APPENDIX A
INDEX TO REQUIRED CONTENT

APPENDIX A
INDEX TO REQUIRED CONTENT

Mine Name: Permanente Quarry **Checklist Completed by:** D. Brown

Reclamation Plan: April 2019 **Amendments:**

End Use: Open Space or a condition for future uses in Hillside and Agriculture Zones **Date:** April 5, 2019

Authority	Requirements/Practices/Standards	Applicable	Source/Page or Explanation
GENERAL CONSIDERATIONS			
PRC 2772(b)	Required contents chart: A chart identifying the location (e.g. page number, chapter, appendix, or other location in the reclamation plan) of content that meets the requirements of PRC Sections 2772, 2773, 2773.3 and CCR Articles 1 and 9 (as delineated in this checklist).	Yes	Reclamation Plan, Appendix A
PRC 2772(c)(1)	Contact information: Name and address of the surface mining operator and any person designated by the operator as an agent for service of process (must reside in CA).	Yes	Reclamation Plan, Pg. 8, Sec. 2.1
PRC 2772(c)(2)	Material quantity and type: The anticipated total quantity and type of minerals to be mined (see Annual Report Instructions, Exhibit B, for mineral types and units of measure).	Yes	Reclamation Plan, Pg. 11,Sec. 3.1
PRC 2772(c)(3)	Dates: The initiation and termination dates of mining (be as specific as possible, e.g. December 31, 2030).	Yes	Reclamation Plan, Pg. 11,Sec. 3.2
PRC 2772(c)(4)	Depth of mining: The maximum anticipated depth of surface mining in relation to a verifiable benchmark such as Mean Sea Level.	Yes	Reclamation Plan, Pg. 12,Sec. 3.3
PRC 2772(c)(5) (A-F)	Reclamation plan maps shall include**:** Size and legal description of lands affected by surface mining operations;	Yes	Reclamation Plan, Figure 4 Sheet 1, and Appendix D
	Names and addresses of owners of all surface interests and mineral interests;	Yes	Appendix C and Appendix D
	Property lines, setbacks, and the reclamation plan boundary;	Yes	Reclamation Plan, Figures 6 and 11; Sheets 2 and 4, and Appendix D-5
	Existing and final topography with contour lines at appropriate intervals;	Yes	Reclamation Plan, Figure 11 and Sheets 1 and 4
	Detailed geologic description of the area of the surface mining operation;	Yes	Reclamation Plan, Pg. 15 and Figure 10
	Locations of railroads, utility features, and roads (access roads, temporary roads to be reclaimed, and any roads remaining for the end use).	Yes	Reclamation Plan, Sheets 2 and 4
	All maps, diagrams, or calculations that are required to be prepared by a California-licensed professional shall include the preparer's name, license number, signature & seal.	Yes	Reclamation Plan, Sheets 2 and 4
PRC 2772(c)(6)	Mining method and schedule: A description of the mining methods and a time schedule that provides for completion of mining on each segment so that reclamation can be concurrent or phased.	Yes	Reclamation Plan, Pg. 11, Sec. 3.2 and Pg. 37, Sec. 4.9

Authority	Requirements/Practices/Standards	Applicable	Source/Page or Explanation
PRC 2772(c)(7)	Subsequent use(s): A description of the proposed subsequent use(s) after reclamation	Yes	Reclamation Plan, Pg. 9, Sec. 2.6
	Evidence that all landowners have been notified of the proposed use.	Yes	Appendix B
PRC 2772(c)(9)	Impact on future mining: A statement regarding the impact of reclamation on future mining on the site.	Yes	Reclamation Plan, Pg. 37, Sec. 4.8.5
PRC 2772(c)(10)	Signed statement: Statement signed by the operator accepting responsibility for reclamation of the mined lands per the reclamation plan.	Yes	Reclamation Plan, Appendix C
PRC 2776(b-c)	Pre-SMARA areas: Reclamation plans shall apply to operations conducted after January 1, 1976 or to be conducted in the future. Mined lands disturbed prior to January 1, 1976 *and not disturbed after that date* may be excluded from the reclamation plan.	Yes	Reclamation Plan, Pg. 8, Sec. 1.3.7 describes the PCRA as separately addressed
CCR 3502(b)(2)	Public health and safety: A description of how any potential public health and safety concerns that may arise due to exposure of the public to the site will be addressed.	Yes	Reclamation Plan, Pg. 37, Sec. 4.8.6
CCR 3709(a)	Equipment storage and waste disposal: Designate areas for equipment storage and show on maps.	Yes	Reclamation Plan, Figure 6 and Sheet 2
	All waste shall be disposed of in accordance with state and local health and safety ordinances.	Yes	Reclamation Plan, Pg. 34, Sec. 4.8.1
CCR 3709(b)	Structures and equipment removed: Structures and equipment should be dismantled and removed at closure, except as demonstrated to be necessary for the proposed end use.	Yes	Reclamation Plan, Pg. 36, Sec. 4.8.2
CCR 3713(a)	Well closures: Drill holes, water wells, monitoring wells will be completed or abandoned in accordance with laws, unless demonstrated necessary for the proposed end use.	Yes	Reclamation Plan, Pg. 36, Sec. 4.8.3
CCR 3713(b)	Underground openings: Any portals, shafts, tunnels, or openings will be gated or protected from public entry, and to preserve access for wildlife (e.g. bats).	Yes	Reclamation Plan, Pg. 36, Sec. 4.8.3
GEOLOGY AND GEOTECHNICAL			
PRC 2772(c)(5)	A description of the general geology of the area	Yes	Reclamation Plan, Figure 10 and Pg. 15, Sec. 3.8.1
	A detailed description of the geology of the mine site.		
PRC 2773.3	If a metallic mine is located on, or within one mile of, any "Native American sacred site" and is located in an "area of special concern, " the reclamation plan shall require that all excavations and/or excess materials be backfilled and graded to achieve the approximate original contours of the mined lands prior to mining.	No	Not a metals mine
CCR 3502(b)(4)	The source and disposition of fill materials used for backfilling or grading shall be considered in the reclamation plan.	Yes	Reclamation Plan, Pg. 18, Sec. 3.8.4
CCR 3502(b)(3)	The designed steepness and treatment of final slopes must consider the physical properties of slope materials, maximum water content, and landscaping.	Yes	Reclamation Plan, Pg. 16, Sec.3.8.2
	The reclamation plan shall specify slope angles flatter than the critical gradient for the type of slope materials.	Yes	Reclamation Plan, Pg. 16, Sec.3.8.2 and Appendix G
	When final slopes approach the critical gradient, a Slope Stability Analysis will be required.	Yes	Reclamation Plan, Appendix G
CCR 3704.1	Backfilling required for surface mining operations for metallic minerals.	No	Not a metals mine

Authority	Requirements/Practices/Standards	Applicable	Source/Page or Explanation
CCR 3704(a)	For urban use, fill shall be compacted in accordance with Uniform Building Code, local grading ordinance, or other methods approved by the lead agency.	No	Not urban use
CCR 3704(b)	For resource conservation, compact to the standards required for that end use.	Yes	Reclamation Plan, Pg. 18, Sec. 3.8.3
CCR 3704(d)	Final reclamation fill slopes shall not exceed 2:1 (H:V), except when allowed by site-specific engineering analysis, and the proposed final slope can be successfully revegetated. See also Section 3502(b)(3).	Yes	Reclamation Plan, Pg. 17, Sec. 3.8.3, and Appendix G
CCR 3704(e)	At closure, all fill slopes shall conform with the surrounding topography or approved end use.	Yes	Reclamation Plan, Pg. 17, Sec. 3.8.3, Pg. 18, Sec. 3.8.4
CCR 3704(f)	Final cut slopes must have a minimum slope stability factor of safety that is suitable for the end use and conforms with the surrounding topography or end use.	Yes	Reclamation Plan, Pg. 16, Sec. 3.8.2
HYDROLOGY AND WATER QUALITY			
PRC 2770.5	For operations within the 100-year flood plain (defined by FEMA) and within one mile up- or downstream of a state highway bridge, Caltrans must be notified and provided a 45-day review period by the lead agency.	No	Not in 100-year floodplain
PRC 2772(c)(8)(A)	Description of the manner in which contaminants will be controlled and mine waste will be disposed.	Yes	Reclamation Plan, Pg. 19, Sec. 3.9, and Appendix H
PRC 2772(c)(8)(B)	The reclamation plan shall include a description of the manner in which stream banks/beds will be rehabilitated to minimize erosion and sedimentation.	No	No streambeds affected
PRC 2773(a)	The reclamation plan shall establish site-specific sediment and erosion control criteria for monitoring compliance with the reclamation plan.	Yes	Reclamation Plan, Pg. 19, Sec. 3.9 and Appendix I
CCR 3502(b)(6)	Temporary stream and watershed diversions shall be detailed in the reclamation plan.	No	No stream diversion
CCR 3503(a)(2)	Stockpiles of overburden and minerals shall be managed to minimize water and wind erosion.	Yes	Reclamation Plan, Pg. 19, Sec. 3.9
CCR 3503(b)(2)	Operations shall be conducted to substantially prevent siltation of groundwater recharge areas.	No	No groundwater recharge zone
CCR 3503(a)(3)	Erosion control facilities shall be constructed and maintained where necessary to control erosion.	No	Reclamation Plan, Pg. 19, Sec. 3.9
CCR 3503(b)(1)	Settling ponds shall be constructed where they will provide a significant benefit to water quality.	No	Reclamation Plan, Pg. 19, Sec. 3.9
CCR 3503(d)	Disposal of mine waste and overburden shall be stable and shall not restrict natural drainage without suitable provisions for diversion.	Yes	Reclamation Plan, Pg. 15, Sec. 3.8
CCR 3503(e)	Grading and revegetation shall be designed to minimize erosion and convey surface runoff to natural drainage courses or interior basins.	Yes	Reclamation Plan, Pg. 19, Sec. 3.9 and Appendix I Reclamation Plan, Pg. 28, Sec. 4.4
	Spillway protection shall be designed to prevent erosion.	No	No discharge spillways
CCR 3706(a)	Surface mining and reclamation activities shall be conducted to protect on-site and downstream beneficial uses of water.	Yes	Reclamation Plan, Pg. 19, Sec. 3.9
CCR 3706(b)	Water quality, recharge potential, and groundwater storage that is accessed by others shall not be diminished.	No	Hardrock quarry; not an aquifer

Authority	Requirements/Practices/Standards	Applicable	Source/Page or Explanation
CCR 3706(c)	Erosion and sedimentation shall be controlled during all phases of construction, operation, reclamation, and closure of surface mining operations to minimize siltation of lakes and water courses as per RWQCB/SWRCB.	Yes	Reclamation Plan, Pg. 19, Sec. 3.9 and Appendix I
CCR 3706(d)	Surface runoff and drainage shall be controlled to protect surrounding land and water resources.	Yes	Reclamation Plan, Pg. 19, Sec. 3.9 and Appendix I
	Erosion control methods shall be designed for not less than 20 year/1 hour intensity storm event.		
CCR 3706(e)	Impacted drainages shall not cause increased erosion or sedimentation. Mitigation alternatives shall be proposed in the reclamation plan.	No	Drainages avoided
CCR 3706(f)(1)	Stream diversions shall be constructed in accordance with the Lake and Streambed Alteration Agreement (LSAA) between the operator and the Department of Fish and Wildlife.	No	No stream diversions
CCR 3706(f)(2)	Stream diversions shall also be constructed in accordance with Federal Clean Water Act and the Rivers and Harbors Act of 1899.	No	No stream diversions
CCR 3706(g)	All temporary stream diversions shall eventually be removed and the affected land reclaimed.	No	No stream diversions
CCR 3710(a)	Surface and groundwater shall be protected from siltation and pollutants in accordance with the Porter-Cologne Act, the Federal Clean Water Act, and RWQCB/SWRCB requirements.	Yes	Reclamation Plan, Pg. 19, Sec. 3.9
CCR 3710(b)	In-stream mining shall be conducted in accordance with Section 1600 et seq. of the California Fish and Game Code, Section 404 of the Clean Water Act, and Section 10 of the Rivers and Harbors Act of 1899.	No	Not an instream operation
CCR 3710(c)	In-stream mining shall be regulated to prevent impacts to structures, habitats, riparian vegetation, groundwater levels, and banks.	No	Not an instream operation
	In-stream channel elevations and bank erosion shall be evaluated annually using extraction quantities, cross-sections, and aerial photos.		
CCR 3712	Mine waste and tailings and mine waste disposal units are governed by SWRCB waste disposal regulations and shall be reclaimed in accordance with this article: CCR Article 1. Surface Mining and Reclamation Practice. Section 3500 et seq.	Yes	Reclamation Plan, Pg. 34, Sec. 4.8.1
SENSITIVE SPECIES AND HABITAT			
CCR 3502(b)(1)	A description of the environmental setting (identify sensitive species, wildlife habitat, sensitive natural communities, e.g. wetlands).	Yes	Reclamation Plan, Pg. 15, Sec. 4.5
	Impacts of reclamation on surrounding land uses.	No	No offsite impacts
CCR 3503(c)	Fish and wildlife habitat shall be protected by all reasonable measures.	Yes	Reclamation Plan, Pg. 23, Sec. 3.10
CCR 3703(a)	Sensitive species shall be conserved or mitigated as prescribed by the federal and California Endangered Species Acts.	Yes	Reclamation Plan, Pg. 23, Sec. 3.10
CCR 3703(b)	Wildlife habitat shall be established on disturbed land at least as good as pre-project, unless end use precludes its use as wildlife habitat.	No	Habitat not a reclamation goal
CCR 3703(c)	Wetlands shall be avoided or mitigated at 1:1 minimum for both acreage and habitat value.	No	No wetlands affected
CCR 3704(g)	Piles or dumps shall not be placed in wetlands without mitigation.	No	No wetlands affected
CCR 3710(d)	In-stream mining shall not cause fish to be trapped in pools or off-channel pits, or restrict migratory or spawning activities.	No	Not an instream operation

Authority	Requirements/Practices/Standards	Applicable	Source/Page or Explanation
TOPSOIL			
CCR 3503(a)(1)	Removal of vegetation and overburden preceding mining shall be kept to a minimum.	Yes	Reclamation Plan, Pg. 12, Sect. 3.6
CCR 3503(f)	When the reclamation plan calls for resoiling, mine waste shall be leveled and covered with a layer of finer material. A soil layer shall then be placed on this prepared surface.	Yes	Reclamation Plan, Pg. 26, Sect. 4.2
	The use of soil conditioners, mulches, or imported topsoil shall be considered where such measures appear necessary.		
CCR 3704(c)	Mine waste shall be stockpiled to facilitate phased reclamation and kept separate from topsoil or other growth media.	Yes	Reclamation Plan, Pg. 26, Sect. 4.2.1
CCR 3705(e)	If soil is altered or other than native topsoil, soil analysis is required. Add fertilizers or soil amendments if necessary.	Yes	Appendix F
CCR 3711(a)	All salvageable topsoil shall be removed as a separate layer.	Yes	Reclamation Plan, Pg. 12, Sect. 3.6
	Topsoil and vegetation removal should not precede mining by more than one year.	Yes	Reclamation Plan, Pg. 12, Sect. 3.6
CCR 3711(b)	Topsoil resources shall be mapped prior to stripping and location of topsoil stockpiles shown on map included in the reclamation plan.	Yes	Reclamation Plan, Pg. 12, Sect. 3.6, and Figure 9
	Topsoil and other growth media shall be maintained in separate stockpiles.	Yes	Reclamation Plan, Pg. 15, Sec. 3.6.3, and Sheet 2
	Test plots may be required to determine the suitability of growth media for revegetation purposes.	Yes	Reclamation Plan, Pg. 26, Sect. 4.2
CCR 3711(c)	Soil salvage operations and phases of reclamation shall be set forth in the reclamation plan to minimize the area disturbed and to achieve maximum revegetation success.	Yes	Reclamation Plan, Pg. 12, Sect. 3.6
CCR 3711(d)	Topsoil and growth media shall be used to phase reclamation as soon as can be accommodated following the mining of an area.	Yes	Reclamation Plan, Pg. 26, Sec.4.2
	Topsoil stockpiles shall not be disturbed until needed for reclamation.	Yes	Reclamation Plan, Pg. 12, Sec. 3.6
	Topsoil stockpiles shall be clearly identified with signs.		
	Topsoil shall be planted with vegetation or otherwise protected to prevent erosion and discourage weeds.		
CCR 3711(e)	Topsoil shall be redistributed in a manner resulting in a stable, uniform thickness consistent with the end use.	Yes	Reclamation Plan, Pg. 26, Sec. 4.2
REVEGETATION			
PRC 2773(a)	The reclamation plan shall be specific to the property and shall establish site-specific criteria for evaluating compliance with the reclamation plan with respect to revegetation.	Yes	Reclamation Plan, Pg. 28, Sec. 4.3
CCR 3503(g)	Available research regarding revegetation methods and selection of species given the topography, resoiling characteristics, and climate of the mined areas shall be used.	Yes	Appendix F
CCR 3705(a)	Baseline studies shall be conducted prior to mining activities to document vegetative cover, density, and species richness.	Yes	Appendix F
	Vegetative cover shall be similar to surrounding habitats and self-sustaining.		
CCR 3705(b)	Test plots shall be conducted simultaneously with mining to ensure successful implementation of the proposed revegetation plan.	Yes	Appendix F
CCR 3705(c)	Decompaction methods, such as ripping and disking, shall be used in areas to be revegetated to establish a suitable root zone for planting.	Yes	Reclamation Plan, Pg. 26, Sec. 4.2
CCR 3705(d)	Roads shall be stripped of roadbase materials, resoiled, and revegetated, unless exempted.	Yes	Reclamation Plan, Pg. 26, Sec. 4.2

Authority	Requirements/Practices/Standards	Applicable	Source/Page or Explanation
CCR 3705(f)	Temporary access shall not disrupt the soil surface on arid lands except where necessary for safe access. Barriers shall be installed to keep unauthorized vehicles out.	No	Not an arid lands site
CCR 3705(g)	Use local native plant species (unless non-native species meet the end use).	Yes	Reclamation Plan, Pg. 28 Sec. 4.3, Pg. 29, Sec. 4.4
	Areas to be developed for industrial, commercial, or residential shall be revegetated for the interim period to control erosion.		
CCR 3705(h)	Planting shall be conducted during the most favorable period of the year for plant establishment.	Yes	Reclamation Plan, Pg. 30, Sec. 4.5.1
CCR 3705(i)	Use soil stabilizing practices and irrigation when necessary to establish vegetation.	No	Reclamation Plan, Pg. 30, Sec. 4.5.2
CCR 3705(j)	If irrigation is used, demonstrate that revegetation has been self-sustaining without irrigation for two years prior to the release of financial assurance.	No	No irrigation
CCR 3705(k)	Weeds shall be monitored and managed.	Yes	Reclamation Plan, Pg. 34, Sec. 4.7
CCR 3705(l)	Plant protection measures such as fencing and caging shall be used where needed for revegetation success. Protection measures shall be maintained until revegetation efforts are successfully completed and the lead agency authorizes removal.	Yes	Reclamation Plan, Pgs. 29 Sec. 4.5
CCR3705(m)	Quantitative success standards for vegetative cover, density, and species richness shall be included in the reclamation plan.	Yes	Reclamation Plan, Pg. 31, Sec. 4.5.5
	Monitoring to occur until success standards have been achieved.	Yes	Reclamation Plan, Pg. 33, Sec. 4.6
	Sampling techniques for measuring success shall be specified. Sample size must be sufficient to provide at least an 80 percent statistical confidence level.	Yes	Reclamation Plan, Pg. 33, Sec. 4.6
AGRICULTURE			
CCR 3707(a)	Where the end use will be agriculture, prime agricultural land shall be returned to a fertility level specified in the reclamation plan.	No	Not prime agricultural land
CCR 3707(b)	Segregate and replace topsoil in proper sequence by horizon in prime agricultural soils.		
CCR 3707(c)	Post reclamation productivity rates for prime agricultural land must be equal to pre-project condition or to a similar site for two consecutive years.		
	Productivity rates shall be specified in the reclamation plan.		
CCR 3707(d)	If fertilizers and amendments are applied, they shall not cause contamination of surface or groundwater.		
CCR 3708	For sites where the end use is to be agricultural, non-prime agricultural land must be reclaimed to be capable of sustaining economically viable crops common to the area.	Yes	Agriculture not the end use

APPENDIX B
NOTIFICATION TO LANDOWNERS

NOTIFICATION OF LANDOWNER

SMARA (Public Resources Code Section 2772[c][7]) requires that a reclamation plan provide evidence that all owners of a possessory interest in the land have been notified of the proposed use or potential uses after reclamation. Reclamation of Permanente Quarry will return the site to an open space condition suitable for subsequent uses allowed under the Santa Clara County Zoning Ordinance for the applicable Agricultural and Hillside zones.

