**154**	**154**	**154**	**154**	**154**
Tree Survival (%)	60%	60%	60%	60%	60%
Approximate Tree Spacing (feet)	20’	20’	20’	20’	20’
Shrub/Vine Cover					
• Toyon	1%	2%	2%	2%	2%
• Buck Brush	1%	1%	2%	2%	2%
• Holly-leaved Redberry	1%	1%	2%	2%	2%
• Coyote Brush	1%	2%	2%	3%	4%
Shrub/Vine Cover Total	**4%**	**6%**	**8%**	**9%**	**10%**
Shrub Density (# shrubs per acre)					
• Toyon	8	8	8	8	8
• Buck Brush	8	8	8	8	8

Table 2. Performance Standards for Revegetation Areas, Years 1-4 and Final Success Criteria for Year 5

	Year 1	Year 2	Year 3	Year 4	Year 5
	Success Criteria				
• Holly-leaved Redberry	16	16	16	16	16
• Coyote Brush	48	48	48	48	48
Shrub Density Total	**80**	**80**	**80**	**80**	**80**
Approximate Shrub Spacing (feet)	20’	20’	20’	20’	20’
Herb Cover (all species)	**40%**	**40%**	**30%**	**30%**	**30%**
Cover by Invasive, Non-native plant Species (%)	<10%	<10%	<10%	<10%	<10%
Container Stock Plant Survival (%)	60%	60%	60%	60%	60%
SUCCESSIONAL FOOTHILL PINE WOODLAND - HYDROSEED (Access road to north pit, and perimeter of south pit, if pit is used for water storage)					
Species Diversity, native species	5 species	5 species	5 species	5 species	5 species
Total Plant Cover	**20%**	**25%**	**30%**	**40%**	**50%**
Shrub/Vine Cover					
• California Sagebrush	<1%	1%	1%	2%	4%
• Coyote Brush	<1%	1%	1%	2%	4%
• Buck Brush	<1%	<1%	1%	2%	2%
• Blue Wild Rye	<1%	1%	1%	2%	5%
• Deerweed	<1%	1%	1%	2%	5%
• Foothill Penstemon	<1%	<1%	<1%	<1%	<1%
Shrub/Vine Cover Total	**<1%**	**4%**	**5%**	**10%**	**20%**
Shrub Density (# shrubs per acre)					
• California Sagebrush	16	16	16	16	16
• Coyote Brush	6	6	6	6	6
• Buck Brush	11	11	11	11	11
• Blue Wild Rye	6	6	6	6	6
• Deerweed	6	6	6	6	6
• Foothill Penstemon	6	6	6	6	6
Shrub Density Total	**51**	**51**	**51**	**51**	**51**
Approximate Shrub Spacing (feet)	30’	30’	30’	30’	30’
Herb Cover (all species)	**20%**	**21%**	**25%**	**30%**	**30%**
Cover by Invasive, Non-native plant Species (%)	<10%	<10%	<10%	<10%	<10%
FRESHWATER WETLANDS (Moody Creek Diversion Channel and Vegetated Sheet Drain)					
Species Diversity, native species	5 species	5 species	5 species	5 species	5 species
Cover by Dominant Species that are OBL, FACW, or FAC	30%	40%	50%	60%	60%
• Black willow	1%	5%	10%	20%	20%
• Meadow Barley	20%	20%	20%	20%	20%
• Pale Spikerush	5%	10%	10%	10%	10%
• Iris-leaved Rush	2%	5%	5%	5%	5%
• Seep Monkey Flower	2%	5%	5%	5%	5%

4.2 Monitoring

Monitoring is an important component of the revegetation plan. Monitoring is used to evaluate the effectiveness of plan activities and as a tool in determining if management actions should be revised to better reach Plan goals. The ability to alter management activities based on monitoring results is the primary tenet of the adaptive management process. Implementation of the plan will utilize adaptive management strategies. This approach is particularly important as new data/research is gathered on-site and elsewhere on native plant revegetation and management.

Plant community performance standards have been established; these standards are based on data collected from reference transects and the project goals for creating a mosaic of mature, self-sustaining plant community types on quarried lands. The revegetation areas are to meet species diversity (i.e., number of plant species) and relative plant cover values as a percentage of the reference transect data.

4.2.1 Methods

Reconnaissance Surveys

A qualified botanist, ecologist, or revegetation specialist will periodically survey the revegetation area during the first year after planting. Reconnaissance surveys will be conducted four times during Year 1 and twice a year during Years 2-5. These surveys will be in addition to any visits made to evaluate contractor performance.

The purpose of the reconnaissance visits will be to assess how the revegetation is proceeding and to identify problems or potential problems that may exist. During these surveys, the inspector will look for plant damage, document significant damage, and will make recommendations to correct any significant problems or potential problems. Plants are most vulnerable to many types of disturbances during the early part of the establishment period, so monitoring must be relatively intensive during these early years. These visits will also be used to document the need to change or adjust revegetation plan activities (i.e., altering the maintenance schedule, adding extra weed control visits, increasing or reducing the frequency or amount of irrigation water, etc.). The presence of invasive non-native plant species will be ascertained during the reconnaissance surveys.

Detailed Monitoring of Shrubs and Trees for Plant Survival and Growth

In addition to the reconnaissance surveys, monitoring visits will be made to the revegetation area between July and September of Years 1-5. These visits will be used to collect quantitative data on the revegetation plantings. The monitoring survey will evaluate plant survival and health/vigor during or, for some species, just after, peak growth.

The container stock plantings will be monitored as to dead/alive, height, and health/vigor.

During Years 1-5, yearly plant survival within each created habitat type should be at least 60%. If plant survival falls below 60% in any year, supplemental container stock planting and/or seeding will be undertaken the following fall. If a plant species does poorly at the site, the revegetation specialist will access suitability of the revegetation site for that plant species and recommend further remedial action, including species substitutions.

If plant cover or density (plants per acre) is less than the required amounts, the revegetation specialist will assess whether remedial actions are necessary (i.e., additional plantings to increase cover values) to achieve yearly performance standards.

Monitoring of Habitat Development

Each created habitat will be monitored for vegetation cover and species' composition. Vegetative cover data will be collected using randomly placed 15 x 40 meter rectangular plots (600 $m^{2)}$. Each of the 15m by 40 m plots will also contain two randomly-placed nested $1m_2$ quadrats. Percent cover of grasses and forbs will be measured within the two quadrats. Density of shrubs and trees will be calculated in each rectangular plot. Plant density within each $600m^2$ plot will be extrapolated to plants per acre. Within each plot data will be collected on plant composition, plant cover (percent cover), and natural recruitment of native and non-native species. The number of plots needed to achieve an 80% confidence and precision level will be determined by the revegetation specialist during Year 1 of the monitoring period.

Reference Transects

Additional reference transects may be established prior to the completion of mining. These transects would be to supplement data collected in 2010 by North State Resources (see Appendix A). Reference transect data will be collected using randomly placed 15 x 40 meter rectangular plots (600 $m^{2)}$. Each of the 15m by 40 m plots will also contain two randomly-placed nested $1m_2$ quadrats. Percent cover of grasses and forbs will be measured within the two quadrats. Density of shrubs and trees will be calculated in each rectangular plot. Plant density within each $600m^2$ plot will be extrapolated to plants per acre. Within each plot data will be collected on plant composition, plant cover (percent cover), and natural recruitment of native and non-native species.

