APPENDIX F
REVEGETATION PLAN

DRAFT TECHNICAL MEMORANDUM ◦ DECEMBER 2018

Revegetation Plan for the Niles Canyon Quarry Reclamation Project, Alameda County, California

PREPARED FOR

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Cover photos, clockwise from lower left: Existing conditions at Niles Canyon Quarry at Basin 2, downstream of Basin 5 looking upstream, adjacent to the upper pad area looking northeast, and within Niles Quarry Creek upstream of Basin 3 looking upstream on April 17, 2018.

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1 INTRODUCTION

1.1 Project Overview

As part of the Niles Canyon Quarry Reclamation Project (Project), Benchmark Resources contracted Stillwater Sciences to develop a revegetation plan in conjunction with engineered restoration designs for the reconstruction of approximately 1,500 feet of channel within Niles Quarry Creek. Site restoration is being planned to mitigate for impacts from the site's history of quarry operations and associated anthropogenic changes. Stream channel reconstruction is designed to remove the numerous culverts, ditches, basins, and fill associated with former operations and to provide habitat connectivity from the lower quarry pad, through the native stream channel, to the upper pad area. The Basis of Design report (Stillwater Sciences 2018a) includes 30% design plans and describes the preferred design based on field- and office-based analyses, as well as review and comment by landowners and a Technical Advisory Committee, which includes representatives from Benchmark Resources, Berlogar Stevens & Associates, Alameda County, U.S. Fish and Wildlife Service (USFWS), Regional Water Quality Control Board (RWQCB), and U.S. Army Corps of Engineers (USACE).

Prior to Stillwater Sciences' involvement with the Project, a revegetation plan was drafted by Gates and Associates (Gate and Associates 2015) reviewed by Alameda County and the Office of Mine Reclamation (OMR), and revised (Gates and Associates 2016). The County determined that the revised plan did not adequately address agency comments; therefore, Stillwater Sciences was contracted to provide a revegetation plan that would meet all Project requirements. The objectives of this plan are to describe the habitat restoration design, detail the pre-implementation weed management activities, and specify post-implementation restoration monitoring to track Project progress and provide timely feedback for adaptive management.

1.2 Project Location and Project Area

Niles Canyon Quarry is located approximately 1.5 miles west of Sunol, on the north side of State Highway 84 (Niles Canyon Road) at 5550 Niles Canyon Road in Alameda County, California (Figure 1). Niles Canyon is in the southeastern Diablo Range, south of Sunol Ridge within the San Francisco Bay Area subregion of the Central Western California region of the California Floristic Province (Jepson Flora Project 2018). Niles Quarry Creek, which flows north-northeast to south-southwest across the site, is an intermittent tributary to Alameda Creek. Elevations within the Project area range from 225 to 1,010 feet.

Access to the Project site is from Niles Canyon Road, up a gated paved road. The Project area consists of four parcels owned by SRDC, Inc. (APN 96-115-2-4; APN 96-125-6-1, 6-2, and 6-3) totaling approximately 181 acres; of this area, approximately 28 acres or 16% of the site has been disturbed by mining operations including the upper pad, lower pad, numerous basins, associated berms, culverts, a road crossing, and quarry fill, and are subject to revegetation as part of this plan (Spinardi Associates 2015).

2 EXISTING CONDITIONS

Two site assessments were conducted of the Project area to inform the revegetation plan. Invasive weed mapping was conducted by a Stillwater Sciences senior botanist (M. Keever) and junior ecologist (S. Gabrielson) on October 18, 2016. In addition, a habitat assessment was conducted by a Stillwater Sciences' senior wildlife biologist (H. Burger), senior botanist (M. Keever), botanist (R. Thoms), and junior ecologist (S. Gabrielson) on April 17, 2018. The habitat assessment included vegetation/habitat mapping, an update to the 2016 invasive weed mapping, an evaluation of the habitat suitability for special-status wildlife species, and a nighttime California red-legged frog (*Rana draytonii*) survey (Stillwater Sciences 2018b). Results of the vegetation/habitat mapping and invasive weed mapping efforts are presented in Sections 2.2 and 2.3.

2.1 Soils

Niles Canyon is in the southeastern Diablo Range, a fault-bounded block of the California Coast Range, composed predominantly of Franciscan Assemblages structurally overlain by the Great Valley Complex (Wiegers 2004). The lithology of the southwestern portion of the Project area is primarily composed of Quaternary surficial deposits comprised of clay, silt, sand, gravels, and landslide rubble derived from rocks upslope. The northwestern portion of the Project area consists of Livermore gravels which include Pliocene to Pleistocene conglomerates, shale, and sandstone with minor occurrences of greywacke and siltstone (Graymer et al. 1992). Soil mantled hillslopes in the Project area are comprised of Los Osos and Millsholm soils, Rincon clay, and Yolo loam. Los Osos and Millholm soils include silt loam and silty clay derived from residuum weathered from sandstone and shale and are well drained to somewhat excessively drained soils. Rincon clay includes clay loam, sandy clay, and stratified sandy loam to clay loam that has been derived from sandstones and shales and is well drained. Yolo loam includes very fine to fine sand and sandy loam derived from Franciscan metamorphic and sedimentary rock. Reworked quarry fill is located between the outlet of Basin 4 and detention Basin 7 and includes well-sorted grey shale and mudstone sediments ranging from 2-16 mm, with sparse (< 20%) coarser sediment.

Soil sampling and associated analysis was completed in June of 2014 by Berlogar Stevens & Associates and in July of 2015 by Soil and Plant Laboratories which documented potential issues with soil compaction and/or nutrients (e.g., organic matter and nitrogen) in some areas (Exhibit C of Gates and Associates 2016). Based on field observations in the Project area since that time (2016–2018), vegetation has naturally recruited after the cessation of quarry operations and there does not appear to be any soil characteristics limiting the establishment of annual plant species in the existing topsoil. In both the upper and lower pad, nonnative grasses and herbaceous species were documented at approximately 80% cover. Conditions within the disturbed areas are similar to adjacent, unaffected areas. In addition, the altered riparian corridor has naturally recruited willows (*Salix* species), coyote brush (*Baccharis pilularis*), western sycamore (*Platanus racemosa*), and cattails (*Typha* species), all of which exhibited good health and vigor. Other than areas subject to slope stability (Berlogar Geotechnical Consultants 1995 with review by Berlogar Stevens & Associates 2014 and Questa Engineering personal communications to Alameda County September 2018), no evidence of soil contamination or compaction was evident that would preclude revegetation and/or hydroseeding.

2.2 Habitat Types

The 181-acre Project area is dominated by ruderal herbaceous vegetation and also includes chaparral, coyote brush, oak woodland, and ornamental plantings in upland areas, and emergent wetland, oak/riparian forest, and riparian scrub along the riparian corridor and surrounding manmade basins (Table 1 and Figure 2).

Table 1. Habitat types documented in the Project area.

Habitat type	Acres	Percent of Project area
Upland Habitats		
Chaparral	4.5	2%
Coyote Brush	3.9	2%
Developed	2.2	1%
Oak Woodland	26.9	15%
Ornamental plantings	7.0	4%
Ruderal Herbaceous	111.0	61%
Wetland Habitats		
Emergent Wetland	0.4	<1%
Oak/Riparian Forest	23.6	13%
Open water	1.0	1%
Riparian Scrub	0.5	<1%
Total	**181.0**	**100%**

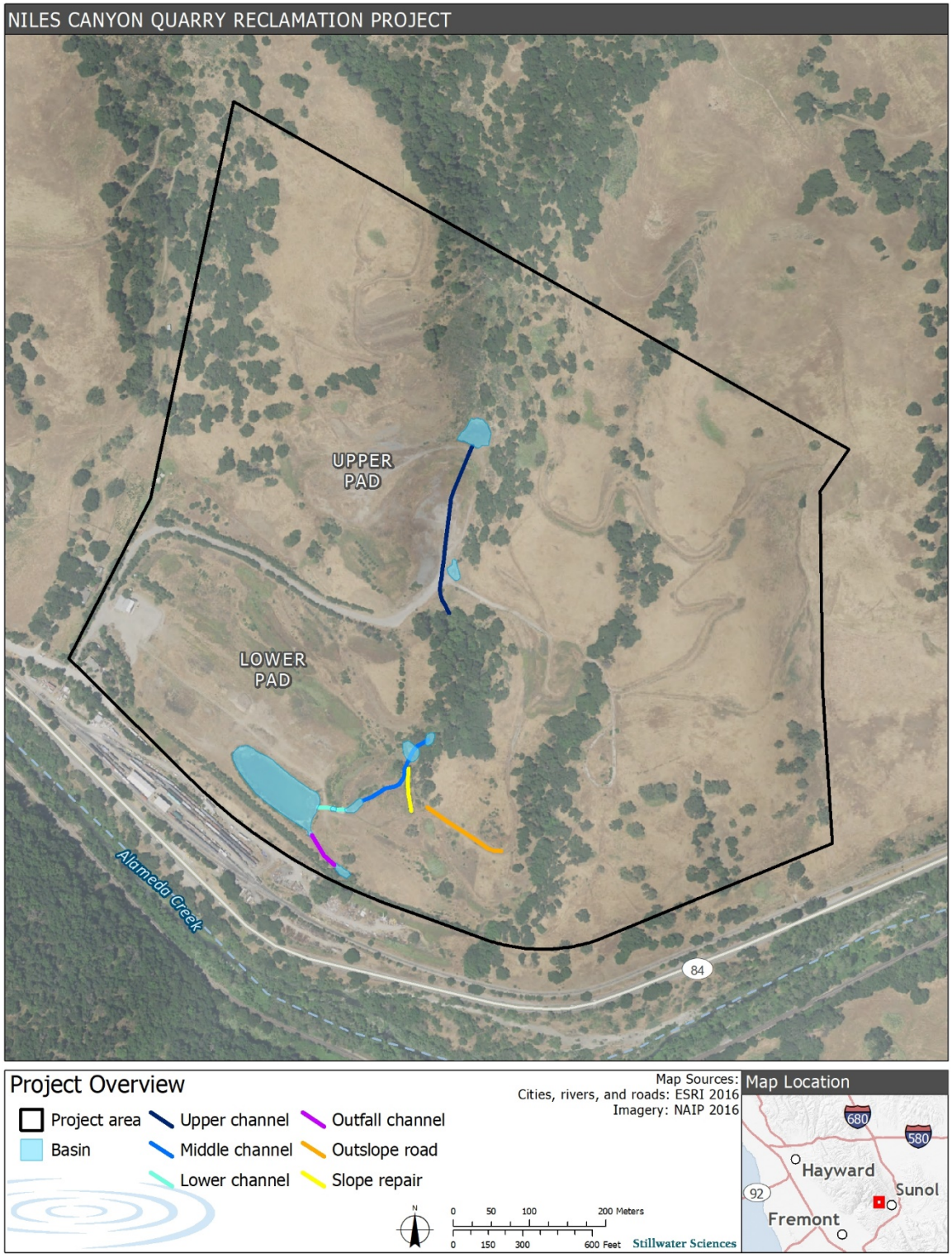

Figure 1. Project area, vicinity, and features.

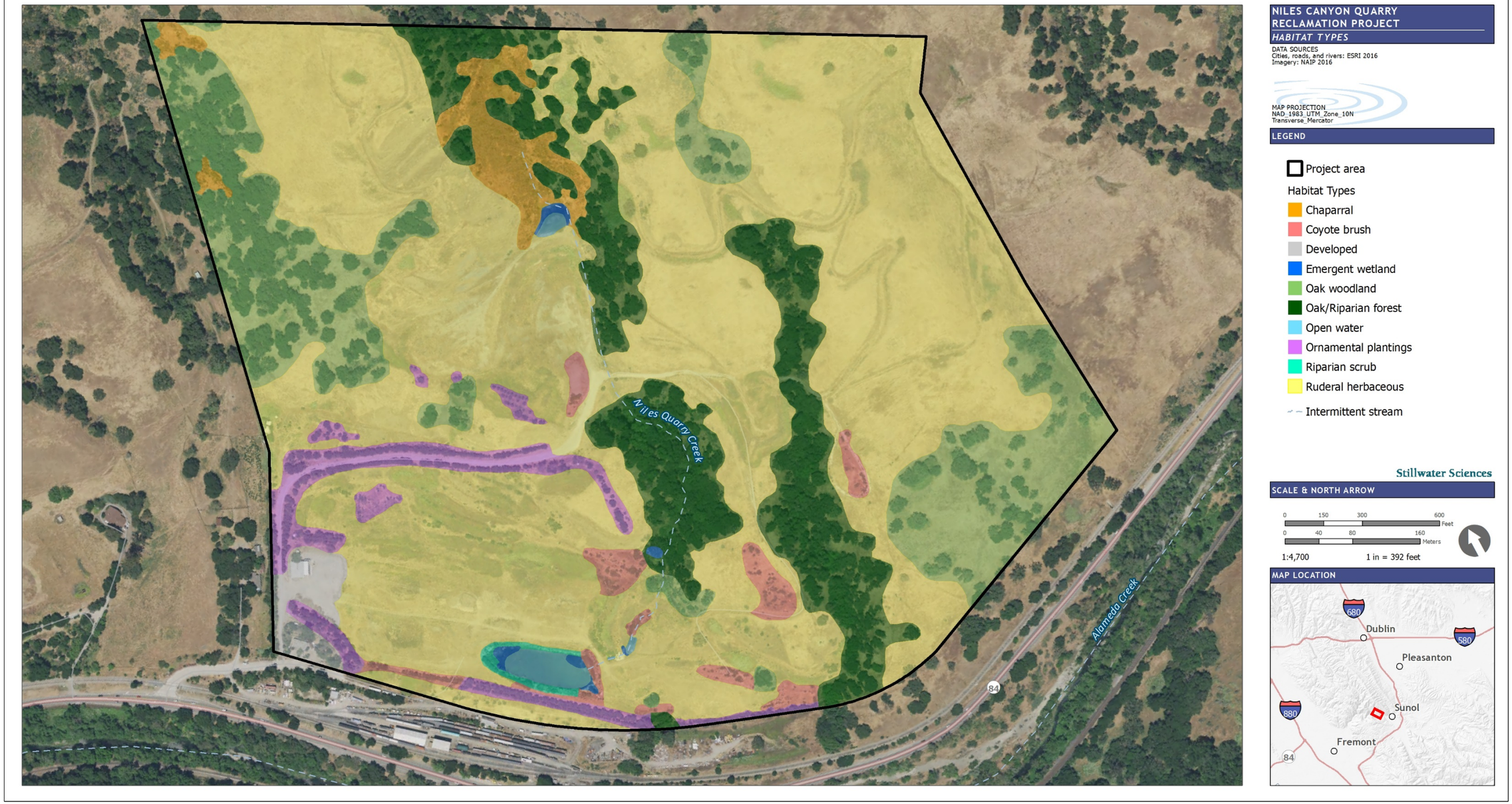

Figure 2. Habitat types in the Project area.

2.2.1 Upland habitats

The ruderal herbaceous areas that cover over 60% of the Project area are dominated by nonnative, annual grasses such as ripgut grass (*Bromus diandrus*), soft chess (*Bromus hordeaceous*), wall barley (*Hordeum murinum*), and rye grass (*Festuca perennis*). The forbs are predominantly non-native and invasive species and include spring vetch (*Vicia sativa* subsp. *sativa*), Italian thistle (*Carduus pycnocephalus*), poison hemlock (*Conium maculatum*), bristly ox-tongue (*Helminthotheca echioides*), black mustard (*Brassica nigra*), yellow star-thistle (*Centaurea solstitialis*), and California burclover (*Medicago polymorpha*). A few patches of native grasses exist (e.g., purple needle grass [*Stipa pulchra*]), particularly in the upper portions of the Project area. Oak woodland, which covers 15% of the Project area, is characterized by variable cover (10–70%) of valley oak (*Quercus lobata*) and coast live oak (*Quercus agrifolia*), with an understory of the same non-native herbaceous speces found within the ruderal herbaceous community. Chaparral occurs on steep slopes above Niles Quarry Creek in the upper portion of 2% of the Project area; it is dominated by native shrubs, predominantly California sagebrush (*Artemisia californica*), along with lower cover of orange bush monkeyflower (*Diplacus aurantiacus*) and western poison oak (*Toxicodendron diversilobum*). Coyote brush stands cover about 2% of the Project area and are scattered throughout the ruderal herbaceous community. Finally, there is a developed area in the southwest corner of the Project area (1% of the Project area) and associated ornamental plantings surrounding the developed area, along the access road, and along the southern perimeter of the Project area (4% of the Project area).

2.2.2 Wetland habitats

Oak/riparian forests are found along Niles Quarry Creek and the unnamed drainage to the east, covering 13% of the Project area. The relatively closed riparian forest canopy, ranging from 60–95% cover, is dominated by valley oak and coast live oak; associated tree species include California buckeye (*Aesculus californica*) and California bay (*Umbellularia californica*). Associated shrub species include poison oak, coyote brush, and snowberry (*Symphoricarpos albus* var. *laevigatus*); the non-native herbaceous species that dominate the ruderal herbaceous community also dominate the riparian forest understory. Riparian scrub covers only 1% of the Project area surrounding the perimeter of the lower pond (Basin 7). This community is dominated by mule fat (*Baccharis salicifolia* subsp. *salicifolia*); associate native species include narrow-leaved willow (*Salix exigua*), arroyo willow (*Salix lasiolepis*), and Fremont cottonwood (*Populus fremontii* subsp. *fremontii*). Emergent wetlands in the assessment area are small, cover less than 1% of the Project area, and are in and around the perimeters of water features with perennial or seasonal inundation, generally where basins were created along Niles Quarry Creek. Dominant species include broad-leaved cattail (*Typha latifolia*), common tule (*Schoenoplectus acutus* var. *occidentalis*), and southern bulrush (*Schoenoplectus californicus*). Finally, areas of open water occur seasonally to perennially, depending on annual rainfall amounts, along several basins in the Project area and cover approximately 1% of the Project area.

2.3 Invasive Plant Species

All species rated by the California Invasive Plant Council (Cal-IPC) as highly or moderately invasive (i.e., species with either severe or substantial and apparent ecological impacts on physical processes, plant and animal communities, and vegetation structure) were mapped with the Project area, and one species rated as limited (i.e., invasive but ecological impacts are minor on a statewide level) was mapped due to its abundance and distribution within the Project area.

Surveyors recorded the species name, areal extent of each infestation, and number of individuals per occurrence using the following abundance categories: sparse (1–10 plants), patchy (11–50 plants), widespread (51–100 plants), and infested (>100 plants).

Fourteen target invasive plant species were documented across 76 occurrences covering approximately 33 acres within the Project area (Table 2). Target invasive plant species were predominantly in ruderal herbaceous habitat, with lesser concentrations found along former roads and in wetland habitats (Figure 3). In addition to the target invasive plant species documented, most of the Project area is covered by non-native herbaceous species (i.e., annual grasses and forbs).

Table 2. Target invasive plant species documented in the Project area.

Common name	Scientific name	Cal-IPC rating[1]	Number of occurrences	Abundance categories[2]	Acres	Cover (% of total Project area)
giant reed	*Arundo donax*	High	3	sparse – patchy	0.03	0.02%
black mustard	*Brassica nigra*	Moderate	3	infested	4.21	2.33%
Italian thistle	*Carduus pycnocephalus*	Moderate	2	patchy, infested	0.17	0.10%
yellow star-thistle	*Centaurea solstitialis*	High	5	patchy – infested	2.16	1.19%
poison hemlock	*Conium maculatum*	Moderate	25	widespread – infested	5.22	2.89%
purple pampas grass	*Cortaderia jubata*	High	2	sparse	<0.01	0.00%
artichoke	*Cynara cardunculus*	Moderate	2	sparse	0.01	<0.01%
stinkwort	*Dittrichia graveolens*	Moderate	10	widespread – infested	20.53	11.34%
fennel	*Foeniculum vulgare*	Moderate	4	sparse – infested	0.13	0.07%
perennial pepperweed	*Lepidium latifolium*	High	1	patchy	<0.01	<0.01%
Himalayan blackberry	*Rubus armeniacus*	High	1	sparse	<0.01	<0.01%
blessed milkthistle	*Silybum marianum*	Limited[3]	10	widespread – infested	0.59	0.33%
tamarisk	*Tamarix* sp. (likely *T. parviflora*)[4]	High	1	sparse	<0.01	<0.01%
Mexican fan palm	*Washingtonia robusta*	Moderate	4	sparse	0.02	0.01%
Total			**76**	**n/a**	**33.09**	**18.28%**

[1] Rating descriptions follow Cal-IPC (2018):
High: These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure.
Moderate: These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure.
Limited: These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score.

[2] Abundance categories defined as sparse (1–10 plants), patchy (11–50 plants), widespread (51–100 plants), and infested (>100 plants).

[3] Although blessed milkthistle is rated as Limited by Cal-IPC, the species was mapped due to the frequency of occurrences and the abundance documented within each occurrence.