I (We) hereby acknowledge the planned mine reclamation for parcels listed below. Further, consent is given the operator, the State of California, and Santa Clara County or its authorized agents, to access the property for annual inspections and evaluation to achieve the satisfactory completion of the provisions of the reclamation plan approved pursuant to the California Surface Mining and Reclamation Act of 1975, as amended.

Parcel(s): 342-22-065m 342-22-098, 342-45-045, 342-64-001, 351-09-003, 351-09-013, 351-09-020, 351-09-022, 351-09-023, 351-09-025, 351-10-003, 351-10-004, 351-10-005, 351-10-006, 351-10-008, 351-10-010, 351-10-011, 351-10-012, 351-10-017, 351-10-023, 351-10-029, 351-10-030, 351-10-033, 351-10-034, 351-10-035, 351-10-037, 351-10-038, 351-10-039, 351-11-001, 351-11-005, 351-11-006, 351-11-007, 351-11-081, 351-12-067

Landowner(s):

_____ _____

Hanson Permanente Cement, Inc. ***Date***

APPENDIX C
STATEMENT OF RESPONSIBILITY

Name and Address of Owner/Operator

Hanson Permanente Cement, Inc.
Lehigh Southwest Cement Company
24001 Stevens Creek Blvd
Cupertino, California 95014
Contact: Erika Guerra
Telephone: (408) 257-7476 ext. 106
E-mail: erika.guerra@lehighhanson.com

Name and Address of Agent

Lehigh Southwest Cement Company
24001 Stevens Creek Blvd
Cupertino, California 95014
Contact: Erika Guerra
Telephone: (408) 257-7476 ext. 106
E-mail: erika.guerra@lehighhanson.com

STATEMENT OF RECLAMATION RESPONSIBILITY

I certify that the information in this reclamation plan is correct, to the best of my knowledge, and that all of the owners of possessory interest in the property in question have been notified of the planned operation and potential uses of the land after reclamation. I also certify that I am authorized on behalf of Lehigh Southwest Cement Company to accept responsibility for reclaiming the mined lands described and submitted herein, with any modification required by Santa Clara County and agreed to as conditions of approval.

Signed this _____ day of _____, 2019.

_____
Erika Guerra
for Lehigh Hanson, Inc. (Owner/Operator)

APPENDIX D
LEGAL DESCRIPTION, PARCEL DATA, AND VESTED PARCELS

APPENDIX D-1
LEGAL DESCRIPTION

DESCRIPTION:

The land referred to herein is partly in the City of Palo Alto and partly in the County of Santa Clara, State of California, and is described as follows:

PARCEL ONE:

THE EAST HALF (E-1/2) OF SECTION 13, TOWNSHIP 7 SOUTH, RANGE 3 WEST, MOUNT DIABLO BASE AND MERIDIAN.

PARCEL TWO:

THE NORTHEAST QUARTER (NE-1/4) OF ALL OF LOTS 1, 2, 3, 4, 5 AND OF SECTION 19, TOWNSHIP 7 SOUTH, RANGE 2 WEST, MOUNT DIABLO BASE AND MERIDIAN.

PARCEL THREE:

ALL OF SECTION 18, TOWNSHIP 7 SOUTH, RANGE 2 WEST, MOUNT DIABLO BASE AND MERIDIAN.

PARCEL FOUR:

ALL OF SECTION 20, TOWNSHIP 7 SOUTH, RANGE 2 WEST, MOUNT DIABLO BASE MERIDIAN.

PARCEL FIVE:

LOTS 1, 2, 3, 4, 5, 6, 7 AND 8 AND SOUTHEAST 1/4 OF SECTION 17, TOWNSHIP 7 SOUTH, RANGE 2 WEST, MOUNT DIABLO BASE AND MERIDIAN.

PARCEL SIX:

THE NE 1/4 OF SECTION 24, TOWNSHIP 7 SOUTH, RANGE 3 WEST, MOUNT DIABLO BASE AND MERIDIAN.

PARCEL SEVEN:

THE NW 1/4 OF SECTION 21, TOWNSHIP 7, RANGE 2 WEST, MOUNT DIABLO BASE AND MERIDIAN.

EXCEPTING THEREFROM THAT PORTION THEREOF DESCRIBED AS FOLLOWS:

ALL THAT CERTAIN PARCEL OF LAND SITUATE IN SECTION 16 OF TOWNSHIP 7 SOUTH, RANGE 2 WEST, M.D.B. & M. IN THE COUNTY OF SANTA CLARA, STATE OF CALIFORNIA AND BEING A PORTION OF THAT CERTAIN TRACT OF LAND DESIGNATED "PARCEL NO. 7" AND CONVEYED TO THE PERMANENTE CORPORATION BY SANTA CLARA HOLDING CO., LTD., BY DEED RECORDED JULY 12, 1939, IN BOOK 942 OF OFFICIAL RECORDS OF SANTA CLARA COUNTY, CALIFORNIA, AT PAGE 290, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT AN IRON PIPE MONUMENT MARKING THE MOST WESTERLY CORNER OF THAT CERTAIN TRACT OF LAND DESCRIBED AND DESIGNATED "PARCEL 1" IN THAT CERTAIN DEED EXECUTED BY THE ROMAN CATHOLIC ARCHBISHOP OF SAN FRANCISCO TO SANTA CLARA HOLDING CO., LTD., DATED JANUARY 18, 1934 AND RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF SANTA CLARA COUNTY, IN BOOK 678 OF OFFICIAL RECORDS, AT PAGE 428 THEREOF, SAID POINT OF COMMENCEMENT BEING IN THE SOUTHWESTERLY LINE OF RANCHO SAN ANTONIO (FOR PURPOSES OF THIS DESCRIPTION THE BEARING OF SAID LINE OF RANCHO SAN ANTONIO AS MARKED UPON THE GROUND BY SAID IRON PIPE MONUMENT AT THE MOST WESTERLY CORNER OF "PARCEL 1" AND BY AN IRON PIPE

MONUMENT IN SAID LINE OF RANCHO SAN ANTONIO DISTANT THEREON 1672.60 FEET NORTHWESTERLY FROM SAID CORNER OF "PARCEL 1" IN TAKEN AS SOUTH 45 DEG. 10' EAST, RUNNING THENCE FROM SAID POINT OF COMMENCEMENT ON AND ALONG THE SOUTHWESTERLY BOUNDARY LINE OF SAID "PARCEL 1" WHICH LINE IS ALSO SAID LINE OF RANCHO SAN ANTONIO, SOUTH 45 DEG. 10' EAST A DISTANCE OF 182.23 FEET TO THE TRUE POINT OF BEGINNING OF THE PARCEL OF LAND TO BE DESCRIBED; RUNNING THENCE FROM SAID TRUE POINT OF BEGINNING SOUTH 35 DEG. 08' 20" EAST A DISTANCE OF 1992.90 FEET; THENCE SOUTH 10 DEG. 23' 20" WEST A DISTANCE OF 625.63 FEET; THENCE SOUTHWESTERLY ON A CIRCULAR CURVE CONCAVE TO THE RIGHT, HAVING A RADIUS OF 798.64 FEET (TANGENT TO LAST DESCRIBED COURSE AT LAST MENTIONED POINT) AN ARC DISTANCE OF 209.78 FEET; THENCE TANGENT TO THE LAST DESCRIBED CURVE AT THE LAST MENTIONED POINT, SOUTH 25 DEG. 26' 20" WEST, A DISTANCE OF 120.00 FEET; THENCE SOUTHWESTERLY ON A CIRCULAR CURVE CONCAVE TO THE RIGHT, HAVING A RADIUS OF 1126.01 FEET (TANGENT TO LAST DESCRIBED COURSE AT LAST MENTIONED POINT), AN ARC DISTANCE OF 363.57 FEET; THENCE TANGENT TO THE LAST DESCRIBED CURVE AT LAST MENTIONED POINT, SOUTH 43 DEG. 56' 20" WEST, A DISTANCE OF 450.00 FEET; THENCE, SOUTH 46 DEG. 03' EAST A DISTANCE OF 40.00 FEET; THENCE, NORTH 43 DEG. 56' 20" EAST A DISTANCE OF 450.00 FEET; THENCE NORTHWESTERLY ON A CIRCULAR CURVE CONCAVE TO THE LEFT, HAVING A RADIUS OF 1166.01 FEET (TANGENT TO LAST DESCRIBED COURSE AT LAST MENTIONED POINT), AN ARC DISTANCE OF 376.49 FEET; THENCE, TANGENT TO THE LAST DESCRIBED CURVE AT THE LAST MENTIONED POINT, NORTH 25 DEG. 20" EAST A DISTANCE OF 120.00 FEET; THENCE NORTHEASTERLY ON A CIRCULAR CURVE CONCAVE TO THE LEFT, HAVING A RADIUS OF 836.64 FEET TANGENT TO LAST DESCRIBED COURSE AT LAST MENTIONED POINT) ON ARC DISTANCE OF 220.29 FEET; THENCE TANGENT TO THE LAST DESCRIBED CURVE AT THE LAST MENTIONED PONT, NORTH 10 DEG. 23' 20" EAST A DISTANCE OF 45.85 FEET; THENCE, NORTH 16 DEG. 27' 20" EAST A DISTANCE OF 385.72 FEET; THENCE NORTHEASTERLY ON A CIRCULAR CURVE CONCAVE TO THE RIGHT, HAVING A RADIUS OF 794.76 FEET (TANGENT TO LAST DESCRIBED COURSE AT LAST MENTIONED POINT), AN ARC DISTANCE OF 263.78 FEET; THENCE, TANGENT TO THE LAST DESCRIBED CURVE AT THE LAST MENTIONED POINT, NORTH 35 DEG. 08' 20" EAST A DISTANCE OF 1860.29 FEET, ACRE OR LESS, TO THE POINT OF INTERSECTION OF SAID LINE WITH THE SOUTHWESTERLY LINE OF SAID "PARCEL 1"; THENCE ON AND ALONG SAID SOUTHWESTERLY LINE OF "PARCEL 1", NORTH 45 DEG. 10' 00" WEST DISTANCE OF 111.59 FEET, MORE OR LESS TO SAID POINT OF BEGINNING.

ALSO EXCEPTING THEREFROM THAT PORTION THEREOF DESCRIBED AS FOLLOWS:

ALL THAT REAL PROPERTY SITUATE IN SECTIONS 16 AND 21, T. 7 S. P. 2. 1., M.D.B. & M. IN COUNTY OF SANTA CLARA, STATE OF CALIFORNIA BEING A PORTION OF THE CERTAIN TRACT OF LAND CONVEYED TO THE PERMANENTE CORPORATION BY SANTA CLARA HOLDING COMPANY, LTD., BY DEED RECORDED JULY 12, 1939 IN BOOK 942 OF OFFICIAL RECORDS OF SANTA CLARA COUNTY, CALIFORNIA, AT PAGE 290 THEREOF AND BEING MORE PARTICULARLY DESCRIED AS FOLLOWS:

COMMENCING AT THE POINT DESIGNATED AS THE TRUE POINT OF BEGINNING IN LAST CERTAIN DEED FROM THE PERMANENTE CORPORATION TO SOUTHERN PACIFIC COMPANY, RECORDED MARCH 25, 1914 IN VOLUME 1029 OF OFFICIAL RECORDS OF SANTA CLARA COUNTY, CALIFORNIA, AT PAGE 210 THEREOF, SAID POINT OF COMMENCEMENT BEING IN THE SOUTHWESTERLY LINE OF THE RANCHO SAN ANTONIO; AND RUNNING THENCE FROM SAID POINT OF COMMENCEMENT ON AND ALONG THE NORTHWESTERLY BOUNDARY LINE OF THE LANDS SO CONVEYED TO SOUTHERN PACIFIC COMPANY THE FOLLOWING COURSES AND DISTANCES, TO WIT: SOUTH 35 DEG. 08' 20" WEST 1992.90 FEET; THENCE SOUTH 10 DEG. 23' 20" WEST 625.63 FEET; SOUTHWESTERLY ON A CIRCULAR CURVE CONCAVE TO THE RIGHT, HAVING A RADIUS OF 798.64 FEET (TANGENT TO LAST DESCRIBED COURSE OF LAST MENTIONED POINT) AN ARC DISTANCE OF 209.78 FEET TO THE TRUE POINT OF BEGINNING OF THE PARCEL OF LAND HEREIN TO BE DESCRIBED; RUNNING THENCE FROM SAID TRUE POINT OF BEGINNING LAST ABOVE MENTIONED, CONTINUING ON AND ALONG THE NORTHWESTERLY BOUNDARY LINE OF SAID SOUTHERN PACIFIC COMPANY LANDS, SOUTH 25 DEG. 26' 20" WEST

A DISTANCE OF 200.00 FEET; THENCE ON A CURVE TO THE RIGHT, TANGENT TO THE LAST MENTIONED COURSE SAID CURVE HAVING A RADIUS OF 1126.01 FEET ON A CENTRAL ANGLE OF 10 DEG. 50' 18" AN ARC DISTANCE OF 213.00 FEET; THENCE LEAVING THE NORTHWESTERLY BOUNDARY OF SAID SOUTHERN PACIFIC COMPANY, LANDS NORTH 78 DEG. 26' 03" WEST 288.19 FEET; THENCE NORTH 88 DEG. 42' 58" WEST 493.52 FEET; THENCE NORTH 27 DEG. 22' 58" WEST 204.10 FEET; THENCE NORTH 62 DEG. 37' 02" EAST 127.00 FEET; THENCE SOUTH 88 DEG. 42' 58" WEST 480.00 FEET; THENCE NORTH 1 DEG. 17' 02" EAST 719.00 FEET; THENCE SOUTH 88 DEG. 42' 58" EAST 270.00 FEET; THENCE SOUTH 1 DEG. 17' 02" WEST 108.00 FEET; THENCE SOUTH 27 DEG. 18' 28" EAST 115.00 FEET; THENCE NORTH 50 DEG. 28' 32" EAST 102.00 FEET; THENCE SOUTH 16 DEG. 26' 16" EAST 265.48 FEET; THENCE SOUTH 8 DEG. 28' 32" WEST 167.16 FEET; THENCE SOUTH 12 DEG. 15' 04" WEST 152.17 FEET TO THE POINT OF BEGINNING.

APN: 351-09-003, 351-09-011, 351-09-012, 351-09-013, 351-10-033, 351-11-001, 351-11-005, 351-11-006, 351-11-007, 351-11-012 and 351-12-001

DESCRIPTION:

The land referred to herein is situated in the State of California, County of Santa Clara, Unincorporated Area, and is described as follows:

PARCEL ONE:

ALL THAT PORTION OF SOUTHWEST QUARTER (1/4) OF SECTION 16, TOWNSHIP 7 SOUTH, RANGE 2 WEST OF MOUNT DIABLO BASE AND MERIDIAN.

EXCEPTING THEREFROM ALL THAT PARCELS A AND B OF PARCEL MAP, FILED DECEMBER 10, 1979, IN BOOK 455 OF MAPS PAGE 14, SANTA CLARA COUNTY RECORDS.

ALSO EXCEPTING THEREFROM THAT PORTION DESCRIBED AS PARCEL THIRTEEN AND PARCEL FOURTEEN-AS TO PARCEL H11, AS SHOWN IN A DEED RECORDED AUGUST 10, 1995, INSTRUMENT NO. 12978152, IN BOOK N954 AT PAGE 1142, SANTA CLARA COUNTY RECORDS.

ALSO EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE PERMANENTE CORPORATION, AS SHOWN IN THE DEED, RECORDED APRIL 10, 1942, IN BOOK 1090 OF OFFICIAL RECORDS, AT PAGE 212.

ALSO EXCEPTING THEREFROM THAT PORTION CONVEYED TO KAISER CEMENT & GYPSUM CORPORATION, AS DESCRIBED AS PARCEL I IN THE DEED, RECORDED JANUARY 13, 1977, IN BOOK C534 OF OFFICIAL RECORDS, AT PAGE 737.

FURTHER EXCEPTING THEREFROM ALL THAT PORTION LYING EASTERLY OF THE WESTERLY LINE OF THE PROPERTY DESCRIBED IN THE GRANT DEED TO SOUTHERN PACIFIC COMPANY, RECORDED MARCH 25, 1941, IN BOOK 1029 OF OFFICIAL RECORDS AT PAGE 210.

APN: 351-10-005

PARCEL TWO:

ALL OF PARCELS A AND B OF THE PARCEL MAP, FILED DECEMBER 10, 1979, IN BOOK 455 OF MAPS PAGE 14, SANTA CLARA COUNTY RECORDS.

PARCEL THREE:

BEGINNING AT A POINT IN THE SOUTHERLY LINE OF THAT CERTAIN 47.5 ACRE PARCEL OF LAND DESCRIBED AS "PARCEL A" AND CONVEYED TO THE TODD-CALIFORNIA SHIPBUILDING CORPORATION BY THE PERMANENTE CORPORATION BY DEED RECORDED APRIL 12, 1941 IN THE OFFICE OF THE COUNTY RECORDER OF THE SANTA CLARA COUNTY, CALIFORNIA IN BOOK 1029 OF OFFICIAL RECORDS, AT PAGE 408 THEREOF; DISTANT THEREON NORTH 88° 44' 20" WEST 156.32 FEET FROM THE MOST SOUTHERLY CORNER OF SAID "PARCEL A".

RUNNING THENCE FROM SAID POINT OF BEGINNING SOUTH 35° 09' 32" WEST A DISTANCE OF 50.00 FEET; THENCE SOUTH 55° 09' 32" WEST A DISTANCE OF 170.00 FEET; THENCE NORTH 57° 37' 38" WEST A DISTANCE OF 274.20 FEET TO A POINT IN THE SOUTHERLY LINE OF SAID "PARCEL A"; THENCE ALONG SAID SOUTHERLY LINE OF "PARCEL A" SOUTH 88° 44' 20" EAST A DISTANCE OF 400.00 FEET, MORE OR LESS, TO SAID POINT OF BEGINNING.

APN: 351-10-037 AND 351-10-038

PARCEL FIVE:

LOTS 1, 2, 3, 4, 5, 6, 7 AND 8 AND SOUTHEAST 1/4 OF SECTION 17, TOWNSHIP 7 SOUTH, RANGE 2 WEST, MOUNT DIABLO BASE AND MERIDIAN.

EXHIBIT "A"

LEGAL DESCRIPTION

All that portion of the following described property owned by the Grantor herein:

All that real property situated in the Unincorporated Area of the County of Santa Clara, State of California, being a portion of the Northeast Quarter and all of the Northwest Quarter of Section 17, Township 7 South, Range 2 West, Mount Diablo Base and Meridian as said Northeast Quarter is shown on that certain Record of Survey of the lands of "Permanente Cement Company and the Permanente Metals Corporation", filed in Book 6 of Maps, Pages 36 through 39, Santa Clara County Records, being more particularly described as follows:

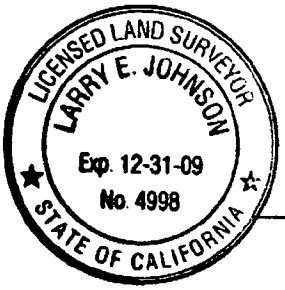
COMMENCING at the Center of said Section 17; thence along the common line between the Northwest and Northeast Quarters of said Section 17, North 00° 16' 50" East, 1290.27 feet to the **TRUE POINT OF BEGINNING** of the lands herein being described; thence continuing along said common line, North 00° 16' 50" East, 9.88' and North 00° 14' 20" East, 1294.71 ft. to the northeast corner of said Northwest Quarter; thence along the northerly line of said Northwest Quarter, South 89° 50'50" West, 2609.14 ft. to the northwest corner of said Northwest Quarter; thence along the westerly line of said Northwest Quarter, South 03° 07' 40" East, 1349.89 ft. and South 03° 06' 40" East 1291.27 ft. to the southwest corner of said Northwest Quarter; thence along the southerly line of said Northwest Quarter, North 88° 50' 50" East, 2454.12 ft. to said center of Section 17; thence along the southerly line of said Northeast Quarter, South 89° 53' 30" East, 1350.42 ft to a point which is distant along said line, North 89° 53' 30" West, 1289.71 ft. from the southeast corner of said Northeast Quarter; thence leaving said southerly line, North 46° 06' 52" West, 1864.93 ft. to the **TRUE POINT OF BEGINNING.**

Containing 172.075 Acres, more or less.