Additional reference data may be collected to supplement the existing freshwater wetland data gathered during the wetland delineation conducted by North State Resources, Inc. in 2010.

4.2.2 Monitoring Schedule

Reconnaissance surveys will be conducted four times during Year 1 and twice a year during Years 2-5. Detailed monitoring (plant survival counts, vegetative cover measurements) will be conducted between July and September of Years 1-5.

4.2.3 Photo-documentation

Photos shall be taken of the revegetation area at least once a year in Years 1-5. Photos will be taken from the same vantage point and in the same direction every year, and shall reflect the findings discussed in the monitoring report. A minimum of 10 photo stations will be established. The location and photo direction of each photo stations will be established in Year 1. GPS data for each photo station shall be recorded and the location depicted on project plans.

Chapter 5. Implementation Plan

5.1 Site Preparation

5.1.1 Grading

Heavy equipment will be used to fine-grade the revegetation areas following completion of mining and apply stockpiled overburden and topsoil.

5.1.2 Soil Treatment

Prior to distribution of overburden/ waste and topsoil, any compacted soils subject to revegetation will be ripped or disked a minimum of 12 inches. Internal access roads no longer necessary for active mining or part of permanent facilities to remain post reclamation will be inspected for roadbase materials and petroleum or lubricant spill residue. If present, this material will be removed prior to decompaction.

The revegetation areas will receive an application of overburden and stockpiled topsoil. The exact amount of material applied will be determined upon cessation of mining and the amount of overburden and topsoil available. Use of topsoil in revegetation is limited to cover of the overburden fill area, catchment berms on the north and south pit benches, primary processing plant, and internal haul roads. Concurrent revegetation and associated topsoil use will be limited to catchment berms on completed benches, construction pads, and internal haul roads. Redistribution of topsoil will be structured so that harder mine overburden and waste is placed below finer materials including overburden or waste mixed with silts and fines. Topsoil, as available, will be spread over the finer materials a minimum of six inches.

The revegetation areas will be appropriately disked/scarified to create a suitable seeding/ planting bed. Individual tree and shrub planting sites may require mechanical auguring. The project applicant will do this site preparation work.

The stockpiled topsoil will be analyzed by an approved Soils and Plant Laboratory. Soil tests will include, at a minimum, soil texture, total nitrogen, phosphorus, potassium and pH. The lab will also evaluate the need for mychorizzal inoculants. The project applicant will amend the existing topsoil as recommended by the laboratory, including spreading of inoculums.

5.1.3 Pest Plant Removal

Due to the presence of invasive weed species on-site and the potential for weed seeds to be within the stockpiled topsoil, one spring/summer season prior to use of the topsoil, the topsoil

pile will be irrigated to encourage a flush of weed seeds. After germination, the stockpiled topsoil will be covered with plastic to kill any remaining seeds.

If necessary, the revegetation specialist will selectively eradicate perennial rhizomatous weeds from the stockpiled topsoil with a biodegradable contact or systemic herbicide.

5.1.6 Monitoring of Site Preparation

The project applicant will designate a revegetation specialist to monitor phases of construction that relate to the revegetation areas, such as weed control of stockpiled topsoil and preparation of the revegetation areas for planting (pre-hydroseed disking/scarifying and/or auger holes for container stock plantings).

5.2 Planting/Seeding

For mined areas, a detailed planting plan will be prepared a minimum of three years prior to the completion of mining. For the wetland revegetation areas, a detailed planting plan will be prepared a minimum of three years prior to construction of the Moody Creek Diversion Channel and vegetated sheet drain feature. The plans will demarcate the location of each revegetation area and the species and quantities of plants and seed to be installed within each area. All revegetation areas will be seeded and straw mulched for erosion control and to aid in establishing the designated habitats. Container stock plantings will occur within select revegetation areas. The revegetation materials and/or techniques described below may be amended based on the results of the revegetation test plots, and if said materials or techniques are successful in meeting the revegetation plan goals and objectives.

5.2.1 Planting Plan

A list of tree, shrub, and herbaceous plant species to be planted in the revegetation area is presented in Table 3. Each plant species is listed by both scientific name and common name. Other native plant species suited to each community may be added to the list at the time of installation, depending on availability, genetic compatibility, and results of the revegetation test plots. Changes or modifications to the plant list will approved by a botanist, plant ecologist, or revegetation specialist. Plant species will be contract-grown at a native plant nursery from collections made from the project vicinity, Moody Creek watershed and/or Shasta County.

The plant species selected for the revegetation areas are adapted to growing in open, sunny areas. In the hydroseed areas plant species and plant spacing will be random, yet the seeding rate will be sufficient to achieve the stated plants per acre. Container stock plantings will be used to establish tree species (i.e., primarily pines and oaks) and to supplement shrub cover with species that may not respond well in hydroseed application (i.e., some manzanita and ceanothus species). In general, the tree and supplemental shrub plantings will be installed 15-

20 foot on-center; however the exact spacing will be depicted on the detailed planting plan which will take into account slope, bench width, and other site micro-habitat features. The initial installation rated (plants per acre) listed on Table 3 reflect a uniform topography with plant spacing between 15 and 20 feet on-center. Figures 5 and 6 depict a generalized layout of trees and shrubs within the successional foothill pine and oak woodland revegetation areas with this on-center spacing.

Table 3. Species to be Planted[1]

Common Name	Scientific Name	Percent Composition	Recommended Propagule Size	Installation Rate (plants per acre)
SUCCESSIONAL FOOTHILL PINE WOODLAND				
Trees				
Foothill Pine	*Pinus sabiniana*	60%	Plug, leach tube or bare root	120
Interior Live Oak	*Quercus wizlizenii*	20%	Seed, 1 gallon and/or tree pot	40
Black Oak	*Quercus kelloggii*	20%	Seed, 1 gallon and/or tree pot	40
Total Trees		100%		200
Shrubs				
White leaf Manzanita	*Arctostaphylos visida*	20%	4” or 1 gallon	35
Buckbrush	*Ceanothus spp.*	10%	Seed, 4” or 1 gallon	18
Holly-leaved Redberry	*Rhamnus illicifolia*	5%	4” or 1 gallon	9
California Sagebrush	*Artemisia californica*	30%	Seed, 4” or 1 gallon	52
Coyote Brush	*Baccharis pilularis*	30%	Seed, 4” or 1 gallon	52
Foothill Penstemon	*Penstemon heterophyllus*	5%	Seed or 4”	9
Total Shrubs		100%		175
Herbs				
Common Yarrow	*Achillea millefolium*	10%	Seed	-
Deerweed	*Lotus scoparius*	30%	Seed	-
Blue Wild Rye	*Elymus glaucus*	60%	Seed	-
Total Herbs		100%	-	-
Biosol Mix 7-2-3 , or equiv.		-	Fertilizer	-
Turbo Start, or equiv.		-	Microbial inoculants	-
Mulch and/or Tackier.		-	-	-

Table 3. Species to be Planted[1]

