Habitat Restoration and Landscape Visual Screening Plan

Granite Esparto Site

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1.0 INTRODUCTION

Granite Construction Company (Granite) contracted TRC to develop a Habitat Reclamation Plan for a proposed gravel mining and processing project near Cache Creek, near the town of Esparto in Yolo County, California. Reclamation of the site will include development of open water, wetland, and upland natural habitat elements. This document describes the methods to be employed for natural lands reclamation during and following completion of mining operations on the property. In order to ensure consistency, many of the restoration techniques and monitoring methods have been adapted from the Habitat Restoration Program (Zentner and Zentner, 1995) and the Habitat Restoration Program Addendum (Foothill Associates, 2001) developed for Granite for the adjacent Capay facility.

The biological feasibility of successful habitat reclamation is largely based on three primary factors– soil, water, and plant selection. As described in the Soils Evaluation Report and Reclamation Plan, there is adequate high quality soil that will be salvaged for use in reclamation. A reliable water source will be available for establishing native vegetation and for maintaining visual screening. Plant species have been selected based on previous plans prepared for the Capay site, along with the Esparto Biological Assessment and experience at other sites. Native plants were chosen that are accustomed to the local climatic conditions. In addition, the hydrology of groundwater at the site was reviewed to ensure that a proper hydrological regime exists to reasonably conclude that proposed wetlands and riparian habitat reclamation is feasible on the property. The program described herein also assigns responsibility for implementation of these measures and provides a plan for monitoring and maintenance. Considering these factors, the proposed revegetation efforts associated with reclamation of mined lands, as described in this plan, are feasible.

1.1 SETTING

The Granite Esparto site (site) is located in the Central Valley of California, west of the Sacramento River, in an area rich in agricultural production consisting of orchards, row crops, and grain crops. The site is situated in western Yolo County, approximately 1.5 miles north of the town of Esparto, along the west side of County Road (CR) 87 near Cache Creek. Elevation at the site ranges from approximately 180 to 186 feet. The climate in the area can be characterized as mild, with average temperatures ranging from 33 to 55 degrees Fahrenheit in the winter and 57 to 96 degrees Fahrenheit in the summer. Average annual precipitation in the area is about 19 inches. A vicinity map is provided in Attachment A.

1.2 PURPOSE AND SCOPE

As required by the California Surface Mining and Reclamation Act of 1975 (SMARA), land reclamation is a required component of plans to extract mineral resources. In addition, Yolo County Surface Mining Ordinance section 10-5.601(c)(1) requires:

> A biological analysis to evaluate the feasibility of proposed revegetation efforts, including detailed plans describing planting methods, appropriate planting times, species to be used, irrigation

requirements, erosion control, weed control, and proposed success rates for plant cover and density. The analysis shall also include cross-sections for those areas proposed to be revegetated, including slopes, visual screens, and wildlife habitat.

Reclamation for the property includes reestablishment of both agricultural and natural habitat lands in areas disturbed by the project. This document addresses Yolo County ordinance 10-5.601(c)(1) for project lands reclaimed to natural habitat. This document also includes establishment of field margin (or fence row) habitat as required by ordinance 10.5-509. The *Soils Evaluation Report and Reclamation Plan* is being prepared under separate cover, and will include agricultural reclamation and soils analysis that may be applicable to this plan.

A *Biological Assessment* has been prepared for the project that documents existing habitat on the site and potential value for wildlife. The habitat reclamation design for the site is based on re-creating plant communities that currently exist on-site, such that their compatibility with the specific soils and climate is assured.

This document addresses the specific measures directed to revegetation of natural plant communities during the various project phases, including seeding and planting methods, appropriate planting times, species to be used, irrigation requirements, erosion control, weed control and proposed success rates for plant cover and density.

1.3 RESPONSIBLE PARTY

Granite, or its successor, is the responsible party for implementing site reclamation in accordance with this plan and subsequent updates, including maintenance or remediation work required to achieve defined performance standards.

2.0 LANDSCAPE AND HABITAT DESCRIPTIONS

2.1 EXISTING CONDITIONS

The Granite Esparto site consists mainly of agricultural production, including row crops, English walnut (*Juglans regia*), and almond (*Prunus dulcis*) orchards. A portion of the site includes nonnative grassland that appears to have been previously disturbed (graded), and the southernmost portion of the site includes an access road to Granite Construction's gravel mining operation and the banks and bed of Cache Creek. A small rural/agricultural development exists at the center of the site, and consists of a house, a barn, and associated smaller structures.

Ornamental native and nonnative plant species, including toyon (*Heteromeles arbutifolia*), oleander (*Nerium oleander*), cork oak (*Quercus suber*), interior live oak (*Quercus wislizeni*), valley oak (*Quercus lobata*), eucalyptus (*Eucalyptus globulus*), sycamore (*Platanus racemosa*), juniper (*Juniperus californica*), and pine (*Pinus* spp.), have been planted along Fulton and Frank Road and near the rural/agricultural development. Nonnative grasses make up a majority of the rest of the area between the Cache Creek stream bank and active agricultural production. Species typical of Central Valley riparian habitats occur on the margins of Cache Creek, including

Fremont cottonwood (*Populus fremontii*), willow (*Salix* spp.), and mule's fat (*Baccharis salicifolia*).

Plant communities that are present within the project boundaries are described in detail and shown in maps in the *Biological Assessment*.

Plant Communities and Habitat Types

The site and surrounding areas support the following natural plant communities:

- Great Valley Willow Scrub
- Nonnative Grassland
- Riverine

Great Valley Willow Scrub

Great valley willow scrub is located along the margins of Cache Creek. On the south bank of Cache Creek, where disturbance is not proposed, approximately five larger cottonwood trees occur. Most of the great valley willow scrub along Cache Creek at the site has sparse stands of cottonwood with an open understory dominated by willow and other low shrubs and grasses, including ripgut brome (*Bromus diandrus*), Mexican tea (*Chenopodium amnrosioides*), and hedge mustard (*Sisymbrium officinale*).

Nonnative Grassland

Nonnative grassland covers a portion of the site proposed for the processing plant. It also covers the slope between the existing Capay facility gravel mining access road and the great valley willow scrub plant community along the bank of Cache Creek. This plant community consists of a dense to sparse cover of annual grasses interspersed with flowering stalks approximately 1 to 3 feet high. Stands of cottonwood trees were observed interspersed along the margins of the nonnative grassland where water sources from irrigation and Cache Creek were persistent.

Riverine

Riverine is primarily a non-vegetated community (habitat) that is located along the banks and in the bed of Cache Creek. This habitat consists predominantly of gravel bars and open water, with patches of riparian vegetation, consisting of mule's fat and willow species near persistent water sources. Where seasonal water flow becomes ponded, marsh-like communities may develop. Within the creek area, one pool of ponded water was supporting a small marsh community with tules (*Schoenoplectus acutus* var. *occidentalis*), cattail (*Typha* spp.), and other emergent species.

2.2 PHASE 1A

The Phase 1A area is comprised primarily of open-space with nonnative grassland. A fraction (approximately 15 percent) is in use for row crops. The Phase 1A area will be reclaimed to dry pasture with annual grasses.