EXHIBIT "A"

LEGAL DESCRIPTION

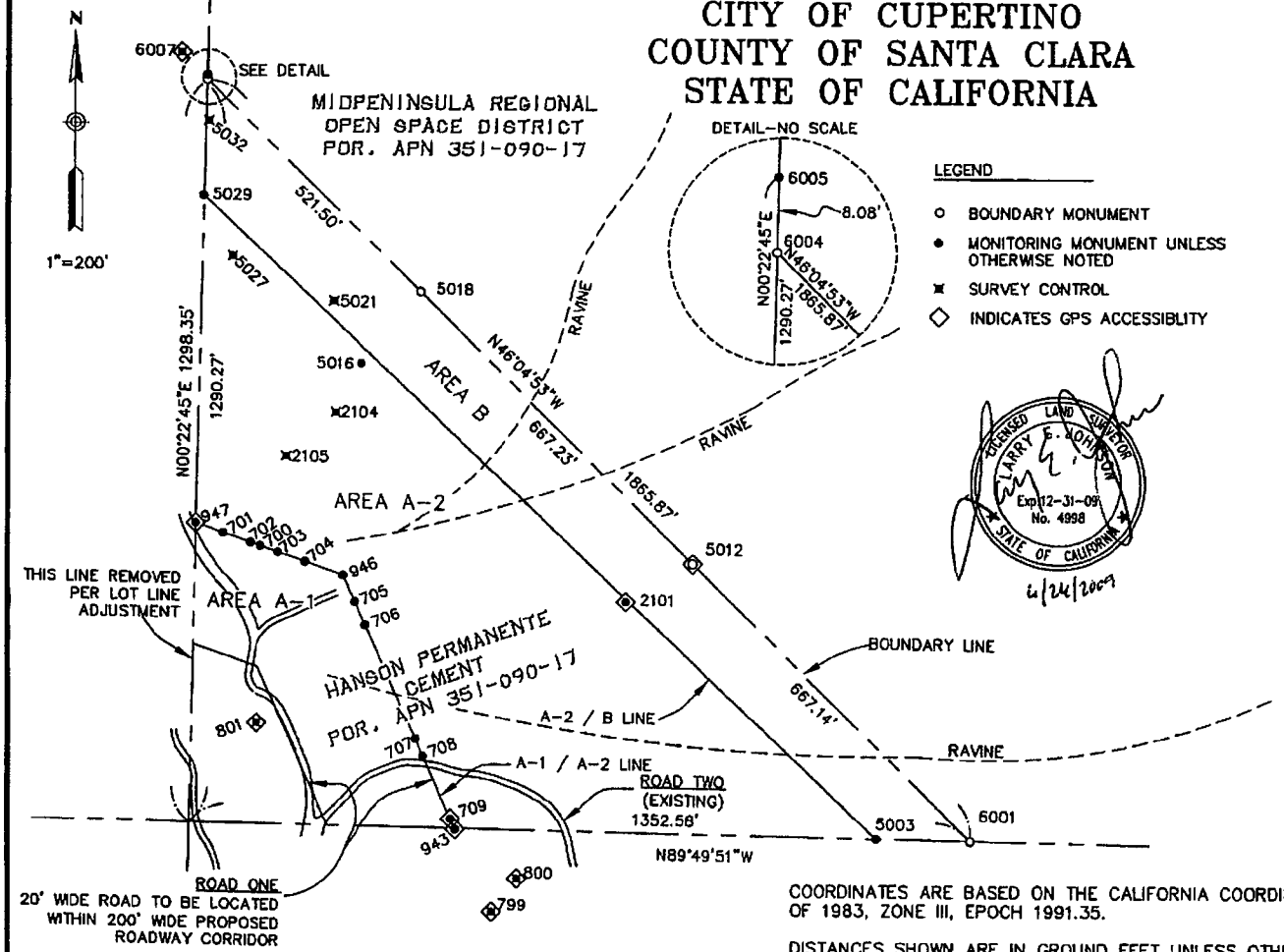
This real property description has been prepared by me, or under my direction, in conformance with the Professional Land Surveyors Act.



Larry E. Johnson
L.S. No. 4998
Expiration Date: 12-31-2009

6/24/2009
Date

CITY OF CUPERTINO
COUNTY OF SANTA CLARA
STATE OF CALIFORNIA



LEGEND

- ○ BOUNDARY MONUMENT
- ● MONITORING MONUMENT UNLESS OTHERWISE NOTED
- ✖ SURVEY CONTROL
- ◇ INDICATES GPS ACCESSIBLITY

Coordinates – Epoch 1991.35 – CCS83 – Zone III				
Point	Northing	Easting	Elevation	Description
BOUNDARY MONUMENTS				
5012	1944474.2984	6095939.5554	——	SET IRON PIPE W/CAP LS 4998
5016	1944044.9330	6095466.6932	——	SET IRON PIPE W/CAP LS 4998
6001	1943998.7217	6096419.4092	——	SET IRON PIPE W/CAP LS 4998
6004	1945313.2615	6095097.5987	——	SET IRON PIPE W/CAP LS 4998
SECTION CORNERS				
6005	1945321.3367	6095097.7868	——	FOUND 1" IRON PIPE
MONITORING MONUMENTS				
700	1944502.7670	6095190.5210	1453.74	SET 1" PIPE IN CONCRETE
701	1944525.2140	6095126.4890	1471.08	SET 1" PIPE IN CONCRETE
702	1944508.6530	6095173.7780	1457.48	SET 1" PIPE IN CONCRETE
703	1944492.0580	6095221.0350	1446.68	SET 1" PIPE IN CONCRETE
704	1944475.5900	6095268.0680	1444.81	SET 1" PIPE IN CONCRETE
705	1944406.5170	6095354.2380	1441.66	SET 1" PIPE IN CONCRETE
706	1944368.4710	6095372.3600	1432.69	SET 1" PIPE IN CONCRETE
707	1944188.8020	6095459.0280	1428.90	SET 1" PIPE IN CONCRETE
708	1944139.1850	6095472.1080	1429.85	SET 1" PIPE IN CONCRETE
709	1944030.9720	6095519.7980	1474.65	SET 1" PIPE IN CONCRETE
943	1944013.1120	6095527.6790	1474.65	SET 3/4" PIPE WITH CAP
946	1944452.2830	6095334.0490	1442.05	SET 1" PIPE IN CONCRETE
947	1944541.7920	6095079.2500	1484.20	SET 1" PIPE IN CONCRETE
2101	1944406.4960	6095823.6510	——	SET REBAR IN CONCRETE
5003	1943999.9854	6096256.7905	——	SET 1" PIPE IN CONCRETE
5016	1944820.7909	6095364.3920	——	SET REBAR IN CONCRETE
5029	1945111.7912	6095091.6275	——	SET REBAR IN CONCRETE
SURVEY CONTROL				
799	1943859.8040	6095590.8560	1477.31	SET HUB & TACK
800	1943927.5630	6095634.4760	1474.82	SET REBAR W/CAP
801	1944195.0860	6095184.1310	1475.30	SET REBAR W/CAP
2104	1944735.4320	6095320.8200	——	SET 1" PIPE IN CONCRETE W/CAP
2105	1944660.1100	6095235.0790	——	SET 1" PIPE IN CONCRETE W/CAP
5021	1944928.3700	6095304.3632	——	SET REBAR W/CAP
5027	1945006.3477	6095141.6159	——	SET REBAR W/CAP
5032	1945242.8334	6095100.4581	——	SET REBAR W/CAP
6007	1945356.9283	6095068.9849	1007.30	SET REBAR W/CAP

NOTE:

1. TOPOGRAPHIC FEATURES ARE APPROXIMATE ONLY. A TOPOGRAPHIC SURVEY WAS NOT PERFORMED.
2. BEARINGS AND DISTANCES SHOWN ARE TAKEN FROM THE MARK THOMAS AND COMPANY RECORD OF SURVEY, UNRECORDED AT THIS TIME.
3. ALL REBAR AND PIPES SET IN CONCRETE FROM 1 TO 4 FEET DEEP.

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)

1 inch = 200 ft.

COORDINATES ARE BASED ON THE CALIFORNIA COORDINATE SYSTEM OF 1983, ZONE III, EPOCH 1991.35.

DISTANCES SHOWN ARE IN GROUND FEET UNLESS OTHERWISE NOTED. MULTIPLY DISTANCES SHOWN BY 0.99989000 TO OBTAIN GRID DISTANCES.

THE VERTICAL DATUM FOR THIS PROJECT IS BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD) 1988, PROVIDED BY THE NATIONAL GEODETIC SURVEY (NGS). THE VERTICAL CONTROL VALUES ARE BASED ON A FIRST ORDER NGS POINT AA1871 – HPGN D CA SAN ANTONIO DESIGNATION, ELEVATION 435.30 FEET.

EXHIBIT B

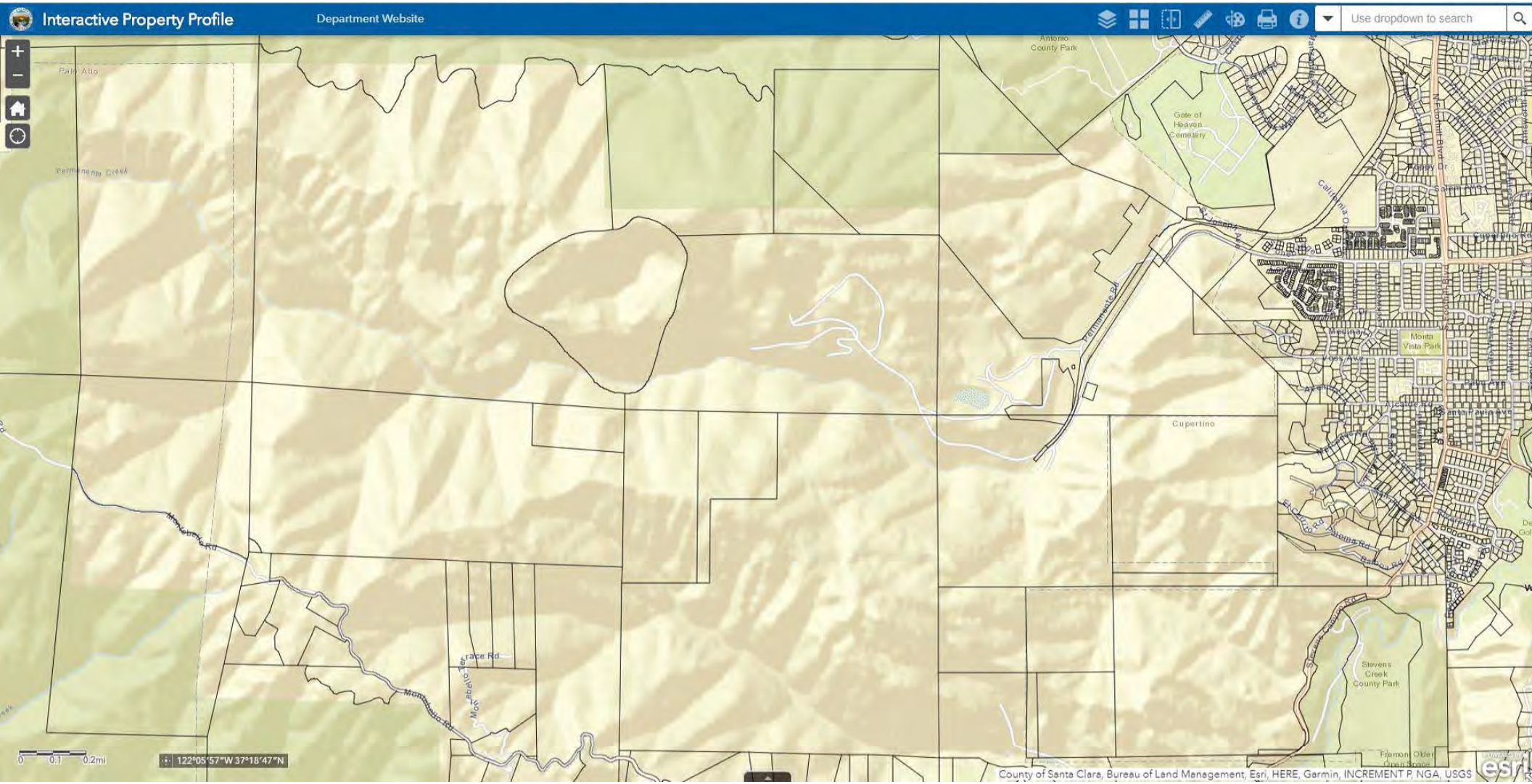
PLAT TO ACCOMPANY EXHIBIT 'A' OF 20-ACRE PARCEL SUBJECT TO RESERVATION OF CONSERVATION EASEMENT

MARK THOMAS & COMPANY, INC.
Providing Engineering, Surveying, and Planning Services
1960 Zanker Road
San Jose, CA 95112
(408) 453-5373

DESIGNED BY GW	APPROVED ON 06/26/09	JOB NO. 55-0188B	SHEET 2 OF 2
CKD. BY DCJ	BY LARRY E. JOHNSON	FILE NO. XXXX	
DATE 06/26/08	LS NO. 4998 12/ '09		
SCALE 1"=200'			

\\Sjfile02\engr\SURVEY\55\55-0188B Hanson Cement\dwg\plat-open- istrict-07-2008.dwg

APPENDIX D-2
COUNTY PARCEL BOUNDARIES



Santa Clara County Department of Planning and Development
Interactive Property Profile

OFFICE OF COUNTY ASSESSOR, SANTA CLARA COUNTY, CALIFORNIA

BOOK 342 PAGE 22

1" = 100'

R.O.S. 611/42

ALCALDE RD.

(45) (44) (17)

MADERA (FMLY MERCEDES RD)

MERCEDES (FMLY. MADERA RD.)

CITY of CUPERTINO

SAN JUAN ROAD

CORDOVA ROAD

SAN FELIPE ROAD

MERCEDES ROAD

(fmly ELENA RD)

65 5.72 AC NET

64 2.50 AC TOTAL

98

4.80 AC.

91 (0.39 Ac Net)

16,628 sf Calc

PCL. 1

PCL. 2 0.46 AC NET

PCL. 3

92

90 0.72 AC

93 72 71 97 73 82

85

86

47

102 103

61

55

62

45

106 0.292 AC.

77

78

109 4.658 Ac. Calc.(TOTAL)

PCL. 1 (4.30 AC. GR.)

PTN. 400 0.55 AC. NET

PTN. 400 0.64 AC. NET

104 105

110 13,474sf

111 12,291sf

112 11,087sf

30 31

0.495Ac. Gr. 0.464Ac. Net

43

P.M. 458-M-4,5,6

R.O.S. 313/35

P.M. 563-M-3

P.M. 464-M-26

R.O.S. 429/35

R.O.S. 633/3

R.O.S. 709/25

R.O.S. 414/24

R.O.S. 856/40

R.O.S. 887/40

R.O.S. 183/A-20

P.M. 42

P.M. 43

INSPIRATION HEIGHTS MONTA VISTA — P.MAPS-13&15

OWNERS REQUEST 1999-00

OWNER'S REQ. 2008-09

20' EASEMENT

PTN. 408

BOOK 351

TRA DET. MAP 75

LAWRENCE E. STONE — ASSESSOR
Cadastral map for assessment purposes only.
Compiled under R. & T. Code, Sec. 327.
Effective Roll Year 2018-2019

OFFICE OF COUNTY ASSESSOR — SANTA CLARA COUNTY, CALIFORNIA

BOOK 342 PAGE 45

1" = 100'

VOSS AVE.

KRISTA CT.

AMISTAD CT.

MELISSA CT.

ALICIA CT.

AVENIDA

LANE

ALCALDE RD.

TRACT Nº 6040

PCL A

0.495 Ac. Calc.

(4.13 AC. DEED)
2.51 AC. ±

BK 351

15 30 29 44 22

16 15
21 22
T.7S R. 2W

TRA DET. MAP 75

LAWRENCE E. STONE – ASSESSOR
Cadastral map for assessment purposes only.
Compiled under R. & T. Code, Sec. 327.
Effective Roll Year 2011–2012

BOOK 342 PAGE 64

SAN ANTONIO RANCHO

DETAIL 'B'
1"=100'

DETAIL 'A'
1"=100'

1" = 200'

SEE DETAIL 'B'

SEE DETAIL 'A'

BOOK 351

BOOK 351

63

62

12

13

1

2

3

4

5

S.B.E. 872-43-(02)62B PCL. 3

S.B.E. 872-43-(02)62E PCL. 5

S.B.E. 872-43(02)62B PCL. 1

SOUTHERN PACIFIC TRANS. CO.

SOUTHERN PACIFIC TRANS. CO.

(FMLY. PERMANENTE RD.)

STEVENS CREEK

COUNTY OF SANTA CLARA

BOULEVARD

R. O. S. 376/47

2.83 AC.

13.783 AC.

W.A.D.3

LAWRENCE E. STONE – ASSESSOR
Cadastral map for assessment purposes only.
Compiled under R. & T. Code, Sec. 327.
Effective Roll Year 2004–2005

BOOK 351 PAGE 9

DOC 20467197

NORTH FORK PERMANENTE CREEK

(65.00AC)

ASSESSED ON PAGE 8

(160.00 AC.)

(150.00 AC.)

(217.92 AC.)

MIDPENINSULA REGIONAL OPEN SPACE DIST

641.75 Ac. Calc.(TOTAL)

(375 AC. TOTAL)

1" = 1000'

W. boundary line San Antonio Ranchs

M.R.O.S.D. OPEN-SPACE ESMT. DOC. 9368823

—7400 St. Joseph Ave.—

40.00 AC.

320.00 AC.

280.00 AC.

PTN.PCL. B
138.102 Ac.Calc.

MIDPENINSULA REGIONAL OPEN SPACE DIST.
PCL. A
137.575 Ac.

L.L.A. 19346547

585.957 Ac.Calc.

(170.90 AC.)

PTN.PCL. B
(7.156 Ac.Calc.)

20Ac.Calc.
PTN.PCL. B

QUARRY
110.63 AC.PLAN. ±

270.161Ac.Calc.

(155.33 AC±)

MIDPENINSULA REGIONAL OPEN SPACE DEPT.

T.7S.,R.3.W.

T.7S.,R.2.W.

R.O.S. 6/36,37,38,39

R.O.S. 833/24

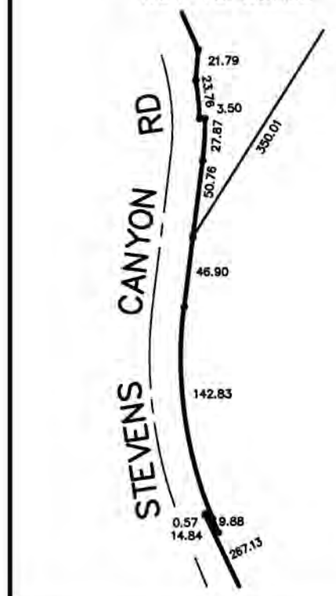
TRA DET. MAP 055 AND 075

LAWRENCE E. STONE — ASSESSOR
Cadastral map for assessment purposes only.
Compiled under R. & T. Code, Sec. 327.
Effective Roll Year 2010-2011

OFFICE OF COUNTY ASSESSOR — SANTA CLARA COUNTY, CALIFORNIA

BOOK	PAGE
351	10

DETAIL A
NOT TO SCALE



BOOK 356

BOOK 342

28 1.52 Ac

43 42.437 AC.

42 51.654 AC.

MIDPENINSULA REGIONAL OPEN SPACE DISTRICT 77.92 Ac

STEVENS CREEK PARK (S.C.C.O)

DETAIL A

2166.90 to P.J. & Stevens creek rd. and N line Alcalde rd.

R.O.S. 183/37

R.O.S. 142/23

CANYON

195.38 Ac

148.96 Ac

103.732 Ac

R.O.S 192/9

LOT7 (160 Ac)

LOT6 14.51Ac

LOT5

120' P.G&E ESMT.

Rancho

San Antonio

SBE 872-43-62F PCL.A-1

PCL.A 6.315 Ac

PCL.B

PCL.H

PCL.H1

PCL.G 0.68Ac

Ferro-Silicon Plant.

10.469 Ac

1.004Ac

159.42Ac

SBE. 872-43-62F PCL.3

0.242Ac

1.64 Ac

11.83 Ac

TRA LINE

40 Ac

35.55 Ac

40 4.45 Ac

120' P.G. & E. R/W

40 Ac

41.949 Ac

35' P.G.&E. ESMT.

65' P.G.&E. ESMT.

L.L.A. 23404073

Southwesterly line

LOT2 45.06 Ac TOTAL

MIDPENINSULA REG. OPEN SPACE DIST. LOT1

151.50 Ac PCL.A

LOT4 76.57 Ac TOTAL (72.28 Ac)

-24001 STEVENS. CR. BLVD.-

P.M.455-M-14

R.O.S. 6/36 TO 39

T.7S. R. 2W.