[4] Identification to species was not possible at the time of the survey; however, all three tamarisk species found in the vicinity are rated High by Cal-IPC.

Figure 3. Locations of invasive plant species mapped within the Project area.

3 REVEGETATION PLAN

All areas disturbed by mining operations, including the upper pad, lower pad, outslope road, slope repair, and altered riparian corridor (upper channel, middle channel, and lower channel) are subject to revegetation actions detailed in this plan (Figure 1). In addition, any areas subject to geotechnical repairs (e.g., north cut slope) will be seeded. All recommended plant species included in the revegetation plan are native and consistent with the site's end use (i.e., wildlife habitat within the riparian corridor and agricultural [grazing] use of the upper and lower pads).

3.1 Habitat Restoration and Habitat Enhancement Goals

The intent of the revegetation after channel redesign and construction is to restore native vegetation types to provide habitat for native plant and wildlife species in support of a healthy ecosystem. The goals establish standards for vegetative cover, density and vigor of native woody plants, species richness, and threshold for cover of invasive plants (Section 5.1).

3.2 Planned Habitat Types

Areas subject to revegetation within the Project area will be planted in accordance with detailed planting plans that will be included in the 65% design documents which will include plant spacing, planting densities, acreages of planting areas, and total plants, along with the amount of seed. In addition, existing riparian forest areas, particularly existing trees, will be protected from construction activities (Stillwater Sciences 2018a). The revegetated areas will include upland habitats (i.e., grasslands and chaparral) and wetland habitats (i.e., upper riparian, lower riparian, and freshwater emergent wetlands). Table 3 summarizes the habitat types to be planted, with dominant and associated species specified for planting. These habitat types include species that are native to the San Francisco Bay Area subregion of the Central Western California region within the California Floristic Province (Jepson Flora Project 2018, Calflora 2018), many of which are already documented within the Project (Stillwater Sciences 2018b) and are known to be easy to establish, have relatively high rates of survival, and are commercially available (California Native Plant Link Exchange 2018, CNPS 2018). Plant species also have been selected that are expected to thrive under well-drained to somewhat excessively drained conditions and the soils documented at the Project site (Section 2.1, Lichvar et al. 2016). The revegetation plan complies with current Surface Mining and Reclamation Act (SMARA) regulations (SMARA 2018), Alameda County Surface Mining Ordinance (Alameda County 2018), and comments provided on the prior revegetation plan (Gates and Associates 2016), as well as references current literature on restoration design (Sampson et al. 1951, Lulow 2006, Griggs 2009, Kroeger et al. 2010, Stark and Dettman 2010, Forero et al. 2016, ANR 2017, and Jackson et al. 2017).

Plants have been selected to enhance and restore wildlife habitat quality, support native pollinators throughout the seasons, and have a rich and diverse understory as this has been identified by some as an important source of plant diversity in California riparian systems (Viers et al. 2012). The target habitat types described in the following sections are intended to take advantage of existing opportunities to maintain and enhance native riparian forest communities within the Alameda Creek watershed, which, based upon a historical ecology study of a subset of the watershed, has lost 80% of its grasslands/savannas, 90% of its freshwater wetlands, 100% of its willow thickets, and 32% of its sycamore alluvial woodlands as compared to their estimated pre-European extents (Stanford et al. 2013; riparian habitats other than sycamore alluvial woodlands were excluded from the analysis).

Planted species are anticipated to provide habitat for native wildlife species, provide a range of canopy heights, and be sustainable in the long-term. Upper and mid canopies are defined as vegetation occupying space greater than 15 ft and from 2 to 15 ft above the ground, respectively. Over one-third of the riparian focal bird species with current ranges containing the Project area depend upon healthy mid to upper canopy conditions for nesting (RHJV 2004). Thus, this design attempts to build a diversity of habitat types that are expected to support a wide range of riparian-dependent bird species. Combining woody tree and shrub cover habitat with seed and fruit producing herbaceous plant communities (i.e., native grasses, mugwort, and hedgenettle), also supports herbivorous and ground nesting birds that use riparian forbs and grasses for nesting and foraging (RHJV 2004; Nur et al.2008).

The herbaceous and shrub species proposed for each community type also were selected to support native pollinator species by including pollinator-preferred plants that flower during the winter, spring, and summer (Xerces Society 2014, Earnshaw 2004). Water and nesting resources (e.g., bare ground, woody debris) are also important for bee pollinators and these are sporadically available throughout the Project area.

Finally, recent studies have found that planting native ground cover species under established canopies can provide competitive advantage over non-native weed species, and such understory plants are most successfully planted as seedlings or starts rather than from seed (Moore et al. 2011). The planting palettes provided in Table 3 reflect these findings.

Table 3. Proposed planting plan[1] for the Project area.

Scientific name	Common name	Life form	Planting type
Chaparral			
Dominant Plant Species			
Artemisia californica	California sagebrush	shrub	container
Diplacus aurantiacus	orange bush monkeyflower	shrub	container
Associate Plant Species			
Baccharis pilularis	coyote brush	shrub	container
Epilobium canum subsp. *canum*	California fuchsia	perennial herb	container
Frangula californica	California coffee berry	shrub	container
Heteromeles arbutifolia	toyon	shrub	container
Lupinus albifrons var. *albifrons*	silver lupine	shrub	container
Salvia mellifera	black sage	shrub	container
Upper Riparian			
Dominant Plant Species			
Quercus agrifolia	coast live oak	tree	seed
Quercus lobata	valley oak	tree	seed
Associate Plant Species			
Aesculus californica	California buckeye	tree	container
Arbutus menziesii	Pacific madrone	tree	container
Clematis ligusticifolia	creek clematis	vine	container
Diplacus aurantiacus	orange bush monkeyflower	shrub	container
Rosa californica	California rose	shrub	container
Rubus parviflorus	thimbleberry	shrub	container
Rubus ursinus	California blackberry	vine	container
Sambucus nigra subsp. *caerulea*	blue elderberry	shrub	container
Symphoricarpos albus var. *laevigatus*	snowberry	shrub	container
Umbellularia californica	California laurel	tree	container
Vitis californica	California wild grape	vine	container
Lower Riparian			
Dominant Plant Species			
Baccharis salicifolia subsp. *salicifolia*	mule fat	shrub	container
Salix exigua var. *hindsiana*	Hinds' willow	shrub	cutting
Salix lasiolepis	arroyo willow	shrub	cutting
Associate Plant Species			
Acer macrophyllum	big-leaf maple	tree	container
Artemisia douglasiana	mugwort	perennial herb	container

Scientific name	Common name	Life form	Planting type
Carex praegracilis	black creeper sedge	perennial grass-like herb	container
Cornus sericea	American dogwood	shrub	cutting
Euthamia occidentalis	western goldenrod	perennial herb	container
Juncus patens	spreading rush	perennial grasslike herb	container
Lonicera involucrata	coast twinberry	shrub	container
Platanus racemosa	western sycamore	tree	container
Rosa californica	California rose	shrub	container
Salix laevigata	red willow	tree	cutting
Salix lasiandra var. *lasiandra*	Pacific willow	tree	cutting
Stachys rigida	rough hedgenettle	perennial herb	container
Freshwater Emergent Wetland			
Dominant Plant Species			
Juncus patens	spreading rush	perennial grass-like herb	container
Schoenoplectus acutus var. *occidentalis*	common tule	perennial grass-like herb	container
Schoenoplectus californicus	southern bulrush	perennial grass-like herb	container
Associate Plant Species			
Carex praegracilis	black creeper sedge	perennial grass-like herb	container
Eleocharis macrostachya	pale spikerush	perennial grass-like herb	container
Juncus balticus subsp. a*ter*	Baltic rush	perennial grass-like herb	container
Juncus xiphioides	iris-leaved rush	perennial grasslike herb	container
Xeric Seed Mixes (used for understory of Chaparral and Upper Riparian)			
Graminoid Species Mix			
Bromus carinatus var. *carinatus*	California brome	perennial grass	seed
Danthonia californica	California oat grass	perennial grass	seed
Elymus glaucus subsp. *glaucus*	blue wildrye	perennial grass	seed
Festuca californica	California fescue	perennial grass	seed
Melica imperfecta	little California melic	perennial grass	seed
Poa secunda subsp. *secunda*	one-sided blue grass	perennial grass	seed
Stipa pulchra	purple needle grass	perennial grass	seed
Forb Species Mix			
Achillea millefolium	common yarrow	perennial herb	seed
Collinsia heterophylla	Chinese-houses	annual herb	seed
Dichelostemma capitatum	blue dicks	perennial herb	seed
Eschscholzia californica	California poppy	perennial herb	seed
Layia platyglossa	tidy tips	annual herb	seed
Lupinus bicolor	miniature lupine	annual herb	seed

Scientific name	Common name	Life form	Planting type
Lupinus formosus var. *formosus*	summer lupine	perennial herb	seed
Lupinus nanus	sky lupine	annual herb	seed
Phacelia distans	distant phacelia	annual herb	seed
Plantago erecta	dotseed plantain	annual herb	seed
Pseudognaphalium californicum	ladies' tobacco	perennial herb	seed
Ranunculus californicus	California buttercup	perennial herb	seed
Trifolium gracilentum	pinpoint clover	annual herb	seed
Trifolium willdenovii	tomcat clover	annual herb	seed
Triteleia laxa	common triteleia	perennial herb	seed
Wyethia angustifolia	California compassplant	perennial herb	seed
Mesic Seed Mixes (used for understory of Lower Riparian)			
Graminoid Species Mix			
Agrostis exarata	spike bent grass	perennial grass	seed
Carex praegracilis	black creeper sedge	perennial grass-like herb	seed
Deschampsia cespitosa	tufted hair grass	perennial grass	seed
Deschampsia elongata	slender hair grass	perennial grass	seed
Elymus triticoides	beardless wild rye	perennial grass	seed
Hordeum brachyantherum subsp. *brachyantherum*	northern barley	perennial grass	seed
Juncus bufonius	toad rush	annual grass-like herb	seed
Juncus patens	spreading rush	perennial grass-like herb	seed
Juncus xiphioides	iris-leaved rush	perennial grass-like herb	seed
Forb Species Mix			
Apocynum cannabinum	hemp dogbane	perennial herb	seed
Artemisia douglasiana	mugwort	perennial herb	seed
Asclepias fascicularis	narrow-leaf milkweed	perennial herb	seed
Drymocallis glandulosa	sticky cinquefoil	perennial herb	seed
Euthamia occidentalis	western goldenrod	perennial herb	seed
Grindelia camporum	Great Valley gumweed	perennial herb	seed
Scrophularia californica	California figwort	perennial herb	seed
Sisyrinchium bellum	western blue-eyed-grass	perennial herb	seed
Stachys ajugoides	bugle hedgenettle	perennial herb	seed
Grazing Seed Mixes			
Graminoid Species Mix			
Bromus carinatus var. *carinatus*	California brome	perennial grass	seed
Danthonia californica	California oat grass	perennial grass	seed
Elymus glaucus subsp. *glaucus*	blue wildrye	perennial grass	seed

Scientific name	Common name	Life form	Planting type
Festuca octiflora	sixweeks grass	perennial grass	seed
Melica californica	California melic	perennial grass	seed
Poa secunda subsp. *secunda*	one-sided blue grass	perennial grass	seed
Forb Species Mix			
Acmispon americanus	American bird's foot trefoil	annual herb	seed
Calandrinia menziesii	red maids	annual herb	seed
Trifolium albopurpureum	Indian clover	annual herb	seed

[1] Planting palettes to be refined based upon availability and other practical considerations, with a minimum of 60% of associate plant species and 60% of plant species specified in seed mixes selected. A complete list of the plants will be included in the 65% design documents including plant spacing, planting densities, acreages of planting areas, and total plants, along with the amount of seed required.

Design targets for vegetative cover, density of native woody plants, and native species richness have been established to represent conditions of mature, fully-restored, and/or comparable natural habitats (Table 4).

Table 4. Revegetation design targets by habitat type.

Habitat Type	Vegetative cover (%)	Density of native woody plants (stems/acre)	Native species richness (count)
Chaparral	60	400	12
Grazing grasslands	70	n/a	6
Upper riparian forest	60	175	16
Lower riparian forest	80	250	16
Freshwater emergent wetland	60	n/a	3

3.2.1 Upland habitats

3.2.1.1 Chaparral

The slope repair area (Figure 1) will be planted with the chaparral community and xeric seed mix (Table 3). Dominant chaparral species include California sagebrush (*Artemisia californica*) and orange bush monkeyflower (*Diplacus aurantiacus*), with other drought tolerant native shrub and perennial herbaceous associates including California fuchsia (*Epilobium canum* subsp. *canum*), toyon (*Heteromeles arbutifolia*), and silver lupine (*Lupinus albifrons* var. *albifrons*).

3.2.1.2 Grassland understory

The understory of the chaparral planting areas and upper riparian planting areas (i.e., slope repair and upper, middle, and lower channel areas) as well as outfall channel (Figure 1) will be planted with a xeric seed mix (Table 3) that includes a diverse assemblage of native grass and forb species. The seed mix will be applied in two phases, with graminoids seeded first and native forbs seeded starting the third year post-restoration, after target invasive plants have been repeatedly maintained with mechanical and/or chemical methods (Sections 4.1 and 4.5).

The grassland forb mixture will include grasses that are adapted to moderate to dry soil moisture conditions such as California fescue (*Festuca californica*), one-sided blue grass (*Poa secunda* subsp. *secunda*), and purple needle grass (*Stipa pulchra*), as well as forbs that flower throughout the year to support a diverse array of pollinator species. These forbs include common yarrow (*Achillea millefolium*), Chinese houses (*Collinsia heterophylla*), California poppy (*Eschscholzia californica*), sky lupine (*Lupinus nanus*), and California buttercup (*Ranunculus californicus*), among others (Table 3).

3.2.1.3 Grazing grasslands

The upper and lower pads as well as the outslope road (Figure 1 and Appendix A) will be planted with a grazing seed mix (Table 3). The seed mix will be applied in two phases, with graminoids seeded first and native forbs seeded starting the third year post-restoration, after target invasive plants have been repeatedly maintained with mechanical and/or chemical methods (Sections 4.1 and 4.5). The grazing mixture includes all native grass and forb species that are adapted to moderate to dry soil moisture conditions, tolerate grazing, and provide adequate foraging material for much of the year.

3.2.2 Wetland habitats

3.2.2.1 Upper riparian

Riparian areas subject to grading, including the upper relative elevations within Upper, Middle, or Lower Channel areas (see Appendix A) will be planted with upper mixed riparian forest species and the xeric seed mix (Table 3). The seed mix will be applied in two phases, with graminoids seeded first and native forbs seeded starting the third year post-restoration, after target invasive plants have been repeatedly maintained with mechanical and/or chemical methods (Sections 4.1 and 4.5). Dominant riparian overstory plants include coast live oak and valley oak, with associated species including California buckeye (*Aesculus californica*), Pacific madrone (*Arbutus menziesii*), thimbleberry (*Rubus parviflorus*), and snowberry.

3.2.2.2 Lower riparian

The understory of the lower elevations within riparian planting areas (upper, middle, and lower channel areas; Figure 1 will be planted with lower mixed riparian forest species and a mesic seed mix (Table 3). The seed mix will be applied in two phases, with graminoids seeded first and native forbs seeded starting the third year post-restoration, after target invasive plants have been repeatedly maintained with mechanical and/or chemical methods (Sections 4.1 and 4.5). Dominant riparian overstory plants include mule fat (*Baccharis salicifolia* subsp. *salicifolia*), Hinds' willow (*Salix exigua* var. *hindsiana*), and arroyo willow (*Salix lasiolepis*), with associated species including big-leaf maple (*Acer macrophyllum*), coast twinberry (*Lonicera involucrata*), western sycamore, and California rose (*Rosa californica*).

The mesic forb mixture will include grasses that are adapted to moist soil conditions such as spike bentgrass (*Agrostis exarata*), slender hair grass (*Deschampsia elongata*), beardless wild rye (*Elymus triticoides*), and northern barley (*Hordeum brachyantherum* subsp. *brachyantherum*), as well as forbs that flower throughout the year to support a diverse array of pollinator species. These forbs include mugwort (*Artemisia douglasiana*), western goldenrod (*Euthamia occidentalis*), and bugle hedgenettle (*Stachys ajugoides*), among others (Table 3).

3.2.2.3 Freshwater emergent wetlands

The lowest relative elevations created within Upper, Middle, or Lower Channel areas (see Appendix A) will be planted with freshwater emergent wetland species (Table 3). Dominant plants include spreading rush (*Juncus patens*), common tule (*Schoenoplectus acutus* var. *occidentalis*), and southern bulrush (*Schoenoplectus californicus*), with associated species including other rush species, black creeper sedge (*Carex praegracilis*), and pale spikerush (*Eleocharis macrostachya*).

4 IMPLEMENTATION ACTIVITIES

4.1 Pre-construction

4.1.1 Invasive Plant Management

Removal of existing target invasive plant species (Section 2.3) will be initiated prior to site restoration construction. At a minimum, invasive plant removal will begin early in the year targeted for construction (e.g., February or March for construction during fall of the same year) using broad-spectrum broadleaf herbicides that do not provide residual control (e.g., 2,4–D, ANR 2017); if possible, invasive plant removal efforts will be iterative and be initiated in the year prior to construction to allow for additional rounds of removal efforts. Species targeted for removal will include the target species documented at the site (Table 2) and any other species deemed feasible to control in consultation with a qualified biologist. These species will be removed using a combination of mechanical (e.g., mowing or pruning) and chemical (i.e., herbicide application) methods. Herbicide will be applied by a licensed applicator, following the products specifications and/or other Project permits. To reduce potential impacts to non-target organisms, herbicides will be considered that are registered for use around wetlands and waterbodies, such as AquaMaster® (Monsanto) and Rodeo® (Dow Chemical), both of which are mixtures of glyphosate and water, with the surfactant Agri-Dex®, as these formulations have been shown to be relatively non-toxic to fish and amphibians, but still completely effective at killing both broadleaf forbs and grasses.

To deplete the nonnative seed bank in planting areas and minimize the potential for invasive plants to outcompete plantings in the future, "grow/kill" cycles will be used. Grow/kill cycles consist of irrigating planting areas prior to planting to initiate weed seed germination and then spraying with an appropriate herbicide to kill the young weeds when less herbicide is necessary to effectively kill the weeds. These cycles, which may be repeated as needed and as time allows, can notably reduce weed cover prior to planting and weed removal efforts following planting. In addition to the removal of invasive plants prior to the planting effort, it is anticipated that continued treatment will be necessary as a part of Project maintenance (see Section 4.5.2).

4.1.2 Topsoil Salvage

Prior to construction, all topsoil suitable for revegetation will be salvaged from areas planned for re-grading (and potentially topsoil from Loop Road, east of the upper channel), stockpiled, and reapplied to facilitate revegetation of recontoured material as specified in the 65% design documents and in accordance with the requirements of Section 3711 of SMARA (2018). The amount of topsoil needed to cover revegetation areas to a depth of four inches is not available on site and approximately 5,000 cy of suitable material will need to be imported. In accordance with Section 3705(b) of SMARA (2018), test plots may be required to determine the suitability of growth media for revegetation purposes; however, based on existing soil conditions within the

Project area, there does not appear to be any soil conditions limiting the establishment of vegetation (Section 2.1).

4.1.3 Site Preparation

After grading and construction activities have been completed, planting areas will be prepared, including fine (i.e., hand) grading of the planting surface, placement of planting soil (i.e., salvaged or imported topsoil), and soil loosening and/or incorporation of soil amendments if deemed necessary. If broadcast seeding used, soil should be disked 1–2 inches deep. Where necessary, erosion-control netting will also be installed.

4.2 Plant and Material Procurement

Container stock, plugs, and herbaceous seed mixes will be acquired from contracted plant nurseries and installed by a qualified contractor. As much as possible, local plant stock collected from the San Francisco Bay Area, growing under similar ecological conditions (e.g., climate, soils, depth to groundwater) will be used; if possible, material will be collected from within 30 miles of the Project site (McKay et al. 2005, ANR 2017). The contracted nursery will collect material during the appropriate time of year per species or provide existing in-stock material already collected from within the region. Where cuttings are specified and the plant species has been documented on-site, cuttings may be taken from existing plants. Cuttings will be collected during the species' dormant period, kept moist, and installed within one week of collection. Collection during late fall/early winter will coincide with the species' dormancy period and the planting schedule. Local cuttings may be substituted for the container stock requirements identified in Table 3 for each species if it is determined to be more cost-effective and consistent with high survival rates. The contracted nursery will follow best management practices for minimizing the spread of *Phytopthera* species (Working Group for Phytoptheras in Native Habitats 2016, or more current guidance).