Common Name	Scientific Name	Percent Composition	Recommended Propagule Size	Installation Rate (plants per acre)
SUCCESSIONAL OAK WOODLAND - HYDROSEED				
Trees				
Blue Oak	*Quercus douglasii*	30	Seed, 1 gallon and/or tree pot	78
Black Oak	*Quercus kellogii*	30	Seed, 1 gallon and/or tree pot	78
Interior Live Oak	*Quercus wizlizenii*	30	Seed, 1 gallon and/or tree pot	78
California Buckeye	*Aesculus californica*	10	Seed, 4" and/or 1 gallon	26
Total Trees		100%		260
Shrubs				
Toyon	*Heteromeles arbutifolia*	20	Seed, 4" or 1 gallon	27
Buckbrush	*Ceanothus spp.*	10	Seed, 4" or 1 gallon	13
Holly-leaved Redberry	*Rhamnus illicifolia*	10	Seed, 4" or 1 gallon	14
Coyote Brush	*Baccharis pilularis*	60	Seed, 4" or 1 gallon	81
Total Shrubs		100%		135
Herbs				
Common Yarrow	*Achillea millefolium*	10	Seed	-
Purple Needlegrass	*Nassella pulchra*	40	Seed	-
Blue Wild Rye	*Elymus glaucus*	40	Seed	-
Woolly Sunflower	*Eriophyllum lanatum*	10	Seed	-
Total Herbs		100%	-	-
Biosol Mix 7-2-3 , or equiv.		-	Fertilizer	-
Turbo Start, or equiv.		-	Microbial inoculants	-
Mulch and/or Tackier.		-	-	-
SUCCESSIONAL FOOTHILL PINE WOODLAND - HYDROSEED (access road to north pit and perimeter of south pit, if pit is used for water storage)				
Shrubs				
California Sagebrush	*Artemisia californica*	40%	Seed	38
Coyote Brush	*Baccharis pilularis*	30%	Seed	28
Buck Brush	*Ceanothus spp.*	20%	Seed	19
Foothill Penstemon	*Penstemon heterophyllus*	10%	Seed	9

Table 3. Species to be Planted[1]

Common Name	Scientific Name	Percent Composition	Recommended Propagule Size	Installation Rate (plants per acre)
Total Shrubs		100%		94[2]
Herbs				
Common Yarrow	*Achillea millefolium*	10%	Seed	-
Deerweed	*Lotus scoparius*	30%	Seed	-
Blue Wild Rye	*Elymus glaucus*	60%	Seed	-
Total Herbs		100%		94[2]
Biosol Mix 7-2-3 , or equiv.		-	Fertilizer	-
Turbo Start, or equiv.		-	Microbial inoculants	-
Mulch and/or Tackier.		-	-	-
FRESHWATER WETLANDS				
Meadow Barley	*Hordeum brachyantherum*	30	Seed	
Pale Spikerush	*Eleocharis macrostachya*	20	Plug	
Seep Monkey Flower	*Mimulus guttatus*	20	Seed	
Black Willow	*Salix goodingii*	20	Dormant cutting	
Iris-leaved Rush	*Juncus xiphioides*	10	Plug	

[1] Species list and propagule size may be revised based on results of test plots and additional information gathered prior to completion of mining.
[2] Seed application rate shall be calculated to achieve stated shrub density

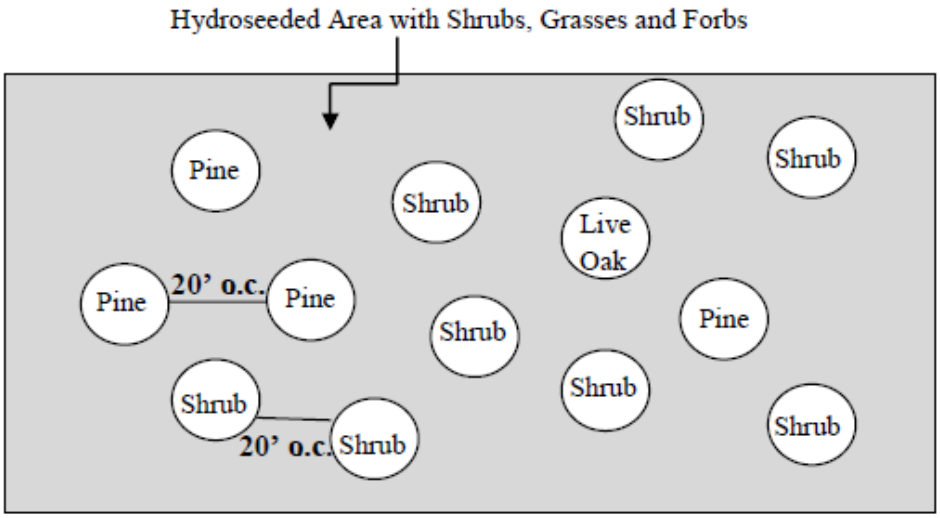

Figure 5. Generalized Layout of Successional Foothill Pine Woodland Hydroseed Area and Typical Container Stock Spacing

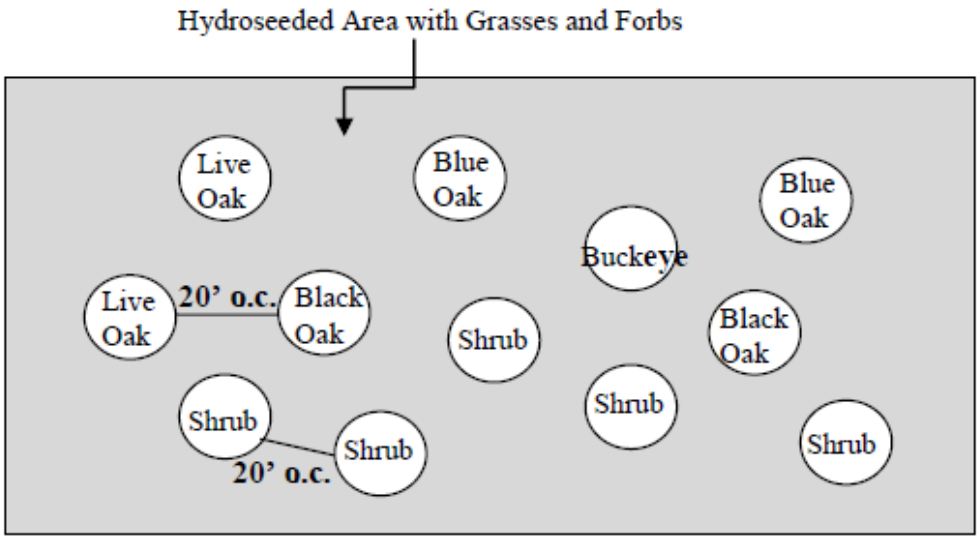

Figure 6. Generalized Layout of Successional Oak Woodland Hydroseed Area and Typical Container Stock Spacing

5.2.2 Nature and Source of Propagules

The purpose of the revegetation plan is to create upland habitat within the mined areas. With the exception of the grasses and forb species identified in the planting plan, seeds, plugs and cuttings to propagate woody plants for the revegetation project will come from on-site or from Moody Creek watershed and/or Shasta County.

Container Stock

Plugs, bare roots, 4-inch dee pots, 1 gallon tree pots and similar containers developed for use in revegetation work produce a plant with a deep root system, inhibit circling of roots, and air-prune roots. They promote strong rooted plants. The exact size of plant propagules used for revegetation will be determined based on the results of the test plots.