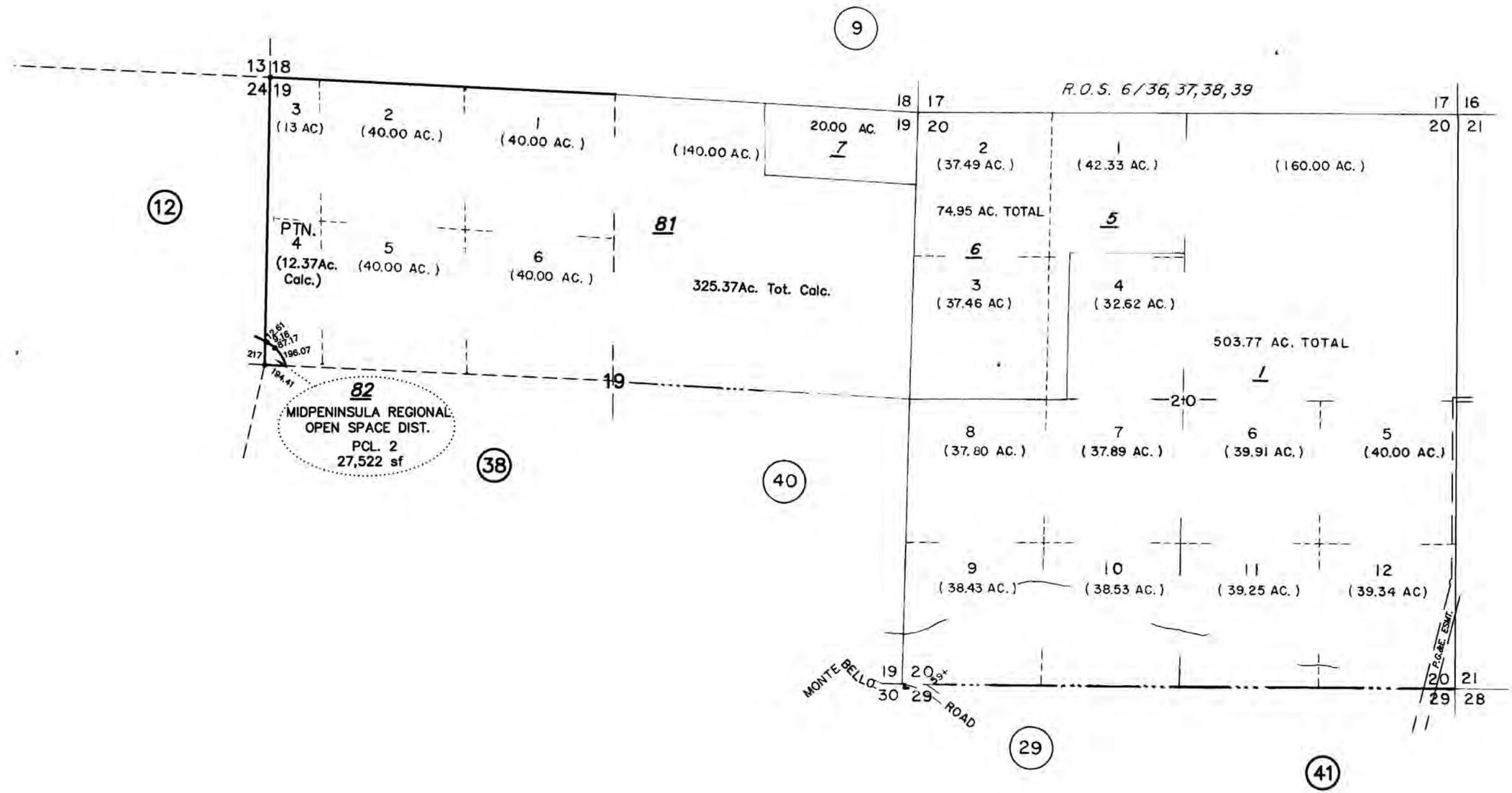
1" = 1000'

TRA DET. MAP 76

LAWRENCE E. STONE – ASSESSOR
Cadastral map for assessment purposes only.
Compiled under R. & T. Code, Sec. 327.
Effective Roll Year 2018-2019

BOOK 351 PAGE 11

TWP 7S - R 2W



N W E S

1" = 1000'

TRA DET. MAP 76

LAWRENCE E. STONE – ASSESSOR
Cadastral map for assessment purposes only.
Compiled under R. & T. Code, Sec. 327.
Effective Roll Year 2011–2012

OFFICE OF COUNTY ASSESSOR — SANTA CLARA COUNTY — CALIFORNIA

BOOK 351 PAGE 12

1" = 1000'

MIDPENINSULA REGIONAL OPEN SPACE DISTRICT (14.58 AC.)

88.34 AC. TOTAL

PCL A

(372.432 AC.±)

PCL A
116.9 Ac.
67

MONTEBELLO RIDGE

56

STEVENS

R.O.S. 195-M-33

(157.38 Ac±)

(40 AC.) (40 Ac.) (120 Ac)

69

MIDPENINSULA REGIONAL OPEN SPACE DISTRICT

68
PCL.B
176.3 Ac.

(18.09 AC.±)

PCL B

M.R.O.S.D.

8.722 AC.

43

W.B.C.

46

476 AC. NET

(R.O.S. 191-M-28)

MIDPENINSULA REGIONAL OPEN SPACE DISTRICT

L.L.A. 20134186
CERT. CORR. 20273497

MIDPENINSULA REGIONAL OPEN SPACE DISTRICT

45

8.27 AC. NET

(23.54AC±)

147.71 Ac

SAN MATEO COUNTY

-1405 SKYLINE BL-

6
W.B.C.

(160.00 Ac.)

COUNTY OF SANTA CLARA

31

238.01 Ac Total
-1720 MONTEBELLO RD.-

(80.00 Ac.)

39

CREEK

N.E.COR. S.E.1/4 OF N.W.1/4 OF SEC. 26

P.M. 586-M-29

MIDPENINSULA REGIONAL OPEN SPACE DIST.

57

600 Ac.

SEE DTL. B

PTN. of PCL A

SEE DETAIL "A"

(135.243 Ac.)

(15.917 Ac.)

MID-PENINSULA REGIONAL OPEN SPACE DIST. 0.78 AC.

61

(APPROX.)
GPS SURVEY
STATION Nº 2
R.O.S. 652/26

50

P.M. 268-M-36

SKYLINE BLVD.

48

PTN. of PCL C

MIDPENINSULA REG. OPEN SPACE DIST.

P.M. 399-M-12,13

TWP 7S., R.3W

13

PCL D

54

W.B.

62
LOT 4
11.04 AC. TOTAL
(0.012AC.PLAN)
S. MATEO CO.)

W.B.

63
LOT 3
12.03 AC. TOTAL
(0.953AC.PLAN)
S. MATEO CO.)

PTN.LOT 1 64
2.007 AC.TOTAL
(0.275AC.PLAN.
S. MATEO CO.)

S.E.COR. OF S.W.1/4 OF N.E.1/4 OF SEC.26

5.16AC.
321.90

65
LOT 2

3.76 AC.TOTAL
(0.4 AC.PLAN.
S. MATEO CO.)

SKYLINE BLVD.

48

COUNTY BOUNDRY

P.M. 399-M-13
L.L.A. 16731369

DETAIL "A"
1"=600'

PTN.LOT 1 66
0.433AC. PLAN
(0.193AC.PLAN
S. MATEO CO.)
W.B.

109 AC.
60

SANTA CLARA CO.
SAN MATEO CO.

PCL. A
(8.59 AC.)

BLVD.

DETAIL "B"
1" = 500'

TRA DET. MAP 55

LAWRENCE E. STONE — ASSESSOR
Cadastral map for assessment purposes only.
Compiled under R. & T. Code, Sec. 327.
Effective Roll Year 2015–2016

SKYLINE BLVD.℄

Nº	DIS.	Nº	DIS.
A	2269.51	M	214.20
B	219.14	N	458.79
C	109.32	O	104.68
D	1042.13	P	341.94
E	523.75	Q	107.75
F	747.29	R	818.56
G	725.08	S	914.48
H	640.75	T	326.67
I	82.65	U	711.36
J	324.57	V	503.24
K	90.74	W	693.02
L	282.51	X	736.82

COUNTY LINE

P.TO.P	DIS	P.TO.P	DIS.
1-2	65.34	18-19	341.88
2-3	572.22	19-20	227.04
3-4	166.98	20-21	118.80
4-5	242.22	21-22	357.06
5-6	489.06	22-23	306.22
6-7	454.08	23-24	149.82
7-8	274.50	24-25	48.84
8-9	330.66	25-26	732.24
9-10	215.16	26-27	176.22
10-11	209.68	27-28	223.64
11-12	209.88	28-29	889.02
12-13	503.58	29-30	878.46
13-14	568.92	30-31	568.92
14-15	654.72	31-32	1249.38
15-16	214.50	32-33	813.78
16-17	1308.12	33-34	326.04
17-18	492.36	34-35	535.92

APPENDIX D-3
RESOLUTION NO. 2011-85
REGARDING VESTED RIGHTS

RESOLUTION NO. 2011-85

RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF SANTA CLARA FINDING THAT THERE IS A LEGAL NON-CONFORMING USE FOR SURFACE MINING ACTIVITIES ON CERTAIN PARCELS COMPRISING THE PERMANENTE QUARRY AND ADDRESSING RELATED MATTERS

WHEREAS, Lehigh Southwest Cement Company operates, and Hanson Permanente Cement Inc. ("Lehigh") owns the Permanente Quarry ("Quarry"), a limestone and aggregate mining operation located two miles west of the City of Cupertino;

WHEREAS, the County of Santa Clara is the lead agency for surface mining operations within the County under California's Surface Mining and Reclamation Act (Pub. Resources Code § 2710 *et seq.* ("SMARA"));

WHEREAS, the County has land use authority over all unincorporated areas within the County, including the property on which the Quarry operates;

WHEREAS, the County approved the existing reclamation plan for the Quarry in March 1985, and Lehigh has filed with the Department of Planning and Development two applications to amend the Quarry's reclamation plan to include, respectively, an approximately 89-acre area known as the East Materials Storage Area ("EMSA"), and the remaining acreage forming the balance of mining operations within Lehigh's property over approximately the next 20 years (known collectively as the "Reclamation Plan Amendment");

WHEREAS, the County has never required a use permit for the Quarry, and has historically considered the Quarry to operate as a legal non-conforming use (also referred to as a "vested" use), although the County has not previously made a specific determination concerning the geographic extent of the Quarry's vested rights;

WHEREAS, the County has found it necessary to define the Quarry's vested rights in order to guide the Department of Planning and Development's processing of the Reclamation Plan Amendment, and therefore duly noticed a public hearing to consider the question of the geographic extent of the Quarry's vested rights, which requires examinations into the history of the use of Quarry parcels, the objective intent of the owners of parcels that the Quarry now owns with regard to the extension of mining operations to property that was not subject to mining operations prior to the vesting date when the Quarry was first subject to County land use restrictions, the adoption and amendment of the County Zoning Ordinance restricting the ability to mine property without obtaining applicable permits, and the history of Permanente Road, which formerly ran through the area that is now the Quarry;

WHEREAS, County staff, the public, and Lehigh provided documentary, photographic and historical evidence pertaining to the extent of the vested mining use at the Quarry, as well as legal authorities bearing on the analysis of vested rights;

WHEREAS, on February 8, 2011, the Board conducted a duly-noticed public hearing and considered the evidence presented on the question of vested rights, including substantial public testimony and written commentary, and all persons wishing to testify were heard and the matter was fully considered;

WHEREAS, all of the findings and conclusions made by the Board pursuant to this Resolution are based upon substantial evidence in the entire record before the Board, including all written evidence presented prior to the hearing and additional written and oral evidence presented during the hearing, and reflect the independent judgment of the Board;

NOW, THEREFORE, BE IT RESOLVED by the Board of Supervisors of the County of Santa Clara, State of California, that the Board of Supervisors finds and determines all of the following based on substantial evidence in the record:

1. That because Permanente Road no longer functioned as a public street as of approximately 1935, the requirement for a Use Permit for quarrying activities within 1,000 feet of a public road in the 1937 County Zoning Ordinance does not apply.

2. That the County Zoning Ordinance first required a use permit for quarrying in the "A-1" district in January 1948.

3. That the area within the boundaries of the 1985 reclamation plan amendment is not relevant to determining the geographic extent of the Quarry's legal nonconforming use.

4. That the Board has determined, on the basis of substantial evidence in the record and controlling legal authority, that vested rights exist over the entirety of parcels 1, 2, 3, 5, 6, 7, 8, 9, 11, 14, 15, 16, and 17, as shown on Exhibit 45 attached hereto ("Vested Parcels"), and that vested rights do not exist over parcels 4, 10, 12, 13, 18 and 19. Quarry surface mining operations on the Vested Parcels are a legal non-conforming use, and do not require a County use permit for continued surface mining operations within the geographic area bounded by the Vested Parcels.

5. That the Quarry must apply for a Use Permit for all of the property within the boundaries of its reclamation plan amendments that is outside the geographic extent of its legal nonconforming use as determined by the Board and that will be disturbed by surface mining operations, except for property utilized for cement production and subject to a separate use permit therefor.

6. That the owners of the Quarry property, Heidelberg Cement, Incorporated and Hanson Permanente Cement, Incorporated, shall apply to the County for a formal abandonment of Permanente Road.

7. That, in making the determinations set forth herein, the Board analyzed and considered all written, photographic, and other documents submitted for the record, including but not limited to the County's Final Staff Report, dated January 27, 2011, and all appendices and exhibits thereto ("Staff Report") and staff's oral and graphic presentation to the Board on

February 8, 2011; all communications submitted by Lehigh, including its submittals, with all attachments, of November 5, 2010, January 4, 2011, February 2, 2011, and February 7, 2011 and its oral and graphic presentation to the Board on February 8, 2011; all communications submitted by members of the public, including all letters submitted prior to the hearing and all oral testimony and statements made during the duly-noticed public hearing held on February 8, 2011.

8. That these determinations are supported by the following findings and evidence:

a. The legal standards governing the existence and scope of vested mining rights are articulated in the California Supreme Court case *Hansen Bros. Enterprises v. Board of Supervisors of Nevada County* (1996) 12 Cal.4th 533 ("*Hansen Bros.*") and authorities cited therein, as well as in other cases and provisions in SMARA and the County Surface Mining and Land Reclamation Standards. Under these authorities, vested mining rights exist where property was used for "surface mining operations" (as that term is defined in SMARA and County regulations) or for which the owner had objectively manifested the intent to use the property for surface mining operations prior to the vesting date.

b. According to County Staff, January 1948 is the earliest date that surface mining operations at the Permanente Quarry required a use permit under the applicable zoning regulations beyond 1,000 from a public street, which represents the "Vesting Date." Lehigh has submitted evidence and analysis that the Vesting Date should be 1960. The Board finds that the December 29, 1947 Zoning Ordinance amendment imposed the first requirement for obtaining a use permit for mining operations in the Quarry area and that January 28, 1948 was the Vesting Date for the property on which the Quarry operates today. (See Staff Report, pp. 8-11 and Exhibits 4-10.) The Board's determination as to the Vested Parcels remains the same under either a 1948 or 1960 vesting date.

c. Mining operations commenced at the Permanente Quarry in approximately 1903. By 1930, Lehigh's predecessors incorporated the core Quarry property into a 1,300-acre mining tract that supported limestone quarry operations. (See Staff Report, p. 11 and Exhibits 10, 15, 44 and 45; Lehigh's January 4, 2011 letter, p. 7, Appendix A, B-1; February 2, 2011 letter, Exhibit B.)

d. In or around 1935, no public access was allowed on Permanente Road. County records do not evidence any action by the Board to vacate Permanente Road, but show that at a public hearing in 1935, the County Surveyor advised the Board that a gate that had been erected across Permanente Road "was not across a county road." As of 1935, Permanente Road was not a "public street" as that term was defined in the County 1937 Zoning Ordinance because the road was no longer a public thoroughfare that afforded the principal means of access to abutting property. Because surface mining operations commenced on the Quarry property prior to 1937 and because the portion of Permanente Road running through the Quarry property was not a "public street" as of 1937, no part of the Quarry required a use permit under the County's 1937 Zoning Ordinance by virtue of its proximity to Permanente Road. (See Staff Report pp. 21-22; Exhibits 4, 21 and 43; Lehigh's January 4, 2011 letter, pp. 29-31, Appendix B; Lehigh's February 2, 2011 letter, Exhibit E.)

e. On July 10, 1939, the Henry J. Kaiser Company and/or affiliated entities (hereinafter "Kaiser") purchased the 1,300-acre Quarry property from the Santa Clara Holding Company. Beginning in 1941, Kaiser acquired several contiguous parcels. As shown on Exhibit 45 to the Staff Report, parcels acquired beginning in 1941 but prior to the Vesting Date include parcels 8 (1941); 2, 5, 14, 15, and 17 (1942); and 11 (1943). (See Staff Report Exhibits 44 and 45; Lehigh's November 5, 2010 letter, p. 2, Exhibit 3; Lehigh's January 4, 2011 letter, pp. 8-11, Appendix A-3; Lehigh's February 2, 2011 letter, Exhibit B; Lehigh's oral and graphic presentation at the February 8, 2011 hearing.)

f. Kaiser conducted surface mining operations, or showed the objective intent to conduct surface mining operations on the Vested Parcels. The scale of Quarry operations, ownership of the Vested Parcels prior to the Vesting Date, actual land disturbance over a portion of the Vested Parcels, evidence of progressive expansion, exploratory activities, and mineral analysis, show objective intent to use all of the Vested Parcels for surface mining operations, in their entirety. (See Staff Report, Exhibits 1, 10, 11, 12, 13, 14, 15, 16, 21, 22, 37, 38, 44, 63; Lehigh's November 5, 2010 letter, Exhibits 1-15; Lehigh's January 4, 2011 letter, Appendix A, B, C, D, E, F; Lehigh's February 2, 2011 letter, Appendix B, C, D; Lehigh's February 7, 2011 letter and attached Exhibits (declarations and letters); Lehigh's oral and graphic presentation to the Board of Supervisors at the February 8, 2011 hearing.)

g. As respects the EMSA (comprising a portion of Vested Parcels 16 and 17) the area was used for surface mining operations both before and after the Vesting Date. Evidence in the record, including photographs and expert analysis of the area from 1939 forward, show that the area was used for the main Quarry access road, internal haul and access roads, administrative facilities, and materials storage used in connection with Quarry operations prior to the Vesting Date and continuing thereafter. Parcels 16 and 17 were also used for other components of site operations, including cement production and metals production. This fact does not affect the vested status of the area. This area was integral to overall operations, including Quarry operations. Transfer of title from Kaiser Cement to Kaiser Metals did not constitute an abandonment of surface mining use or otherwise affect the vested mining rights. Such rights run with the land. (See Staff Report, Exhibits 1, 10, 11, 12, 13, 14, 15, 16, 21, 22, 37, 38, 44, 63; Lehigh's November 5, 2010 letter, Exhibits 1-15; Lehigh's January 4, 2011 letter, Appendix A,

//

//

//

//

//

//

//

B, C, D, E, F; Lehigh's February 2, 2011 letter, Appendix B, C, D; Lehigh's February 7, 2011 letter and attached Exhibits (declarations and letters); Lehigh's oral and graphic presentation to the Board of Supervisors at the February 8, 2011 hearing.)