4.3 Plant Installation

The location, quantity, and spacing of cuttings, plugs and container plants will be implemented as specified in design documents. Planting will follow guidelines developed by the California Department of Conservation (Newton and Claassen 2003). For potted material, a hole will be prepared that is 1.5 times the depth and 3 times the diameter of the original planting container, the plant will be placed so the root crown is at the soil surface, and the hole will be backfilled with the original soil that was removed. Cuttings do not require digging; they may be pressed or pounded into the soil to a depth of 1 to 1.5 ft. Immediately after installation, all plantings and cuttings will be thoroughly irrigated. If root crowns become exposed, additional soil will be placed throughout the planting hole to raise the soil to the correct level. Plugs for grasses, rushes, and sedges obtained from contracted plant nurseries will be planted per the nurseries specifications/recommendations and will follow similar guidelines described for container stock and cuttings. Seeds for herbaceous species will be broadcast seeded by hand, drill seeded, or hydroseeded, as specified in design documents (broadcast seeding can require significantly more seed but higher success rates than drill seeding, drill seeding would require use of a tractor but can be cost-effective; ANR 2017). As-built planting numbers will be documented, as a baseline against which to compare plant survival in future monitoring years.

4.4 Timing

Plant installation including container plants, cuttings, and grass seed mixes will occur during late fall/early winter following grading and other restoration activities, ideally at least 7–14 days after the onset of the first winter rains to allow for another round of invasive plant management prior to plant installation. This timing will help maximize success of plant establishment as it typically coincides with most plant species' dormancy period and minimize the need for initial irrigation. After three years of woody plant and graminoid establishment and related weed control activities (Section 4.5.2), during the subsequent fall rainy season, the forb seed mix will be applied.

4.5 Post-implementation Maintenance Monitoring

The plantings will be actively maintained by the nursery contractor for the five year monitoring period. This maintenance will involve regular review of all planting areas as well as actions based on the results of performance monitoring (Section 5).

4.5.1 Irrigation

Water conservation is an important component of the Project to minimize irrigation needs, and planting techniques for conservation include the selection of native, drought-resistant plants. However, ground and surface water supplies may not be adequate to ensure establishment of the full range of species; therefore, temporary irrigation will be installed to irrigate the newly planted areas and utilized on an as-needed basis to ensure plant establishment with supplemental watering if dry periods develop.

4.5.2 Invasive plant management

Controlling target invasive plant species will be key to successful restoration; therefore, monitoring of the site will occur in early spring (February/March) and again in the fall to determine the appropriate time to mow or plan for herbicide applications. Removal efforts will focus on control of target invasive plants (Table 2); additional target species may be included if any are found to be detrimental to the successful establishment of seed mixes and plantings. Target invasive plant maintenance may include a combination of mechanical (e.g., mowing, pruning or hand removal) and chemical (i.e., herbicide application) methods as described in Section 4.1.1.

Mowing in upland areas is recommended multiple times in the first year throughout the spring and summer to reduce the likelihood of target invasive grasses producing viable seed. The first mowing may be early April (informed by visiting the site in March), and as needed thereafter to prevent target invasive grass seed development. In Years 2 and 3, if planted grasses are dominant and likely to seed, avoid mowing during seed maturation (typically late May to early June), to encourage native seed production. Weed whacking also may be used instead of mowing, to better target invasive plants prior to seed development while not causing damage to native herbaceous plants or woody plantings.

5 PERFORMANCE MONITORING PROGRAM

Plantings will be monitored annually for five years following implementation to determine if the habitat restoration and enhancement goals (Section 3.1) and performance standards (Section 5.1) for the revegetation effort are being met, and whether remedial actions (Section 6) are needed.

Achievement of interim performance goals will be used as indicators of whether or not the sites are on a successful trajectory towards meeting the final goals. If monitoring in any given year indicates that a performance standard may not be met by Year 5, remedial actions will be recommended for implementation as described in Section 6. If performance standards are not met by Year 5, monitoring will continue biennially until all performance standards are met.

5.1 Performance Standards

Five quantitative performance standards have been designed for the revegetation effort to ensure the site meets the revegetation goals (see Section 3.1) and to have self-sustaining plant communities by the end of five-year monitoring period. These performance standards are based on experience in other restored or protected natural sites. In response to site-specific conditions and information gained from maintenance and monitoring, Alameda County may choose to modify these goals through consensus negotiations. Of the five performance standards developed for the Project (Table 5), three are measured in percent of progress toward design targets (Table 4). The performance standards include:

- **Vegetative cover**: The cover of vegetation within each habitat type should meet or exceed 30% of the design target (Table 4) by Year 2, 50% of target cover by Year 3, 70% of target cover by Year 4, and 90% of target cover by Year 5. This goal is inclusive of all vegetation layers within a given habitat type.
- **Density of native woody plants:** The density of native woody plants within each habitat type containing shrubs and/or trees should meet or exceed 80% of the design target (Table 4) by Year 5 and not fall below 60% during any interim year. Other projects in the East Bay (Stillwater Sciences 2017) and South Bay (SCVWD and Stillwater Sciences 2018) suggest that natural recruitment in riparian areas may supplement the plantings and contribute to meeting this performance goal. Therefore, plant density monitoring shall include both surviving planted stock and any post-restoration natural recruitment of native woody plants. Woody plants must have above ground living material or they are considered dead. Tender vines (e.g., creek clematis and California blackberry) are not considered woody; sturdy vines and canes (e.g., California grape and California rose) are considered woody.
- **Vigor of native woody plants:** The percent of native woody plants with a vigor rating of 3 (defined as having 50% or more healthy foliage, Table 6) within each habitat type containing shrubs and/or trees should meet or exceed 80% by Year 5 and 60% during any interim year. Native woody plants need to show signs of health and vigor to achieve the intent of the restoration being self-sustaining.
- **Species richness of native species:** The number of native species within each habitat type should meet or exceed 75% of the design target (Table 4) by Year 5. This goal is inclusive of all vegetation layers within a given habitat type.
- **Threshold for cover of target invasive plants:** The total percent cover of target invasive plants in each habitat type should be less than 30% absolute cover by Year 2; less than 20% by Year 3; less than 10% by Year 4; and less than 5% by Year 5. The intent of these thresholds are to ensure success of revegetation, prevent the spread of invasive plants to nearby areas, and eliminate fire hazard. These figures may be revised upon comparison to cover of invasive plants at reference sites; exceedance of threshold values triggers abatement measures (Section 4.5.2).

Table 5. Summary of interim and final performance goals for each habitat type[1].

Goal metric	Interim goal(s)	Final goal (Year 5)
Vegetative cover	30% of design target cover by Year 2, 50% of design target cover by Year 3, 70% of design target cover by Year 4	90% of design target cover by Year 5
Density of native woody plants	60% of design target density by habitat type	80% design target density by habitat type
Vigor of native woody plants	60% of living with vigor rating of 3 by habitat type	80% of living with vigor rating of 3 by habitat type
Native species richness	N/A	75% of design target number of native species across all habitat types
Threshold cover for target invasive plants	<30% cover by Year 2, <20% cover by Year 3, <10% cover by Year 4	<5% by Year 5

[1] For design targets for cover, density, and species richness, refer to Table 4.

5.2 Performance Monitoring Methods

Monitoring of progress toward achieving the project performance goals will occur twice annually for five years following installation. One monitoring event will occur during late spring (likely May, depending on climatic conditions) during flowering periods of most herbaceous species to aid in species identification and accurate assessments of percent herbaceous cover. A second monitoring event will occur toward the end of the dry summer season (late August–September), to assess woody species survival and vigor prior to fall rains. An annual report summarizing findings from both the spring and fall monitoring events will be submitted to the County by December 15th of each year. This will provide time to develop adaptive response plans (e.g., supplemental planting, invasive plant species control) to aid any unmet performance goals for the next planting season. It should be noted that performance monitoring would be in addition to the early weed advisory monitoring (Section 5.2.1) and any routine maintenance inspections, which may occur more frequently and at any time of the year.

5.2.1 Early advisory weed monitoring

The site will be informally monitored in early spring (February/March) for invasive plants (Cal-IPC 2018). Information on occurrence location and intensity will be transmitted to the Restoration Contractor early in the spring so that immediate actions (e.g. herbicide application, hand-grubbing, or cutting), can be taken to reduce cover of invasive plants and support growth of native species early in the growing season.

5.2.2 Vegetative cover

Within each habitat type containing woody trees and shrubs—upper riparian, lower riparian, and chaparral—four or more 50–100m^2 plots will be randomly established following initial planting depending on total acreage of revegetated habitat types (i.e., a minimum of four plots per habitat type with the number of plots calculated using three plots/acre of revegetated habitat), using a modified version of the CDFW-CNPS combined rapid assessment and releve sampling method (CDFW-CNPS 2017). For habitat types containing only herbaceous species—grazing grasslands and freshwater emergent wetlands—four or more 10m^2 plots will be randomly established following initial planting depending on total acreage of revegetated habitat types (i.e., a minimum of four plots per habitat type with the number of plots calculated using three plots/acre of

revegetated habitat). The boundaries of all plots will be recorded with high-resolution GPS or other methodology that ensures consistency for revisiting. In each plot, visual estimates of absolute cover will be recorded for each plant species present with approximately 5% or more cover, as will bare ground and organic litter/debris (e.g., dead plant material such as leaf litter or thatch). If unknown species are encountered in the field, they will be keyed out either in the field (preferably), or if necessary, a sample will be collected, assigned a unique identifier (e.g., UNK1), placed in a marked plastic bag, and refrigerated or pressed for later identification. Monitoring plot results will then be averaged across each habitat type to determine if the performance standards are met (Table 4).

5.2.3 Density and vigor of woody plants

Within each habitat type containing woody trees and shrubs—upper riparian, lower riparian, and chaparral—planted and naturally recruited woody species will be monitored for density and vigor. If it is infeasible for all woody plantings to be monitored within one day, then sub-sampling may be performed in the plots established for monitoring vegetative cover. A monitor will traverse each planting area, either in its entirety or within plots, recording species, status (i.e., planted vs. naturally recruited), and vigor rating (Table 6) for each woody plant. Monitoring results (mean density and vigor, if plots are used) will be reported by habitat type to determine if the performance standards are being met (Table 4).

Table 6. Vigor categories.

Category	Description
0	Dead
1	<25% of foliage appears to be healthy[1]
2	25–50% of foliage appears to be healthy
3	51–80% of foliage appears to be healthy
4	>80% of foliage appears to be healthy

[1] Healthy foliage is defined as showing no signs of herbivory, nutrient or water stress, or pathogens on stems or foliage.

5.2.4 Percent cover invasive plant species

The percent cover of invasive weeds will be monitored in each habitat type at the same time and using the same methods described above for vegetative cover (Section 5.2.2), except that cover of all invasive plant species will be recorded even if absolute cover is less than five percent. If unknown species are encountered in the field, they will be keyed out either in the field (preferably), or if necessary, a sample will be collected, assigned a unique identifier (e.g., UNK1), placed in a marked plastic bag, and refrigerated or pressed for later identification. Monitoring results (mean percent cover, if plots are used) will be reported by habitat type to determine if the performance standards are being met (Table 4).

5.2.5 Photo monitoring and incidental observations

Within each habitat type, three or more fixed locations for photo monitoring will be established to monitor site changes over time. Photo monitoring will begin prior to implementation to provide a baseline. Photographs will be taken at least once each year in the same season(s). To ensure consistency, the fixed-station locations will be recorded using a handheld GPS receiver, all photos will be taken at a standing position, and a compass bearing of the direction the camera is

facing will be taken (or the compass bearing for the start and end of a panoramic series of photographs). Photographs of other notable features or incidental observations will also be taken during each monitoring event. Qualitative observations on plant stress and likely cause (e.g., herbivory, water stress, pathogens, etc.) and distribution and abundance of target invasive plants may also be noted.

5.3 Analysis and Reporting

5.3.1 Data Analysis

Data will be collected and analyzed as required, to assess whether the performance standards have been met. Inter-annual comparisons of the monitoring results may be made to assist in determining status and trends in planting performance and whether remedial actions may be necessary.

5.3.2 Monitoring Reports

Annual monitoring reports of performance monitoring will document the performance standard parameters from all habitat types and whether the performance standards are being met. Each year, comparisons of each habitat type with the performance goals will be performed, including standard errors and 95% confidence intervals in cases where sub-sampling plots were used. Reports will include the following sections:

- Introduction
- Maintenance Activities Performed
- Monitoring Methods
- Monitoring Results
- Achievement of Performance Standards (and any requested revisions to standards, if developed)
- Recommendations for Remedial Actions

Monitoring reports will be provided to Alameda County by December 15 of each monitoring year. A final monitoring report will be produced upon successful achievement of all performance standards. If performance standards are not met, discussions will be held with relevant permitting agencies and remedial actions will be taken as necessary (see Section 6), although maintenance and/or interim remedial actions may be implemented as soon as determined to be necessary. An additional one or two years of monitoring may also be conducted in accordance with the methods described above.

6 REMEDIAL ACTIONS

If interim or final performance standards (Section 5.1) are not being met, remedial actions will be implemented. Remedial actions are likely to include the following activities, but other activities may be considered:

- Removal of target invasive plants, using hand removal, mowing, and/or herbicide as described in Section 4.1;
- Irrigation and irrigation system maintenance;
- Repair and/or installation of plant protectors; and,

- Adding or replacing plantings and additional seeding, as necessary, using the species in Table 3. Additional plantings will be installed in the same manner and schedule as described in Section 3 unless the planting method is suspected to be the reason for plant mortality. Additional planting numbers will be documented, to be incorporated into calculations of plant survival in future monitoring years (Section 5.2).

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Appendix A

30% Design Plans Overview

NILES CANYON QUARRY RECLAMATION
30% DESIGN
ALAMEDA COUNTY, CA

GENERAL NOTES, TERMS, & CONDITIONS:

1. **DESIGN INTENT.** THESE DRAWINGS REPRESENT THE GENERAL DESIGN INTENT TO BE IMPLEMENTED AND CONTRACTOR IS RESPONSIBLE FOR ALL ITEMS SHOWN ON THESE PLANS. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE PROJECT MANAGER FOR ANY CLARIFICATIONS OR FURTHER DETAILS NECESSARY TO ACCOMMODATE ACTUAL SITE CONDITIONS. ANY DEVIATION FROM THESE PLANS WITHOUT THE COUNTY'S REPRESENTATIVE APPROVAL ARE AT THE CONTRACTOR'S OWN RISK AND EXPENSE. NOTIFY PROJECT MANAGER IMMEDIATELY OF ANY UNEXPECTED AND CHANGED CONDITIONS, SAFETY HAZARDS, AND ENVIRONMENTAL PROBLEMS ENCOUNTERED.

2. **JOB SITE CONDITIONS AND CONTRACTOR RESPONSIBILITY.** CONTRACTOR SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR SITE CONDITIONS DURING THE COURSE OF THE CONSTRUCTION OF THIS PROJECT, INCLUDING THE SAFETY OF ALL PERSONS AND PROPERTY, AND ALL ENVIRONMENTAL PROTECTION ELEMENTS, WHETHER SHOWN ON THESE DRAWINGS OR NOT. CONTRACTOR SHALL FOLLOW ALL APPLICABLE CONSTRUCTION AND SAFETY REGULATIONS. THESE REQUIREMENTS SHALL APPLY CONTINUOUSLY AND WILL NOT BE LIMITED TO NORMAL WORKING HOURS. THE CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE COUNTY OR THE ENGINEER (STILLWATER SCIENCES) HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPT FROM LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE MRC OR ENGINEER.

3. **DAMAGE.** CONTRACTOR SHALL EXERCISE CARE TO AVOID DAMAGE TO EXISTING PUBLIC AND PRIVATE PROPERTY, INCLUDING NATIVE TREES AND SHRUBS, AND OTHER PROPERTY IMPROVEMENTS. IF CONTRACTOR CAUSES DAMAGES TO SUCH ITEMS, HE SHALL BE RESPONSIBLE FOR REPAIR OR REPLACEMENT IN LIKE NUMBER, KIND, CONDITION, AND SIZE. ANY SUCH COST MAY BE DEDUCTED BY OWNER FROM MONIES DUE CONTRACTOR UNDER THIS CONTRACT.

4. **LIMITS OF WORK, ACCESS, STAGING AND MOBILIZATION AREAS.** THE APPROXIMATE LIMITS OF WORK ARE SHOWN ON THE DRAWINGS. EXACT LIMITS OF WORK, POINTS OF INGRESS-EGRESS, CREEK CHANNEL ACCESS, MOBILIZATION, STAGING, AND WORK AREAS WILL BE FLAGGED IN THE FIELD BY THE ENGINEER. EQUIPMENT MAINTENANCE AND FUELING MUST OCCUR OUTSIDE OF THE CHANNEL AREA AS DESCRIBED IN THE ENVIRONMENTAL PERMITS FOR THE PROJECT.

5. **WORK IN STREAM CHANNELS AND STREAM DIVERSIONS.** ALL WORK INVOLVING USE OF HEAVY EQUIPMENT MUST BE COMPLETED FROM TOP OF BANK UNLESS A SPECIFIC POINT OF CREEK CHANNEL ACCESS HAS BEEN APPROVED AND IS SHOWN ON THE PLANS, AND THEN ONLY IN NON-LIVE WATER AS DEFINED BY CDFW. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING THE DEWATERING PLAN DEPICTED IN THIS PLAN SET.

   5.1. CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND DISPOSING OF ALL WATER CONTROL STRUCTURES AND EQUIPMENT.

   5.2. THE CONTRACTOR SHALL FURNISH, INSTALL, AND OPERATE ALL OTHER NECESSARY MACHINERY, APPLIANCES, AND EQUIPMENT TO DIVERT FLOWING WATER AROUND WORK AREAS, AND TO KEEP EXCAVATIONS AND TRENCHES REASONABLY FREE FROM WATER DURING CONSTRUCTION. CONTRACTOR SHALL DISPOSE OF THE WATER SO AS NOT TO CAUSE INJURY TO PUBLIC OR PRIVATE PROPERTY, OR TO CAUSE A NUISANCE OR A MENACE TO THE PUBLIC, OR TO DEGRADE WATER QUALITY. HE SHALL AT ALL TIMES HAVE ON HAND SUFFICIENT PUMPING EQUIPMENT AND MACHINERY IN GOOD WORKING CONDITION FOR ALL ORDINARY EMERGENCIES AND SHALL HAVE AVAILABLE AT ALL TIMES COMPETENT MECHANICS FOR THE OPERATION OF ALL PUMPING EQUIPMENT. IF THE CONTRACTOR CHOOSES TO USE A PUMPING SYSTEM FOR ANY PORTION OF THE WATER CONTROL WORK, HE SHALL HAVE ADEQUATE BACK-UP EQUIPMENT TO INSURE THE CONTINUOUS OPERATION OF THE EQUIPMENT.

   5.3. THE CONTRACTOR SHALL AT ALL TIMES PROVIDE FOR THE ADEQUATE RETURN FLOW OF DIVERSIONS BELOW THE PROJECT SITE. THE CONTRACTOR MAY TEMPORARILY DIVERT WATER DURING CONSTRUCTION, AS OUTLINED IN THE APPROVED STREAM DIVERSION AND WATER CONTROL PLAN. THIS MAY INCLUDE FOR INSTANCE, VISQUEEN AND STRAW BALE OR SAND BAG DIVERSION DIKES AND PIPING SYSTEMS. RETURN FLOW SHALL BE FILTERED THROUGH FILTER CLOTH, STRAW BALES AND/OR THROUGH A SERIES OF STILLING BASINS WHEN REQUIRED.

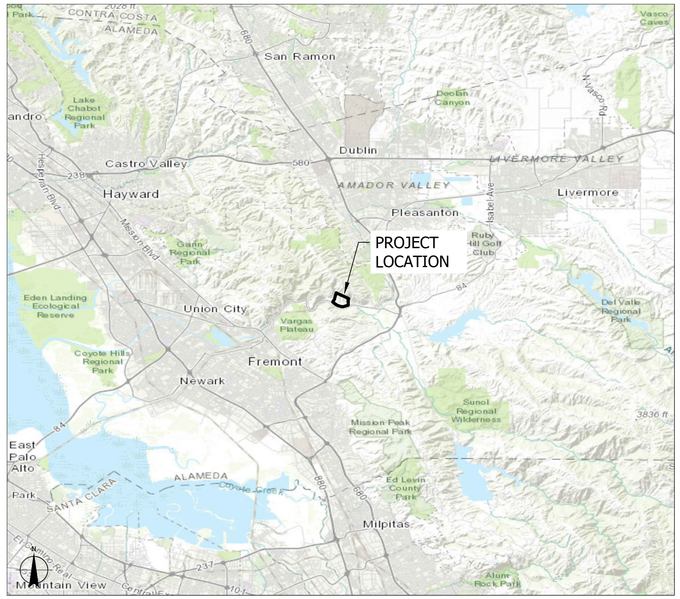
   5.4. TURBID DEWATERING FLOWS SHALL BE PUMPED INTO A HOLDING FACILITY OR SPRAYED OVER A LARGE AREA OUTSIDE THE STREAM CHANNEL TO ALLOW FOR NATURAL FILTRATION OF SEDIMENTS. AT NO TIME SHALL TURBID WATER FROM THE HOLDING FACILITY BE ALLOWED BACK INTO THE STREAM CHANNEL UNTIL WATER IS CLEAR OF SILT.