All container stock for the revegetation areas will be contract-grown by a native plant nursery, assuring availability and health of plant material. Dormant willow cuttings may be collected on-site.

Hydroseeding

Several early successional plant species identified for the foothill pine and oak woodland revegetation areas will be applied through hydroseed. The specific plant species to be utilized are listed on Table 3, as well as requirements for fertilizer and inoculants. The exact amount of fertilizer and inoculums will be determined after soil testing. Hydroseeding will include a spray wood fiber mulch or an application of non-weed straw (approximately 2").

5.2.3 Plant Installation

Installation of the container stock plants will occur in early fall after project construction. Installation will consist of flagging all planting locations, auguring/digging planting holes, installing plants, creating planting/watering basins around the plants (if appropriate), above-ground browse protection and placing mulch in the planting basins. Installation of dormant willow cuttings will occur in later fall/winter.

5.3 Irrigation

Supplemental irrigation will be required for the foothill pine and oak woodland container stock plants immediately after installation and for a minimum of three years after planting. A battery-controlled above-ground drip system is recommended. This system will be designed and installed by the project landscape contractor or operator.

No fixed schedule of irrigation will meet the needs of different plants during all times of year and in varying weather and soil conditions. Therefore, irrigation will be scheduled by analysis of drought stress and soil moisture conditions. Revegetation areas will be irrigated when soil in the root zone is dry enough to warrant irrigation.

Irrigation will be discontinued at the end of three years after planting, but will be resumed any time during Years 4 and 5 if plants show significant drought stress during monitoring. The goal is to have the plants off irrigation for two years before the end of the 5-year establishment period.

Each year that irrigation is required, operation of irrigation will begin in May, subject to determination by the revegetation specialist. Irrigation will occur approximately twice a week during the summer and about once a week during spring and fall until October 15 (exact schedule depending upon weather). In the event of a drought year, periodic irrigation may be required throughout the year.

To encourage deep rooting, deep watering will be implemented for all container stock. Woody plantings will be watered in such a way that the soil profile is wetted continuously to a depth of at least three inches, as determined by the revegetation specialist

5.4 Implementation Schedule

The schedule of the revegetation actions outlined in revegetation plan is depicted on Table 4.

Table 4. Typical Revegetation Schedule, Years 0-5

Task	Year 0				Year 1				Year 2				Years 3-5			
	W	S	S	F	W	S	S	F	W	S	S	F	W	S	S	F
Propagation of Propagules[1]																
Final Site Preparation																
Hydroseed Revegetation Areas																
Install Container Stock Plants																
Conduct Site Maintenance																
Supplemental Planting (if necessary)																
Conduct Yearly Monitoring																

[1] Collection of propagules and contract-growing of plant materials should be initiated at least one year prior to out planting.

Chapter 6. Maintenance During Monitoring Period

6.1 Maintenance Activities

The goal for the revegetation area is to establish native habitats that provide suitable and sustainable habitat for wildlife, and that will require little or no maintenance in the long term. Several other goals for the project involve minimizing maintenance efforts, minimizing opportunities for invasive, non-native plant species establishment, and minimizing irrigation system operation and maintenance. During the early establishment period, proper maintenance will be important. When the habitats have established, maintenance efforts should be reduced.

An establishment period maintenance program will be implemented for the first five years following plant installation. After these five years, the site will be periodically maintained by the project applicant as part of the reclamation plan.

Maintenance efforts will consist primarily of weed removal and irrigation system operation and upkeep. Some plant replacement may be necessary during the first five years. When plants are well established, maintenance efforts will consist of weed control. After Years 5 maintenance will likely be reduced to control/removal of invasive non-native plants.

6.1.1 Weeds and Invasive, Non-Native Plant Control

Infestations of non-native plants will be reduced and controlled throughout the revegetation area and in adjacent existing vegetation if these areas are providing a significant source of weed seeds. The safest way to control weeds is to patrol frequently, and remove weeds manually. It is improbable that pre-emergent herbicides will be appropriate for use on the revegetation site as they do not discriminate between desirable native seeds and undesirable weeds, but prevent all seed germination. If herbicides are considered necessary, they will be used only on the recommendation of a California Licensed Qualified Applicator in conjunction with a qualified revegetation specialist, and only on sites narrowly specified. Table 5 lists the weeds currently or potentially of management concern within the project area.

Table 5. Invasive Weeds of Management Concern

Common Name	Scientific Name	Cal-IPC Ranking	Growth Habit
Wild mustard	*Brassica spp.*	Moderate	Annual Biennial
Italian thistle	*Carduus pycnocephalus*	Moderate [2]	Annual Biennial
Bull thistle	*Cirsium vulgare*	Moderate	Annual Biennial

Table 5. Invasive Weeds of Management Concern

Common Name	Scientific Name	Cal-IPC Ranking	Growth Habit
Poison hemlock	*Conium maculatum*	Moderate	Annual Biennial
Pampas/Jubata grass	*Cortederia jubata*	High	Perennial
French broom	*Genista monspessulanus*	High	Perennial
Bristly ox-tongue	*Picris echioides*	Limited	Biennial
Wild radish	*Raphanus sativa*	Limited	Annual

Categories of Invasive Plants, California Invasive Plant Inventory (Cal-IPC)

Ranking	**Meaning of Ranking**
High	Plant species pose severe ecological impacts on physical processes, plant and animal communities and vegetation structure, plants have moderate to high rates of dispersal and establishment.
Moderate	Plant species have substantial ecological impacts; plants have moderate to high rates of dispersal yet establishment is generally dependent on ecological disturbance.
Limited	Plant species are invasive, but ecological impacts are minor on statewide level; reproductive biology result in low to moderate rates of spread, but species may be locally persistent and problematic.

Source: Cal-IPC 2006

6.1.2 Irrigation System Inspection and Maintenance

The foothill pine and oak woodland revegetation areas will be irrigated under direction of a revegetation specialist. Irrigation may cease on the recommendation of the revegetation specialist at the end of the 5-year establishment period if the following conditions are met: 1) the tree and shrub composition meets the criteria of the performance standards; and 2) the plants are deemed to be established and no longer in need of irrigation.

6.1.3 Repair of Watering Basins

Where individual plants are surrounded by watering basins, the basins will be routinely inspected. The basins will be repaired expeditiously so irrigation water is directed to plant roots and does not contribute to erosion.

6.1.4 Pruning

Pruning will not be required. Much more irregular and random plant growth is desirable (for wildlife value) in natural habitats than is typical for urban landscaping. Pruning will not be permitted for grooming plants. Most especially, pruning to clean the understory shrubs and low branches of trees will not be conducted. This practice would undermine progress toward the vegetative community structures specified in the performance standard, where cover, screening and closure of shrubs are part of the criteria for success.

If pruning is necessary, under the direction of a revegetation specialist, pruning will be limited to the barest minimum required to accomplish the following goals:

a. Promote healthy initial plant growth. Extremely unbalanced plant growth will be

pruned only during the first five years after planting, and just enough to promote initial strong growth of trees and shrubs.

b. Repair storm damage or remove hazard. Storm damage, such as broken branches or fallen trees, will be cleaned up if they are deemed to compromise channel stability or capacity.