PASSED AND ADOPTED by the Board of Supervisors of the County of Santa Clara, State of California, on MAR 01, 2011, by the following vote:

AYES: **CORTESE, KNISS, SHIRAKAWA, WASSERMAN, ~~YEAGER~~**
NOES: NONE
ABSENT: YEAGER
ABSTAIN: NONE

DAVE CORTESE, President
Board of Supervisors

ATTEST:

MARIA MARINOS, Clerk of the Board of Supervisors

APPROVED AS TO FORM AND LEGALITY:

ORRY P. KORB, Assistant County Counsel

Exhibits to this Resolution:
45 – Map of Parcels

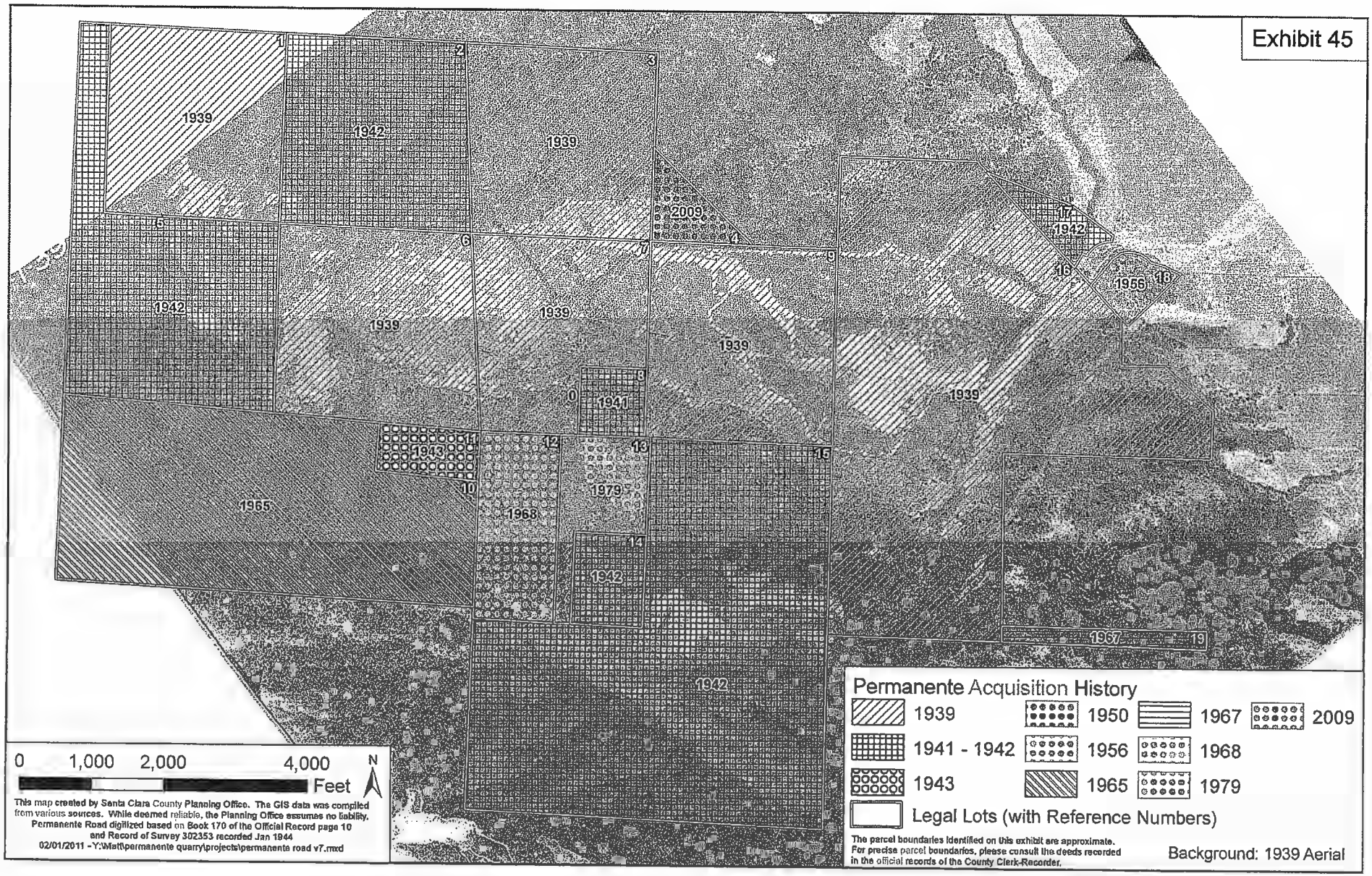
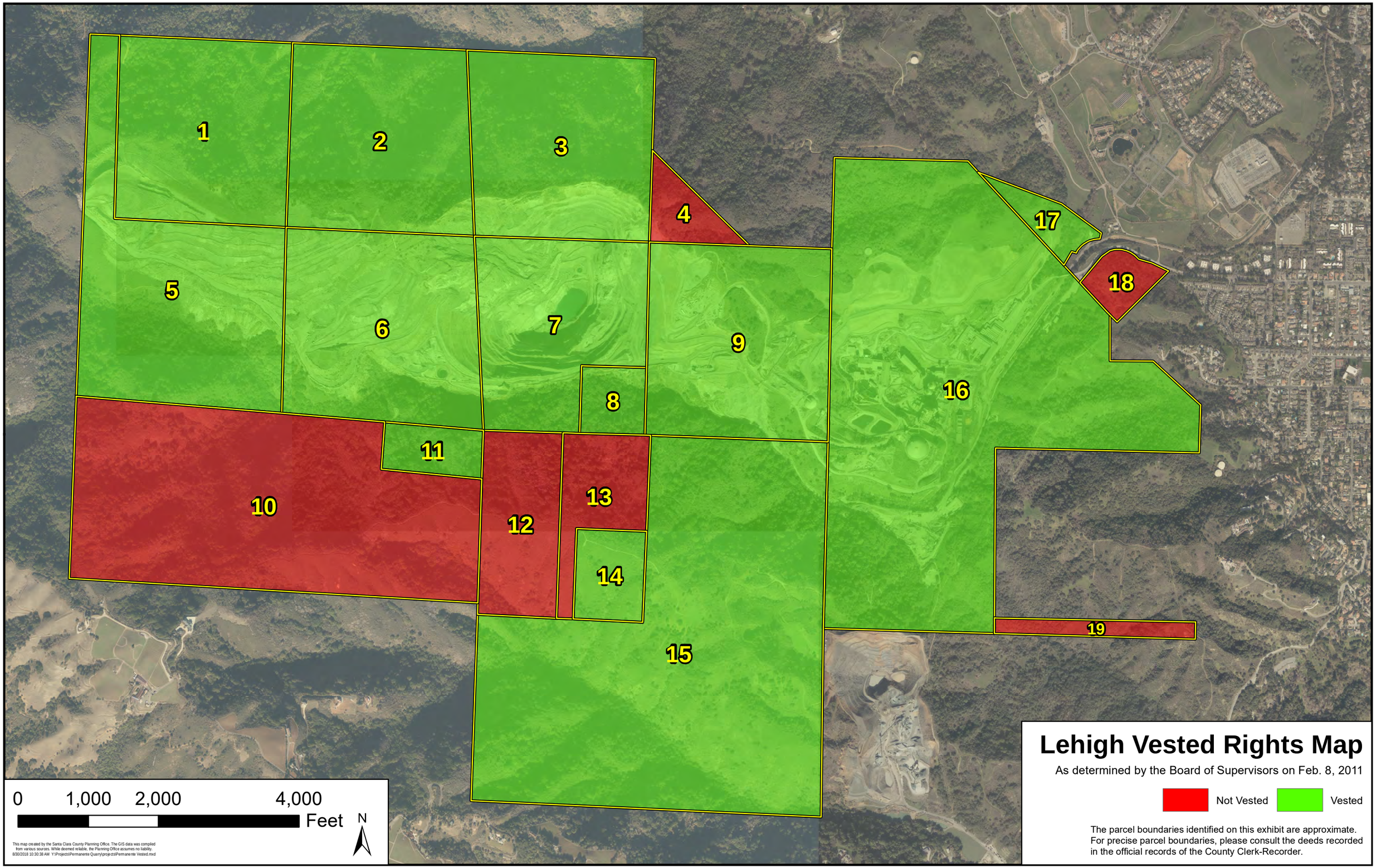
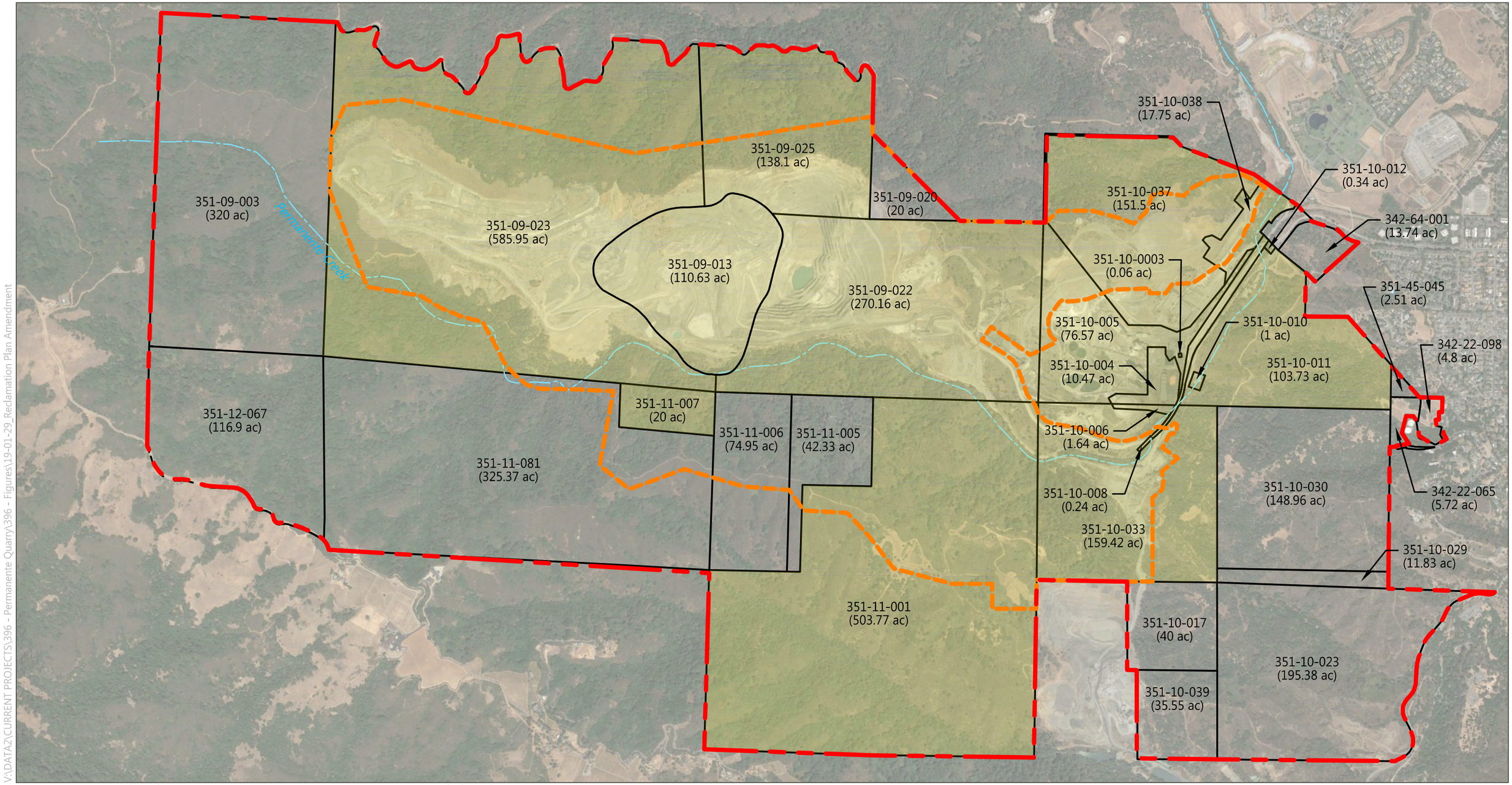


Exhibit 45
1939
1942
1939
2009
1942
1956
1942
1939
1939
1939
1939
1941
1943
1965
1968
1979
1942
1967
Permanente Acquisition History
1939
1941 - 1942
1943
1950
1956
1965
1967
1968
1979
2009
Legal Lots (with Reference Numbers)
The parcel boundaries identified on this exhibit are approximate. For precise parcel boundaries, please consult the deeds recorded in the official records of the County Clerk-Recorder.
Background: 1939 Aerial
0 1,000 2,000 4,000 Feet
N
This map created by Santa Clara County Planning Office. The GIS data was compiled from various sources. While deemed reliable, the Planning Office assumes no liability.
Permanente Road digitized based on Book 170 of the Official Record page 10 and Record of Survey 302353 recorded Jan 1944
02/01/2011 - Y:\Matt\permanente quarry\projects\permanente road v7.mxd


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
0
1,000
2,000
4,000
Feet
N
This map created by the Santa Clara County Planning Office. The GIS data was compiled from various sources. While deemed reliable, the Planning Office assumes no liability.
8/30/2018 10:30:38 AM Y:\Projects\Permanente Quarry\projects\Permanente Vested.mxd
Lehigh Vested Rights Map
As determined by the Board of Supervisors on Feb. 8, 2011
Not Vested
Vested
The parcel boundaries identified on this exhibit are approximate.
For precise parcel boundaries, please consult the deeds recorded
in the official records of the County Clerk-Recorder.

APPENDIX D-4
SUMMARY OF SITE PARCELS, ACREAGES AND APPLICABILITY



V:\DATA2\CURRENT PROJECTS\396 - Permanente Quarry\396 - Figures\19-01-29_Reclamation Plan Amendment

SOURCES: AERIAL: Google Earth (2018-08-09); SITE BOUNDARY/RECLAMATION BOUNDARY: Lehigh Southwest Cement Company, generated in 2018; PARCELS: Santa Clara County parcel data accessed in 2018; compiled by Benchmark Resources in 2019

NOTES:

1. ac = acres
2. Property boundary for illustrative purposes only. See Appendix D-2, "County Parcel Boundaries," for maps of the site and boundaries prepared by a California-licensed professional and Appendix D-1, "Legal Description," for owner information and property details.
3. See Appendix D-5, "Topographic Survey and Parcels," for parcel boundaries and acreages.

Property Boundary	±3,510 acres	Permanente Parcels	
Reclamation Plan Boundary	±1,280 acres	Vested Parcels	
Permanente Creek			

BENCHMARK RESOURCES

N

0 700 1,400 2,800 Feet

Parcels and Vested Rights

PERMANENTE QUARRY RECLMATION PLAN AMENDMENT

Appendix D-4

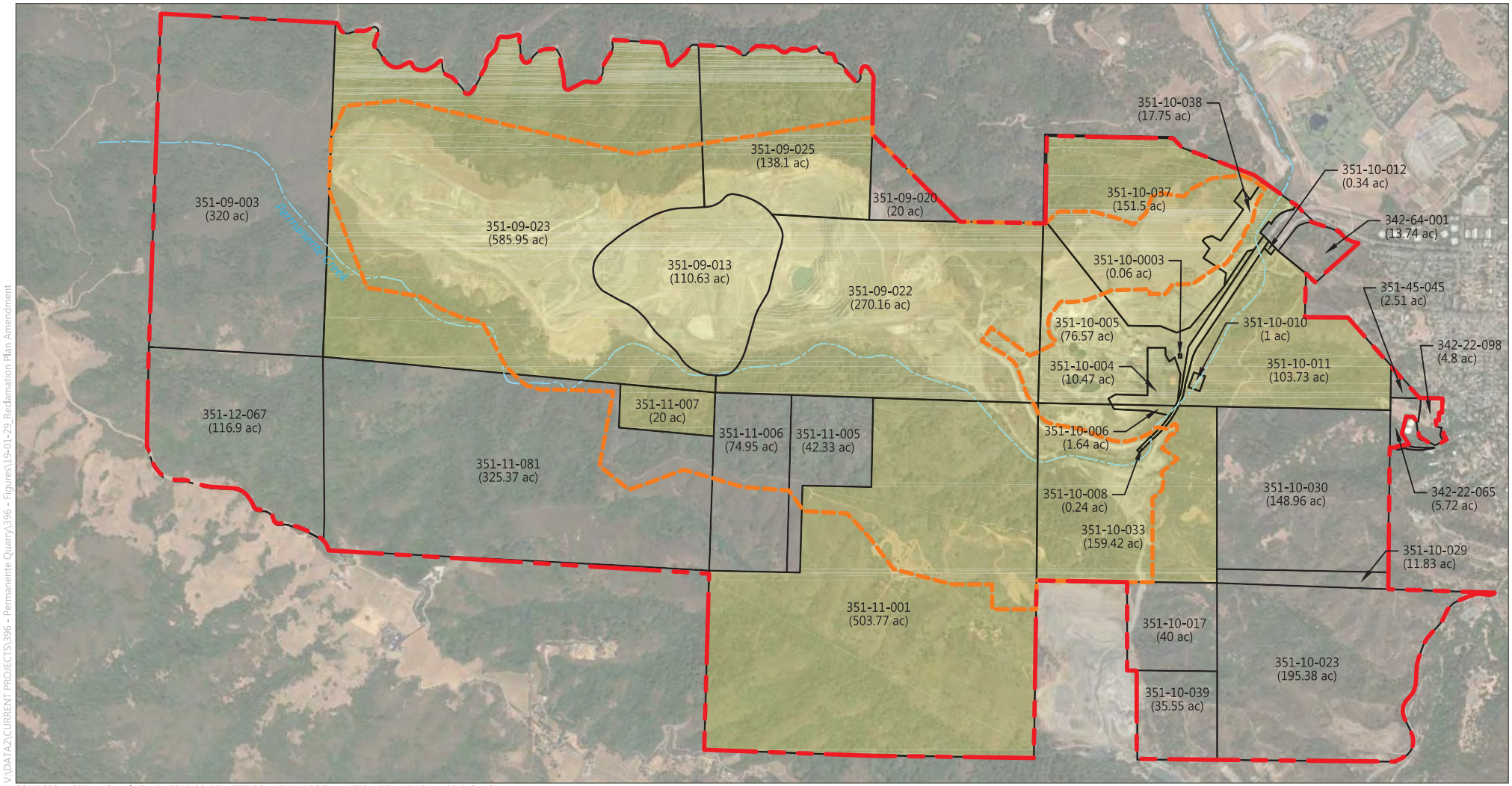
APPENDIX D-4
PERMANENTE QUARRY

SUMMARY OF PARCELS AND APPICABILITY

Within Property Boundary	Acreage	Vested	Within Reclamation Plan Boundary
342-22-065	5.72		
342-22-098	4.8		
342-45-045	2.51		
342-64-001	13.74		
351-09-003	320		
351-09-013	110.63		
351-09-020	20		X
351-09-022	270.16	X	X
351-09-023	585.95	X	X
351-09-025	138.1	X	X
351-10-003	0.06	X	
351-10-004	10.47	X	
351-10-005	76.57	X	X
351-10-006	1.64	X	
351-10-008	0.24	X	
351-10-010	1	X	
351-10-011	103.73	X	
351-10-012	0.34	X	
351-10-017	40		
351-10-023	195.38		
351-10-029	11.83		
351-10-030	148.96		
351-10-033	159.42	X	X
351-10-034*	NA	X	
351-10-035*	NA	X	
351-10-037	151.5	X	X
351-10-038	17.75	X	X
351-10-039	35.55		
351-11-001	503.77	X	X
351-11-005	42.33		X
351-11-006	74.95		X
351-11-007	20	X	X
351-11-081	325.37		X
351-12-067	116.9		
Total Acreage:	**3,509.37**	**2,040.7**	

Notes:

*Although included in the overall site boundary, these parcels are owned by Southern Pacific Transportation.



V:\DATA2\CURRENT PROJECTS\396 - Permanente Quarry\396 - Figures\19-01-29_Reclamation Plan Amendment

SOURCES: AERIAL: Google Earth (2018-08-09); SITE BOUNDARY/RECLAMATION BOUNDARY: Lehigh Southwest Cement Company, generated in 2018; PARCELS: Santa Clara County parcel data accessed in 2018; compiled by Benchmark Resources in 2019

NOTES:

1. ac = acres
2. Property boundary for illustrative purposes only. See Appendix D-2, "County Parcel Boundaries," for maps of the site and boundaries prepared by a California-licensed professional and Appendix D-1, "Legal Description," for owner information and property details.
3. See Appendix D-5, "Topographic Survey and Parcels," for parcel boundaries and acreages.