2.3 PHASE 1B

The Phase 1B area is currently farmed as row crops. This area will be reclaimed to prime agriculture land. Reclamation of this area to prime agriculture is described in the *Soils Evaluation Report and Reclamation Plan* and is not further discussed in this document.

2.4 PHASE 2

The Phase 2 area is currently planted with orchard crops and row crops. A small percentage is developed with buildings, farm facilities, and some ornamental vegetation. The Phase 2 area will be reclaimed to lake with associated wetlands, and surrounding riparian and oak woodland vegetation.

2.5 TEST 3 LINE MAINTENANCE AREA

Part of Granite's proposal includes implementing a segment of the County's Test 3 line on Cache Creek, as a net benefit to the County. The area encompassed by the proposed Test 3 line implementation is shown in maps in the *Biological Assessment*. There will be no mining in the Test 3 line Maintenance area, but disturbance will occur to construct a stable streambank along the Test 3 alignment and to fill behind the streambank. This work will require a Flood Hazard Development Permit from Yolo County pursuant to the CCRMP.

3.0 RESTORATION MEASURES AND IMPLEMENTATION

3.1 GOALS AND OBJECTIVES

This plan is designed to meet the goals and objectives of the Yolo County Surface Mining Ordinance to provide for the protection and subsequent beneficial use of mined lands, and the CCRMP and OCMP to develop high quality natural habitat that is dominated by native plants. In particular, principles incorporated into the habitat design of the reclaimed lands include the following:

- Promote the conjunctive use of surface and groundwater to maximize the availability of water for a range of uses, including habitat, recreation, agriculture, water storage, flood control, and urban development.

- Provide a diversity of habitat types and plant communities. Habitat diversity promotes vegetation diversity, which in turn, provides for greater and more varied wildlife use, and more resiliency within the system to withstand environmental shocks.

- Create long, variable shorelines for a range of habitat and protected sites for nesting pair territories, ranging from large species such as waterfowl and shorebirds to smaller organisms such as amphibians.

- Limit dense stands of aquatic vegetation in shallow areas to lower mosquito harborage and enhance wave action. This will also serve as substrate for mosquito predators. Prevent isolated pooling as the water level recedes to allow for wave action and to provide access to mosquito predators.

- Provide dense, tall plant cover at the shoreline. Trees at the water's edge provide roosting and nesting habitat near a food source, while the tree leaves provide an important source of organic material that, in turn, promotes productivity of organisms within the open water and marsh zones.

- Provide a continuous corridor of natural open space between restored habitat lands and Cache Creek. Plant oaks and drought-tolerant shrubs interspersed with grasslands on higher elevation lands. Oaks and shrubs should be especially encouraged on slopes facing north or east.

3.2 SITE PREPARATION

Soils

During mining operations, the A-horizon topsoils and the B- and C-horizon subsoils will be removed and salvaged for use in reclamation. If ongoing reclamation activities do not immediately require soil placement, salvaged materials will be used for visual berms and levees, or stored in temporary stockpiles located in nearby areas on the site, so as to minimize haul distances and re-handling. Topsoil and subsoil stockpiles will be seeded with a vegetative cover to prevent erosion and leaching. The vegetative cover will consist of species included in the annual grassland seed mix. Pre-project assessments of the grass and herbaceous cover growing in areas proposed for topsoil salvage will identify weed species and prescribe methods for controlling them before topsoils are stockpiled. The following soils will be used for habitat reclamation:

- ***Brentwood silty clay loam (BrA):*** Historically this soil has been used for tree fruit, nut crops, vegetables, and field crops. This soil is suitable for annual grassland and oak woodland restoration.

- ***Loamy alluvial land (Lm):*** These soils have a texture of sand, sandy loam, loam, and silt loam and are very well drained. They are suitable for annual grassland, wetland, and willow/cottonwood riparian restoration.

- ***Soboba gravely sandy loam (Sn):*** This soil unit consists of deep, excessively drained soils that formed in alluvium from predominantly granitic rock sources and is suitable for annual grassland and scrub restoration. This soil type is partially hydric and is suitable for wetland restoration.

- ***Yolo silt loam (Ya):*** This soil unit consists of thick grayish brown, neutral silt loam and pale brown mildly alkaline silt loam. The soil will be primarily used for row, field, and

orchard crops, but may also be used for restoration of annual grasslands and oak woodlands.

The *Soils Evaluation Report and Reclamation Plan* indicates that overburden soils are adequate for the necessary habitat reclamation. Soils that are salvaged as overburden will be used initially for temporary berms and levees and later for habitat reclamation purposes in accordance with their suitability as described above. Some of the overburden may be stockpiled for later use in reclamation [It is anticipated that approximately seven feet of overburden and topsoil will be salvaged for reclamation of the mined areas and approximately two feet of A-horizon and C-horizon soils will be spread where needed for reclamation] (refer to the *Soils Evaluation Report and Reclamation Plan* for details). Subsoils will be ripped to a depth of three feet prior to spreading stockpiled topsoil.

Erosion and Sediment Control

Slopes around the Phase 2 area will be reclaimed as soon as practical to reduce erosion potential and ensure the establishment of habitat.

Permanent erosion and sediment control will be in the form of revegetation in accordance with this plan.

Mulch, consisting of weed-free straw, wood fiber, or an approved equivalent, may be applied to disturbed soils to minimize the effects of wind or rain to exposed soils. Mulch will be applied at a minimum of 3,000 pounds per acre.

3.3 PHASE 1A

Excavation and Contouring

Reclamation plans for this area call for a return to annual grassland for use as dry pasture. Refer to the Mining and Reclamation Plan Exhibits for reclamation plan and cross-section drawings. Phase IA includes the plant site and the initial two (interim) settling ponds. The interm settling ponds will be reclaimed early in the project's operational life. These ponds will be used to deposit washed fines until the first settling pond is completed in Phase IB. The Phase IA settling ponds will be reclaimed with a lower surface elevation than surrounding land to collect and infiltrate runoff from the plant area. When no longer needed, the interim settling ponds will be allowed to dry. When sufficiently dry, the surface of the accumulated fines will be ripped. Stockpiled C-Horizon and A-Horizon soils will be evenly spread across the surface, and the area will be tilled and planted.

Upon completion of mining, processing and sales, the remainder of the Phase IA area, where the processing plant is located, will be reclaimed. Stockpiles, equipment and gravel or asphalt surfaces will be removed. The site will be graded to match surrounding contours, and the subsoil will be scarified to a depth of 6 inches prior to topsoil replacement. Stockpiled C-Horizon and A-Horizon soils will be evenly spread across the area. After topsoil is replaced, the area will be tilled, planted and seeded.

The plant site's final reclamation grades are designed to drain northerly toward the interim settling ponds, easterly toward a retention basin at the east side of the plant site, and southwesterly toward a retention basin at the southwest corner of the plant site. This will keep surface drainage at the plant site from entering open water mining areas and from leaving the site.