There will be no anticipated need for safety pruning of hazard trees since the revegetation area is not intended for public access.

6.1.5 Herbivore Protection

Above ground browse protection cages will need maintenance if they are knocked over by deer or other animals. Cages will be removed once plants reach the top of the cage.

6.1.6 Insect Pest Control

Pest insect infestations will not be treated unless more than 5 to 10 percent of the trees or shrubs show significant damage. Insects are a primary food source for birds and other insects, and once the habitats are functioning, birds and other insects will likely keep pest species in balance. If this level of tolerance is exceeded and insects must be controlled, a revegetation specialist will develop an Integrated Pest Management (IPM), which will be implemented and the use of biological controls will be maximized.

6.1.7 Debris Removal

All non-organic debris will be removed and properly disposed of off-site during the entire maintenance period. All organic debris such as leaves, dead branches, plants, snags, etc., will be left in the revegetation area to increase wildlife habitat and add organic matter to the soil.

6.2 Supplemental Seeding and Planting

6.2.1 Supplemental Seeding

Supplemental seeding will be conducted if monitoring results indicate failure of the initial seeding. This may occur from poor seed viability, disease, or an unexpected drought or other weather anomaly. Supplemental seeding will be conducted in the fall following the monitoring. A revegetation specialist will decide the seeding application. Substitute species may be used if the original species consistently perform poorly, and suitable alternative species perform well. However, substitute species should be consistent with the goals and objectives, and be compatible with the criteria for success.

6.2.2 Supplemental Planting

The density of woody plant species was formulated to allow for up to 40% mortality (i.e., 60% survival rate), so that supplemental planting can be kept to a minimum. Even with over

planting, some sites are expected to require supplemental planting due to unforeseen events or factors, such as soil compaction, vandalism, drought, wildfire, or other events. Supplemental planting needs will be assessed during the annual monitoring. The need for supplemental planting will be determined by monitoring field performance and comparing it to the success criteria for the revegetation area. The number of replacement plants, the species, and the propagule or container size, will be determined by the monitor and stated in the annual monitoring reports. Substitute species may be used if the original species consistently performs poorly and suitable alternative species perform well. However, substitute species should be consistent with the goals and objectives and be compatible with the criteria for success. The project applicant will be responsible for contracting with a native plant nursery for the production of the required plants.

Supplemental plant installation will occur in the first fall season after monitoring. This schedule may be amended if the necessary plants are not available, are low in quality, or conditions are deemed unsuitable for replanting. It is desirable to replant as soon as possible to minimize the extension of the establishment period maintenance.

The number of supplemental plants installed should be greater than the number of plants required to bring the total live plants up to the criteria for success. Enough plants should be replanted to allow for expected mortality and still meet the success criteria.

6.3 Maintenance Schedule

After plant installation, maintenance activities will be selected and timed to minimize disturbance to wildlife. Maintenance activities will occur only in areas designated for those activities. Table 6 lists a typical maintenance schedule.

During the five-year establishment period, the revegetation specialist will check and, if necessary, tend to each plant at least once a month. Irrigation emitters (if used) will also be checked at least once every other week during periods of irrigation system operation. If necessary, animal protection devices, such as screening, will be adjusted, weeds removed, or mulch adjusted. Soil around the plant will be examined to ensure that adequate moisture is available and the emitter or irrigation system will be adjusted, if necessary. A log of all observations and adjustments will be kept by maintenance personnel. All plants will receive water at a rate suitable for plant survival and growth. If appropriate, each irrigation circuit or valve zone will be checked during each irrigation session for proper operation.

The revegetation specialist will monitor the need for maintenance and will keep records documenting maintenance task items performed. Documentation will include the date, maintenance tasks performed, who performed maintenance, notes on other tasks requiring action, and observations of problems or potential problems. Maintenance tasks documented will include, but not be limited to: irrigation, irrigation system maintenance, weed control, supplemental planting, mulching, plant protection measures and debris removal.

Table 6. Maintenance Schedule

Task	Winter	Spring	Summer	Fall
Yearly, conduct field inspections to monitor plant growth and progress of flowering stalks on invasive weed species. Monitor project area for changes in distribution of existing invasive weeds.				
Yearly, prior to the spring flowering season conduct first-season removal of invasive weeds.				
Monthly, check planting basins and remove weeds, repair browse protection cages, if needed.				
Yearly, in early spring check irrigation system and progran system for spring and summer irrigation (Years 1-3)				
In spring and summer, every two weeks check irrigation system to ensure each plant is receiving adequate water; repair leaks or other problems with irrigation system				

Chapter 7. Proposed Monitoring Reports

7.1. Due Dates

The first annual report shall be delivered to Shasta County on December 31 of each monitoring year (i.e., Year 1). Each annual report is to be delivered by that date in subsequent years, Year 2-5.

7.2. Monitoring Report Content

Annual reports for monitoring Years 1-5 will present data on the revegetation area and the attainment of yearly target criteria, progress toward final success criteria, and any remedial actions required.

Annual reports will include the following:

1. Project name and location
2. Applicant's name, address, and phone number
3. Names, titles, and companies of all persons who prepared the content of the annual report and participated in monitoring activities for that year
4. County application number
5. Purpose and goals of the revegetation
6. Dates of revegetation site construction, hydroseeding, and planting
7. Results of field data and analysis of quantitative monitoring data and success criteria
8. Monitoring photographs from photo stations.
9. Maps identifying monitoring areas, planting zones, etc., as appropriate.
10. Identification of any remedial actions necessary to meet performance standards.
11. List of actions for the next year's maintenance.

Chapter 8. Potential Contingency Measures

8.1. Initiating Procedures

If an annual performance goal is not met for all or any portions of the revegetation site is any monitoring year, or if the final success criteria are not met, the applicant will prepare an analysis of the cause(s) of failure and propose remedial actions for Shasta County approval. Remedial action may include re-planting on-site or other measures approved by the applicant and the County.

8.2. Contingency Funding Mechanism

The project applicant is responsible for funding implementation of contingency items.

Chapter 9. Completion of Mitigation Responsibilites

9.1. Notification

When the required monitoring period is complete and the applicant believes that the final success criteria have been met, the applicant will notify Shasta County when submitting the proposed final report (Year 5). Final success criteria will be considered met a minimum of two years after all irrigation has ceased. Maintenance actions, such as control and/or removal of invasive non-native plant species can occur throughout (and beyond) the five-year monitoring period.

9.2. County Confirmation

Following receipt of the proposed final report, Shasta County will either confirm the successful completion of the revegetation obligation or require additional years of monitoring. The County will make this determination within 30 days of receipt of the final report. The applicant will not be released from the revegetation obligation until written notice of completion is received from the County or 180 days have passed since the applicant's submittal of the final report.

Chapter 10. Long Term Management Plan

10.1. Property Ownership

The property owner after completion of the monitoring period will be 3M Company.

10.2. Management Plan

Long-term management will include the control/removal of invasive, non-native plant species from the revegetation area.