Property Boundary ±3,510 acres

Reclamation Plan Boundary ±1,280 acres

Permanente Creek

Permanente Parcels

Vested Parcels

BENCHMARK RESOURCES

N

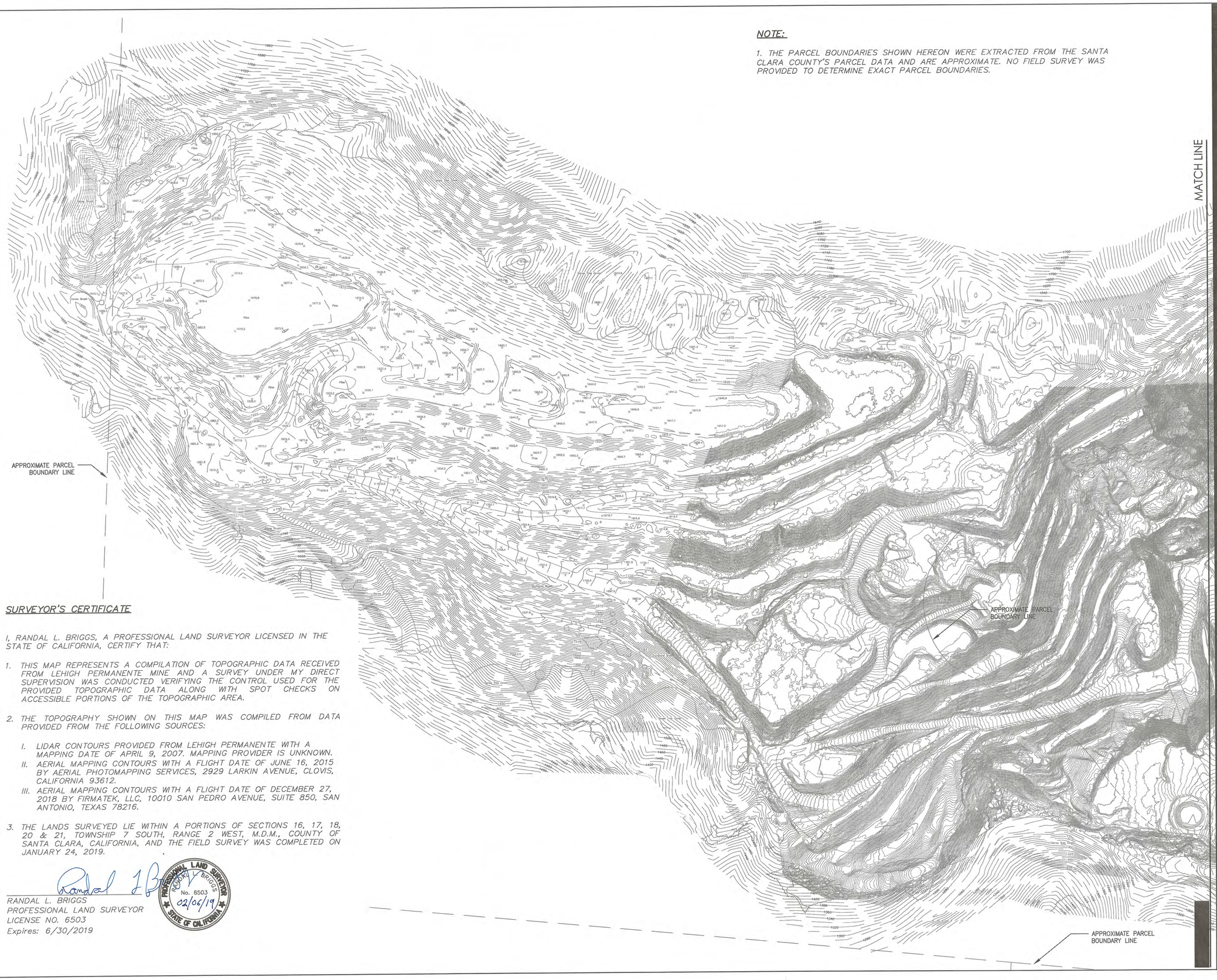
0 700 1,400 2,800 Feet

Parcels and Vested Rights

PERMANENTE QUARRY RECLMATION PLAN AMENDMENT

Appendix D-4

APPENDIX D-5
TOPOGRAPHIC SURVEY AND PARCELS



NOTE:

1. THE PARCEL BOUNDARIES SHOWN HEREON WERE EXTRACTED FROM THE SANTA CLARA COUNTY'S PARCEL DATA AND ARE APPROXIMATE. NO FIELD SURVEY WAS PROVIDED TO DETERMINE EXACT PARCEL BOUNDARIES.

SURVEYOR'S CERTIFICATE

I, RANDAL L. BRIGGS, A PROFESSIONAL LAND SURVEYOR LICENSED IN THE STATE OF CALIFORNIA, CERTIFY THAT:

1. THIS MAP REPRESENTS A COMPILATION OF TOPOGRAPHIC DATA RECEIVED FROM LEHIGH PERMANENTE MINE AND A SURVEY UNDER MY DIRECT SUPERVISION WAS CONDUCTED VERIFYING THE CONTROL USED FOR THE PROVIDED TOPOGRAPHIC DATA ALONG WITH SPOT CHECKS ON ACCESSIBLE PORTIONS OF THE TOPOGRAPHIC AREA.

2. THE TOPOGRAPHY SHOWN ON THIS MAP WAS COMPILED FROM DATA PROVIDED FROM THE FOLLOWING SOURCES:

   I. LIDAR CONTOURS PROVIDED FROM LEHIGH PERMANENTE WITH A MAPPING DATE OF APRIL 9, 2007. MAPPING PROVIDER IS UNKNOWN.
   II. AERIAL MAPPING CONTOURS WITH A FLIGHT DATE OF JUNE 16, 2015 BY AERIAL PHOTOMAPPING SERVICES, 2929 LARKIN AVENUE, CLOVIS, CALIFORNIA 93612.
   III. AERIAL MAPPING CONTOURS WITH A FLIGHT DATE OF DECEMBER 27, 2018 BY FIRMATEK, LLC, 10010 SAN PEDRO AVENUE, SUITE 850, SAN ANTONIO, TEXAS 78216.

3. THE LANDS SURVEYED LIE WITHIN A PORTIONS OF SECTIONS 16, 17, 18, 20 & 21, TOWNSHIP 7 SOUTH, RANGE 2 WEST, M.D.M., COUNTY OF SANTA CLARA, CALIFORNIA, AND THE FIELD SURVEY WAS COMPLETED ON JANUARY 24, 2019.

RANDAL L. BRIGGS
PROFESSIONAL LAND SURVEYOR
LICENSE NO. 6503
Expires: 6/30/2019

PROFESSIONAL LAND SURVEYOR
RANDAL L. BRIGGS
No. 6503
02/06/19
STATE OF CALIFORNIA

Stantec

Stantec Consulting Services Inc.
6995 Sierra Center Parkway, Suite 200
Reno, Nevada, 89511
www.stantec.com
775.850.0777

Consultants

Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD

File Name:	Dwn.	Chkd.	Dsgn.	YY.MM.DD

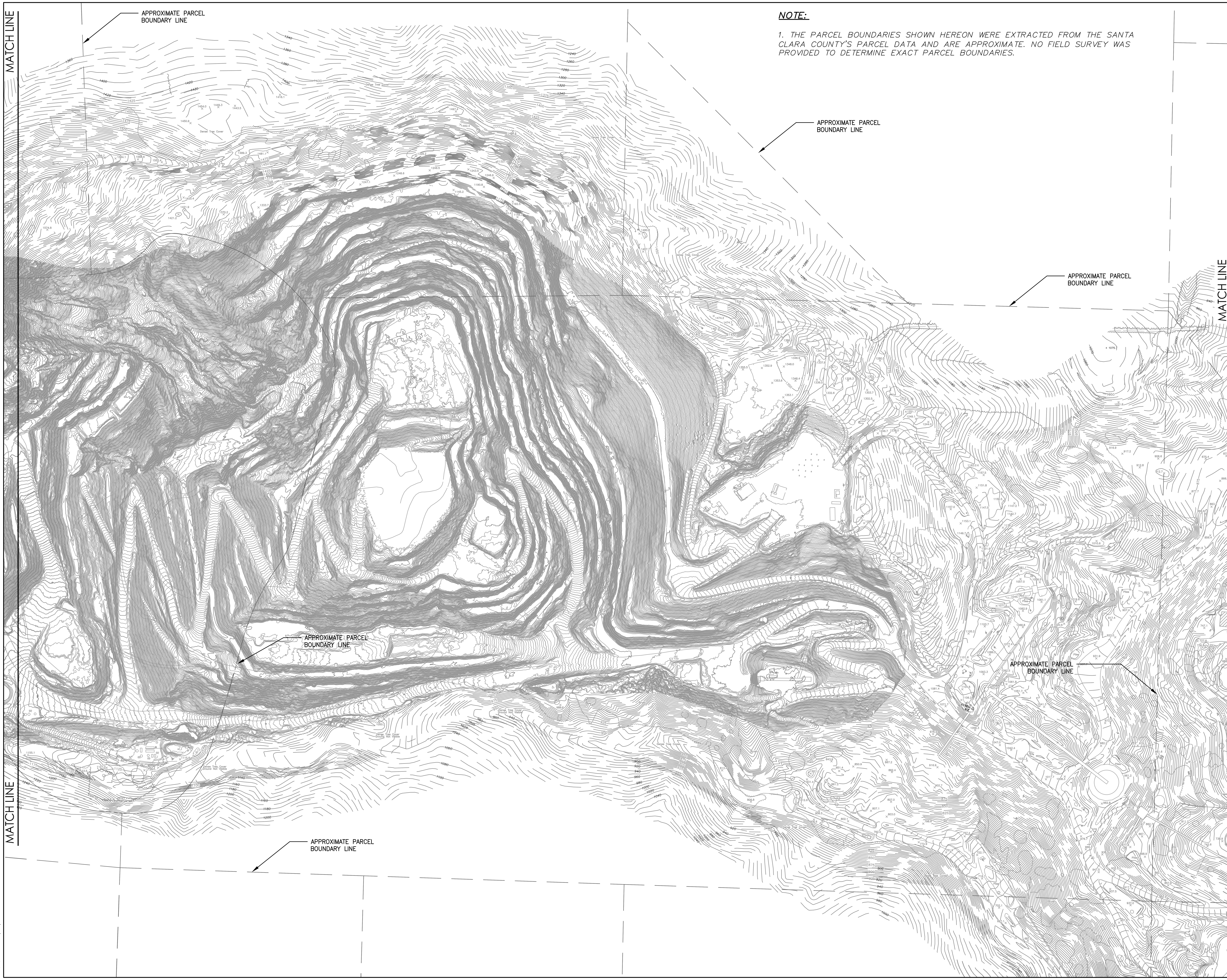
Permit-Seal

Client/Project
LEHIGH SOUTHWEST CEMENT COMPANY
PERMANENTE MINE

SURVEY VERIFICATION &
CERTIFICATION OF MAPPING DATA
CUPERTINO, CALIFORNIA

Title
COMPILED TOPOGRAPHY &
APPROXIMATE PARCEL BOUNDARIES

Project No.	Scale	
180101720	1" = 200'	
Drawing No.	Sheet	Revision
	1 of 3	0



NOTE:

1. THE PARCEL BOUNDARIES SHOWN HEREON WERE EXTRACTED FROM THE SANTA CLARA COUNTY'S PARCEL DATA AND ARE APPROXIMATE. NO FIELD SURVEY WAS PROVIDED TO DETERMINE EXACT PARCEL BOUNDARIES.

Stantec

Stantec Consulting Services Inc.
6995 Sierra Center Parkway, Suite 200
Reno, Nevada, 89511
www.stantec.com
775.850.0777

Consultants

Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD

File Name:	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project

LEHIGH SOUTHWEST CEMENT COMPANY
PERMANENTE MINE

SURVEY VERIFICATION &
CERTIFICATION OF MAPPING DATA
CUPERTINO, CALIFORNIA

Title

COMPILED TOPOGRAPHY &
APPROXIMATE PARCEL BOUNDARIES

Project No.	Scale	
180101720	1" = 200'	
Drawing No.	Sheet	Revision
	2 of 3	0

V:\1801\active\180101720\survey\design\drawing files\CUPERTINO_TOPO.dwg
2019/02/06 8:54 AM By: Snyder, Eric

NOTE:

1. THE PARCEL BOUNDARIES SHOWN HEREON WERE EXTRACTED FROM THE SANTA CLARA COUNTY'S PARCEL DATA AND ARE APPROXIMATE. NO FIELD SURVEY WAS PROVIDED TO DETERMINE EXACT PARCEL BOUNDARIES.

V:\1801\active\180101720\survey\design\drawing files\CUPERTINO_TOPO.dwg
2019/02/26 8:55 AM BY Jensen, Eric

Stantec

Stantec Consulting Services Inc.
6995 Sierra Center Parkway, Suite 200
Reno, Nevada, 89511
www.stantec.com
775.850.0777

Consultants

Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD

File Name:	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project
LEHIGH SOUTHWEST CEMENT COMPANY
PERMANENTE MINE

SURVEY VERIFICATION &
CERTIFICATION OF MAPPING DATA
CUPERTINO, CALIFORNIA

Title
COMPILED TOPOGRAPHY &
APPROXIMATE PARCEL BOUNDARIES

Project No.	Scale	
180101720	1" = 200'	
Drawing No.	Sheet	Revision
	3 of 3	0

APPENDIX E
CONDITIONS OF APPROVAL

Conditions of approval applicable to this reclamation plan amendment will be inserted when available.

APPENDIX F
REVEGETATION

APPENDIX F-1
REVEGETATION PLAN

Revegetation Plan Update

Permanente Quarry

SANTA CLARA COUNTY

CALIFORNIA

Prepared For:

Lehigh Southwest Cement Company
24001 Stevens Creek Blvd.
Cupertino, CA 95014

WRA Contact:

Geoff Smick

smick@wra-ca.com

Date:

March 2019 - Updated May 2019

WRA Project No. 16143-15

ENVIRONMENTAL CONSULTANTS

2169-G East Francisco Blvd., San Rafael, CA 94901 (415) 454-8868 tel (415) 454-0129 fax info@wra-ca.com www.wra-ca.com

This page left intentionally blank

Executive Summary

This Revegetation Plan (Plan) describes the revegetation program for Permanente Quarry's proposed Reclamation Plan replaces the previously approved revegetation plan (2012) except for the Permanente Creek Reclamation Area (PCRA), which is not addressed in this document. This Plan provides specific guidance on soil composition and depth, species planting palette, and revegetation success criteria. The Plan is based on site specific analysis and testing, augmented by the results of test plot monitoring, and current and future revegetation results, to optimize revegetation success. This Plan employs the following revegetation strategies:

- Species palette based on:
    - Initial assessment of native plants in undisturbed areas
    - Results of 16 test plots
- Planting plans that incorporate:
    - Analysis and characterization of planned final slope angles
    - Slope aspect and solar radiation
    - Visibility from populated or frequently visited areas
    - Environmental objectives, such as aesthetics from public viewpoints
    - Substrate limitations (such as hard rock walls and coarse overburden)
    - Other prevailing considerations (such as highwall benches developed for stability)
- Resoiling with materials designed to address shortcomings of overburden and other mined surfaces based on test plot results. Materials may include fine-grained rock, salvaged soils, soil amendments or mulches, or imported soils, as available.
- Interim erosion control and final revegetation with native and naturalized species, using:
    - Suppliers specializing in California native plants
    - Seed collected from on-site plants or the surrounding region where local genetics are factored
    - Plugs and container plants where local slope and aspect will support larger species
- Success based on revegetation performance standards, demonstrated by monitoring and measuring for species richness, density, and cover.
- Maintenance until success criteria is met through supplemental planting, weed control, and application of organic materials.

Utilizing these strategies, the Plan is designed to reclaim disturbed lands to self-sustaining revegetated cover that support a post-mining open space land use. The vegetation communities established will mature over time to be similar to surrounding natural areas. South- and west-facing slopes, which are warmer and drier, are designed to be scrub and chaparral habitats, while north- and east-facing slopes, which are cooler and moister, are designed to support woodlands. The different planting areas were determined using a solar radiation analysis of reclaimed slope contours:

- Sloped areas and south-facing benches will be seeded or planted with native shrub and herb seeds and will grow into scrub and chaparral habitat.

- Flat areas with less intense solar radiation will be planted with container shrubs and trees and will grow into woodlands. North-facing benches will be planted with an oak-woodland species assemblage.

- East-facing benches will be planted with a mixture of oak woodland species and native grey pine, which can tolerate the harsher solar exposures for such areas and create microhabitats that will allow more successful establishment of oak woodland over time. Eventually these areas will develop into mixed oak woodland habitat that will blend in with the surrounding environment. While these should provide habitat for wildlife, wildlife habitat is not a specific reclamation goal.

- When practical, seeds used for the revegetation effort will be generated from seed collected onsite and contract grown in commercial gardens to generate large amounts seed and plant stock that have adapted to local conditions.

These strategies are based off of a soil development plan and a detailed test plot program. The test plot program generated useful data regarding the optimal species blends and planting methods. Additionally, the soil development plan and test plot program were designed to develop blends of natural topsoil with overburden and other materials available onsite that will enhance the amount of growth media available for revegetation purposes, as necessary to ultimately achieve revegetative success. A test plot program has been implemented that tests the various soil blends, four seed mixes, and container shrub and tree plantings. Monitoring data were used to adjust species selection and to describe idealized soil treatments and are reported herein. Test plot monitoring was continued for five years and the results were applied to the revegetation effort.

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

1.0 INTRODUCTION

This Revegetation Plan (Plan) has been prepared at the request of Lehigh Southwest Cement Company (Lehigh) for the Permanente Quarry (Quarry). This plan provides recommendations for revegetation of 625[1] acres of the Reclamation Plan Area (RPA). The RPA and boundaries of the larger 3,510-acre Quarry property are shown in Figure 1. The recommendations in this Plan are intended to comply with the requirements of the California Surface Mining and Reclamation Act (SMARA), Public Resources Code section 2710 et seq., and SMARA's reclamation standards at Code of Regulations, Title 14, section 3705 et seq. (Reclamation Standards). This Plan replaces the previously approved reclamation plan (2012) except for the Permanente Creek Reclamation Area (PCRA), which will be addressed in a separate revegetation memorandum associated with the Permanente Creek Restoration Project dated November 14, 2018.

SMARA regulations at California Code of Regulations section 3711 provide guidance to developing site-specific performance standards for topsoil salvage, maintenance, and redistribution. The regulations include salvaging soil before mining begins; however, they also provide, "If the amount of topsoil needed to cover all surfaces to be revegetated is not available on site, other suitable material capable of sustaining vegetation (such as subsoil) shall be removed as a separate layer for use as a suitable growth media." Permanente Quarry is such a site. Operations here were initiated almost a century before these regulations were developed. Consequently, as reclamation planning is employed, creative options must be available to address surfaces that do not have the proper water holding capacity and nutrients for rapid establishment of vegetation. Thus, this Plan compiles available data for site conditions and the results of onsite revegetation test plots, and provides conceptual recommendations for resoiling and revegetation. Because no particular solution may be sufficient for the entirety of the approximately 625 acres to be revegetated, flexibility is provided for the soil amendment materials. While the vegetation goals are set in terms of SMARA reclamation standards for revegetation richness, density, and cover, the key determinant of success will be whether a self-sustaining vegetation is initiated that will, over time, control erosion, prevent off-site sedimentation, and attenuate visual contrasts where mined surfaces are visible from offsite locations. These revegetation goals are compatible with the open space land use goal for reclamation.

Materials available to supplement growth media are limited. However, the reclamation plan calls for use of imported soil and other materials to backfill the North Quarry. If that provision is employed, then the solution to soil amendment is more easily resolved by diverting a fraction of the import for that use.

Reclamation of the RPA will occur within the disturbed areas shown in Figure 1. Existing and planned soil disturbance at the site that is to be revegetated totals approximately 625 acres, and this acreage has been broken up into 3 stages associated with reclamation sequencing. The acreage of each Revegetation Stage Polygon is shown in Table 1 and is inclusive of the disturbed areas with a small buffer around the disturbance area to smooth boundaries. Reclamation will be divided into three distinct phases, and the sizes of the areas requiring revegetation in each phase are described in Table 1. These areas are referred to as

[1] Note that the revegetation acreages in this document may differ slightly from the stated area of disturbance in the Reclamation Plan since some disturbed areas will remain in an unvegetated state for access into the future.

"Revegetation Stages" and parallel the Reclamation Phasing described in the Reclamation Plan (Lehigh 2019). Engineered swales will be created on the interior edges of benches to collect and direct stormwater. Reclamation will include revegetation of disturbed ground, except for active roads and adjacent drainage swales, with native species following the guidance set forth in the Reclamation Standards. Reclamation will occur in phases with progressive revegetation of areas as the planned landforms are graded to final contour.

Table 1. Revegetation stage acreages

Stage	Approximate Acreage
Stage 1 (0-20 years)	298
Stage 2 (15-30 years)	95
Stage 3 (30-40 years)	232
Total Revegetation Area	625

This Plan also extends to the reclamation of areas disturbed by mineral exploration activities in the area known as the South Resource Area, an area previously disturbed by mineral exploration. Limited erosion control seeding occurred on redundant access routes in this area previously, though major access routes were left unreclaimed to allow for continued access. This Revegetation Plan includes a description of the following:

- Goals of the revegetation program;
- Site characteristics that influence revegetation;
- Test plot program (constructed in 2008) and results;
- Proposed soil development and planting methods; and
- Performance standards.

Appendix A lists potential suitable native plant species for revegetation of the RPA. Appendix B includes soil test reports from Soil and Plant Lab, Inc. Appendix C includes Figures 1-5 as referenced in this Revegetation Plan. Appendix D summarizes revegetation along test plots and associated maps and photos.

1.1 Revegetation Goals and Objectives

The goal for revegetation efforts in the RPA is to establish a self-sustaining vegetation cover that will, over time, control erosion, prevent off-site sedimentation, and attenuate visual contrasts where mined surfaces are visible from offsite locations. Use of native shrubs and trees will assist in blending mined surfaces into the surrounding landscape. Revegetation will be sufficient to stabilize the surface against the effects of long-term erosion and is designed to meet the post-mining land use goal of open space.

The planned end use for the RPA is open space. As a result, revegetation should visually integrate with the surrounding open space areas and provide for permanent soil protection. The surrounding areas include north-facing slopes with scrub and woodland communities and scattered high meadows, and dry south-facing slopes vegetated with chaparral and scrub species.

The objective of RPA revegetation for north-facing slopes is to establish shrub and herbaceous species present in adjacent undisturbed communities, with "islands" of shrub and tree plantings

on the benches that eventually will contribute to the regeneration of scrub, woodland, and forest. Shrub cover on north-facing slopes should provide shade and appropriate successional growing conditions for natural recruitment of tree species in the future. Since oak tree establishment is difficult and oak trees are slow growing, native grey pine will be planted in some more visible bench areas with greater solar radiation exposure; these visible bench areas also favor grey pine as a hardier and faster-growing species due to solar exposure that is not optimal for oak tree establishment outside of a mature canopy. Over time, the grey pine will provide shade and protection that will improve oak tree establishment and create a more successful oak woodland habitat.