Seeding and Planting

Following final grading and topsoil replacement, the area being reclaimed will be tilled to a minimum 12-inch depth using a stubble disk, followed by a spring-tooth harrow for the final pass, to alleviate soil compaction. The tilled surface will be seeded with the annual grassland seed mix as described in **Section 3.7**. Scattered valley oak woodland clusters of trees and shrubs will be planted along the perimeter of the grasslands. Planting sites will be identified by the Environmental Monitor (EM) based on the suitability of the soil, slope, aspect, and micro-habitat. Exact locations and spacing will be determined by the EM based on site constraints, area availability, and access requirements for maintenance and irrigation.

3.4 PHASE 2

Excavation and Contouring

The Phase 2 area will be reclaimed to be a lake with varying depths, seasonally fluctuating water levels, and diverse shorelines. The lake will have a variable shoreline with changing slopes of 2:1 or flatter to provide natural type variations in habitat. Refer to the Mining and Reclamation Plan Exhibits and Attachment A for reclamation plan drawings.

The proposed lake will be centered in a generally east to west orientation within the property between reclaimed agricultural land to the north and open space/pasture to the south. Depth to groundwater is on the order of 40 feet below the surface. During mining operations, the lake will be excavated to a depth of approximately 75 feet below the surface. This will lead to a maximum water depth on the order of 35 feet. The water elevation of the lake will fluctuate on the order of 10 feet with the groundwater elevation. The slopes around the lake will be graded no steeper than 2:1 to five feet below the average low water (ALW), except for the west end of the lake adjacent to the canal where the slope will be approximately 3:1. Topsoil will be spread over the surface of the slopes to the edge of the lake.

A variable shoreline will be sculpted around the lake with a series of coves and undulations to increase shoreline edge. Sculpting of the shoreline area will be done to ensure proper drainage and prevent establishment of isolated ponds that could harbor mosquito larvae.

After excavation and contouring is complete, the enhancement site will contain the following features:

- Deep open water
- Various degrees of transition slopes

- Vegetated wetland/open water edge
- Upland perimeter slopes

Lake Level Fluctuations

Refer to the *Hydrogeology Report of Findings* for a description of groundwater depths within the basin.

Seeding and Planting

The slopes around the lake will be planted with a progression of habitats down-slope including oak woodland species higher on the slopes transitioning to riparian woodland and then wetland species near and in the edges of the lake. Planting methods and species are described in **Section 3.8**.

To account for the drying effects of the sun and wind on slope aspects, a higher ratio of trees to shrubs, and riparian species to upland species will be planted on the more mesic north-facing and east-facing slopes, as opposed to the more xeric south-facing and west-facing slopes, which will get more sun and receive the prevailing wind off the lake.

The proposed habitat enhancement is designed to be structurally diverse with vegetated areas interspersed among more open water areas, allowing several foraging depths for waterfowl. Vegetated areas will be composed of low herbaceous vegetation, tall herbaceous vegetation, and minimal shrub/tree layers. Various wildlife species forage at the interface between habitats. Habitat edge is an important indicator of biotic diversity (Yahner, 1988; Harris, 1988).

3.5 TEST 3 LINE MAINTENANCE AREA

Excavation and Contouring

The proposed implementation of the Test 3 line is not part of proposed mine reclamation, since it is outside of the mining and mineral processing boundaries and there will be no mining in the Test 3 line area. Test 3 Line implementation will adhere to the conditions of the Flood Hazard Development Permit.

3.6 VEGETATIVE SCREENS

Seeding and Planting

Landscaped buffers will be constructed along County Road 87 and directly south of the Capay facility haul road, to screen project operations from adjacent lands. Berms established from the stockpiled soil will be contoured to conform visually with the surrounding topography, where possible. In order to prevent erosion or the establishment of noxious weeds, the soil berms will be seeded with grass species included in Table 1 and planted with shrubs.

The berm south of the Capay facility haul road will be constructed on top of a portion of the Test 3 line implementation area. The vegetated screen on this berm will include cottonwoods planted on 20-foot centers, and seeded with annual grassland species. The cottonwoods are relatively fast growing and may reach heights of 10 to 12 feet after two years. Low growing shrubs of 6 to 12 feet in height, such as coyote brush, will make up the visual screen along County Road 87. These screens are expected to last until final reclamation measures are implemented, which will include removal of the screens and reclamation of the screen footprint.

3.7 SEEDING

Seed will be applied in fall, winter or spring. Fall seeding prior to November 1 will occur wherever practical, since this is the optimal time for taking advantage of winter rains. For typical years, fall seeding would be expected to favor a higher percentage of germination and more robust growth. Soil stockpiles, visual screening berms, and the Phase 1A area will be seeded with the mix identified in Table 1. Depending on seed availability, alternate seed mixes may be approved by the EM.

Before seeding is initiated, all debris will be removed from the area to be seeded and the soil will be treated for weeds. If soil has been compacted, the ground surface will be tilled to a minimum 12-inch depth using a stubble disk. Otherwise, the surface will be scarified to a depth of 3 to 4 inches to reduce compaction and create a favorable seedbed. In those sites where seedbed preparation is not practical (e.g., steep slopes, rocky areas, etc.), topsoil will be left in an adequately rough condition to create micro-environments for seed germination and growth, and to reduce the potential for soil loss. In order to prevent an overabundance of invasive weed species, a mixture of non-invasive annual grassland species will be applied to the site for the first one or two years. Weed treatment will consist of at least one grow-kill cycle involving irrigating the soil followed by hand, mechanical, or chemical removal of germinated weed species. The cycle will be conducted a sufficient number of times to remove the majority of the weed species seed bank, usually determined by a decrease in germination. This will help ensure the successful establishment of native grasslands and woodlands before the annual grassland seed mix and any plantings are applied. Seeded upland areas will be fertilized using a low dose of 20-9-9 (NPK ratio) fertilizer (such as brand name First Choice), or other approved safe controlled release fertilizer at a rate of 200 pounds per acre. Fertilizer will be applied to the seeded upland areas under the direction of the EM. A mycorrhizal inoculant will be added at the rate of approximately 60 pounds per acre for any soil that has been stockpiled for more than one year. The composition of the inoculant will be determined in consultation with a qualified specialist at the time of implementation to ensure compatibility with the local soils.

Table 1: Annual Grassland Seed Mix

Common Name	Scientific Name	Native or Nonnative	PLS (lbs./acre)
California barley	*Hordeum brachyantherum* spp. *californicum*	Native grass	5
California brome	*Bromus carinatus*	Native grass	10
Blue wildrye	*Elymus glaucus*	Native grass	5
Six-weeks fescue	*Vulpia microstachys*	Native grass	5
Purple needlegrass	*Nassella pulchra*	Native grass	5
Creeping wildrye	*Leymus triticoides*	Native grass	4
California poppy	*Eschscholzia californica*	Native forb	3
Tom cat clover	*Trifolium tridentatum (willdenowii)*	Native forb	1
Sky lupine	*Lupinus nanus*	Native forb	2
Total			**40**

PLS: pure live seed; values derived from Pacific Coast Seed

Each bag of seed will be properly labeled certifying the species, the percentage of seed of each species, the percent germination of each species, the purity of seed, and the source of the seed.