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Appendix A

Reference Transect Data
North State Resources, 2010

Table A-1. Summary of plant species composition, percent cover, and density sampled within CWHR Habitat types. Moody Flats Project Vegetation Characterization

PLOT # AND CWHR CODE	GROWTH FORM	NATIVE/ NON-NATIVE	CAL-IPC[1]	*SCIENTIFIC NAME*	COMMON NAME	CANOPY COVER[2] (%)	DENSITY PER PLOT[3] (#)	AVE. DBH[4]	HERB COVER[5] (%)
Annual Grassland (AGS)									
9_AGS	Herb	Non-Native	Moderate	*Anthoxanthum odoratum*	Sweet Vernal Grass	—	—	—	50
9_AGS	Herb	Non-Native	High	*Centaurea solstitialis*	Yellow Star-Thistle	—	—	—	15
9_AGS	Herb	Non-Native	n/a	*Lactuca saligna*	Narrow-Leaved Wild-Lettuce	—	—	—	10
9_AGS	Herb	Non-Native	n/a	*Trifolium hirtum*	Rose Clover	—	—	—	5
9_AGS	Grass	Non-Native	Moderate	*Bromus diandrus*	Ripgut Brome	—	—	—	1
9_AGS	Grass	Non-Native	n/a	*Cynosurus echinatus*	Hedgehog Dogtail	—	—	—	t
9_AGS	Grass	Native	n/a	*Elymus glaucus*	Blue Wildrye	—	—	—	t
9_AGS	Grass	Non-Native	Moderate	*Lolium multiflorum*	Italian Ryegrass	—	—	—	t
Blue Oak – Gray Pine (Bop)									
2_BOP	Tree	Native	n/a	*Quercus douglasii*	Blue Oak	19	10	—	—
2_BOP	Tree	Native	n/a	*Quercus wislizenii*	Interior Live Oak	13	15	—	—
2_BOP	Shrub	Native	n/a	*Arctostaphylos viscida*	White Leaf Manzanita	6	11	—	—
2_BOP	Shrub	Native	n/a	*Toxicodendron diversilobum*	Poison Oak	2	—	—	—
2_BOP	Shrub	Native	n/a	*Ceanothus cuneatus*	Buck Brush	1	3	—	—
2_BOP	Tree	Native	n/a	*Rhamnus ilicifolia*	Holly-Leaf Redberry	t	2	—	—
2_BOP	Tree	Native	n/a	*Pinus sabiniana*	Gray Pine	t	2	—	—
2_BOP	Grass	Non-Native	n/a	*Cynosurus echinatus*	Hedgehog Dogtail	—	—	—	5
2_BOP	Herb	Native	n/a	*Galium aparine*	Goose Grass	—	—	—	3
2_BOP	Herb	Non-Native	Moderate	*Torilis arvensis*	Field Hedge-Parsley	—	—	—	1

PLOT # AND CWHR CODE	GROWTH FORM	NATIVE/ NON-NATIVE	CAL-IPC[1]	*SCIENTIFIC NAME*	COMMON NAME	CANOPY COVER[2] (%)	DENSITY PER PLOT[3] (#)	AVE. DBH[4]	HERB COVER[5] (%)
2_BOP	Grass	Non-Native	n/a	*Bromus hordeaceus*	Soft Brome	—	—	—	1
2_BOP	Herb	Native	n/a	*Aristolochia californica*	Pipevine	—	—	—	t
2_BOP	Grass	Non-Native	High	*Bromus madritensis*	Foxtail Chess	—	—	—	t
2_BOP	Grass	Non-Native	High	*Bromus tectorum*	Cheat Grass	—	—	—	t
2_BOP	Herb	Non-Native	Moderate	*Carduus pycnocephalus*	Italian Plumeless Thistle	—	—	—	t
2_BOP	Herb	Native	n/a	*Castilleja attenuata*	Valley Tassels	—	—	—	t
2_BOP	Herb	Non-Native	High	*Centaurea solstitialis*	Yellow Star-Thistle	—	—	—	t
2_BOP	Herb	Native	n/a	*Dichelostemma capitatum*	Blue Dicks	—	—	—	t
2_BOP	Grass	Native	n/a	*Elymus glaucus*	Blue Wildrye	—	—	—	t
2_BOP	Herb	Non-Native	Moderate	*Hypericum perforatum*	Klamathweed	—	—	—	t
2_BOP	Herb	Non-Native	n/a	*Lactuca serriola*	Prickly Lettuce	—	—	—	t
2_BOP	Shrub	Native	n/a	*Lonicera interrupta*	Chaparral Honeysuckle	—	—	—	t
2_BOP	Grass	Native	n/a	*Nassella cernua*	Nodding Needlegrass	—	—	—	t
2_BOP	Herb	Non-Native	Limited	*Plantago lanceolata*	English Plantain	—	—	—	t
Blue Oak Woodland (Bow)									
1 _BOW	Tree	Native	n/a	*Quercus douglasii*	Blue Oak	50	36	6	—
1 _BOW	Shrub	Native	n/a	*Arctostaphylos viscida*	White Leaf Manzanita	2	4	—	—
1 _BOW	Grass	Non-Native	Moderate	*Avena barbata*	Slender Wild-Oat	—	—	—	60
1 _BOW	Grass	Non-Native	Moderate	*Lolium multiflorum*	Italian Ryegrass	—	—	—	6
1 _BOW	Grass	Non-Native	n/a	*Bromus hordeaceus*	Soft Brome	—	—	—	2
1 _BOW	Herb	Non-Native	Moderate	*Carduus pycnocephalus*	Italian Plumeless Thistle	—	—	—	2
1 _BOW	Herb	Non-Native	n/a	*Hordeum murinum*	Barley	—	—	—	1

PLOT # AND CWHR CODE	GROWTH FORM	NATIVE/ NON-NATIVE	CAL-IPC[1]	*SCIENTIFIC NAME*	COMMON NAME	CANOPY COVER[2] (%)	DENSITY PER PLOT[3] (#)	AVE. DBH[4]	HERB COVER[5] (%)
1 _BOW	Herb	Native	n/a	*Chlorogalum pomeridianum*	Soaproot	—	—	—	t
1 _BOW	Herb	Native	n/a	*Lotus purshianus*	Spanish Clover	—	—	—	t
1 _BOW	Grass	Non-Native	High	*Taeniatherum caput-medusae*	Medussa Head	—	—	—	t
1 _BOW	Herb	Non-Native	Moderate	*Torilis arvensis*	Field Hedge-Parsley	—	—	—	t
Mixed Chaparral (Mch)									
8_MCH	Shrub	Native	n/a	*Arctostaphylos viscida*	White Leaf Manzanita	71	—	—	—
8_MCH	Tree	Native	n/a	*Quercus wislizenii*	Interior Live Oak	8	11	8	—
8_MCH	Herb	Native	n/a	*Heteromeles arbutifolia*	Toyon	t	—	—	—
8_MCH	Tree	Native	n/a	*Pinus sabiniana*	Gray Pine	t	3	3	—
8_MCH	Grass	Non-Native	n/a	*Bromus hordeaceus*	Soft Brome	—	—	—	t
Montane Hardwood - Conifer (Bow)									
4_MHC	Shrub	Native	n/a	*Arctostaphylos viscida*	White Leaf Manzanita	28	31	—	—
4_MHC	Tree	Native	n/a	*Quercus wislizenii*	Interior Live Oak	14	20	8	—
4_MHC	Tree	Native	n/a	*Pinus sabiniana*	Gray Pine	6	8	18	—
4_MHC	Tree	Native	n/a	*Quercus kelloggii*	Black Oak	1	3	2	—
4_MHC	Herb	Native	n/a	*Heteromeles arbutifolia*	Toyon	1	—	—	—
4_MHC	Shrub	Native	n/a	*Toxicodendron diversilobum*	Poison Oak	t	—	—	—
4_MHC	Tree	Native	n/a	*Quercus douglasii*	Blue Oak	t	1	—	—
Montane Hardwood (Mhw)									
6_MHW	Tree	Native	n/a	*Quercus kelloggii*	Black Oak	46	27	7	—
6_MHW	Herb	Native	n/a	*Heteromeles arbutifolia*	Toyon	15	—	—	—