For south-facing RPA slopes, the objective of revegetation is to mimic the scrub communities present on south-facing slopes in the adjacent open space areas by seeding with native shrubs and grasses that will eventually contribute to the establishment of scrub communities. Results from the completed test plot program have been used to improve the phased reclamation of the quarry and are described in Appendix D. Annual monitoring results of the test plots provided useful information on species survivorship, natural recruitment success, and soil blend and depth preferences. The results also help assess additional revegetation components such as benefits of mulch around container plants and the need for herbivory control. These analyzed results were used to further refine the planting plan such that the most successful plant species and soil blends are used preferentially to facilitate revegetation of the site as quickly as possible.

1.2 Summary of Revegetation Tasks

Tasks described in this Plan will provide vegetative cover for final contours, thus controlling erosion and stabilizing slopes on the site. Revegetation efforts will utilize plant materials capable of self-regeneration without continued dependence on irrigation, soil amendments, or fertilizer in accordance with the Reclamation Standards.

1.2.1 Project Area Revegetation Summary

Seeding of the finished slopes with a mixture of grasses, herbaceous plants, and shrubs will provide surface cover and erosion control for the new slopes. Tree and shrub planting areas will be located on contoured benches to encourage the long-term development of an oak savannah or forest on north- and east-facing slopes, and native scrub on south-facing slopes. This Plan describes the test plot program, soil treatment and plant installation, maintenance and adaptive management guidelines, and verifiable monitoring standards to achieve the goals and objectives listed above.

1.2.2 Special Treatment Areas Summary

Areas identified by Benchmark Resources as visible from populated or public visitation areas occur along the ridgelines in the RPA. These sites are located along the north-facing slopes of the northern ridgelines in the North Quarry, EMSA, and WMSA and the south-facing slopes along the Rock Plant Reserve (see Figure 4). These areas have been assigned thickly vegetated communities whenever solar radiation conditions permitted, though revegetation managers may opt for special revegetation treatments in these areas to hasten vegetative establishment to more quickly obscure regraded and barren slopes. Options to speed plant growth include irrigation, increased ratios of organic material in the growth media, and planting larger plants.

1.2.3 South Resource Area Summary

Upon the completion of drilling activities, unnecessary greenfield and historic roads and pads were reclaimed and revegetated. Key access roads were winterized and left in place for continued use. Roads and pads were recontoured as necessary to native slopes, and exposed soils were broadcast seeded with native grasses and wildflowers. Hay was spread over exposed soil surfaces to control erosion. In some cases, brush that was cleared for road and drill pad construction was spread back over the disturbed area creating microclimate variation for revegetation. This area is not shown on the Figures in Appendix D, but is located south of the PCRA on the north facing slopes.

2.0 EXISTING CONDITIONS

2.1 Native Soil Types

The USDA *Soil Survey of Santa Clara Area, California* (USDA 1958) indicates that the RPA has seven native soil types (map units) and depicts excavated Quarry areas as a "Pit" map unit. These map units are described in detail below. According to the soil survey, the native soils of the RPA were subject to erosion and gullying, were generally quite shallow, and hosted a plant community almost wholly dominated by scrub. Although historical Quarry activities have disturbed the native soils, previous successful restoration plantings at the Quarry have shown that plant communities and soil characteristics may be restored.

Pit (Ec) - This map unit consists of areas large enough to map where excavations have been made and where the original soil has been removed. Excavations in this area have been principally for limestone and aggregate production.

Azule silty clay, 20-30 percent slopes (At) - Azule silty clay surface soil consists of brown or pale-brown silty clay that normally varies from 8 to 15 inches in depth. The surface soil overlies a brown or pale-brown slightly compact subsoil of silty clay texture. The underlying material occurs at depths of 20 to 45 inches and is light-brown or light yellowish brown unconsolidated material of clay loam or silty clay loam texture. In a few places a small amount of gravel occurs in the profile. The native vegetation is mostly brush, but there are some areas of this soil type in grassland and woodland.

Los Gatos clay loam, 20-35 percent slopes (La) - The Los Gatos surface soils are brown and become nearly reddish brown when moist. They grade into brown or reddish brown subsoil of clay loam texture. In most places some rock fragments occur in the subsoils. The number and size of fragments increase with depth. The soils are underlain by hard but generally broken or shattered metamorphosed sedimentary rock at depths of 26 to 38 inches.

Los Gatos clay loam, moderately eroded, 20-35 percent slopes (Lb) - This soil differs from the non-eroded Los Gatos clay loam described above mainly in degree of erosion, except that the exposed soil is redder in color, somewhat shallower, and contains a few gullies.

Los Gatos - Maymen stony soils, undifferentiated, 50+ percent slopes (Lf) – This map unit consists of very steep and stony areas of Los Gatos and Maymen soils. Slopes are steep, and in most places rock outcrops are numerous. The vegetation is a dense growth of brush. The Los Gatos soils predominate, but in some places fairly large areas of Maymen soils occur. The Los Gatos surface soils are brown and become nearly reddish brown when moist. They grade into

brown or reddish brown slightly compact subsoils of finer texture than the surface soils. In most places some rock fragments occur in the subsoils. The number and size of fragments increase with depth. The soils are underlain by hard but generally broken or shattered shale or sandstone that has undergone varying degrees of metamorphosis. Maymen surface soils are light brown or pale brown. They overlie light brown or light reddish brown medium textured subsoils. In most places rock fragments occur in the subsoils and in the surface soils. The subsoils grade irregularly at shallow depths into hard sandstone or conglomerate bedrock.

Permanente stony soils, undifferentiated, 50+ percent slopes (Pa) - These very steep areas of Permanente soils are very shallow and stony. The surface soils are brown (becoming nearly reddish brown when moist), medium textured, stony, and generally non-calcareous. In most places fragments of bedrock are mixed with the surface soils, which grade irregularly at very shallow depths into light-gray or white hard limestone bedrock. The natural vegetation is almost entirely brush.

Soper gravelly loam, 20-35 percent slopes (Sm) - The surface soil is a brown or light-brown, slightly or medium acid gravelly loam to depths of 8 to 13 inches. The surface soil grades into a slightly more reddish-brown, moderately compact, weakly blocky subsoil of gravelly clay loam texture. The subsoil retards drainage somewhat and causes waterlogging of the surface soil during heavy rains. At depths of 23 to 32 inches the subsoil grades into a noncalcareous moderately or weakly consolidated conglomerate bedrock that is somewhat more permeable than the subsoil.

Soper gravelly loam, 35-50 percent slopes (So) - This soil is normally somewhat shallower than that on less steep slopes. The natural vegetation is a thick growth of brush. The typical slopes of Soper soils usually range from 20 to 35 percent, but steep slopes are more common in this area. The surface soils are brown or light brown, medium textured, and generally gravelly. The surface soils grade into slightly more reddish-brown, moderately compact, weakly blocky subsoils of gravelly clay loam texture. The subsoils in most places are dense enough to retard drainage to a moderate degree. The subsoils grade into brown or yellowish-brown noncalcereous, moderately or weakly consolidated conglomerate bedrock.

2.2 Climate

The RPA lies within a semi-arid Mediterranean climate zone characterized by warm summer and mild winter temperatures with a substantial slope effect contributing to vegetative community differences on north- and south-facing slopes. Rainfall occurs mainly from November through April. Average annual rainfall is about 22 inches; however, precipitation can range widely from year to year. On north-facing slopes, conditions are moister and less warm than on south-facing slopes as evidenced by the dramatic differences in vegetative communities. The RPA will have both north-facing and south-facing slopes.

WRA conducted an analysis of the average solar radiation of the reclaimed slopes in order to determine the best types of plants to use for revegetation in different areas. Figure 2 depicts the variation in solar radiation at the ground surface within different areas of the RPA based on proposed final reclaimed slope and aspect. Classes of “low”, “medium”, and “high” solar radiation were determined based on average conditions in surrounding intact vegetation communities. The upper limit of the low range was defined by the mean plus one-half of the standard deviation of the solar radiation value of the existing tree-dominated communities (oak and bay woodland). The upper end of the medium range extends the mean plus one standard deviation of the existing tree-dominated communities. And the high range includes all solar

radiation values higher than the low and medium. The unvegetated slopes of the RPA may experience higher summer temperatures than would be expected for this region because sparse vegetative cover will be less effective in reflecting and absorbing sunlight until a denser cover of vegetation is established.

2.3 Vegetation

Vegetation in the RPA is described in WRA's *Biological Resources Assessment* (2011) and GEI's Biological Resources Report – Permanente Quarry Reclamation Plan Amendment (2019a and b). Portions of the RPA have been historically disturbed by Quarry operations and other industrial activities dating to the early 1900's. According to the *Biological Resources Assessment*, a Northern Mixed Chaparral / Scrub Oak Chaparral / Coast Live Oak Woodland community is presumably the natural community that once dominated the majority of the RPA. Most of the hillslopes surrounding the RPA are described as one of these community types. These biological communities are a mosaic of south-facing dry rocky slopes with thin soils dominated by chaparral species and north-facing slopes and shaded ravines dominated by a mature tree and shrub dominated canopy. These north facing slopes support oak woodland and bay forest in the canyons and scrub oak chaparral on the ridges.

Shrub species typical of the chaparral community on south-facing slopes include mainly native species: California sagebrush (*Artemisia californica*), chamise (*Adenostoma fasciculatum*), coyote brush (*Baccharis pilularis*), scrub oak (*Quercus berberidifolia*), buckbrush (*Ceanothus cuneatus*), toyon (*Heteromeles arbutifolia*), and poison oak (*Toxicodendron diversilobum*). On north-facing slopes, typical overstory species include coast live oak (*Quercus agrifolia*), California bay (*Umbellularia californica*), scrub oak, toyon, and California buckeye (*Aesculus californica*) with scattered valley oak (*Quercus lobata*), and blue oak (*Quercus douglasii*). Scrub species in the understory on north-facing slopes are typically coyote brush and poison oak.

2.4 Previous Revegetation Sites

Previous natural and focused revegetation efforts at the Quarry have occurred successfully. In the EMSA, a cut slope above the old "boneyard" was covered with a dense shrub community dominated by purple sage (*Salvia leucophylla*; see Appendix A). The slope below the old boneyard is adjacent to the Quarry entrance and is vegetated with a variety of native and ornamental tree species, including olive (*Olea europaea*), Monterey pine (*Pinus radiata*), Deodar cedar (*Cedrus deodara*), and coast live oak. These slopes were graded during the construction of the previous administration building locations in 1941. Historic aerial photos from 1948 show young plantings in some of these areas that are currently covered with a dense layer of trees and shrubs.

Previous material storage areas were successfully revegetated per the 1985 Reclamation Plan (known as Area C in that plan). Native shrub species such as coyote brush and California buckwheat (*Eriogonum fasciculatum*) were used in that revegetation effort and currently dominate the area today (Appendix A).

Past revegetation efforts typically consisted of grading slopes to a final contour, hydroseeding or seeding with native grass species, and planting at a low to moderate density with native shrubs and trees including coyote brush, chamise, and oaks from locally collected cuttings and acorns. The growing substrate was typically crushed overburden rock with little reclaimed topsoil. More than a decade after reclamation, the most successful sites were primarily south-facing slopes

which are now dominated by 70 to 100 percent cover of native shrubs including California buckwheat, coyote brush, buckbrush, and California sagebrush.

Irrigation was utilized in some revegetated areas to encourage the establishment of planted trees and shrubs, and protective cages were installed around most plantings to reduce damage from deer browsing. Generally, these areas are now dominated by an herbaceous layer of non-native and native grass species including wild oats (*Avena* spp.), brome grasses (*Bromus* spp.), three weeks fescue (*Festuca microstachys*), and Italian rye-grass (*Festuca perennis*).

3.0 GROWTH MEDIA DEVELOPMENT

Areas to be revegetated in the RPA will initially consist of an overburden rock surface, other fill slopes, areas used for general operations that have been compacted for vehicle travel, backfill within the North Quarry, and stability benches along highwall cut slopes. Overburden on-site is low-grade limestone or greenstone that must be mined in order to reach the high-grade limestone situated at deeper elevations. Fill slopes scheduled to undergo revegetation will be graded to a final contour. The growth media development plan is designed to produce recommendations for additional materials that may be added, if necessary, to improve the substrate's texture, structure, and nutrient availability, and to promote faster soil development ultimately. For the purposes of this report, "soil" refers to the upper layer of earth in which plants grow, typically consisting of a mixture of decomposed rock and organic material. "Topsoil" refers to the upper most layer of soil, typically the upper 5 to 10 inches, and it contains the highest levels of organic matter, microorganisms, and plant seeds. "Native soil" refers to soils originating from within the RPA and generally undisturbed or selectively stockpiled for later use. "Growth media" is a term used to capture any mixture of these components with other materials available onsite. This term is broader than soil because it captures a variety of materials intended to support plant growth that may provide lower than typical levels of organic material content. The terms "soil laboratory," "soil analysis," and "soil sample" colloquially capture all of these material types.

To provide information on growth media conditions for the RPA growth media development program, several samples of soil and other materials available onsite were collected. These samples included a representative sample of the overburden rock which will be the underlying substrate throughout the RPA, as well as samples from twenty-five undisturbed reference sites, three existing revegetation sites, and five potential supplemental material sources.

The Soil and Plant Laboratory, Inc. in Santa Clara, California performed an analysis of the soil and on-site materials samples, including an assessment of the following characteristics:

- pH
- Total Exchangeable Cations
- Salinity
- Sodium
- Sulfate
- Sodium Adsorption Ratio (SAR) Value
- Boron
- Macronutrients (Nitrogen, Phosphate, Potassium, Calcium, Magnesium, Sulfur)
- Micronutrients (Iron, Manganese, Copper, Zinc)
- United States Department of Agriculture (USDA) Soil Textural Classification
- Organic Matter Content (Percent Dry Weight)

Detailed reports on the soil sample analyses are provided in Appendix C. Two additional samples included in Appendix C, the “Basin Clean Out” and “Pit #2”, are not discussed below due to poor sample quality. Figure 3 shows the location of soil samples described below. Table 2 outlines the primary characteristics of the soil samples.

Table 2. Description and characteristics of soil samples (additional details in Appendix D).

SAMPLE MATERIAL	DOMINANT PLANT COMMUNITY	USDA map unit (1958)	Organic matter (% dry weight)	USDA SOIL CLASSIFICATION
Undisturbed Reference Topsoil (potential topsoil sources)				
South of Quarry - B1	bay forest	Pa	7.8	Very Gravelly Sandy Loam
South of Quarry - B2	bay forest	Lf	9.7	Very Gravelly Sandy Loam
South of Rock Plant - B3	bay forest	Lf	4.7	Loam
EMSA - C5	chaparral	La	2.4	Clay Loam
EMSA - C6	chaparral	Lf	2.5	Very Gravelly Sandy Loam
EMSA - C7	chaparral	Sm	3.5	Sandy Clay Loam
EMSA - C8	chaparral	La	2.5	Clay Loam
EMSA Native	chaparral	Sm	7.4	Sandy Loam
WMSA Native	chaparral	Lf	2.5	Clay Loam
South of Quarry - C1	chaparral	Pa	6.9	Gravelly Sandy Loam
South of Quarry - C2	chaparral	Lf	8.8	Sandy Clay Loam
South of Rock Plant - C3	chaparral	Pa	6.7	Loam
South of Rock Plant - C4	chaparral	So	7.6	Gravelly Sandy Loam
EMSA - G3	grassland	La	0.7	Gravelly Sandy Clay Loam
EMSA - G4	grassland	La	2.2	Gravelly Clay Loam
South of Quarry - G1	grassland	La	2.6	Sandy Clay Loam
South of Rock Plant - G2	grassland	At	0.7	Sandy Clay Loam
EMSA - O5	oak woodland	Sm	7.1	Clay Loam
EMSA - O6	oak woodland	Lf	5.5	Gravelly Sandy Loam
EMSA - O7	oak woodland	Ec	2.6	Sandy Loam
EMSA - O9	oak woodland	La	2.8	Clay Loam
South of Quarry - O1	oak woodland	Pa	5.7	Gravelly Sandy Loam
South of Quarry - O2	oak woodland	Lf	5.1	Very Gravelly Sandy Loam
South of Rock Plant - O3	oak woodland	Pa	6.4	Gravelly Loam
South of Rock Plant - O4	oak woodland	Pa	6.1	Gravelly Sandy Clay Loam
Revegetation Site Samples				
East Quarry Revegetation	native shrubs (70%) [Cal. buckwheat, coyote brush]	Lf	4.8	Very Gravelly Sandy Loam
West Quarry Revegetation	non-native grass (90%), w/ scattered plantings	Pa	3.7	Very Gravelly Loam Sand
WMSA Revegetation	native & non-native grass (70%), w/ shrub/tree plantings	Lb	0.8	Very Gravelly Sandy Loam
Supplemental Materials				

Overburden rock	N/A	Lf	1.2	Gravelly Sandy Loam
North Quarry fine greenstone	N/A	Ec	0.7	Very Gravelly Loamy Sand
Rock Plant fines	N/A	At	1.4	Clay Loam
West Main topsoil	N/A	Lf	0.5	Very Gravelly Sand
North Quarry topsoil	N/A	Pa	1.2	Very Gravelly Sandy Loam

3.1 Reference Sites

As shown in Table 2 and Figure 3, soil conditions at the 25 undisturbed reference sites supporting native plant communities served as a reference for determining the requirements to achieve a suitable growth medium for revegetation. Existing revegetation sites also provide information for targeting suitable soil conditions since these sites are underlain by a substrate similar to that which will be used in the RPA. Three revegetation sites were sampled in the WMSA and North Quarry, and they vary in age of installation and revegetation techniques and plant materials used.

Undisturbed Topsoil Sites

The “EMSA Native” and “WMSA Native” topsoil samples (referred to as “East Dump Native” and “West Dump Native” in soil laboratory reports [Appendix C]) were collected and analyzed in May 2008 while the other 23 undisturbed topsoil samples were collected and analyzed in February and March 2009. Samples were taken from existing road cut banks and vegetated portions of the RPA and adjacent areas on the Quarry property, within oak woodland, chaparral, and grassland vegetation communities. The samples varied in soil texture, organic matter content, and other characteristics (Appendix C). Soil structure and organic matter also varied within each vegetation community type, although grassland samples had low organic matter content and woodland and forest samples generally had higher organic matter content. The organic matter content of the reference soil samples varies between 0.7 and 9.7 percent with an average content of 4.8 percent. A minimum organic matter content of approximately 3.0 percent is typically desired for native plant establishment.

East Quarry Revegetation Site

The “East Quarry Revegetation” soil sample (referred to as “Reveg East Pit” in soil laboratory data) was obtained from a revegetation area in the northeast portion of the North Quarry (Figure 3). This area was planted in the 1980s, and the primarily south-facing slopes of the site are now dominated by grass and native brush species, including California buckwheat, coyote brush, buckbrush, and California sagebrush. Soil analyses indicate that soil at the East Quarry Revegetation site has the highest organic matter content (4.8 percent) of the three revegetation sites, an amount sufficient to support native vegetation (Appendix C). The soil texture has a high amount of gravel fractions as well as coarse sands. A soil pit showed a relatively thick “O” horizon, or organic horizon, compared to the other two revegetation sites. Of the three revegetation sites where soil samples were taken, the East Quarry Revegetation site also supports the highest cover of native vegetation, dominated by native shrubs. The other two revegetation sites were dominated by non-native grasses. Given the relatively high organic matter content of the soil and the well-established native vegetation at the East Quarry Revegetation site, the soils at this site provide an appropriate target for RPA soil characteristics.

West Quarry Revegetation Site

The “West Quarry Revegetation” soil sample (referred to as “Reveg West Pit” in soil laboratory data) was obtained from a revegetation area in the northwest portion of the North Quarry (Figure 3). The West Quarry Revegetation site was developed in the 1970s. Currently the non- native grass wild oats (*Avena barbata*) dominates the site with broadly scattered plantings consisting of such species as Monterey cypress (*Cupressus macrocarpa*), ornamental pine (*Pinus* sp.), and blue elderberry (*Sambucus mexicana*). The soil conditions at the West Quarry Revegetation site show a slightly lower amount of organic matter (3.7 percent) than the East Quarry Revegetation site and a similarly high amount of gravel fractions and coarse sands.

WMSA Revegetation Site

The “WMSA Revegetation” soil sample (referred to as “Reveg Slope West Dump” in soil laboratory data) was obtained from a revegetation area at the north end of the WMSA (Figure 3). Installed between 2002 and 2006, the WMSA Revegetation site is predictably less mature than the other two revegetation sites and correspondingly, the vegetation cover at this site is less dense. Hydroseeded grasses and shrub and tree plantings dominate these north-facing slopes. The soil has a relatively low amount of organic matter (0.8 percent) compared to the other two revegetation sites. A hydroseed slurry, including some compost, biosol fertilizer, mycorrhizal inoculant, and hydrostraw, was applied directly to the overburden rock in this revegetation effort.