   5.5. ALL HEAVY EQUIPMENT MUST HAVE A SUPPLY OF SORBENT PADS AVAILABLE TO CLEAN-UP GREASE, OIL, OR FUEL THAT DRIPS OR SPILLS INTO THE STREAM CHANNEL. SORBENT BOOMS MUST BE PLACED DOWNSTREAM FROM LOCATIONS WHERE MACHINERY IS EXPECTED TO CROSS THE STREAM CHANNEL. USED PADS AND BOOMS ARE TO BE DISPOSED OF PROPERLY AT CONTRACTOR'S EXPENSE.

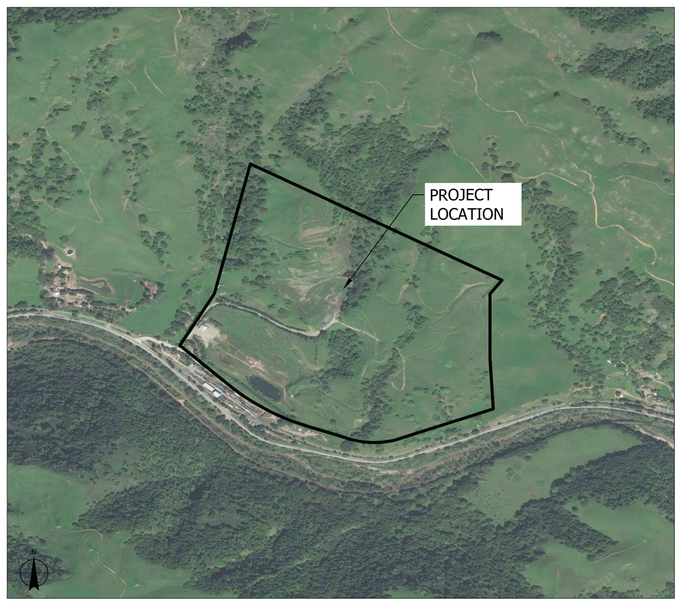
6. **EARTHWORK QUANTITIES.** CONTRACTOR IS RESPONSIBLE FOR ALL EARTHWORK, INCLUDING GRADING, PROVISION AND PLACEMENT OF ROCK MEETING SIZE LIMITS, AS SHOWN ON DRAWINGS, AND DISPOSAL OF ALL EXCESS SOIL AND RUBBLE. EARTHWORK QUANTITIES, INCLUDING GRADING, PLACED ROCK RIP-RAP AND OFF-HAUL QUANTITY ESTIMATES PROVIDED BY THE ENGINEER ARE ESTIMATES ONLY. COUNTY AND ENGINEER DO NOT, EXPRESSLY OR OTHERWISE BY IMPLICATION, EXTEND ANY WARRANTY TO EARTHWORK CALCULATIONS

7. **THE** FOLLOWING PERMITS ARE REQUIRED FOR THIS PROJECT, THE CONTRACTOR SHALL BE GIVEN COPIES OF ALL THE PERMITS, SHALL BECOME FAMILIAR WITH THE PERMIT REQUIREMENTS, AND SHALL BE RESPONSIBLE FOR ADHERENCE TO AND CONFORMANCE WITH ALL PERMIT CONDITIONS.
   SEC. 404 PERMIT ISSUED BY US ARMY CORPS OF ENGINEERS
   1601/1603 STREAMBED ALTERATION AGREEMENT ISSUED BY CA DEPT. FISH & WILDLIFE
   WATER QUALITY CERTIFICATION, BY NORTH COAST REGIONAL WATER QUALITY CONTROL BOARD
   US FISH AND WILDLIFE SERVICE CONSULTATION AND IMPLEMENTATION RECOMMENDATIONS
   NATIONAL MARINE FISHERIES SERVICE CONSULTATION AND IMPLEMENTATION RECOMMENDATIONS.
8. AREAS TO BE GRADED SHALL BE CLEARED OF ALL VEGETATION INCLUDING ROOTS AND OTHER UNSUITABLE MATERIAL FOR A STRUCTURAL FILL, THEN SCARIFIED TO A DEPTH OF 6 INCHES PRIOR TO PLACING OF ANY FILL.
9. AREAS WITH EXISTING SLOPES WHICH ARE TO RECEIVE FILL MATERIAL SHALL BE KEYED AND BENCHED.
10. FILL MATERIAL SHALL BE SPREAD IN LIFTS NOT EXCEEDING 6 INCHES IN COMPACTED THICKNESS, MOISTENED OR DRIED AS NECESSARY TO NEAR OPTIMUM MOISTURE CONTENT AND COMPACTED BY AN APPROVED METHOD. FILL MATERIAL SHALL BE COMPACTED TO A MINIMUM OF 90% MAXIMUM DENSITY AS DETERMINED BY 1957 ASTM D - 1557 - 91 MODIFIED PROCTOR (AASHO) TEST OR SIMILAR APPROVED METHODS.
11. CUT SLOPES SHALL NOT EXCEED A GRADE OF 1.5 HORIZONTAL TO 1 VERTICAL. FILL AND COMBINATION FILL AND CUT SLOPES SHALL NOT EXCEED 2 HORIZONTAL TO 1 VERTICAL. SLOPES OVER THREE FEET IN VERTICAL HEIGHT SHALL BE PLANTED WITH APPROVED PERENNIAL OR TREATED WITH EQUALLY APPROVED EROSION CONTROL MEASURES PRIOR TO FINAL INSPECTION.
12. BEST MANAGEMENT PRACTICES FOR CONSTRUCTION ACTIVITIES: ERODED SEDIMENTS AND OTHER POLLUTANTS MUST BE RETAINED ONSITE AND MAY NOT BE TRANSPORTED FROM THE SITE VIA SHEET FLOW, SWALES, AREA DRAINS, NATURAL DRAINAGE COURSES, OR WIND. STOCKPILES OF EARTH AND OTHER CONSTRUCTION RELATED MATERIALS MUST BE PROTECTED FROM BEING TRANSPORTED FROM THE SITE BY THE FORCES OF WIND OR WATER. FUELS, OILS, SOLVENTS, AND OTHER TOXIC MATERIALS MUST BE STORED IN ACCORDANCE WITH THEIR LISTING AND ARE NOT TO CONTAMINATE THE SOIL AND SURFACE WATERS. ALL APPROVED STORAGE CONTAINERS ARE TO BE PROTECTED FROM THE WEATHER. SPILLS MAY NOT BE WASHED INTO THE DRAINAGE SYSTEM. EXCESS OR WASTE CONCRETE MAY NOT BE WASHED INTO PUBLIC WAY OR ANY OTHER DRAINAGE SYSTEM. PROVISIONS MUST BE MADE TO RETAIN CONCRETE WASTES ON SITE UNTIL THEY CAN BE DISPOSED AS A SOLID WASTE. TRASH AND CONSTRUCTION RELATED SOLID WASTE MUST BE DEPOSITED INTO A COVERED WASTE RECEPTACLE TO PREVENT CONTAMINATION OF RAINWATER AND DISPERSAL BY WIND. SEDIMENTS AND OTHER MATERIAL MAY NOT BE TRACKED FROM TO THE SITE BY VEHICLE TRAFFIC.

VICINITY MAP



PROJECT LOCATION MAP



Sheet List Table	
Sheet Number	Sheet Title
1	TITLE SHEET
2	EXISTING CONDITIONS
3	STAGING, DEMOLITION, ACCESS & SITE PROTECTION
4	EXISTING PLAN & PROFILE - STA. 0+00 TO 10+50
5	EXISTING PLAN & PROFILE - STA. 10+50 TO 21+00
6	EXISTING PLAN & PROFILE - STA. 21+00 TO END
7	PROPOSED SHEET INDEX OVERVIEW
8	LOWER CHANNEL - PLAN & PROFILE
9	LOWER CHANNEL - SECTIONS
10	MIDDLE CHANNEL - PLAN & PROFILE
11	MIDDLE CHANNEL - SECTIONS
12	UPPER CHANNEL - PLAN & PROFILE
13	BASIN 7 OUTFALL CHANNEL - PLAN, PROFILE & SECTIONS
14	ROAD GRADING - PLAN & SECTIONS
15	LOWER PAD FEATURES
16	UPPER CHANNEL FEATURES
17	EROSION CONTROL & PLANTING DETAILS
18	DETAILS

EARTHWORK ESTIMATES:

CUT: 18,000 CY

IMPORT:
750 CY 1-3 TON RIPRAP ROCK
250 CY ½-1 TON RIPRAP ROCK
100 CY ESM

FILL: 900 CY ON-SITE

BALANCED ON-SITE (SLOPE REPAIR AREAS BY OTHERS): 17,100 CY

ABBREVIATIONS AND SYMBOLS:

(E) EXISTING

(E) PROPOSED

EXISTING TREE (SURVEYED)

EXISTING TREE (APPROXIMATE LOCATION)

3/8 FIGURE # ON SHEET / SHEET #

NILES CANYON QUARRY RECLAMATION
30% DESIGN

ALAMEDA COUNTY, CA

Stillwater Sciences
2855 TELEGRAPH AVENUE, SUITE 400
BERKELEY, CA 94705 P: (510) 848-8098

PROJECT NUMBER: 652.00
SCALE: AS NOTED
DATE: 11/16/2018

DESIGN: CL
DRAWN: CL
CHECKED: JM
APPROVED: ----

REGISTERED PROFESSIONAL ENGINEER — JOEL "MONSOUR" — No. 79688 — 9-30-20 EXPIRES — CIVIL — STATE OF CALIFORNIA

TITLE SHEET

SHEET 1 OF 19

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY

LAST SAVED: 11/16/2018 PLOT DATE: 11/16/2018

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OVERVIEW

CONTROL POINT TABLE				
Point #	Northing	Easting	Elevation	Description
1	2044887.57	6151939.49	903.45	SWS001
2	2042739.46	6152175.71	437.11	SWS002
3	2043344.60	6151956.08	504.22	SWS003
4	2042588.78	6151778.53	287.10	SWS004
5	2042983.07	6151893.66	367.46	SWS005
6	2042935.39	6152093.36	340.79	SWS006
7	2043149.88	6152247.06	366.82	SWS007
8	2043256.74	6152224.27	375.12	SWS008
9	2043416.70	6152115.93	410.93	SWS009
10	2043521.76	6152057.45	483.80	SWS010
11	2043621.33	6151963.76	507.86	SWS011
12	2044139.15	6152211.46	541.99	SWS012
13	2044419.22	6152254.23	564.21	SWS013
14	2042882.07	6151973.98	340.78	SWS014
15	2042824.60	6151901.25	326.11	SWS015
16	2042734.19	6151511.96	262.15	SWS016
17	2043527.80	6152742.85	641.18	SWS017
18	2042729.42	6151935.70	327.56	SWS018

CULVERT TABLE			
CULVERT NUMBER	DIAMETER (INCHES)	LENGTH (FEET)	NOTE
1	42	580	REMOVE CULVERT & CONSTRUCT CHANNEL
2	24	200	REMOVE CULVERT & CREATE PLUNGE POOLS
3	36	50	REPLACE WITH WILLOW PLANTED ROCK ARMORED SPILLWAY
	12	48	
4	24	50	REPLACE WITH WILLOW PLANTED ROCK ARMORED SPILLWAY
	24	40	
5	18	35	REMOVE CULVERT & REGRADE TO NATURAL SLOPE
6	18	90	REMOVE CULVERT & REGRADE TO NATURAL SLOPE
7	24	60	REPLACE WITH WILLOW PLANTED ROCK ARMORED SPILLWAY
8	24	250	EXCAVATE & ARMOR OVERFLOW CHANNEL BETWEEN POND & OVAL CULVERT
	24	250	
9	42 H x 60 W (OVAL)	55	TO REMAIN
10	18	30	REPLACE WITH WILLOW PLANTED ROCK ARMORED SPILLWAY
11	18	25	REMOVE CULVERT & INSTALL ROCK LINED DITCH

2/18 INSTALL SILT FENCE PRIOR TO EXCAVATION

REMOVE (E) CULVERT #1 & CREATE NATURAL OPEN CHANNEL

UPPER STAGING AREA

SLOPE STABILITY REPAIR AREAS (BY OTHERS)

REMOVE (E) CULVERT #2 & CREATE A SERIES OF PLUNGE POOLS TO CONNECT UPPER PAD TO (E) NATURAL CHANNEL REACH

(E) TOPSOIL STOCKPILE TO BE USED FOR SOIL AMENDMENT IN UPLAND PLANTING AREAS

(E) ACCESS ROAD TO BE REVEGETATED

EXISTING HAUL ROAD (TO REMAIN)

ACCESS ROAD TO UPPER PAD AREA

GATE

MAINTENANCE SHOP (TO REMAIN)

ASPHALT IN THIS AREA (TO REMAIN)

ACCESS ACROSS LOWER PAD

LOWER STAGING AREA

GATE

ENTRANCE\EXIT

GATE

CARETAKER HOUSE (TO REMAIN)

NILES CANYON ROAD

REMOVE (E) CULVERT #3 & INSTALL WILLOW PLANTED ROCK ARMORING SPILLWAY

REMOVE (E) CULVERT #4 & INSTALL WILLOW PLANTED ROCK ARMORING SPILLWAY

(E) BASINS 3 &4 TO REMAIN WITH MODIFICATION TO OUTFLOWS ONLY

2/18 INSTALL SILT FENCE PRIOR TO EXCAVATION

OUTSLOPE ROAD SEGMENT TO PREVENT RUNOFF CONCENTRATION & GULLYING

REMOVE CONCRETE RUBBLE & INSTALL WILLOW-PLANTED ROCK ARMOR SPILLWAY

DECOMMISSION (E) DRAINAGE DITCH & FAILED CULVERT #5 & #6; REGRADE TO NATURAL SLOPE

REMOVE (E) CULVERT #11 & INSTALL ROCK-LINED DITCH ACROSS ROAD

2/18 INSTALL SILT FENCE PRIOR TO EXCAVATION

EXCAVATE & ARMOR DITCH TO PROVIDE CAPACITY & STABILITY FOR 100-YEAR FLOWS; PLANT WITH NATIVE SEEDLINGS

REMOVE (E) CULVERT #7 & INSTALL WILLOW PLANTED ROCK ARMORING SPILLWAY

SWS001 SWS002 SWS003 SWS004 SWS005 SWS006 SWS007 SWS008 SWS009 SWS010 SWS011 SWS012 SWS013 SWS014 SWS015 SWS016 SWS017 SWS018

0 50 100 200 FEET

SCALE: 1" = 100'

LEGEND

- PROPERTY BOUNDARY
- DRAINAGE PATHWAY
- ACCESS ROAD
- BASINS
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- SWS019 CONTROL POINT

NILES CANYON QUARRY RECLAMATION
30% DESIGN

ALAMEDA COUNTY, CA

Stillwater Sciences
2855 TELEGRAPH AVENUE, SUITE 400
BERKELEY, CA 94705 P: (510) 848-8098

PROJECT NUMBER: 652.00
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CHECKED: JM
APPROVED: ----

REGISTERED PROFESSIONAL ENGINEER JOEL MONSCHKE No. 79688 9-30-20 EXPIRES CIVIL STATE OF CALIFORNIA

STAGING, DEMOLITION, ACCESS & SITE PROTECTION

SHEET 3 OF 19

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY

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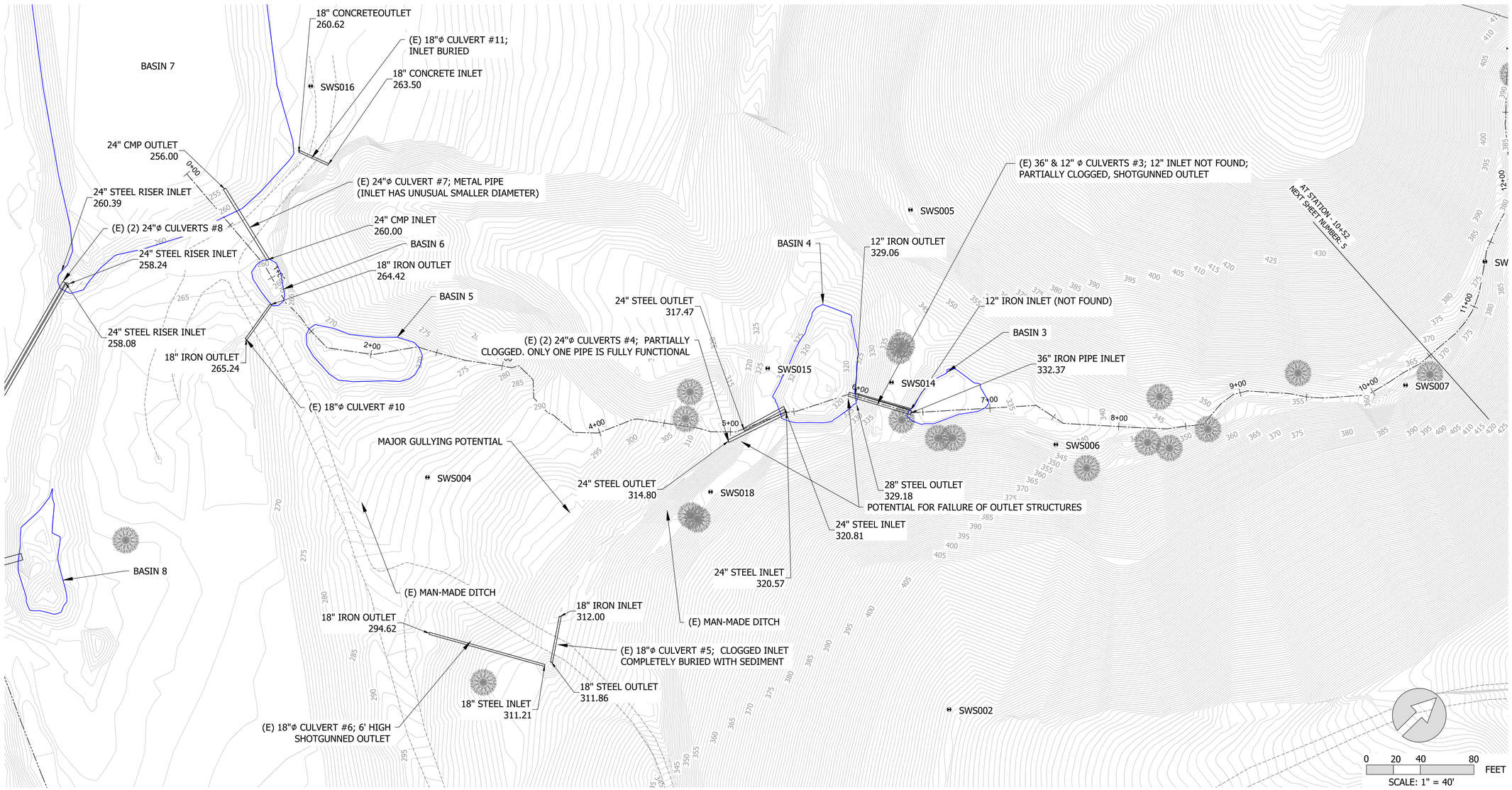

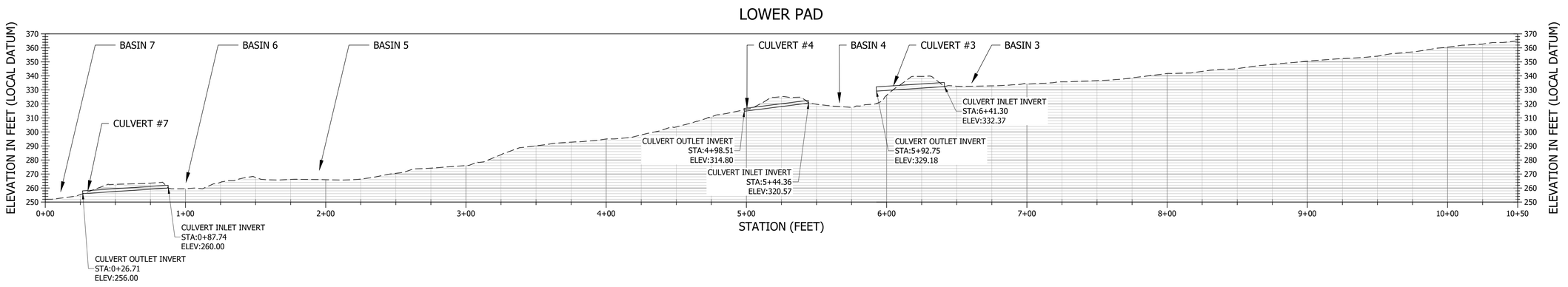

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REGISTERED PROFESSIONAL ENGINEER
JOEL MONSCHKE
No. 79688
9-30-20
EXPIRES
CIVIL
STATE OF CALIFORNIA