PLOT # AND CWHR CODE	GROWTH FORM	NATIVE/ NON-NATIVE	CAL-IPC[1]	*SCIENTIFIC NAME*	COMMON NAME	CANOPY COVER[2] (%)	DENSITY PER PLOT[3] (#)	AVE. DBH[4]	HERB COVER[5] (%)
6_MHW	Tree	Native	n/a	*Quercus chrysolepis*	Canyon Live Oak	10	7	8	—
6_MHW	Shrub	Native	n/a	*Rhamnus ilicifolia*	Holly-Leaf Redberry	4	—	—	—
6_MHW	Shrub	Native	n/a	*Arctostaphylos viscida*	White Leaf Manzanita	4	—	—	—
6_MHW	Shrub	Native	n/a	*Cornus sericea*	American Dogwood	4	—	—	—
6_MHW	Tree	Native	n/a	*Pinus sabiniana*	Gray Pine	t	3	6	—
6_MHW	Tree	Native	n/a	*Quercus wislizenii*	Interior Live Oak	t	3	5	—
6_MHW	Shrub	Native	n/a	*Toxicodendron diversilobum*	Poison Oak	t	—	—	—
Valley Foothill Riparian (Vri)									
3_VRI	Tree	Native	n/a	*Quercus lobata*	Valley Oak	15	8	16	—
3_VRI	Tree	Native	n/a	*Quercus douglasii*	Blue Oak	15	6	10	—
3_VRI	Tree	Native	n/a	*Quercus wislizenii*	Interior Live Oak	8	6	6	—
3_VRI	Shrub	Native	n/a	*Rosa californica*	California Rose	2	—	—	—
3_VRI	Shrub	Native	n/a	*Toxicodendron diversilobum*	Poison Oak	2	—	—	—
3_VRI	Vine	Native	n/a	*Vitis californica*	California Wild Grape	2	—	—	—
3_VRI	Shrub	Native	n/a	*Rhamnus tomentella*	Hoary Coffeeberry	1	3	—	—
3_VRI	Shrub	Native	n/a	*Arctostaphylos viscida*	White Leaf Manzanita	t	—	—	—
3_VRI	Herb	Native	n/a	*Aristolochia californica*	Pipevine	t	—	—	—
3_VRI	Shrub	Native	n/a	*Brickellia californica*	California Brickellbush	t	—	—	—
3_VRI	Shrub	Native	n/a	*Cercis occidentalis*	Western Redbud	t	1	—	—
3_VRI	Shrub	Native	n/a	*Lonicera interrupta*	Chaparral Honeysuckle	t	—	—	—
3_VRI	Grass	Non-Native	n/a	*Cynosurus echinatus*	Hedgehog Dogtail	—	—	—	5

PLOT # AND CWHR CODE	GROWTH FORM	NATIVE/ NON-NATIVE	CAL-IPC[1]	*SCIENTIFIC NAME*	COMMON NAME	CANOPY COVER[2] (%)	DENSITY PER PLOT[3] (#)	AVE. DBH[4]	HERB COVER[5] (%)
3_VRI	Grass	Non-Native	n/a	*Bromus sp.*	Brome	—	—	—	2
3_VRI	Herb	Non-Native	Moderate	*Torilis arvensis*	Field Hedge-Parsley	—	—	—	2
3_VRI	Herb	Non-Native	Moderate	*Trifolium hirtum*	Rose Clover	—	—	—	1
3_VRI	Grass	Non-Native	Moderate	*Bromus diandrus*	Ripgut Brome	—	—	—	1
3_VRI	Grass	Non-Native	Moderate	*Avena barbata*	Slender Wild-Oat	—	—	—	t
3_VRI	Herb	Non-Native	n/a	*Barbarea verna*	Scurvy Grass	—	—	—	t
3_VRI	Herb	Non-Native	High	*Centaurea solstitialis*	Yellow Star-Thistle	—	—	—	t
3_VRI	Herb	Native	n/a	*Cyperus eragrostis*	Tall Flatsedge	—	—	—	t
3_VRI	Grass	Native	n/a	*Elymus glaucus*	Blue Wildrye	—	—	—	t
3_VRI	Herb	Non-Native	Moderate	*Hypericum perforatum*	Klamathweed	—	—	—	t
3_VRI	Herb	Non-Native	n/a	*Lactuca serriola*	Prickly Lettuce	—	—	—	t
3_VRI	Grass	Non-Native	Moderate	*Lolium multiflorum*	Italian Ryegrass	—	—	—	t
3_VRI	Herb	Native	n/a	*Perideridia kelloggii*	Kellogg's Yampah	—	—	—	t
3_VRI	Herb	Non-Native	n/a	*Mentha spicata*	Spearmint	—	—	—	t
3_VRI	Herb	Native	n/a	*Mimulus guttatus*	Seep Monkey Flower	—	—	—	t
3_VRI	Herb	Non-Native	n/a	*Polypogon maritimus*	Mediterranean Beard Grass	—	—	—	t
3_VRI	Herb	Native	n/a	*Rumex salicifolius*	Willow Dock	—	—	—	t
3_VRI	Herb	Non-Native	n/a	*Tragopogon dubius*	Goat's Beard	—	—	—	t
3_VRI	Herb	Non-Native	n/a	*Vicia villosa*	Winter Vetch	—	—	—	t
10_VRI	Tree	Native	n/a	*Quercus lobata*	Valley Oak	15	5	16	—
10_VRI	Shrub	Native	n/a	*Salix lasiolepis*	Arroyo Willow	13	—	—	—
10_VRI	Herb	Native	n/a	*Heteromeles arbutifolia*	Toyon	6	—	—	—