Each seed mix will be uniformly applied at its specified Pure Live Seed application rate as described in Table 1. Seed will be applied by "rangeland"-type seed drill or by broadcast equipment. Seeding rates are based on drill-seed application rates. If the broadcast method is used, the seed will be applied at a rate of twice that prescribed for drill-seeding. Seed applied directly on bare soil will be lightly raked into the soil surface. In areas where straw mulch is used, seed will be applied before the mulch.

3.8 PLANTING

Oak and Riparian Woodland

The Phase 2 slopes above average high water (AHW) and the perimeter of the Phase 1A area will be planted in valley oak woodland. Species to be planted in the oak woodland are comprised of the grasses in Table 1 with the following oak woodland species in Table 2 planted in clusters within the grasslands.

Table 2: Valley Oak Woodland Planting List

Common Name	Scientific Name	# Per Acre(1)
Valley oak	*Quercus lobata*	43
Interior live oak	*Quercus wizlensii*	6
California buckeye	*Aesculus californica*	5
California blackberry	*Rubus ursinus*	8
Coyote brush	*Baccharis pilularis*	10
Wild rose	*Rosa californica*	15

(1) Per acre average within clusters.

Native grass plugs will be incorporated within oak woodland planting clusters; 300 plugs of purple needlegrass (*Nassella pulchra*) and 100 plugs of creeping wildrye (*Leymus triticoides*) will be added to the list in Table 2.

Riparian woodland will be planted from just above the average low water (ALW) line to just above the AHW line along the Phase 2 slopes. Species to be planted in the riparian woodland are shown in Table 3.

Table 3: Riparian Woodland Planting List

Common Name	Scientific Name	# Per Acre
Valley oak	*Quercus lobata*	82
Freemont cottonwood	*Populus fremontii*	26
Black willow	*Salix goodingii*	29
Red willow	*Salix laevigata*	29
Arroyo willow	*Salix lasiolepis*	29
California blackberry	*Rubus ursinus*	19
Mule fat	*Baccharis salicifolia*	6
Wild rose	*Rosa californica*	36
Wild grape	*Vitis californica*	16
Dogwood	*Cornus stolonifera*	16
Creeping wildrye	*Leymus triticoides*	400

The numbers per acre in tables 2 and 3 are to be considered averages and the exact planting spacing and layout will be determined by the EM in the field. The EM will determine the

approximate number of plants that will be needed, so a sufficient quantity can be ordered prior to the restoration. As a general rule, large crowning trees can be spaced at 20 to 25 ft. on center (OC), small crowning trees at 10 to 15 ft. OC, large shrubs at 5 to 8 ft. OC, small shrubs at 3 to 5 ft. OC, and grasses and ground cover plants at 1.5 to 3 ft. OC. As noted previously, a higher ratio of trees to shrubs, and riparian species to upland species will be planted on the more mesic north-facing and east-facing slopes, as opposed to the more xeric south-facing and west-facing slopes, which will get more sun and receive the prevailing wind off the lake. Groupings of blackberry and wild rose shrubs may also be planted over long stretches of slope to provide spiny nesting substrates for colonial nesting species such as tricolored blackbird.

All plant material for use in propagation will be collected from the region. Containerized stock in the form of 1-gallon and 5-gallon trees will be purchased from nurseries that collect acorns and other plant material from Yolo County and Central Valley woodlands. A mycorrhizal inoculant will be included with the nursery medium at approximately 5 pounds per cubic yard, or will be added at a similar ratio to the planting holes. All trees will be inspected to ensure they are not root-bound, desiccated, or otherwise diseased. If possible, willow cuttings will be taken from plants on-site or adjacent to the project area within the Cache Creek drainage.

Plantings will be done in the late fall or early winter to take advantage of cool months and maximize plant survival. Planting holes will be made by hand or mechanical auger and will be approximately twice the diameter of the pot. Each planting hole will be filled with water and the water will be allowed to soak into the soil prior to plant installation. A low dose of Osmocote 18-6-12 fertilizer, or other approved safe controlled release fertilizer compatible with mycorrhizae, will be added to the planting holes. The crown should be level with grade and covered with approximately 0.25 inch of soil to prevent a wicking effect from drying out the rootball. Watering basins are to be constructed around each tree to conserve the water applied via drip irrigation or hand watering. The basin will be constructed so as to keep the root or crown area dry. The plants will be thoroughly watered after installation. Approximately 2 inches of wood mulch will be applied around each plant. The mulch should be watered during the initial plant watering. Protective wire cages or ventilated tree shelters will be installed around trees and shrubs as needed to prevent browsing by wildlife that otherwise would threaten reclamation success.

Willow cuttings will be a minimum of 18 inches long and not less than three-eighths of an inch in diameter at the base. The base of the cuttings will be planted to a depth of approximately two-thirds the length of the cutting (12 inches). Willow planting will be performed during the typical dormant period for the species, generally from December to February. Any remaining leaves will be trimmed away from the stems with at least three bud scars present aboveground. The cuttings will be obtained from surrounding willows in the Cache Creek drainage if possible, with not more than 25 percent of any individual plant cut. All cuttings will be made with sharp, clean tools. For each cutting, the top will be cut square above a leaf bud (node), and the base will be cut below a leaf bud at an angle of approximately 45 degrees. All cuttings should be oriented the same way and bundled for storage. If not immediately planted, cuttings will be stored for no longer than 48 hours under moist, cool conditions.

Wetlands

Wetlands around the fringe of the open water lake will be supported within the zone of alternating inundation and exposure. Based on the hydrology at the site, freshwater marsh at the Phase 2 site will be restricted to within a few feet of the ALW zone where soils are highly permeable. Where less permeable soils are present, perennial freshwater marshes will transition to other wetland plant communities with higher elevation up to the AHW zone. This transition will move from seasonal marshes at mid-elevations to wet meadows near the AHW zone. Species to be planted in the wetland plant communities are shown in Table 4.

Table 4: Wetland Planting List

Common Name	Scientific Name	Relative Elevation	# Per Acre
Common tule	*Scirpus acutus*	Low	25
Cattail	*Typha domingensis*	Low	15
Three-square	*Scirpus americanus*	Low	10
Creeping spikerush	*Eleocharis palustris*	Mid	20
Seep monkeyflower	*Mimulus guttatus*	Mid	5
Baltic rush	*Juncus balticus*	Mid	5
Beaked sedge	*Carex rostrata*	Mid	5
Scouring rush	*Equisetum hyemale*	High	5
Yerba mansa	*Anemopsis californica*	High	5
Buttonbush	*Cephalanthus occidentalis*	High	5

In addition to these species planted along the shoreline, floating vegetation such as duckweed (*Lemna* sp.) and azolla (*Azolla filiculoides*) will be planted within open water. The following guidelines will be implemented to help ensure that the marshes do not promote mosquito production.

- The banks of areas that retain water after June 1 (the beginning of the optimal mosquito breeding period) will be steep enough to prevent isolated pooling as the water level recedes and to allow wave action and access to mosquito predators. Shoreline configuration will not isolate small channels or shallow ponding areas from the main body of water, but instead will provide for continued access by predators, particularly mosquito fish (*Gambusia* sp.).

- Dense stands of aquatic vegetation will be limited in shallow areas to lower mosquito harborage and enhance wave action. Perennial marsh species, like cattails and tule, in moderate stands, do not promote mosquito productivity and will function as substrate for mosquito predators.