EXISTING PLAN & PROFILE
STA. 0+00 TO 10+50

SHEET 4 OF 19

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY

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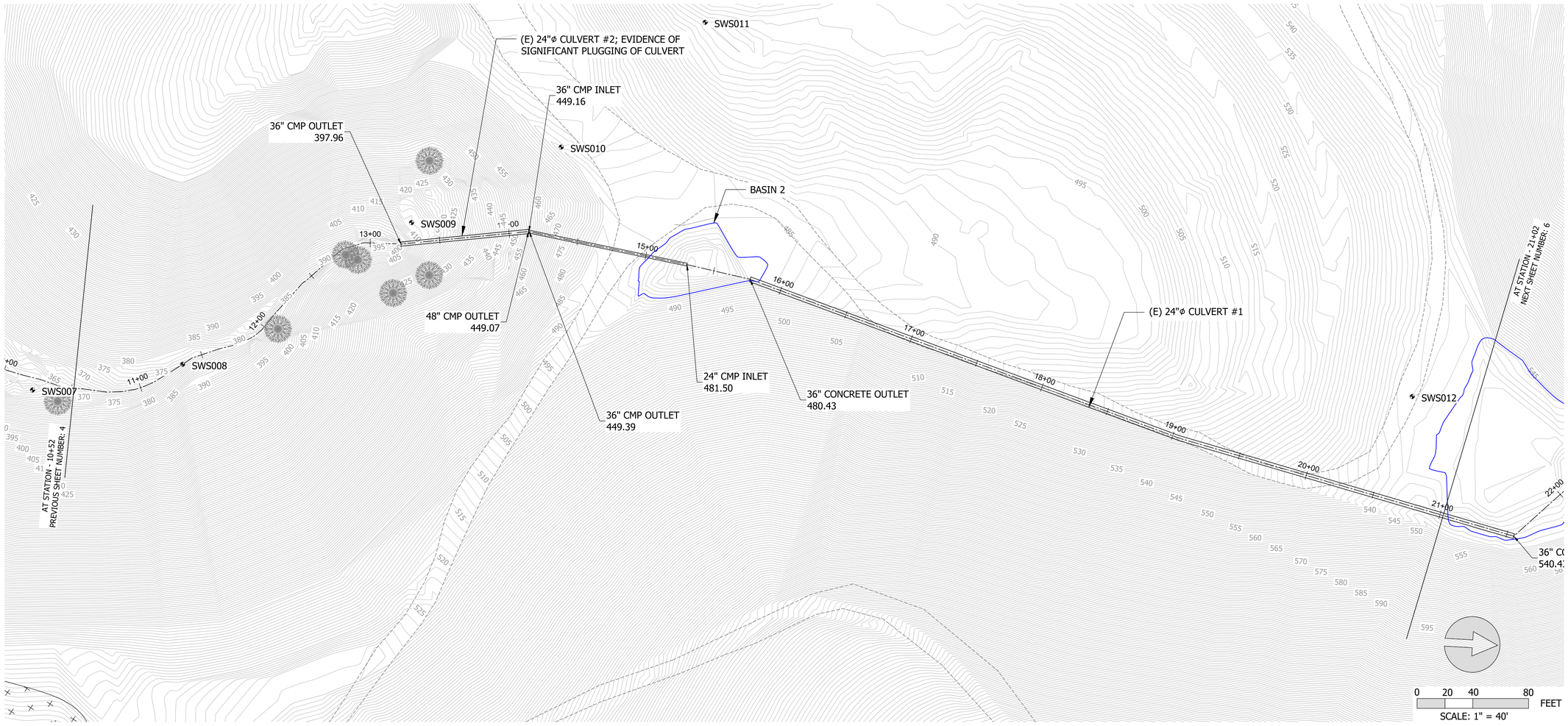

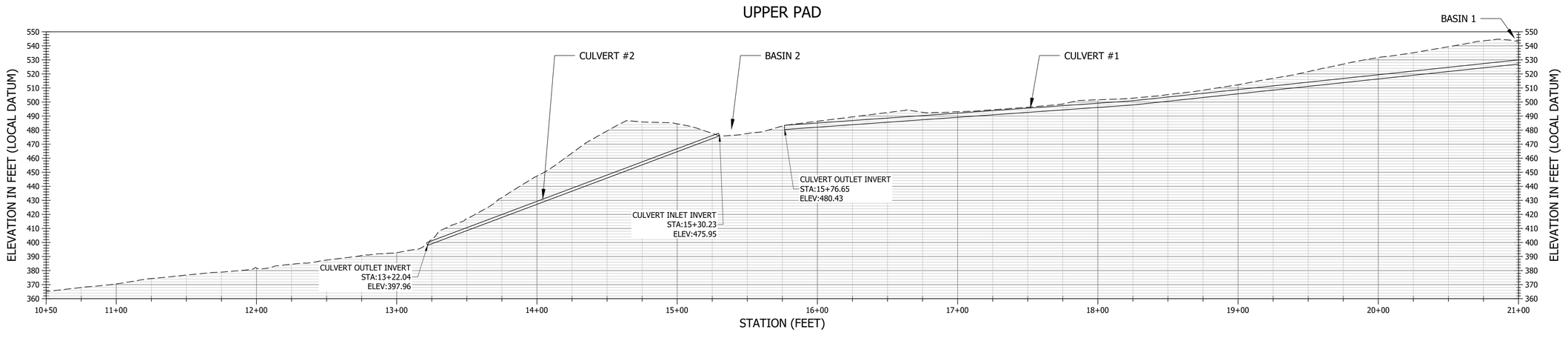

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REGISTERED PROFESSIONAL ENGINEER
JOEL MONSONIS
No. 79688
9-30-20
EXPIRES
CIVIL
STATE OF CALIFORNIA

EXISTING PLAN & PROFILE
STA. 10+50 TO 21+00

SHEET 5 OF 19

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY

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BASIN 1 (DRAINAGE CULVERT INLET HAS RISER)

SWS012

SWS013

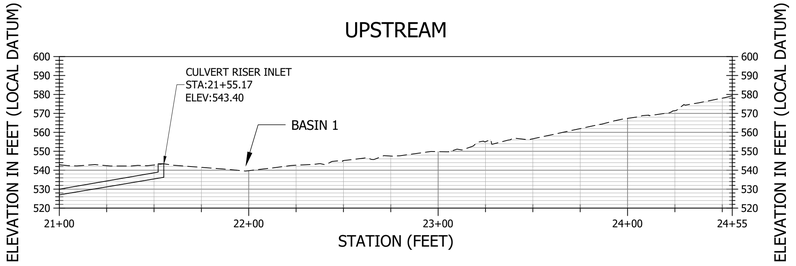
36" CONCRETE OUTLET
540.43

36" CMP INLET
722.54

18" STEEL OUTLET
720.34

AT STATION - 21+02
PREVIOUS SHEET NUMBER- 5

0 20 40 80 FEET
SCALE: 1" = 40'



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REGISTERED PROFESSIONAL ENGINEER
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EXISTING PLAN & PROFILE
STA. 21+00 TO END

SHEET 6 OF 19

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY

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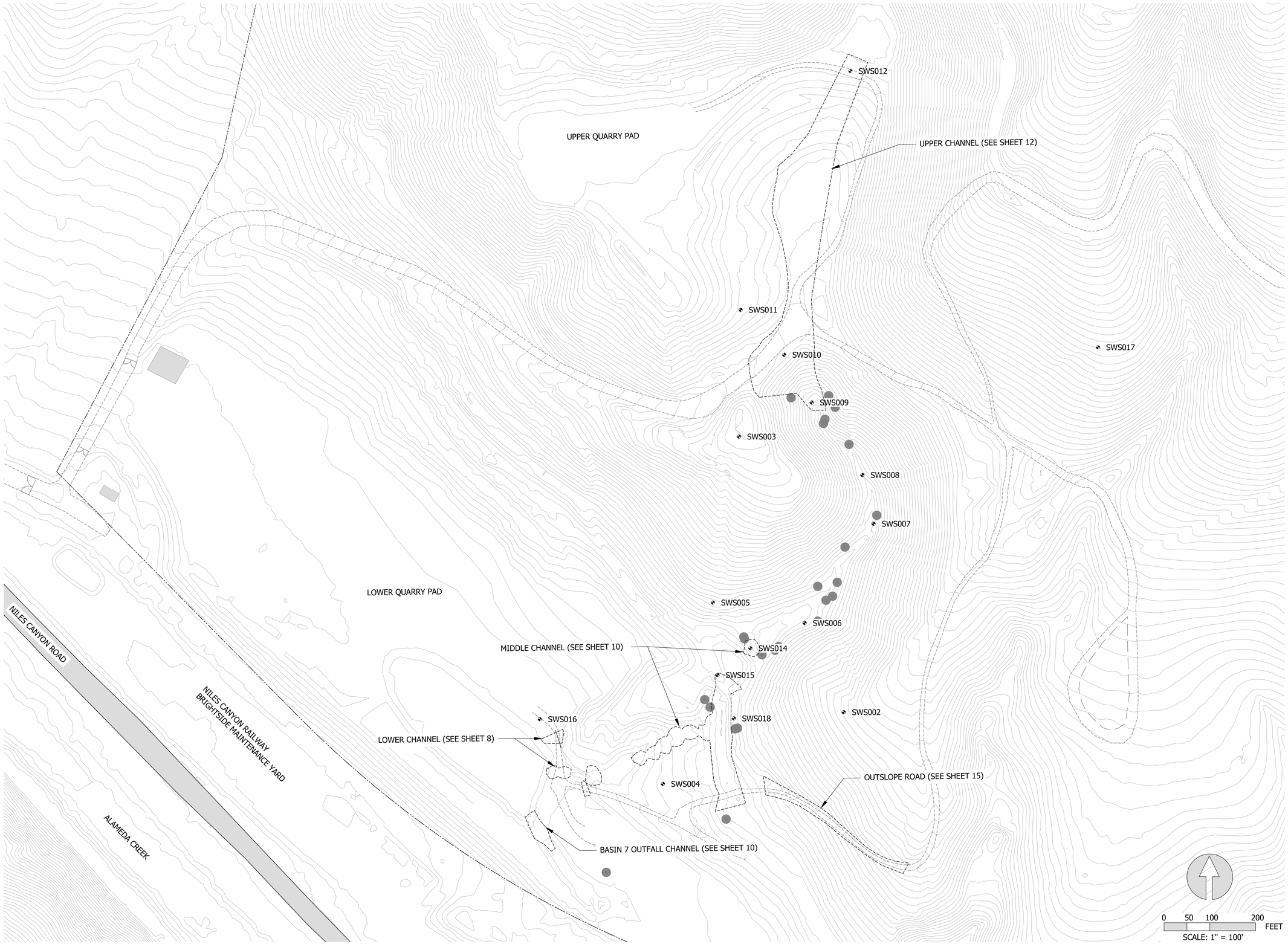

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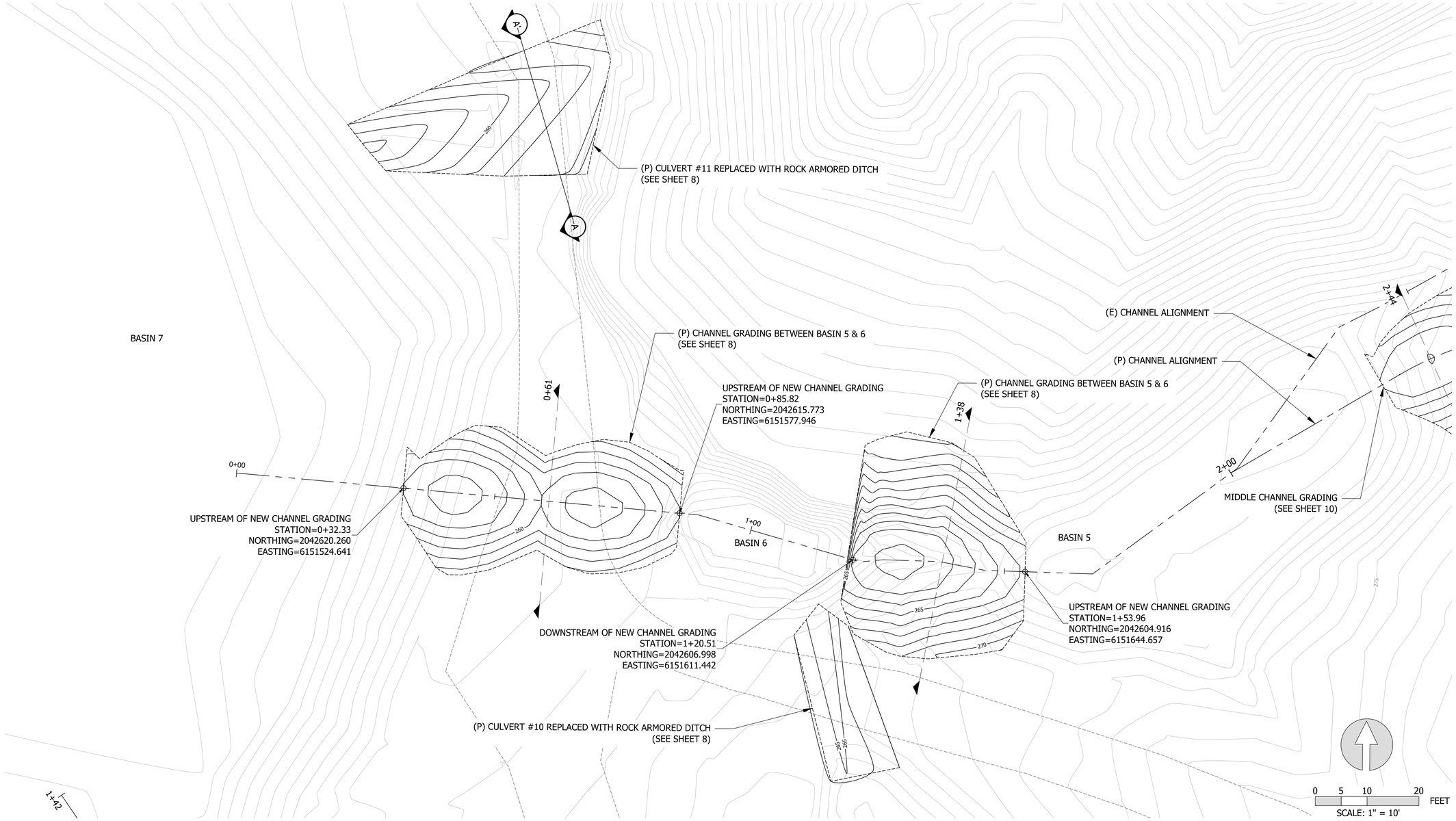
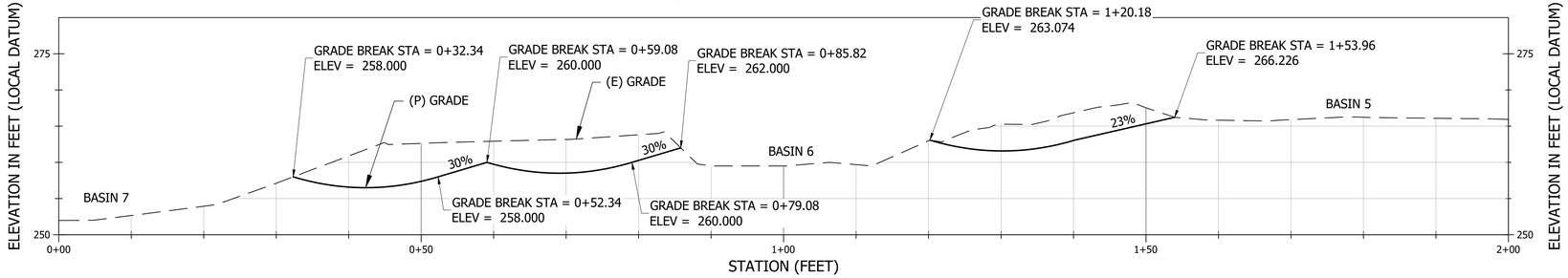
REGISTERED PROFESSIONAL ENGINEER
ABEL MONSCHKE
No. 79688
9-30-20
EXPIRES
CIVIL
STATE OF CALIFORNIA

PROPOSED SHEET INDEX OVERVIEW

SHEET 7 OF 19



PROPSOED LOWER CHANNEL PROFILE



NILES CANYON QUARRY RECLAMATION
30% DESIGN

ALAMEDA COUNTY, CA

Stillwater Sciences
2855 TELEGRAPH AVENUE, SUITE 400
BERKELEY, CA 94705 P: (510) 848-8098

PROJECT NUMBER: 652.00
SCALE: AS NOTED
DATE: 11/16/2018

DESIGN: CL
DRAWN: CL
CHECKED: JM
APPROVED: ----

REGISTERED PROFESSIONAL ENGINEER
JOEL MONSEN
No. 79688
9-30-20
EXPIRES
CIVIL
STATE OF CALIFORNIA

LOWER CHANNEL - PLAN & PROFILE

SHEET 8 OF 19

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY

LAST SAVED: 11/16/2018 PLOT DATE: 11/16/2018 PLOT STYLE: ----

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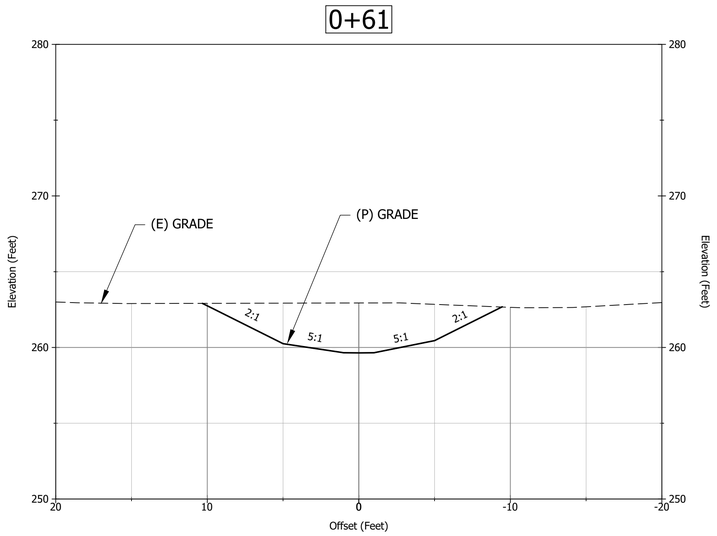

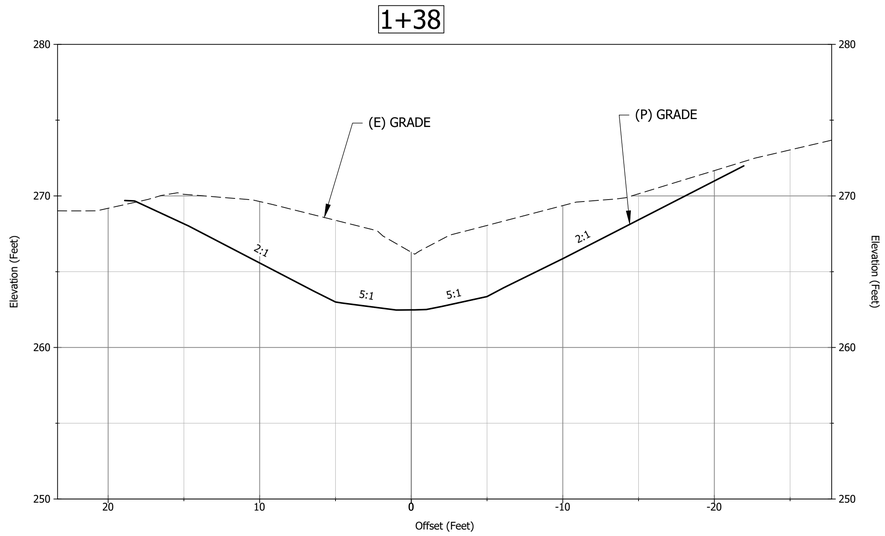

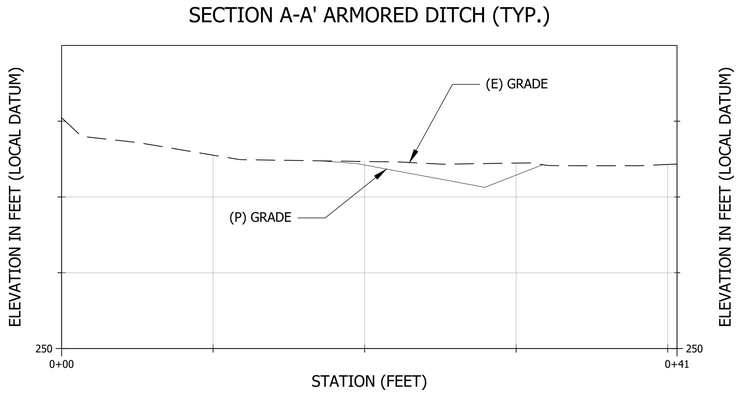

LEGEND

EXISTING GRADE

PROPOSED GRADE

NILES CANYON QUARRY RECLAMATION
30% DESIGN

ALAMEDA COUNTY, CA

Stillwater Sciences
2855 TELEGRAPH AVENUE, SUITE 400
BERKELEY, CA 94705 P: (510) 848-8098