PLOT # AND CWHR CODE	GROWTH FORM	NATIVE/ NON-NATIVE	CAL-IPC[1]	*SCIENTIFIC NAME*	COMMON NAME	CANOPY COVER[2] (%)	DENSITY PER PLOT[3] (#)	AVE. DBH[4]	HERB COVER[5] (%)
10_VRI	Vine	Native	n/a	*Vitis californica*	California Wild Grape	3	—	—	—
10_VRI	Shrub	Native	n/a	*Toxicodendron diversilobum*	Poison Oak	3	—	—	—
10_VRI	Herb	Native	n/a	*Aristolochia californica*	Pipevine	1	—	—	—
10_VRI	Shrub	Native	n/a	*Rhamnus tomentella*	Hoary Coffeeberry	1	—	—	—
10_VRI	Shrub	Native	n/a	*Cercis occidentalis*	Western Redbud	1	—	—	—
10_VRI	Vine	Native	n/a	*Clematis lasiantha*	Chaparral Clematis	t	—	—	—
10_VRI	Tree	Native	n/a	*Pinus sabiniana*	Gray Pine	t	—	—	—
10_VRI	Tree	Native	n/a	*Quercus wislizenii*	Interior Live Oak	t	—	—	—
10_VRI	Shrub	Native	n/a	*Rhamnus ilicifolia*	Holly-Leaf Redberry	t	—	—	—
10_VRI	Vine	Non-Native	High	*Rubus armeniacus*	Himalaya Blackberry	t	—	—	—
10_VRI	Herb	Non-Native	Moderate	*Hypericum perforatum*	Klamathweed	—	—	—	t
10_VRI	Herb	Native	n/a	*Perideridia kelloggii*	Kellogg's Yampah	—	—	—	t
10_VRI	Herb	Native	n/a	*Rumex salicifolius*	Willow Dock	—	—	—	t
7_VRI	Vine	Native	n/a	*Vitis californica*	California Wild Grape	7	—	—	—
7_VRI	Shrub	Native	n/a	*Cornus sericea*	American Dogwood	7	—	—	—
7_VRI	Herb	Native	n/a	*Heteromeles arbutifolia*	Toyon	6	—	—	—
7_VRI	Tree	Native	n/a	*Quercus kelloggii*	Black Oak	4	5	7	—
7_VRI	Shrub	Native	n/a	*Berberis aquifolium*	Oregon-Grape	1	—	—	—
7_VRI	Shrub	Native	n/a	*Ceanothus integerrimus*	Deerbrush	t	—	—	—
7_VRI	Shrub	Native	n/a	*Cercis occidentalis*	Western Redbud	t	—	—	—
7_VRI	Tree	Native	n/a	*Pinus sabiniana*	Gray Pine	t	2	15	—
7_VRI	Tree	Native	n/a	*Quercus wislizenii*	Interior Live Oak	t	1	1	—

PLOT # AND CWHR CODE	GROWTH FORM	NATIVE/ NON-NATIVE	CAL-IPC[1]	*SCIENTIFIC NAME*	COMMON NAME	CANOPY COVER[2] (%)	DENSITY PER PLOT[3] (#)	AVE. DBH[4]	HERB COVER[5] (%)
7_VRI	Shrub	Native	n/a	*Rhamnus tomentella*	Hoary Coffeeberry	t	—	—	—
7_VRI	Shrub	Native	n/a	*Toxicodendron diversilobum*	Poison Oak	t	—	—	—
7_VRI	Tree	Native	n/a	*Umbellularia californica*	California Bay	t	—	—	—
7_VRI	Grass	Native	n/a	*Elymus glaucus*	Blue Wildrye	—	—	—	t
7_VRI	Herb	Native	n/a	*Eriophyllum lanatum*	Woolly Sunflower	—	—	—	t
7_VRI	Herb	Native	n/a	*Galium porrigens*	Narrow-Leaved Climbing Bedstraw	—	—	—	t
7_VRI	Herb	Non-Native	Moderate	*Hypericum perforatum*	Klamathweed	—	—	—	t
7_VRI	Herb	Native	n/a	*Lagophylla glandulosa*	Glandular Hareleaf	—	—	—	t
7_VRI	Herb	Native	n/a	*Perideridia kelloggii*	Kellogg's Yampah	—	—	—	t
7_VRI	Herb	Native	n/a	*Monardella villosa*	Coyote Mint	—	—	—	t
7_VRI	Herb	Native	n/a	*Potentilla glandulosa*	Sticky Cinquefoil	—	—	—	t
7_VRI	Herb	Native	n/a	*Scutellaria siphocampyloides*	Curve-Flowered Skullcap	—	—	—	t
7_VRI	Herb	Non-Native	Moderate	*Torilis arvensis*	Field Hedge-Parsley	—	—	—	t
Valley Oak Woodland (Vow)									
5_VOW	Tree	Native	n/a	*Quercus lobata*	Valley Oak	39	8	12	—
5_VOW	Shrub	Native	n/a	*Toxicodendron diversilobum*	Poison Oak	9	—	—	—
5_VOW	Tree	Non-Native	n/a	*Prunus sp.*	Feral Prune	6	—	—	—
5_VOW	Tree	Native	n/a	*Quercus chrysolepis*	Canyon Live Oak	6	5	6	—
5_VOW	Herb	Native	n/a	*Aristolochia californica*	Pipevine	5	—	—	—
5_VOW	Shrub	Native	n/a	*Rhamnus tomentella*	Hoary Coffeeberry	5	—	—	—

PLOT # AND CWHR CODE	GROWTH FORM	NATIVE/ NON-NATIVE	CAL-IPC[1]	*SCIENTIFIC NAME*	COMMON NAME	CANOPY COVER[2] (%)	DENSITY PER PLOT[3] (#)	AVE. DBH[4]	HERB COVER[5] (%)
5_VOW	Tree	Native	n/a	*Umbellularia californica*	California Bay	3	3	4	—
5_VOW	Tree	Non-Native	n/a	*Malus sp.*	Feral Apple	1	—	—	—
5_VOW	Shrub	Native	n/a	*Cercis occidentalis*	Western Redbud	1	—	—	—
5_VOW	Shrub	Native	n/a	*Aesculus californica*	California Buckeye	t	—	—	—
5_VOW	Herb	Native	n/a	*Heteromeles arbutifolia*	Toyon	t	—	—	—
5_VOW	Shrub	Native	n/a	*Lonicera interrupta*	Chaparral Honeysuckle	t	—	—	—
5_VOW	Shrub	Native	n/a	*Rubus ursinus*	California Blackberry	t	—	—	—
5_VOW	Vine	Native	n/a	*Vitis californica*	California Wild Grape	t	—	—	—
5_VOW	Herb	Native	n/a	*Cyperus eragrostis*	Tall Flatsedge	—	—	—	t
5_VOW	Grass	Native	n/a	*Elymus glaucus*	Blue Wildrye	—	—	—	t
5_VOW	Herb	Native	n/a	*Galium aparine*	Goose Grass	—	—	—	t
5_VOW	Herb	Native	n/a	*Lotus pinnatus*	Pinnate-Leaved Lotus	—	—	—	t
5_VOW	Herb	Native	n/a	*Mimulus guttatus*	Seep Monkey Flower	—	—	—	t
5_VOW	Herb	Native	n/a	*Potentilla glandulosa*	Sticky Cinquefoil	—	—	—	t
5_VOW	Fern	Native	n/a	*Selaginella hansenii*	Spike Moss	—	—	—	t
5_VOW	Herb	Non-Native	Moderate	*Torilis arvensis*	Field Hedge-Parsley	—	—	—	t

[1] Cal-IPC ratings of invasive plants per the California Invasive Plant Inventory produced by California Invasive Plant Council (Cal-IPC 2006). N/A signifies that plant is not listed by Cal-IPC.

[2] Canopy cover measured for woody perennials, including trees, shrubs, and vines. Cover value of “t” signifies that cover is trace (i.e., less than one percent) within the plot.

[3] Density only measured for trees and selected shrubs.

[4] Average diameter at breast height (DBH) is an average of trees in plot with a DBH greater than one inch.

[5] Herb cover includes grasses and herbs. Cover value of “t” signifies that cover is trace (i.e., less than one percent) within the plot.