3.9 IRRIGATION

The wetland planting, the lower portions of the riparian planting, and annual grassland will not require irrigation. Upland trees and shrubs, and upper portions of riparian plantings will be provided with a reliable source of water until their root structures become established. Because the first rainfall of the year is unpredictable, temporary irrigation will be required. A proper water regime that promotes deep rooting is crucial to the establishment of these plantings. Conversely, over-watering will cause damage to the trees' root structure and may cause root rot. Most plantings will require supplemental irrigation during the first three years. It is anticipated that the watering schedule will be gradually diminished each year so that the native plants do not become dependent on regular watering. Most irrigation should cease by the fourth year. All new woodland plants and cuttings, with the exception of willows and other species planted on low terraces, will be irrigated using a temporary drip irrigation system. A watering schedule, including which tree species will require irrigation, will be determined by a landscape architect or certified arborist based on the maintenance requirements of individual plantings.

The irrigation systems will be set up with pressure reducers and filters to avoid clogging drip emitters. Polyethylene tubing may be installed above ground and secured with 6-inch staples or jute hooks. All lines will be flushed prior to installing emitters. Emitters will be placed at the rootball, and moved back to the dripline as the plant canopy expands. Pressure testing of the completed main irrigation lines and valves will be required. Lateral lines will be left on for at least two hours to visually inspect for leaks and functionality. Upon completion of the irrigation system, the EM will verify the system is operating correctly.

4.0 MONITORING AND MAINTENANCE

This section provides the specific monitoring methods and performance standards for evaluating plant community restoration success, along with annual reporting requirements and maintenance and remediation guidelines. Monitoring and maintenance, and remediation if needed, will be, performed as described in this plan and will be overseen by the EM.

4.1 GENERAL REQUIREMENTS

- Monitoring shall occur for five years after reclamation is completed or until the success performance standards have been met for three consecutive years without supplemental watering or plant care, whichever is greater. The monitoring period will be triggered following completion of reclamation in a given area, so different stages of monitoring at different areas of the site may be ongoing at any given time.

- Monitoring results shall be submitted in an annual report to the permitting agencies by November 1 each year.

4.2 WETLAND MONITORING

Methods

Wetland monitoring will consist of the following actions:

- **Mapping**. Ground measurements or aerial photographs, other methods documenting the extent of inundation will occur in the areas of wetland construction twice per monitoring period between February and June. The purpose of these mapping programs is to provide an overview of general conditions in the wetland reclamation areas, and to identify potential problem areas (e.g., erosion, lack of inundation).

- **Site Monitoring and Floristic Data Collection**. Data on plant community composition will be collected once each monitoring period. Based on expected inundation, the optimum time for data collection will be late spring or early summer. Wildlife species associated with the wetlands will also be incidentally noted during field data collection.

- **Data Analysis**. Data analysis will consist of calculation of the Prevalence Index and wetland species richness and preparation of summary statistics for each constructed wetland.

Performance Standards

The following shall be used to measure the performance of wetland restoration:

Species Richness/Wetland Species Richness

Species richness is defined as the total number of plant species recorded within an individual wetland, while wetland species richness is defined as the total number of wetland plant species recorded within an individual wetland. Wetland plant species include those categorized by the *National List of Plant species that Occur in Wetlands: California (Region 0)* (Reed, 1988) as described in Table 5.

Table 5: Species Category Definitions

Species Category	Definition
Obligate (OBL)	Occur almost always in wetlands (more than 99 percent probability)
Facultative Wetland (FACW)	Usually occur in wetlands (67 to 99 percent probability)
Facultative (FAC)	Equally likely to occur in wetlands and non-wetlands (34 to 66 percent probability)
Facultative Upland (FACU)	Usually occur in non-wetlands (67 to 99 percent probability)
Upland (UPL)	Occur almost always in non-wetlands (more than 99 percent probability)

For those wetland species not listed as OBL, FACW, or FAC, or eligible for such designation, a literature review will be conducted to determine their status. A wetland species richness of 10 is the success performance standard for wetlands reclamation areas of the project.

Prevalence Index

The prevalence index (PI) is a floristic gradient that ranks wetlands on the basis of the relative proportions of wetland and non-wetland species, weighted on the basis of the species' category in the *National List of Plant species that Occur in Wetlands: California (Region 0)* (Reed, 1988). For calculation of the PI, each category is weighted according to the scale outlined in Table 6.

Table 6: Prevalence Index Weight Scale

Wetland Status	Weighting
OBL	1
FACW	2
FAC	3
FACU	4
UPL	5

The PI is a standard method of determining whether a wetland data set is categorized as a wetland or upland plant community. By using the weightings described above, the PI establishes a gradient where low values represent the "wet" end of the gradient (plant communities dominated by OBL and FACW species) and high values represent the "dry" end of the gradient (plant communities dominated by FACU and UPL species).

PI values range from 1 to 5, with a value of 1 indicating that all species in that sample are obligate wetland species and a value of 5 indicating that all species are obligate upland species, with intermediate values indicating the relative importance of wetland species. To be considered a wetland, the area must have a prevalence index value less than 3.0 (U.S. Fish and Wildlife Service *et. al.*, 1989). The PI for wetland reclamation will be calculated using the following formula:

$$PI = \frac{1f(OBL) + 2f(FACW) + 3f(FAC) + 4f(FACU) + 5f(UPL)}{f(OBL) + f(FACW) + f(FAC) + f(FACU) + f(UPL)}$$

where "f" equals the frequency of occurrence for each indicator group of plants counted along a given transect through a wetland. A minimum of two 50-meter (or four 25-meter) point intersect transects will be conducted per acre vertically along the bank from the interface of water and vegetation. Points will be taken every half meter in accordance with the sampling technique described by the California Native Plant Society (Sawyer and Keeler-Wolf, 1995).

A PI value of less than 3 is the success performance standard for wetlands reclamation areas of the project.

4.3 OAK AND RIPARIAN WOODLAND MONITORING

Oak and riparian woodland monitoring is designed to ensure compliance with performance standards and to discover and correct conditions that are detrimental to the plantings. Annual monitoring of plantings will occur during the monitoring period, and will be conducted by the EM and, as necessary, in consultation with a certified arborist.

Methods

Monitoring will occur annually to evaluate the health of plants. Tree health will be evaluated based on the qualitative scale shown in Table 7. Only trees receiving a rating of fair or above will be considered successful.

Table 7: Tree Health Rating Scale

Rating	Tree Health
Excellent	Free of any signs of stress, disease, nutrient deficiency, or parasites. Wounds, if any, all healed.
Good	Some evidence of stress, disease, nutrient deficiency, or parasites. Minor leaf loss or deformity. Any wounds nearly healed or showing satisfactory progress toward healing.
Fair	Clear evidence of stress, disease, nutrient deficiency, or parasites. Moderate loss or deformity of leaves or buds. Wounds showing evidence of closure but with moderate amounts of exposed wood.
Poor	Widespread evidence of stress, disease, nutrient deficiency, or parasites. Substantial leaf loss or deformity, bud death, or other pathology. Wounds showing little or no closure, with substantial exposed wood. High potential for tree mortality.