PROJECT NUMBER: 652.00
SCALE: AS NOTED
DATE: 11/16/2018

DESIGN: CL
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APPROVED: ----

REGISTERED PROFESSIONAL ENGINEER
JOEL MONSOOR
No. 79688
9-30-20
EXPIRES
CIVIL
STATE OF CALIFORNIA

LOWER CHANNEL - SECTIONS

SHEET 9 OF 19

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY

LAST SAVED: 11/16/2018 PLOT DATE: 11/16/2018 PLOT STYLE: ----

Z:\DATA\652.00_NILES_CANYON_QUARRY\2_MODEL\652.00_MODEL.DWG

DOWNSTREAM OF NEW CHANNEL GRADING
STATION=2+33.86
NORTHING=2042641.445
EASTING=6151713.362

2+00 BASIN 5

2+44

2+93

3+00

3+39

3+93

4+00

4+45

4+87

5+00

TREE TO REMAIN
(PROTECT IN PLACE)

(P) CHANNEL GRADING EXTENTS
BETWEEN BASIN 4 & 5

SWS004

SWS018

(P) SLOPE REPAIR GRADING

ROAD GRADING (SEE SHEET 15)

DOWNSTREAM OF NEW CHANNEL GRADING
STATION=6+01.32
NORTHING=2042872.490
EASTING=6151959.513

(P) SPILLWAY GRADING EXTENTS
BETWEEN BASIN 3 & 4

SWS015

6+00

BASIN 4

UPSTREAM OF NEW CHANNEL GRADING
STATION=5+36.84
NORTHING=2042820.625
EASTING=6151923.383

TREES TO REMAIN
(PROTECT IN PLACE)

UPSTREAM OF NEW CHANNEL GRADING
STATION=6+37.70
NORTHING=2042889.876
EASTING=6151991.463

SWS014

6+94

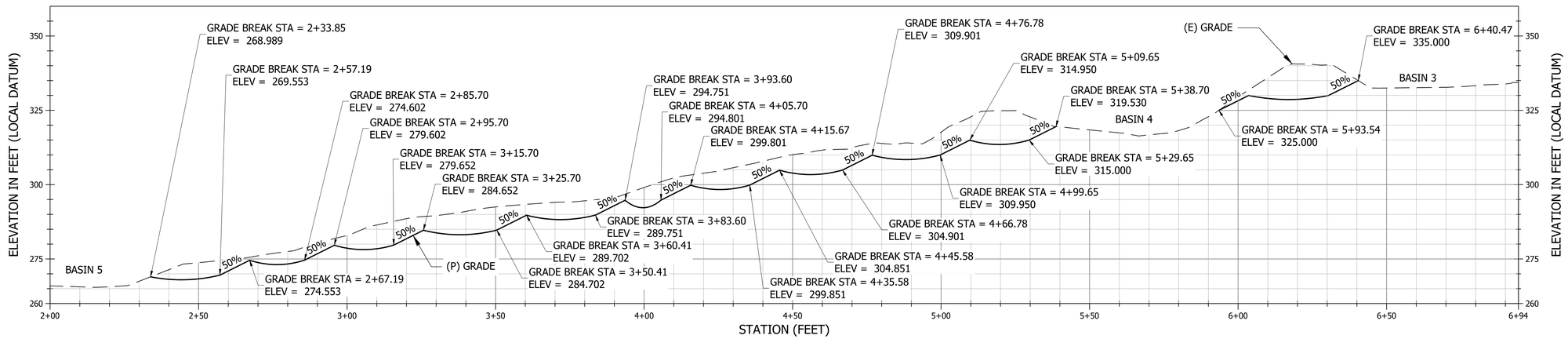
BASIN 3

TREE TO REMAIN
(PROTECT IN PLACE)

SWS006

0 10 20 40 FEET
SCALE: 1" = 20'

PROPOSED MIDDLE CHANNEL PROFILE



NILES CANYON QUARRY RECLAMATION
30% DESIGN

ALAMEDA COUNTY, CA

Stillwater Sciences
2855 TELEGRAPH AVENUE, SUITE 400
BERKELEY, CA 94705 P: (510) 848-8098

PROJECT NUMBER: 652.00
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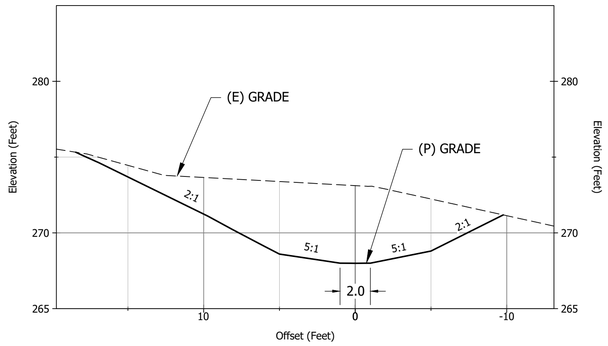
DESIGN: CL
DRAWN: CL
CHECKED: JM
APPROVED: ----

REGISTERED PROFESSIONAL ENGINEER
JOSEL MONSERATE
No. 79688
9-30-20 EXPIRES
CIVIL
STATE OF CALIFORNIA

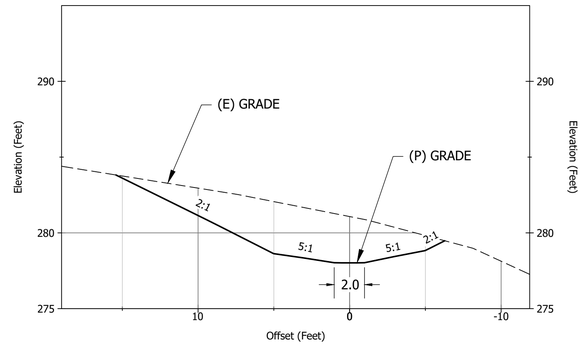
MIDDLE CHANNEL - PLAN & PROFILE

SHEET 10 OF 19

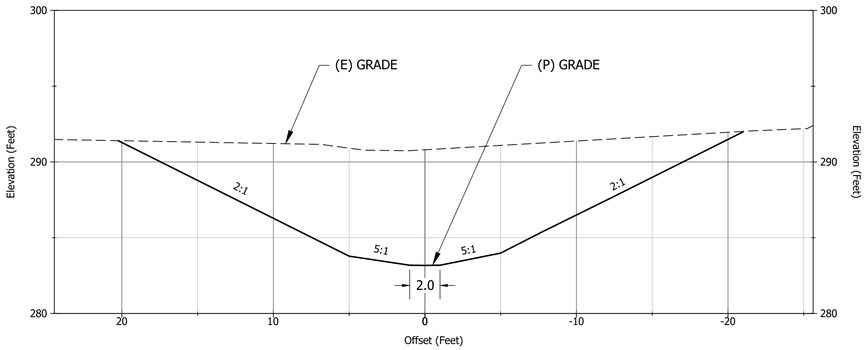
2+44



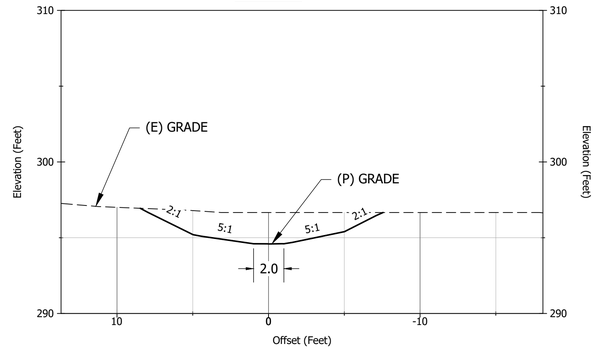
2+93



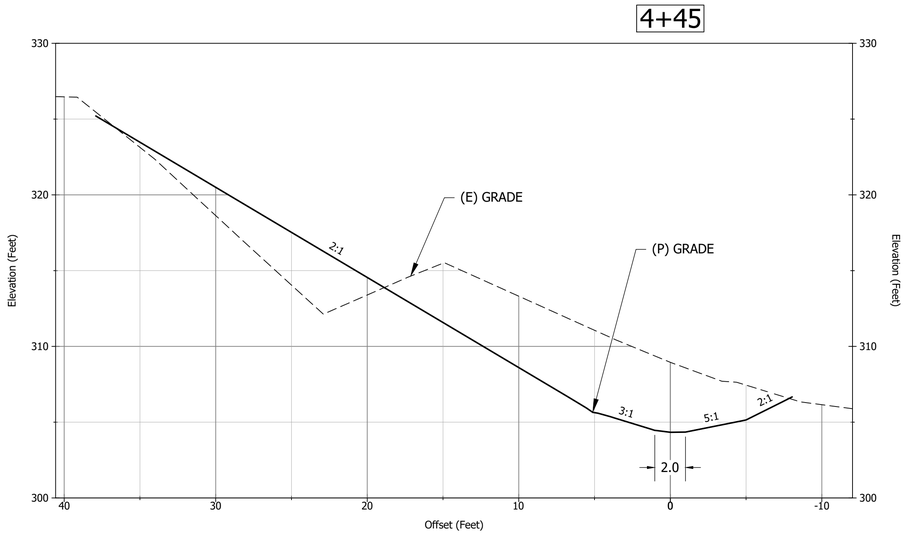
3+39



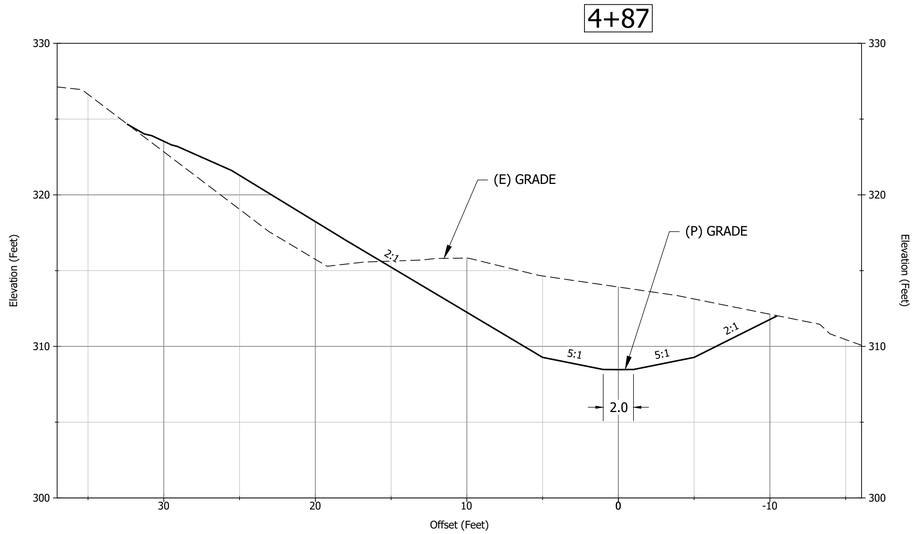
3+93



4+45



4+87



LEGEND

EXISTING GRADE

PROPOSED GRADE

NILES CANYON QUARRY RECLAMATION
30% DESIGN

ALAMEDA COUNTY, CA

Stillwater Sciences
2855 TELEGRAPH AVENUE, SUITE 400
BERKELEY, CA 94705 P: (510) 848-8098

PROJECT NUMBER: 652.00
SCALE: AS NOTED
DATE: 11/16/2018

DESIGN: CL
DRAWN: CL
CHECKED: JM
APPROVED: ----

PROFESSIONAL ENGINEER
JOEL MONSCHKE
No. 79688
9-30-20 EXPIRES
CIVIL
STATE OF CALIFORNIA

MIDDLE CHANNEL - SECTIONS

SHEET 11 OF 19

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY

LAST SAVED: 11/16/2018 PLOT DATE: 11/16/2018 PLOT STYLE: ----

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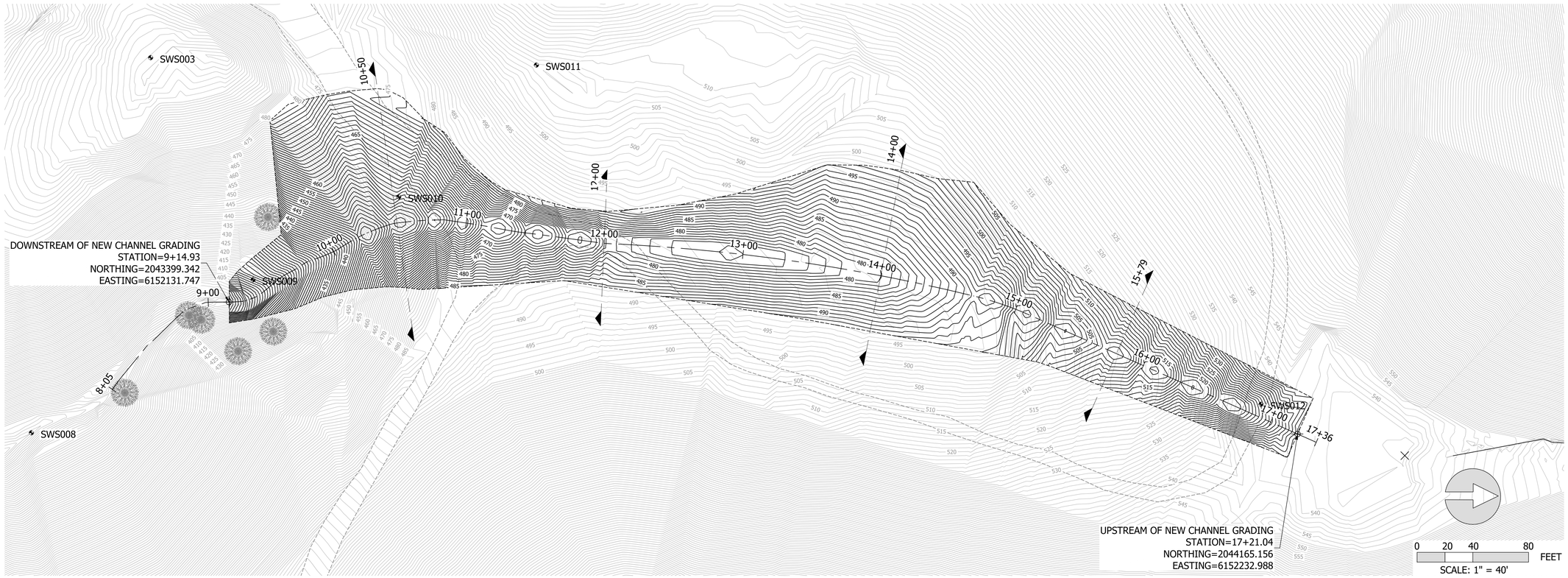
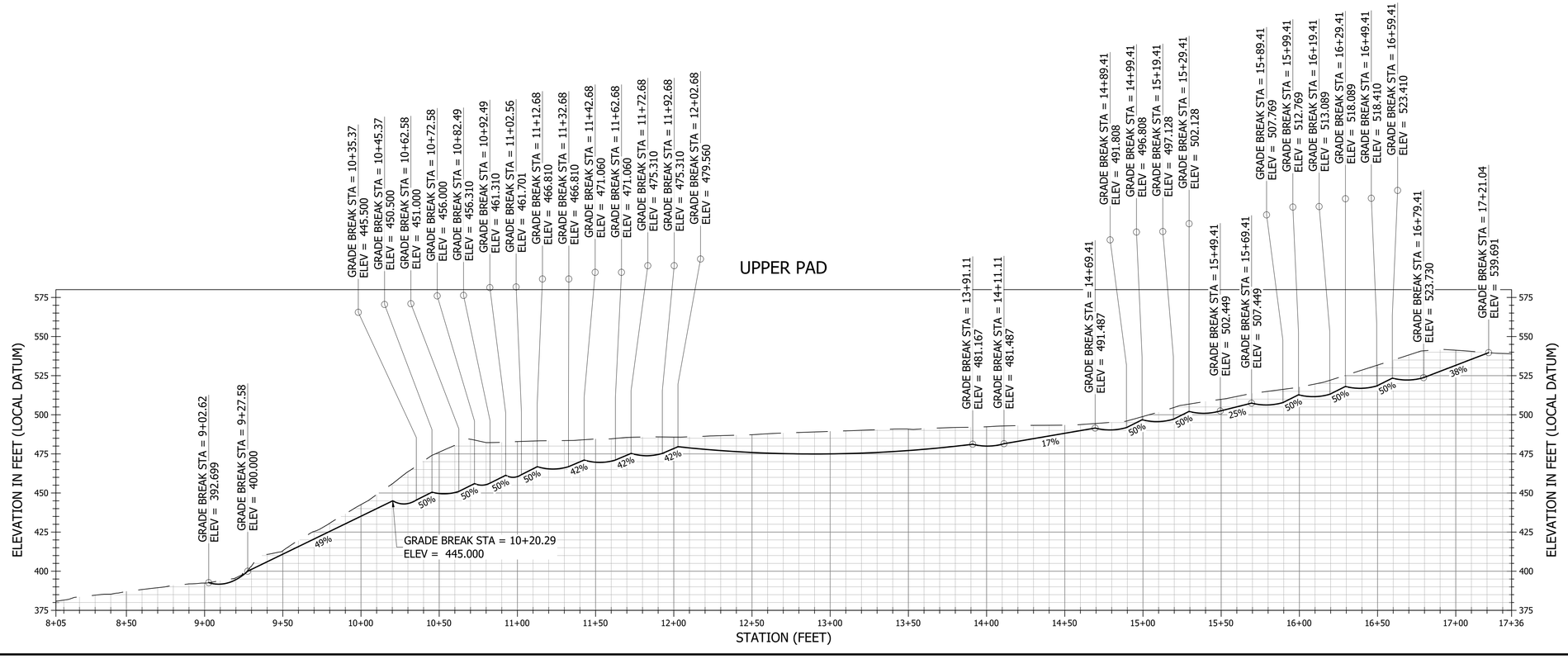




NILES CANYON QUARRY RECLAMATION
30% DESIGN

ALAMEDA COUNTY, CA

Stillwater Sciences
2855 TELEGRAPH AVENUE, SUITE 400
BERKELEY, CA 94705 P: (510) 848-8098

PROJECT NUMBER: 652.00
SCALE: AS NOTED
DATE: 11/16/2018

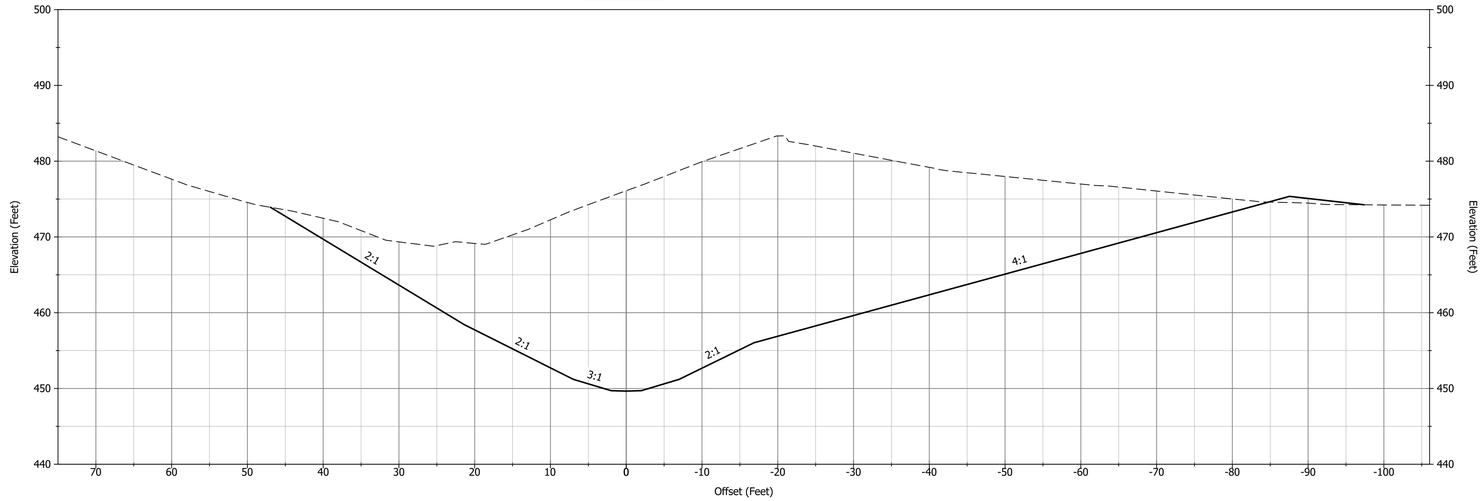
DESIGN: CL
DRAWN: CL
CHECKED: JM
APPROVED: ----

REGISTERED PROFESSIONAL ENGINEER
JOEL C. MONSEBRAIE
No. 79688
9-30-20 EXPIRES
CIVIL
STATE OF CALIFORNIA

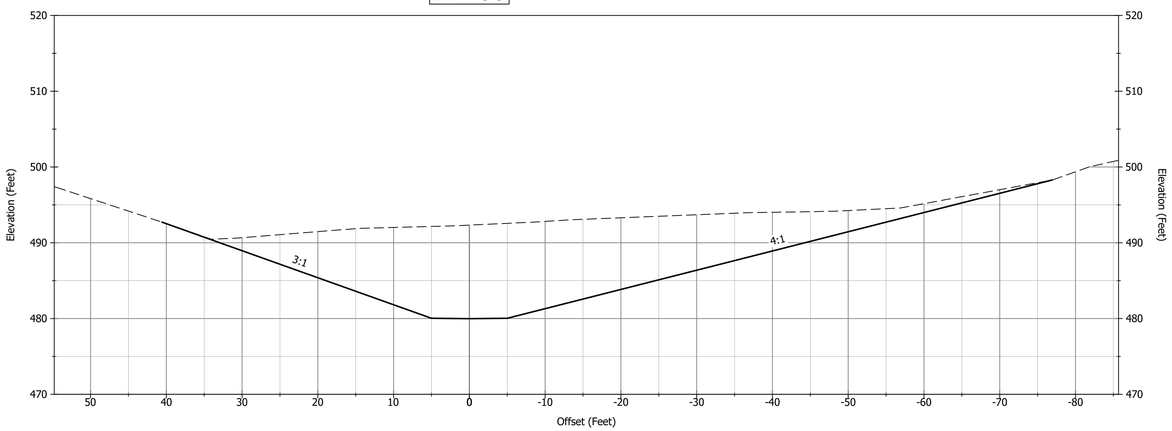
UPPER CHANNEL - PLAN & PROFILE

SHEET 12 OF 19

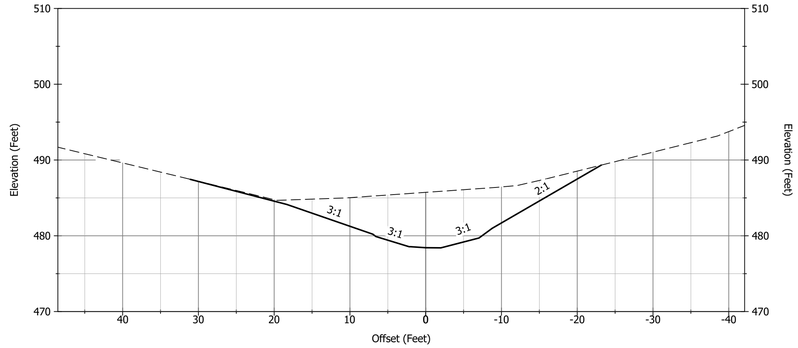
10+50



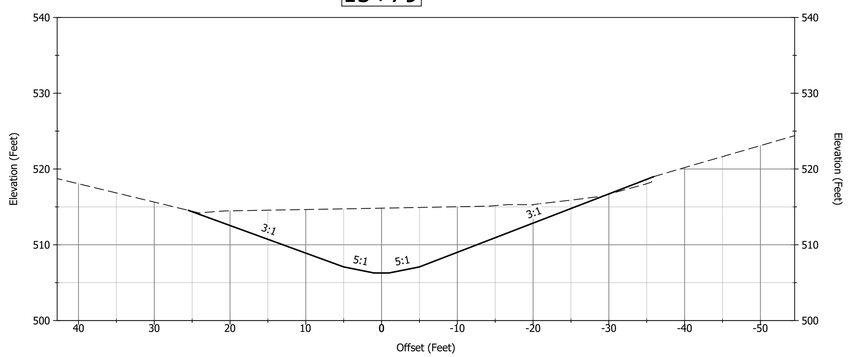
14+00



12+00



15+79



LEGEND

EXISTING GRADE

PROPOSED GRADE

NILES CANYON QUARRY RECLAMATION
30% DESIGN

ALAMEDA COUNTY, CA

Stillwater Sciences
2855 TELEGRAPH AVENUE, SUITE 400
BERKELEY, CA 94705 P: (510) 848-8098

PROJECT NUMBER: 652.00
SCALE: AS NOTED
DATE: 11/16/2018

DESIGN: CL
DRAWN: CL
CHECKED: JM
APPROVED: ----

REGISTERED PROFESSIONAL ENGINEER JOEL MONSCHKE No. 79688 9-30-20 EXPIRES CIVIL STATE OF CALIFORNIA

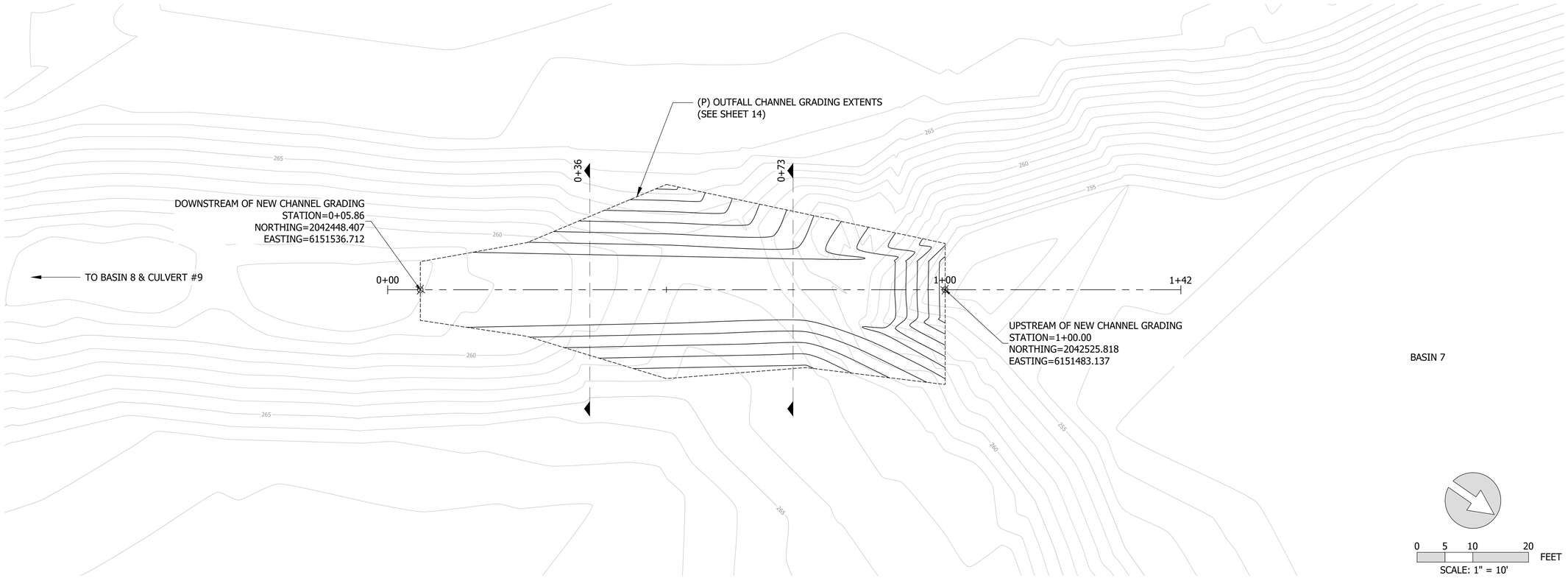
UPPER CHANNEL - SECTIONS

SHEET 13 OF 19

IF BAR DOES NOT MEASURE 1" ORIGINAL IS NOT TO SCALE - ADJUST ACCORDINGLY

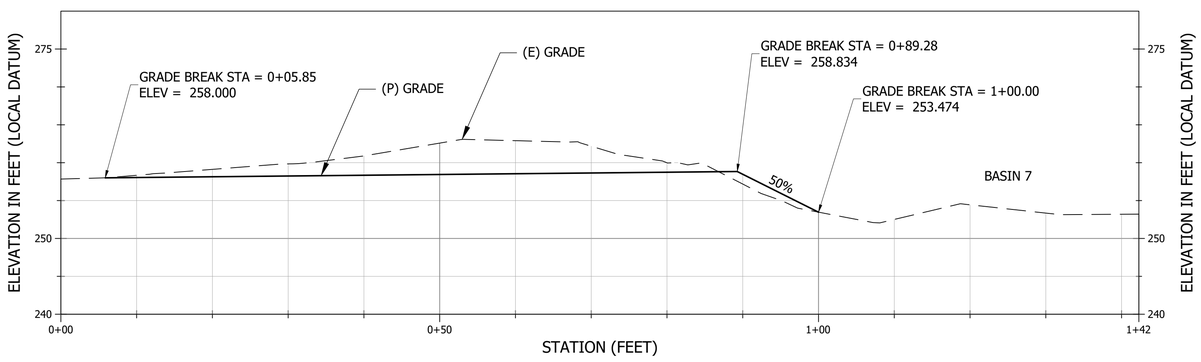
LAST SAVED: 11/16/2018 PLOT DATE: 11/16/2018 PLOT STYLE: ----

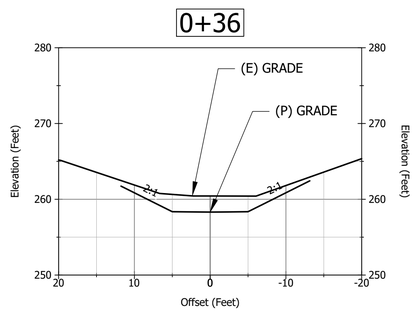
Z:\DATA\652.00_NILES_CANYON\CAD\Y2_MODEL\652.00_MODEL.DWG

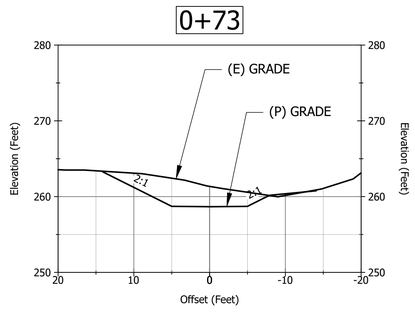


0 5 10 20 FEET
SCALE: 1" = 10'

PROPOSED BASIN 7 OUTFALL CHANNEL







NILES CANYON QUARRY RECLAMATION
30% DESIGN

ALAMEDA COUNTY, CA

Stillwater Sciences
2855 TELEGRAPH AVENUE, SUITE 400
BERKELEY, CA 94705 P: (510) 848-8098

PROJECT NUMBER: 652.00
SCALE: AS NOTED
DATE: 11/16/2018

DESIGN: CL
DRAWN: CL
CHECKED: JM
APPROVED: ----

REGISTERED PROFESSIONAL ENGINEER
JOEL MONSEN
No. 79688
9-30-20
EXPIRES
CIVIL
STATE OF CALIFORNIA

BASIN 7 OUTFALL CHANNEL -PLAN, PROFILE & SECTIONS

SHEET 14 OF 19

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY

LAST SAVED: 11/16/2018 PLOT DATE: 11/16/2018 PLOT STYLE: ----

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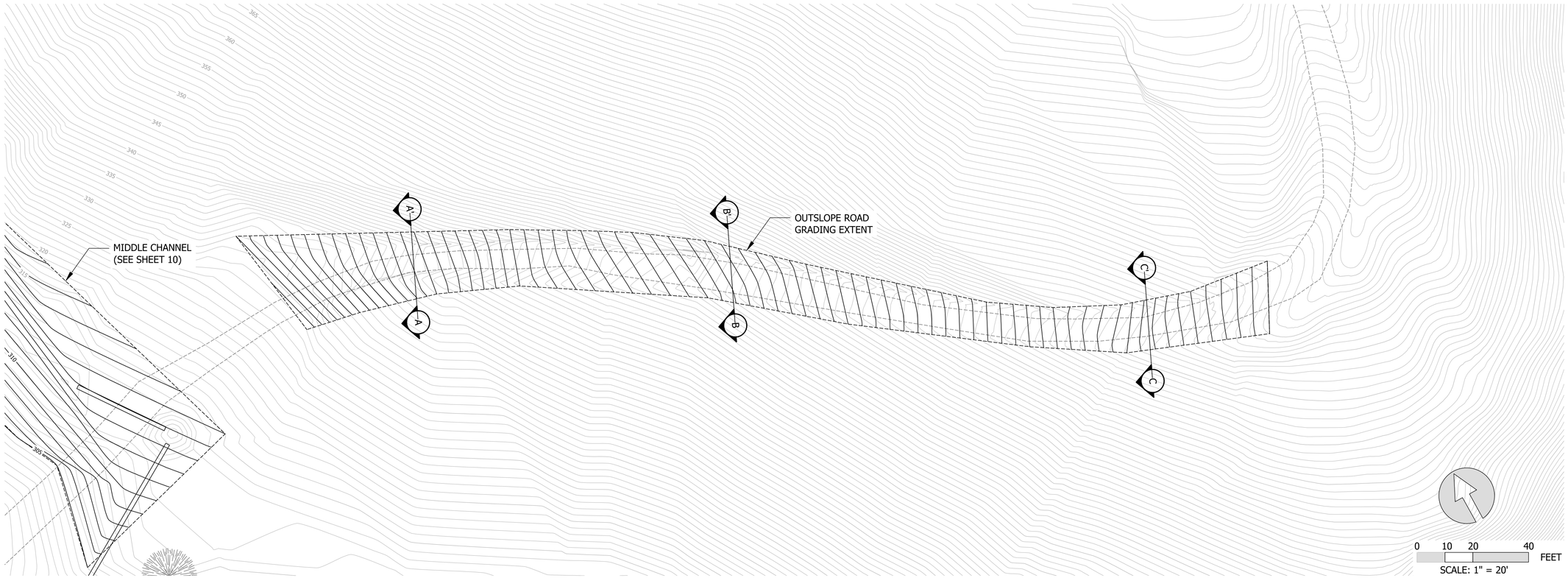

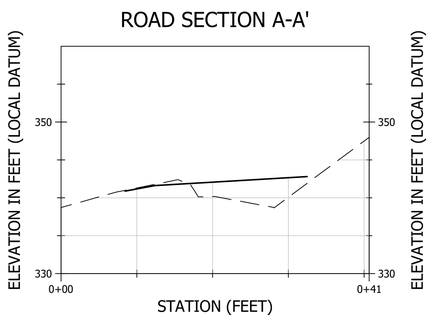

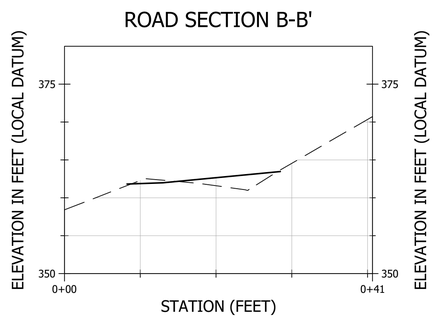

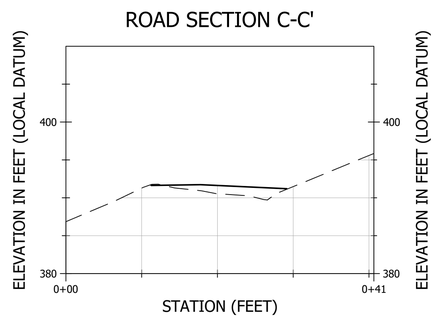

LEGEND

EXISTING GRADE

PROPOSED GRADE

NILES CANYON QUARRY RECLAMATION
30% DESIGN

ALAMEDA COUNTY, CA

Stillwater Sciences

2855 TELEGRAPH AVENUE, SUITE 400
BERKELEY, CA 94705 P: (510) 848-8098

PROJECT NUMBER: 652.00
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DESIGN: CL
DRAWN: CL
CHECKED: JM
APPROVED: ----

REGISTERED PROFESSIONAL ENGINEER JOEL MONSEN No. 79688 9-30-20 EXPIRES CIVIL STATE OF CALIFORNIA

ROAD GRADING - PLAN & SECTIONS

SHEET 15 OF 19

NILES CANYON QUARRY RECLAMATION
30% DESIGN

ALAMEDA COUNTY, CA

Stillwater Sciences
2855 TELEGRAPH AVENUE, SUITE 400
BERKELEY, CA 94705 P: (510) 848-8098

SWS006

6+94

SWS014

6+00

ROCK GRADE CONTROL 3/19

SWS015

5+00

ROCK RAMP & PLUNGE POOL 1/19

SWS00

SWS018

SWS016

(P) CULVERT #11 REPLACED WITH ROCK ARMORED DITCH (SEE SHEET 8)

4+00

(P) CHANNEL GRADING BETWEEN BASIN 5 & 6 (SEE SHEET 8)

3+00

(P) CHANNEL GRADING BETWEEN BASIN 5 & 6 (SEE SHEET 8)

ROCK RAMP & PLUNGE POOL 1/19

2+00

MIDDLE CHANNEL GRADING (SEE SHEET 10)

3/19 ROCK GRADE CONTROL

SWS004

(P) CULVERT #10 REPLACED WITH ROCK ARMORED DITCH (SEE SHEET 8)

(P) ARMOR EXISTING DITCH

1+42

ROCK GRADE CONTROL 3/19

(P) OUTFALL CHANNEL GRADING EXTENTS (SEE SHEET 14)

1+00

3/19 ROCK GRADE CONTROL

0+00

NOTE: ENGINEERED STREAMBED MATERIAL (ESM) TO BE PLACED THOUGH OUT CHANNEL BE EXTENTS (SEE DETAIL 2 - ROCK SIZING & VOLUME ON SHEET 19)

0 10 20 40 FEET
SCALE: 1" = 20'

PROJECT NUMBER: 652.00
SCALE: AS NOTED
DATE: 11/16/2018

DESIGN: CL
DRAWN: CL
CHECKED: JM
APPROVED: ----

REGISTERED PROFESSIONAL ENGINEER JOEL MONSCHKE No. 79688 9-30-20 EXPIRES CIVIL STATE OF CALIFORNIA

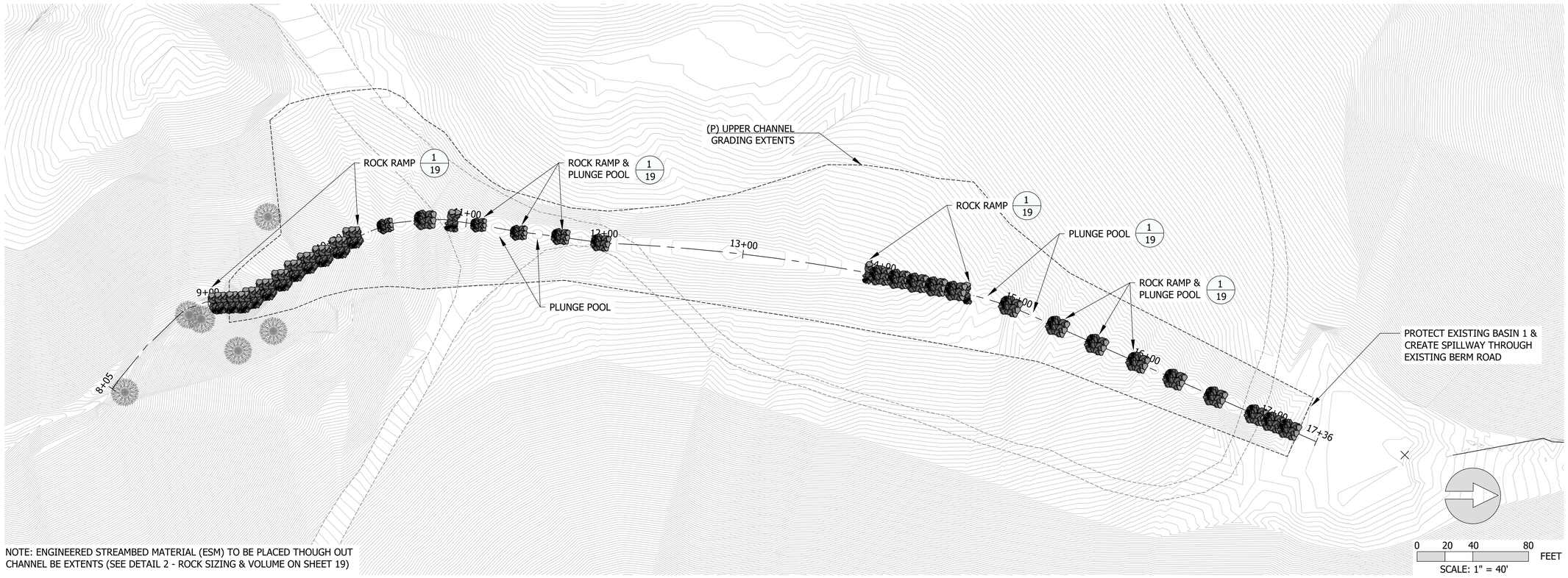
LOWER PAD FEATURES

SHEET 16 OF 19

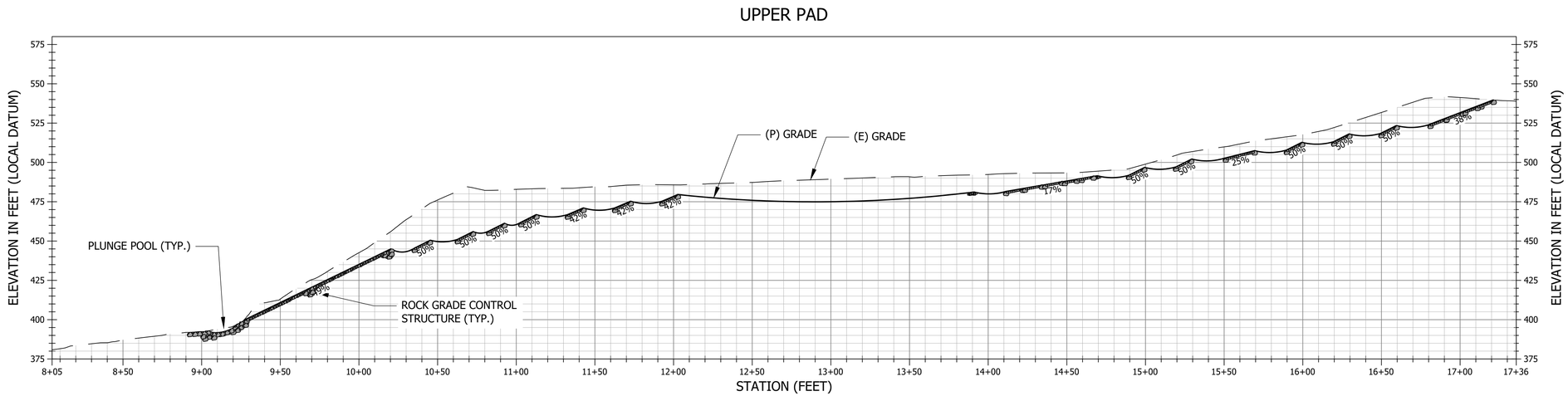
IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY

LAST SAVED: 11/16/2018 PLOT DATE: 11/16/2018 PLOT STYLE: ----

Z:\DATA\652.00_NILES_CANYON\CAD\2_MODEL\652.00_MODEL.DWG



NOTE: ENGINEERED STREAMBED MATERIAL (ESM) TO BE PLACED THOUGH OUT CHANNEL BE EXTENTS (SEE DETAIL 2 - ROCK SIZING & VOLUME ON SHEET 19)



NILES CANYON QUARRY RECLAMATION
30% DESIGN

ALAMEDA COUNTY, CA

Stillwater Sciences
2855 TELEGRAPH AVENUE, SUITE 400
BERKELEY, CA 94705 P: (510) 848-8098

PROJECT NUMBER: 652.00
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DESIGN: CL
DRAWN: CL
CHECKED: JM
APPROVED: ----

REGISTERED PROFESSIONAL ENGINEER JOEL MONSEN No. 79688 9-30-20 EXPIRES CIVIL STATE OF CALIFORNIA

UPPER CHANNEL FEATURES

SHEET 17 OF 19

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY

LAST SAVED: 11/16/2018 PLOT DATE: 11/16/2018 PLOT STYLE: ----

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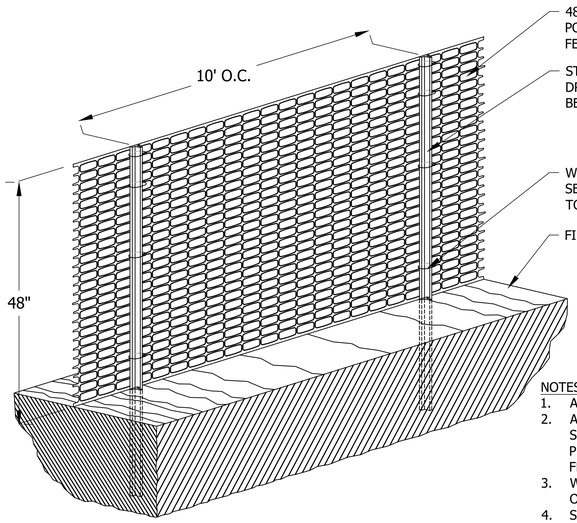
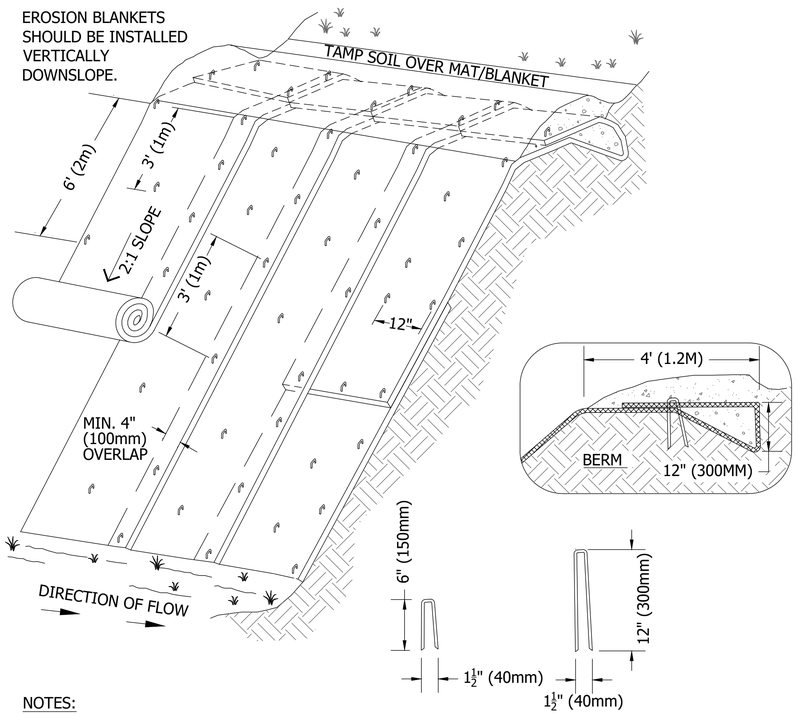


NOTES:

1. ALL SENSITIVE AREAS SHALL BE PROTECTED AS PER PLAN.
2. ALL TREES IN THE CONSTRUCTION AREA NOT SPECIFICALLY DESIGNATED FOR REMOVAL SHALL BE PRESERVED AND PROTECTED WITH HIGH VISIBILITY FENCE AS PER PLAN.
3. WHEN PRACTICABLE, INSTALL HIGH VISIBILITY 3 FEET OUTSIDE OF THE DRIP LINE OF THE TREE.
4. SAFETY FENCE SHOULD BE FASTENED SECURELY TO THE T-POSTS.
5. THE FENCING MUST REMAIN IN PLACE DURING ALL PHASES OF CONSTRUCTION; ANY CHANGE OF THE PROTECTIVE FENCING MUST BE APPROVED.

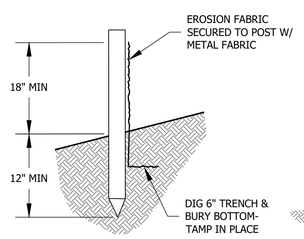
1 **SENSITIVE AREA & TREE PROTECTION**
Scale = NTS



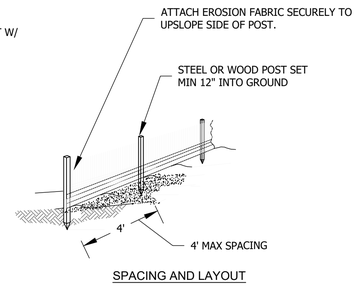
NOTES:

1. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS.
MATS/ BLANKETS SHALL HAVE GOOD SOIL CONTACT.
2. APPLY PERMANENT SEEDING BEFORE PLACING BLANKETS.
3. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.

4 **EROSION CONTROL FABRIC**
Scale = NTS

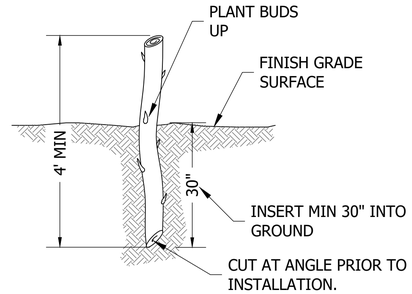


SECTION VIEW



SPACING AND LAYOUT

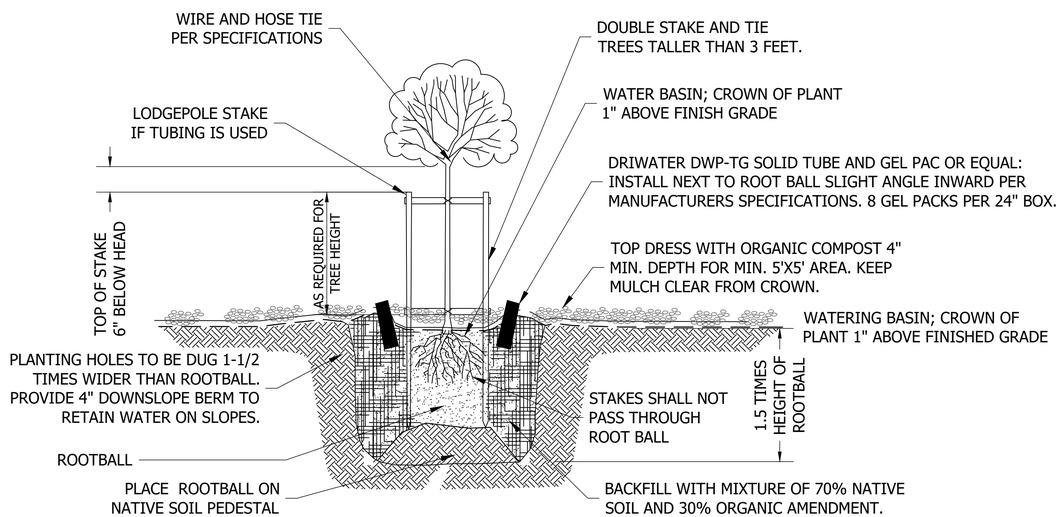
2 **SILT FENCING**
Scale = NTS



NOTES:

1. WILLOW STAKE SPECIES SHALL BE A MIX OF SPECIES PRESENT AT AND ADJACENT TO THE WORK SITE
2. EACH STAKE SHALL BE 1.5" - 3" THICK AT THE BOTTOM TO FACILITATE ROOT GROWTH AFTER TREATMENT WITH ROOTING HORMONE
3. INSERT MIN 30" INTO GROUND
4. INSTALL STAKES CONCURRENTLY WITH ROCK AND LOG STRUCTURES AND THEN BACKFILL WITH NATIVE SOIL TO PROMOTE ROOTING

3 **WILLOW STAKING**
Scale = NTS



5 **TREE PLANTING**
Scale = NTS

NILES CANYON QUARRY RECLAMATION
30% DESIGN

ALAMEDA COUNTY, CA

Stillwater Sciences
2855 TELEGRAPH AVENUE, SUITE 400
BERKELEY, CA 94705 P: (510) 848-8098

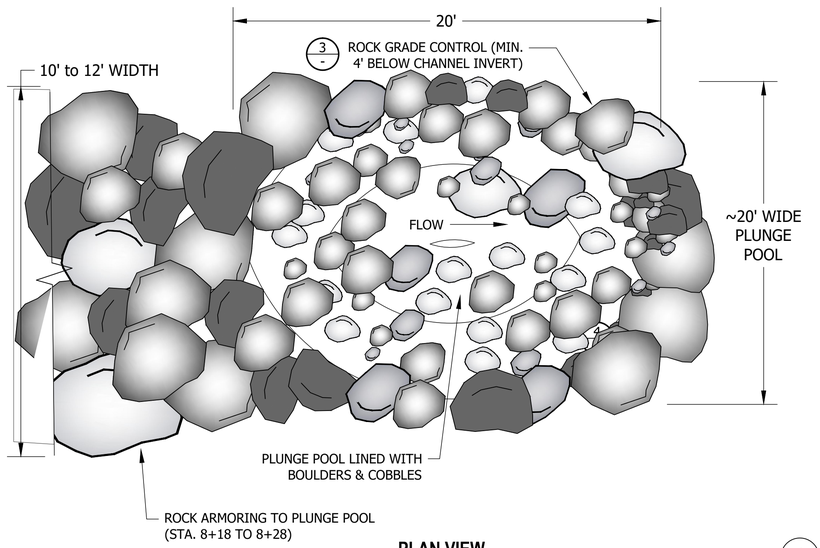
PROJECT NUMBER: 652.00
SCALE: AS NOTED
DATE: 11/16/2018

DESIGN: CL
DRAWN: CL
CHECKED: JM
APPROVED: ----

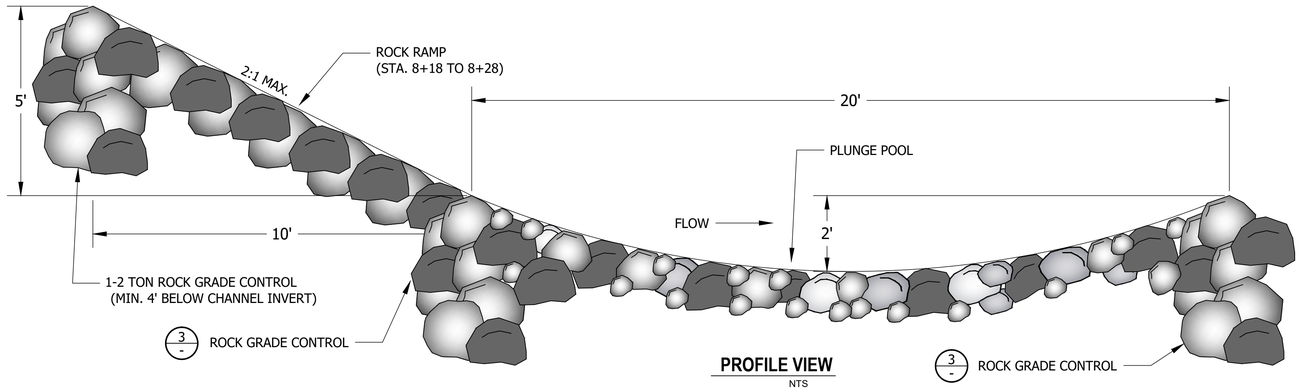
REGISTERED PROFESSIONAL ENGINEER — JOEL MONSCHKE — No. 79688 — 9-30-20 EXPIRES — CIVIL — STATE OF CALIFORNIA

EROSION CONTROL & PLANTING DETAILS

SHEET 18 OF 19



PLAN VIEW
NTS

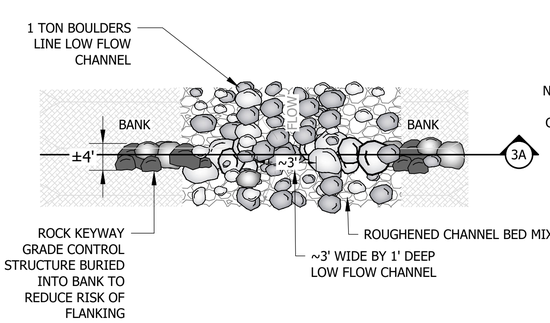


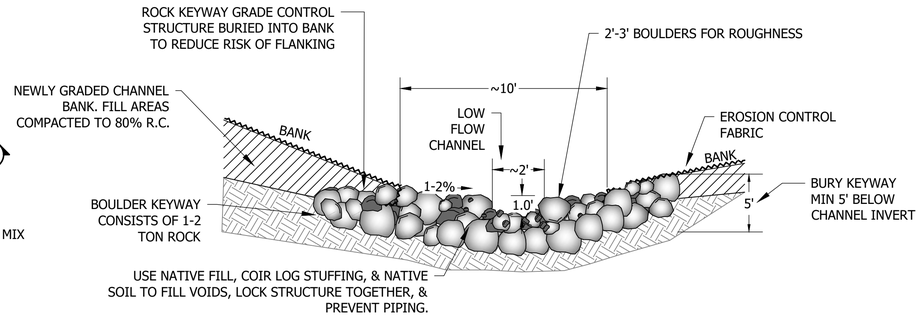
PROFILE VIEW
NTS

1 **ROCK RAMP & PLUNGE POOL**
Scale = NTS

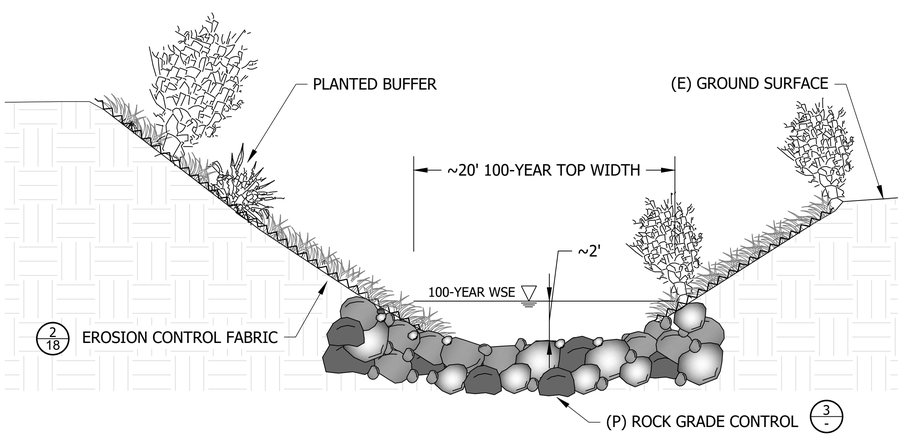
CHANNEL ARMORING BOULDERS 1-3 TON _____ 30 - 60"	ENGINEERED STREAMBED MATERIAL (ESM)* SIZE (INCHES) %PASSING D84 15"-18" D50 10"
GRADE CONTROL STRUCTURES • INDIVIDUALLY PLACED 1-3 TON ROCK. • BACKFILL WITH ESM	D30 6" D16 1" D0 SAND
RSP FOR ROCK RAMP • 1/2-1 TON _____ 30" - 60" • BACKFILL WITH ESM	*ESM SHALL CONTAIN A MIN OF 10% AND MAX OF 15% NATIVE ON-SITE SOIL.
TOTAL VOLUME OF ROCK ROCK SLOPE PROTECTION (RSP) (1/2 - 1 TON): 250 CUBIC YARDS BOULDERS (1 - 3 TON): 750 CUBIC YARDS ENGINEERED STREAMBED MATERIAL: 200 CUBIC YARDS	

2 **ROCK SIZING & VOLUME**
Scale = NTS

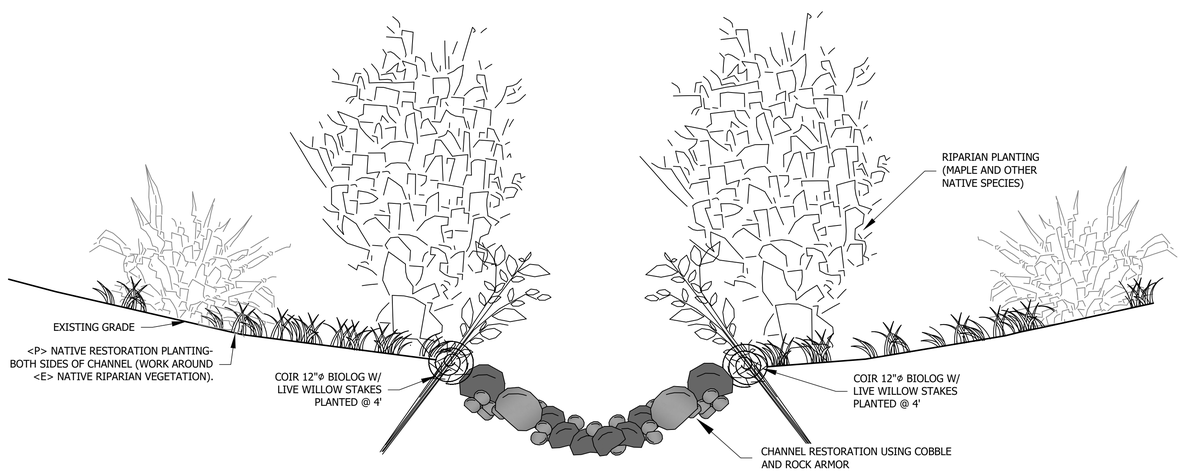




3 **GRADE CONTROL PLAN & SECTION VIEW**
Scale = NTS



4 **TYPICAL CHANNEL SECTION**
Scale = NTS



5 **BIO-TECHNIAL CHANNEL RESTORATION DETAIL**
Scale = NTS

NILES CANYON QUARRY RECLAMATION
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DETAILS

SHEET 19 OF 19