Performance Standards

The success performance standard for plantings is a minimum of 80 percent survival annually. Trees will be successful with 80 percent or more exhibiting fair or better health rating based on Table 7. If the plantings fail to meet this performance standard, they will be replaced annually, under the guidelines of this plan, to meet the 80 percent survival goal.

4.4 REPORTING

Annual monitoring reports will be prepared and submitted to Yolo County by November 1 each year for five years or until success performance standards are met for three consecutive years. The basic purpose of the monitoring reports is to present data, summary statistics, and data analysis for constructed wetlands and each planting area. The monitoring reports will contain reproductions of maps or aerial photographs and a description of reclamation success relative to performance standards. Any conditions identified during monitoring as being detrimental to wetland function or to plantings (erosion, predation, etc.) will be described, along with recommended corrective measures. The effectiveness of the irrigation systems will be evaluated, along with recommendations for altered watering regimes, if appropriate.

4.5 MAINTENANCE

The need for maintenance activities will be determined by the EM during the monitoring surveys or during site visits at other times of the year. Potential maintenance measures could include supplemental watering, weed eradication, additional planting or seeding, and erosion repair. At least monthly visits will be made to check on the irrigation systems and plantings during the first year. Maintenance will be performed on at least a quarterly basis during the second and third years, and as-needed, thereafter.

Weed Abatement

Throughout the monitoring period, one focus of inspections will be to observe for the presence of weeds, and weed eradication will normally be implemented (by hand-pulling or cutting) with scheduled maintenance events. It is expected that the measures described in Section 3.7 for controlling weeds as part of the seeding regimen will significantly reduce, but not eliminate, the need for continued weed abatement during maintenance. In the event of problematic weed infestations, non-routine response such as strategic use of an appropriate and approved herbicide by a licensed applicator may be necessary. Integrated vegetation management (IVM) includes preventing encroachment of noxious weeds into land that is not infested, detecting and eradicating new weed introductions, and containing large-scale infestations using an integrated approach, often with the use of revegetation. The following methodologies have been adopted from the *Integrated Vegetation Management Guide* (Drlik *et al.*, 1998).

Areas determined to require noxious weed control will be prioritized based on size and severity of weed establishment in a given area and the likelihood of noxious weeds spreading into adjacent areas. Transects will be walked through restored areas for the purpose of making visual estimates of noxious weed cover. Situations that may increase the priority of a site include (1) the discovery of a small "outlier" population, such as a recent invasion from another area that must be controlled quickly in order to prevent it from becoming a larger problem, or (2) the discovery that a weed population has become a threat to agriculture, native plants, food sources for wildlife, water resources, etc.

Table 8 lists thresholds that may be used to indicate and prioritize infestation levels. Larger areas or areas with high percentages of noxious weed cover will be given higher priority for weed

control response. Areas will be treated for weeds beginning at a low threshold level to proactively minimize the potential for infestation. For some cases the criteria threshold will be established at the trace level, as with particularly noxious weeds such as perennial peppergrass (*Lepidium latifolium*) and yellow star-thistle (*Centaurea solstitialis*). In other cases the number of weeds tolerated may be much greater, such as the natural succession of moderate ruderal vegetation cover. In some cases, complete eradication may not be practical unless the weed-infested patches are very small.

Table 8: Noxious Weed Threshold Criteria

Threshold Level	Percent Noxious Weed Cover	Action Priority*
Trace	Less than 1 percent	None
Low (occasional plants)	Between 1 and 5 percent	Low
Moderate (scattered plants)	Between 5 and 25 percent	Moderate
High (fairly dense)	Greater than 25 percent	High

* Priorities may be altered due to patch size and the invasiveness of identified weed species.

Noxious weeds to be controlled will be in accordance with species lists available from the Yolo County Agriculture Department (http://www.yolocounty.org/org/AG/), and the Yolo County Resource Conservation District (http://www.yolorcd.org/on-farm-practices/weeds-a-war-we-can-win).

Manual Controls

Hand removal of weeds will be best suited for relatively small patches infested by invasive woody plants. Cutting may be accomplished by hand-pruning or chopping, weed whips, or similar hand-held, gas-powered tools. Weeds may also be cut and then spot sprayed with an herbicide. Grubbing is another effective method, which consists of removal and destruction of the entire plant, including the taproot. However, this procedure can be destructive to the treated area (National Park Service, 2007) and should be restricted to small plots. Removal of crowns only is more effective than cutting, but must be repeated, since remaining roots will re-sprout. Crown removal should be timed with flowering (when the plants are weakest) if they are easily visible, or in the fall. Crowns may be difficult to find except in the spring, when this method will be less effective. Selection of the appropriate manual control method will depend on the type and extent of the weed infestation.

Timing is crucial in controlling weeds, especially annuals. Because cutting does not remove the root systems, weeds should be cut just prior to setting seed to maximize the likelihood of complete control.

Herbicidal Controls

Pre-emergent chemical controls are applied to the ground prior to the emergence of weeds in the spring and post-emergents are used to kill or stunt plants during their active growth stages. Pre-emergents may be applied adjacent to newly planted plants for revegetation purposes because they limit the growth of competing weeds. Post-emergent controls are most useful for broad areas completely dominated by weeds, or for spot spraying of individual weeds.

Herbicides should be applied before seeds are produced. Proper timing will depend on the herbicide, weed characteristics, and other physical factors such as soil moisture and site characteristics. Most summer or winter annuals, biennials, or newly germinated perennial weeds can be successfully treated in the seedling or rosette stage prior to bolting (Drlik *et al.*, 1998). Because it is easier to distinguish weeds from desirable plants when they are rosettes rather than seedlings, the rosette stage is often preferred. Also, the rosette stage may last for several months, providing a wider treatment period.

Established perennial plants, particularly woody species, are more difficult to control with herbicides, and timing according to the stage of growth is critical. In general, herbicides will be applied to established perennial plants toward the end of the growing season. At this time, food reserves in the roots have been used up, reducing the plant's ability to resprout. Woody species treated at other growth stages when nutrient reserves are high, will often recover and resprout.

Spot-treatment applies herbicides to target weeds without impacting desirable vegetation or other non-target organisms. Broadcast herbicide applications will be used only when necessary (e.g., where weed infestations are dense and extensive, or when plant fuel must be dry prior to controlled burns). Herbicides may be used as a border spray to prevent infestations from moving into non-infested areas.

Herbicide applications will be kept to a minimum and all spraying will be done by a California licensed qualified applicator. Herbicides should be approved for use near water sources. All herbicide use will follow the written recommendation of a California licensed pest advisor.

Other Controls

Other controls that may be appropriate include mechanical (i.e., mowing, disking), or cultural (modification of grazing practices).

Plant Care

Most plants should require little cultural care, except for irrigation and weed control in the basins. Oaks are very susceptible to root rot and will be carefully monitored. Weed control around plantings is very important during the first two years of maintenance. Areas within approximately two feet of the plants will be kept free of competing vegetation. No use of weed-eating machinery will occur in or around the crown area of the plant, so as to prevent girdling.

Plants will be fertilized once in the spring of the second and third year of maintenance. If determined necessary by the EM, plants in the vegetative screen areas may be staked using two eight-foot, pressure-treated stakes, two inches in diameter, installed on either side of the tree.

Irrigation

The irrigation systems will be routinely checked for malfunctions and to correct any over or under watering. Irrigation scheduling decisions will be made by the EM in consultation with a certified arborist. Drip lines and filters will be flushed as needed. Emitters will be checked regularly for malfunctions and their locations adjusted away from the crown as the canopy expands.

For revegetation efforts using native plants, the goal is for the plant community to become self-sustaining as soon as possible. The irrigation systems will be used as a supplement to seasonal precipitation to establish plants. A typical establishment period lasts one to three years, after which irrigation systems can be removed or abandoned. In order to facilitate this, water will be decreased each year until no longer needed after the third year. Watering will be limited so that plants develop deep root systems and do not become dependent on regular watering. Deep watering spaced at the longest time possible before plants show signs of stress will be used.

The exception will be along the visual screens where lush plants are desirable and the plants will only be present until the end of operations. The visual screens will be watered with drip systems throughout the life of the project. Watering will be kept to the minimum that is consistent with the aesthetic benefits of the screening.

Remedial Actions

Additional willow cuttings or plants will be planted in the late fall or early winter if scheduled inspections show that the total number required to meet the success criteria did not survive. Similarly, additional seeding will take place if appropriate ground cover requirements are not met.

Should monitoring indicate that plantings or wetlands are not achieving the performance standard, Granite will meet with County representatives to discuss appropriate remediation or maintenance actions. These may include planting additional trees, seeding, enhanced control of competing vegetation, re-grading, and protection from predation.

5.0 REFERENCES

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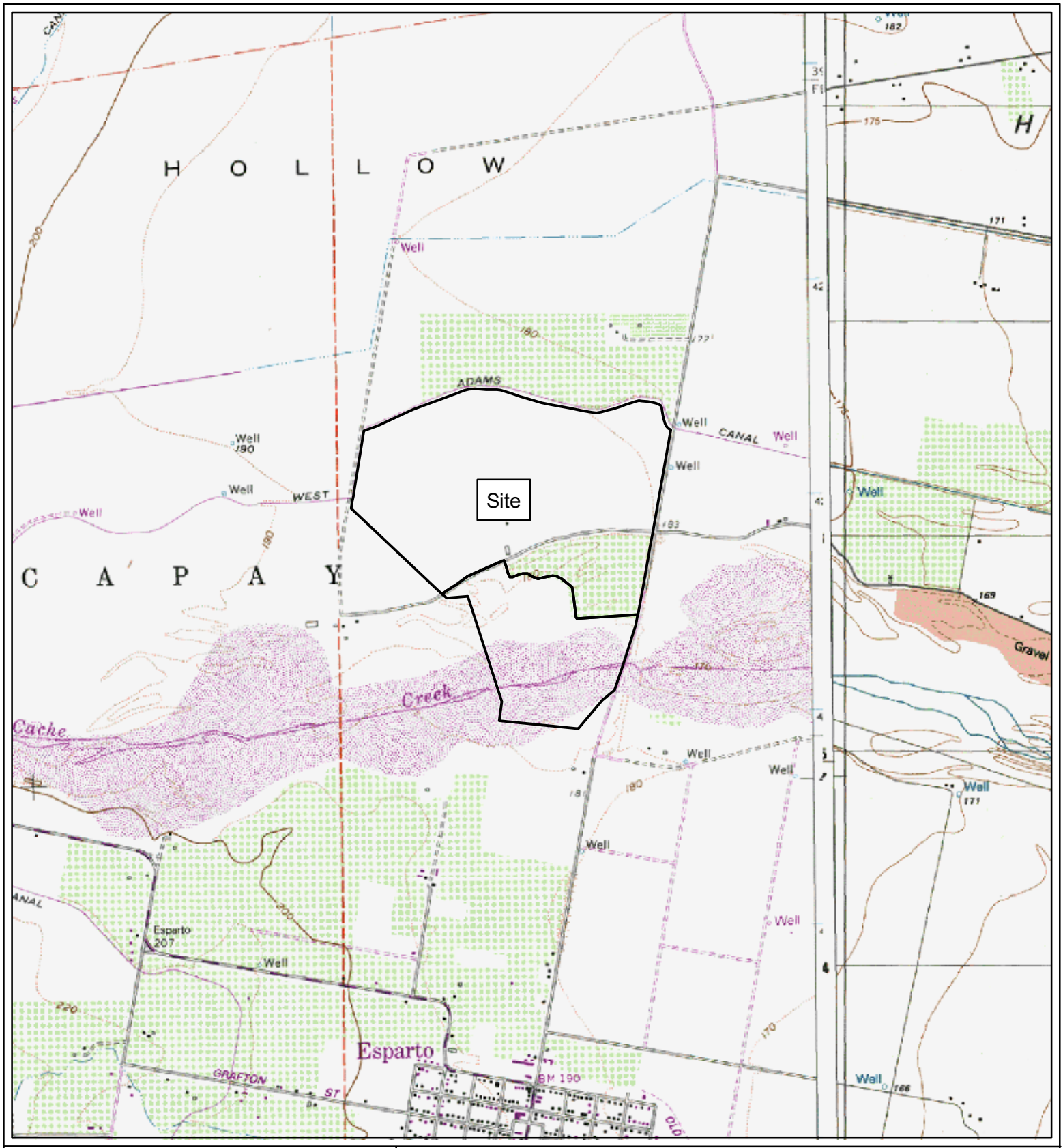
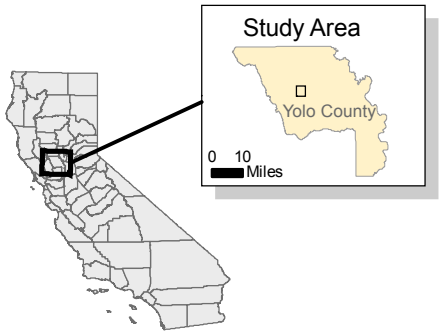
Attachment A:
Vicinity Map and Drawings





Granite Esparto Site
Figure 1. Vicinity Map

June 11, 2007

TRC

Figure 2

Northern Lakeshore Cross Section

Esparto Facility

Yolo County

California

NOT TO SCALE

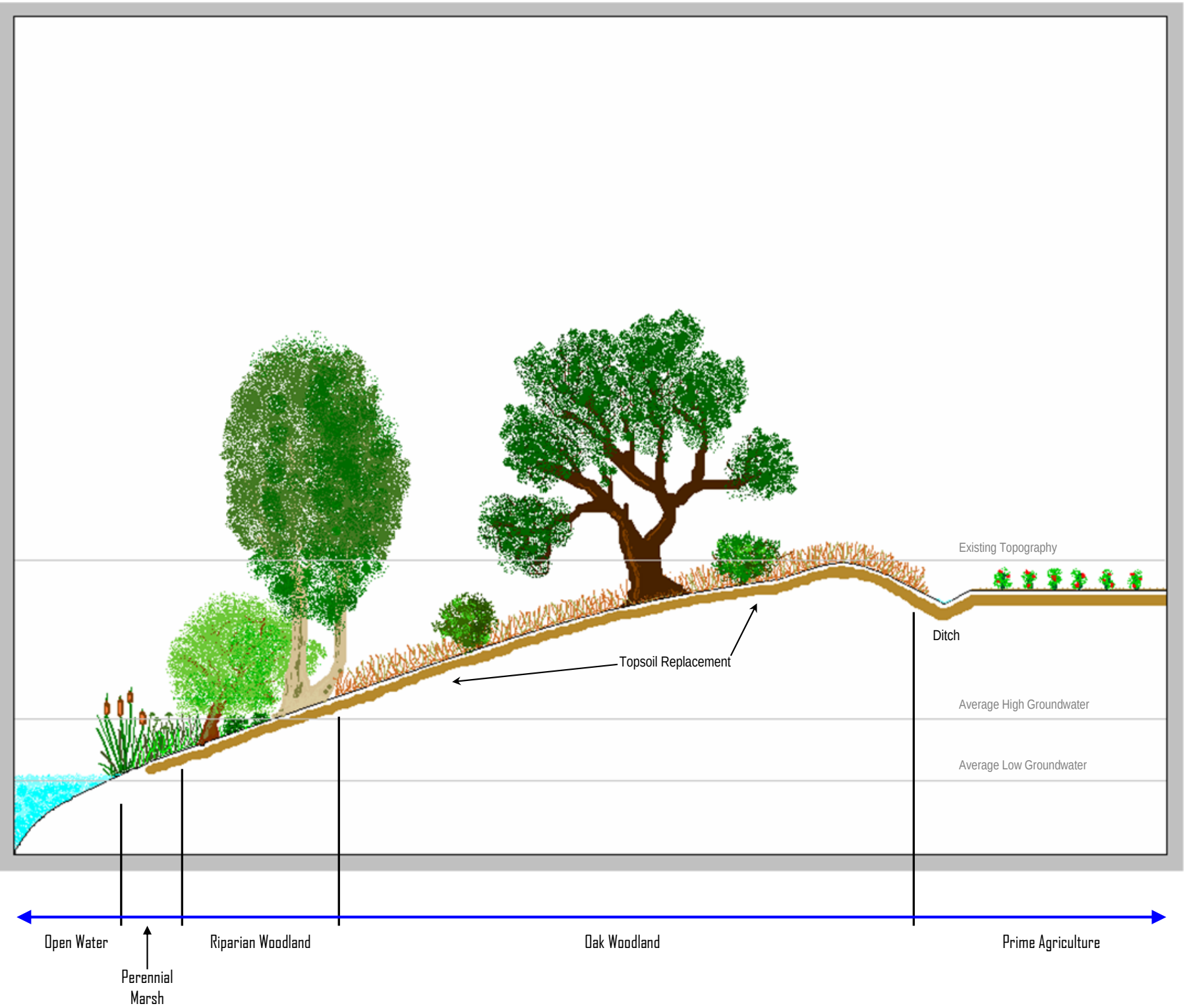


Figure 3

Southern Lakeshore Cross Section

Esparto Facility

Yolo County

California

NOT TO SCALE

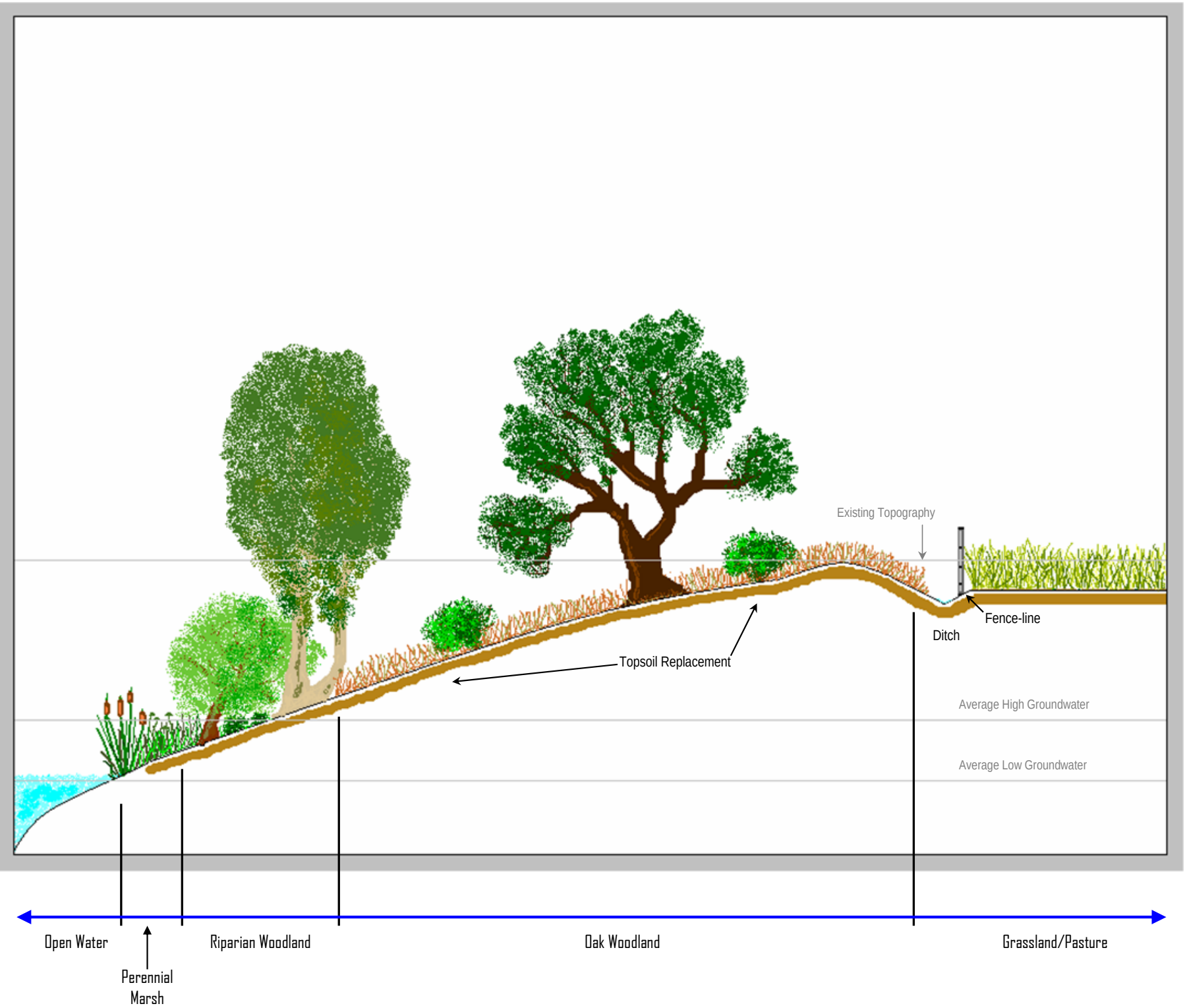


Figure 4

Eastern Lakeshore Cross Section

Reclaimed

Esparto Facility

Yolo County

California

NOT TO SCALE