3.2 Target Soil Characteristics and Potential Remediation Techniques

Based on the assessment of the undisturbed reference and revegetation sites, some recommendations can be made on the soil characteristics for the RPA that would likely support successful revegetation. These recommendations can be employed at the operator’s discretion based on the location, timing, and availability of soil amendments needed to meet the performance standards. Important factors to consider include soil texture and organic matter content in addition to soil chemistry and nutrient levels. The soil characteristics of the East Quarry Revegetation site provide an appropriate target because it is a revegetation site with the most well-established vegetation and utilized a topsoil medium with loamy soil mixed with small rocks similar to that which will be available under the project. The soil conditions of the undisturbed reference sites provide better conditions as plant growth media; however, these conditions will be more difficult and less realistic to achieve than those at the revegetation sites since the RPA will be more similar to the previous revegetation sites.

Targeting a loamy/rocky topsoil texture would be desirable for the RPA to achieve adequate infiltration rates and an appropriate plant growth medium. Loamy soils with high amounts of gravel and coarse sand were observed to support native shrub species, and so may be an acceptable and desirable soil characteristic in revegetation areas. The East Quarry Revegetation site soil is classified as a Very Gravelly Sandy Loam, and while this soil may include large, gravel-size particles, it has enough smaller material and organic matter to support a chaparral community.

3.3 Available Materials

Since topsoil was not salvaged and stockpiled when initial quarry disturbance occurred many decades ago there is a difficiency of suitable topsoil on the site for revegetation efforts. Therefore, existing stockpiles of topsoil, new topsoil generated during quarry operational and reclamation practices, and potentially imported fill, will be incorporated with the top layer of

overburden rock when present to improve soil conditions in the RPA. Remaining topsoil from the RPA will be harvested and stockpiled for reclamation purposes. In cases where woody plant material must be removed from within the RPA to achieve the appropriate grade, the material will be chipped and later combined with the topsoil to increase the organic matter. However, the majority of quarry surfaces have long been established, and new disturbance areas, which contain salvageable topsoil and vegetation, are limited to approximately 50 acres. The overburden rock substrate and potential soil materials are described below in more detail.

Overburden Rock

The results of the soil analysis for the representative overburden rock sample (referred to as "West Waste Rock" in soil laboratory data) indicate that the overburden rock alone is not an ideal substrate for certain plant communities being targeted in the RPA. During the test plot program, the lack of moisture-holding capacity in this material resulted in low grass-seed germination rates. However, shrub germination was extensive with the highest number of stems per area, they were however quite slow growing due to the limited moisture availability. The particle size analysis shows that the USDA classification is a Gravelly Sandy Loam with a diverse distribution of particle sizes. With this varied distribution of particle sizes, the susceptibility to consolidation is high. Over time, particles of various sizes could lock into a consolidated state which could slow down water infiltration rates to an undesirable degree and could cause the soil to be impervious in places. The organic content (1.2 percent) of the overburden rock is low for supporting a native plant community. The pH level indicates slightly alkaline conditions and the natural lime content is relatively high. The content of salinity, sodium, and boron is safely low and the Sodium Adsorption Ratio (SAR) value is acceptable. Available nitrogen and potassium are low, phosphorus is fair, and calcium, magnesium, and sulfate are well supplied. Iron, copper, manganese, and zinc occur at low levels (Appendix C).

Given its rocky texture and low organic content, the overburden rock would benefit from the addition of topsoil and/or organic amendments. Blending stockpiled overburden rock with topsoil and other materials is a consideration for improving texture and nutrient content, and potential blends are described below.

Undisturbed Topsoil

The 25 undisturbed topsoil samples described above represent native soil conditions found within the footprint of the RPA. Prior to removing the topsoil, existing trees and shrubs may be cut and chipped in place. This woody debris will be incorporated into the topsoil to increase the level of organic matter in the soil.

The soil texture, organic matter content, and other characteristics of the topsoil samples varied in quality, with 15 of the 25 samples having generally adequate amounts of organic matter for native plant establishment. Samples classified as "gravelly" or "very gravelly" were identified by the Soil & Plant Lab as less suitable for revegetation as they are more susceptible to consolidation. Several samples were identified by the Lab that would benefit from organic matter and/or potassium supplementation. However, the samples generally exhibited favorable soil chemical composition and they clearly can support native communities as evidenced in the reference sites examined. Available topsoil is a priority material for use in RPA revegetation, as it will potentially also contain native seeds and microorganisms that can improve revegetation success. However, the majority of the Quarry was developed long before mine reclamation requirements were enacted, so topsoil is generally unavailable for reclamation in sufficient quantities. The planned new areas of mining at the lay-back area for ridgeline stabilization and

the Rock Plant Reserve, where topsoil salvage and vegetation salvage and chipping may occur, is limited to approximately 50 acres, producing little soil for overall site reclamation.

A topsoil storage site exists adjacent to the Rock Plant, though the volume of this material is insufficient to provide adequate coverage of the entire RPA without addition growth media amendments.

Disturbed Topsoil

Both the West Main and North Quarry topsoils are samples of salvaged, disturbed soils. These samples contained high amounts of gravel content and coarse sands with a broad distribution of particle sizes. The susceptibility to consolidation is very high for these materials. The organic matter content is relatively low at 0.5 percent and 1.2 percent, respectively. Somewhat similar to the North Quarry fine greenstone material, incorporating the West Main and North Quarry topsoil materials with the overburden rock may improve soil texture conditions but would add little value as a source of nutrients and organic matter and would do little to improve soil structure.

North Quarry Fine Greenstone

The North Quarry (referred to as Pit 1 in soil laboratory data) fine greenstone material may be left in place or harvested from a slope failure occurring in the North Quarry pit if layback of the northern slope is implemented as part of mining and reclamation operations. This material contains coarse sands with high gravel content, and similar to the overburden rock material, the susceptibility to consolidation of this material is high. The infiltration rates are estimated at a slow 0.10 inches per hour and could be even slower when consolidated. Organic matter content is relatively low (0.7 percent). North Quarry fine greenstone material may improve soil texture conditions of the overburden rock but based on the low organic matter content, would provide little added value in nutrient availability or soil structural development to the overburden rock substrate.

Rock Plant Fines

The Rock Plant fines material is a byproduct of the rock processing activities at the Quarry. It has a clay loam texture and contains a substantially greater amount of silt and clay compared to the overburden rock. The Rock Plant fines material has relatively low organic matter content (1.4 percent). Blending the Rock Plant fines material with the overburden rock may improve soil texture conditions. However, based on efforts to create soil blends by the Soil & Plant Laboratory, achieving a homogeneous blend with this material may be difficult to achieve on the broad scale required. The Rock Plant fines material has high moisture content and would have to be dried before it is incorporated with the other soil materials. Only non-limestone fines would be used for revegetation purposes, to address water-quality considerations.

Imported Soils

Under the 2019 reclamation plan update, the North Quarry will be backfilled with a mixture of greenstone overburden (generated onsite) and imported surplus construction soil that meets site-specific acceptance criteria. To augment growth media, imported surplus construction soil with higher organic matter content than on-site materials may also be used in revegetation.

3.4 Growth Media Preparation Experimentation

Based on the soil analysis results, a suitable plant growth medium can be created in the RPA by placing supplemental materials on top of and/or incorporated directly into the mined surfaces, with organic amendments, as necessary and available (Section 3.5.4). In some cases, simply ripping the compacted surface materials may be acceptable to achieve the needed soil texture.

In 2008 nine different growth media combinations were tested at the Soil & Plant Laboratory to gain information on the soil composition resulting from various blends of soil materials, overburden rock, and compost, which was a proxy for added topsoil. In formulating the blends, the lab targeted 4.8 percent organic matter, the amount of organic matter found in the East Quarry Revegetation soil sample. A summary of the soil blend results is listed in Table 3. These blends are meant to provide a menu of growth media amendment options to provide flexibility that can be used strategically during reclamation and are not intended to be prescriptive for the site.

Nutrient values show improvement in overall fertility for all of the blends compared to the overburden rock alone, most often as a result of the nutrient rich compost addition, which served as a proxy for added topsoil. The target organic matter content of 4.8 percent was surpassed for all of the test blends except one, which still had an adequate amount of organic matter for native plants. In general, adding about 25 percent compost on a volume basis, as a proxy for pure topsoil in the test plots, provided an appropriate amount of organic matter for establishment of native plants.

Lab results indicated that excess sodium occurring in the compost used in the test blends contributed to elevated salinity and Sodium Adsorption Ratio (SAR) values present in the test blend results which was not present in the soil samples tested alone. Evaluating the intended compost or imported fill product prior to use is recommended to assure that salts are safely low. Elevated salinity in the growth media could hinder seed germination and be toxic to seedlings. Compost is not currently proposed for use in reclamation of the RPA (see Section 4.0).

Table 3. Summary of soil blend test results		
SOIL BLEND	ORGANIC MATTER (% DRY WEIGHT)	USDA SOIL CLASSIFICATION
1. Overburden rock (73%); compost (27%)	7.0	Very Gravelly Sandy Loam
2. North Quarry fine greenstone (40%); overburden rock (20%); Rock Plant fines (20%); compost (20%)	4.0	Very Gravelly Sandy Clay Loam
3. Rock Plant fines (41%); North Quarry fine greenstone (35%); compost (24%)	5.6	Very Gravelly Loam
4. North Quarry fine greenstone (81%); compost (19%)	5.1	Very Gravelly Sandy Loam
5. North Quarry fine greenstone (43%); overburden rock (36%); compost (21%)	8.5	Very Gravelly Sandy Loam
6. EMSA Native topsoil (68%); overburden rock (32%)	5.1	Very Gravelly Sandy Loam
7. EMSA Native topsoil (75%); North Quarry fine greenstone (25%)	10.1	Very Gravelly Sandy Loam
8. Rock Plant fines (50%); West Main topsoil (28%); compost (22%)	6.3	Very Gravelly Loam
9. Rock Plant fines (46%); compost (22%); North Quarry fine greenstone (16%); West Main topsoil (16%)	6.8	Very Gravelly Loam

The most favorable soil blend candidates were those with predominantly EMSA Native topsoil material [blends 6 and 7]. Combining the overburden rock or North Quarry fine greenstone material with the EMSA Native topsoil results in growth media with excellent fertility and organic content and creates the most promising plant growth media of the blends tested. Given limited quantities of stockpiled native topsoil, adding supplemental materials may be necessary to achieve acceptable growth media volumes onsite. The growth media mixtures that include topsoil do not need compost or imported organic matter-rich fill to achieve the target organic matter content level since they are well-supplied with organic matter.

The second best soil blends contain the Rock Plant fines material [blends 3, 8, and 9]. While the Rock Plant fines material favorably increases silt and clay content of the coarser overburden rock, North Quarry fine greenstone, and West Main and North Quarry disturbed topsoil materials, producing homogeneous soil blends with these materials may prove to be logistically difficult. Only non-limestone Rock Plan fines would be considered for inclusion in this mixture. The Rock Plant fines material has a high moisture content and would have to be dried before it is incorporated with the other soil materials. In field conditions, the drying and consequent incorporation of this material may be time-consuming and its effectiveness unpredictable. It is recommended that results from test plots using the Rock Plant fines material be obtained before application on a large scale.

The tested soil blends utilizing compost (as a proxy for topsoil) with the overburden rock or North Quarry fine greenstone provide adequate conditions for native plant establishment

although the soil texture may be coarser than desired [blends 1, 4, and 5]. Native topsoil will be the highest priority material for use in reclamation, with imported topsoil or organic-rich fill topsoil just below native topsoil. However, other materials discussed above will be available to create growth media treatment mixtures in future revegetation efforts or if topsoil harvest does not meet the quantities needed for ultimate revegetation.

3.5 Growth Media Preparation

The objective of this Plan is to meet revegetation objectives using whatever fine-grained media and organic materials are available when reclamation within each phase occurs whenever possible. To the extent that topsoil placement is necessary to enhance the amount of growth media available to achieve growth targets, certain growth media preparation strategies have been developed. Growth media preparation in the majority of the RPA will involve preparing the surfaces by incorporating supplementary materials as needed to provide suitable plant growth media for revegetation activities. Different growth media treatments may be used for the various portions of the RPA, depending on the target plant community and general aspect and substrate of each area. For the purposes of the reclamation plan, it is understood that the supplementary materials discussed below will be non-limestone materials.

3.5.1 Ideal Material Quantities

WRA has investigated portions of the EMSA, Rock Plant, and areas south of the active Quarry with undisturbed topsoil and native vegetation and described available topsoil depths and general condition. Soil depths (including the A and B horizons) in undisturbed portions of the RPA average from 8 to 11 inches in chaparral, 13 inches in grasslands, 17 to 22 inches in oak woodland, and 35 inches in bay forest.

The ideal soil preparation depth for areas targeted for scrub in the RPA is six inches, a depth tested in the test plots and considered suitable to support most shrub and grass species to be seeded. This target could include 50 percent ripped overburden rock mixed with 50 percent topsoil blend. Preliminarily, this could include 3 inches of loamy topsoil which will be amended with other materials to achieve the 6 inch planting medium. In practice, the exact percentages of the blend may be altered based on topsoil and fill availability.

The tree and shrub plantings on highwall benches will require a deeper planting substrate such as 12 inches to support root establishment. Similar to the reclaimed slopes, the ideal planting substrate could consist of 50 percent overburden rock with a 50 percent topsoil blend amendment. Preliminarily, this could include 6 inches of pure topsoil, to be amended with other materials to achieve a 12 inch planting medium. The exact percentages of the combination may be adjusted in future reclamation efforts based on test plot results and material availability. These topsoil quantities were chosen based on the results of test plot monitoring. Test plots with thicker soils (up to 24 inches) were consistently overrun by undesired annual grasses.

3.5.2 Soil Surface Treatments

The Reclamation Plan (Lehigh Southwest Cement Company 2019) explains that topsoil in quantities sufficient for intensive revegetation efforts is not available. Consequently, the Reclamation Plan proposes creative solutions to ensure that material capable of sustaining vegetation (such as using subsoil, which lies below the topsoil but lacks significant organic material) is available during the reclamation process. These solutions include prescribing soil surface treatments of “Coarse Overburden,” “Soil Backfill,” “Compacted Soils,” and “Highwall

Benches" as the growth media into which plants will be planted or seeds sown (Appendix D, Figure 4). As the amount of surface area exceeds the available and projected topsoil, a revegetation strategy that implements the use of revegetation islands on some surfaces may be the most effective approach to meeting certain revegetation goals. Effective use of available soil is made by concentrating the applications rather than distributing soil in a thin layer. Soil islands would be placed on mine benches, and potentially scattered over areas of overburden stockpile fill. In particular, highwall benches are planned to remain in place at reclamation for long term stabilization purposes. The rocky vertical faces will not support substantial vegetative growth; however the highwall benches flanking the hard rock walls will be revegetated using a revegetation treatment described in Section 4. Cross sections of these areas are provided (Appendix D, Figure 5) for reference.

Coarse Overburden

Coarse overburden represents the largest soil treatment area since this material is the most prevalent surface on the site. Coarse overburden is overburden rock that has been stockpiled over the years and is in the 2-8" size class. This material was used in the test plot program given its abundance. Used alone, coarse overburden actually supports very high stem counts of native shrubs in the test plot program. Although total cover of shrubs in the coarse overburden plots was relatively low, shrub establishment was high and some individual shrubs began to grow substantially towards the later years of the test plot monitoring indicating that this treat is an effective, long term treatment for returning large areas to native scrub or chaparral habitat. The low organic matter content reduces the amount of moisture retention of the soil blend which favors hearty native shrubs over grass and forb species which would otherwise outcompete the shrubs.

Soil Backfill

The Soil Backfill area is limited to the area comprising the existing quarry pit which will be backfilled with materials available onsite to bring it up to final reclamation contours. The majority of these materials have been used as growth media blends in the test plot program. In general this area will be planted similarly to the Coarse Overburden zones – with shrub species targeting scrub and chaparral habitats. Since this area will be situated in a partial bowl-like state at the base of the reclaimed quarry slopes it will receive more runoff than most of the Coarse Overburden and Compacted Soils revegetation areas. Therefore moisture content of the area should be higher supporting greater species richness and cover.

Compacted Soils

Many of the existing and historic operational areas of the quarry are covered with compacted soils. These are a mixture of soil and rock types that have been laid down at various times throughout history and used for roads, parking, maintenance areas, etc. Due to them receiving vehicular traffic over the years they are compacted; however, they contain a mixture of material sizes which can help increase plant establishment and water retention. Areas of compacted soils will be ripped prior to reclamation to enhance plant establishment. Scrub and chaparral communities will be the target communities much like the areas of coarse overburden.

Highwall Benches

Areas on the west, north, and eastern flanks of the existing quarry pit and portions of the proposed rock plant reserve area are comprised of a step-like series of flat benches and vertical

or near vertical walls. The hard composition of the rock in these areas promote slope stability despite near vertical slopes. While the near vertical slopes will not be planted, the highwall benches will be revegetated. The majority of the highwall bench soil treatment area will support scrub and chaparral communities; however, some areas are appropriate for pine or oak woodland communities. Areas targeted for scrub and chaparral communities will be ripped (when not native rock) and planted similarly to the Compacted Soils areas. However, areas proposed for pine or oak communities will be revegetated using concentrated soil islands as discussed elsewhere in this document.

Soil Islands

While not a specific planting area, Soil Islands are a soil treatment type that can be used in any of the previously discussed soil treatment areas. The idea is that by concentrating the limited amount of available (or potentially imported) topsoil/planting media into smaller but deeper 'islands', plant material planted there will have a greater chance of success in the deeper soils than if the same amount of soil was spread thinly throughout all of the various treatment areas. These islands will act as primary succession zones where natural plant communities can become more easily established. Over time, plants from the soil islands will spread throughout the surrounding areas and provide organic matter, shade, and seed material that will help the areas with thinner soils establish more plants and slowly grow into a similar plant community. The soil islands will be comprised of a blend of overburden, stockpiled topsoil, imported topsoil, or other soil amendments as available to a depth of approximately 12 inches and scattered throughout the pine and oak treatment areas on top of the parent material in appropriate treatment areas.

3.5.3 Topsoil Stockpiling and Placement

For any newly disturbed areas, topsoil shall be stripped, hauled, and stored within the RPA if it cannot be used at that time for concurrent reclamation activities. In order to facilitate plant root growth, the topsoil should be compacted as little as possible. When soil materials are to be harvested, moved, stored, or worked during the construction or mining phase, it is important that these activities occur when the soil materials are dry. Wet or damp soils are easily compacted and will be much less able to grow plants than if they were handled when dry. Beneficial bacteria, fungal spores, and plant seeds are also in a resistant stage of their life cycle if the soil is dry and are more likely to survive the disturbance of the moving process. Topsoil stockpile areas will be identified and well-marked to avoid any unnecessary disturbance to the topsoil. In addition, relocation of topsoil after it is stockpiled will be minimized. If topsoil is stored during the winter rainy season, erosion control measures may be necessary to protect the stockpile. If compacting of a portion of the stockpiles is necessary for stability, compacting will occur to minimum extent necessary. A small bulldozer or similar equipment will be used to rip the soil materials as necessary. Topsoil will be track walked to stabilize the topsoil material, and then the surface will be scarified to allow for proper seed germination. Topsoil compaction will be minimized as much as possible to compromising the medium's ability to perform as a planting medium. To the extent feasible, rocks and plant material in excess of four inches in greatest dimension should be removed from the topsoil, though plant parts should be allowed to persist in the material to enhance organic content.

3.5.4 Organic Amendments and Mulches

As described above, existing plant material on topsoil harvest areas can be grubbed, chipped, and incorporated into the topsoil to be stockpiled. Additional potential organic amendments are

described below. These materials may be added as necessary to promote establishment and growth of native vegetation as needed.

Organic amendments such as compost and mulch provide a ready source of carbon and nitrogen to facilitate the presence of microorganisms in the soil, contributing to the essential soil nutrient cycling that facilitates plant growth. Bacteria, fungi, and other microorganisms involved in decomposing organic material increase dramatically when materials such as compost are added to soils. Microorganisms break down the organic matter and in turn provide a supply of nutrients for higher plants. The amendments described below may be added to available overburden materials to enhance and expedite plant growth, such as in areas identified as "Special Treatment Areas" (Figure 4).

Compost

Compost is derived from the biological decomposition of organic material, including such materials as grass and lawn clippings, food overburden, municipal solid overburden, and sewage sludge. Compost is known to enhance macronutrient fertility, improve soil structure, increase infiltration and moisture retention, and improve nutrient exchange capabilities of the soil. When topsoil is not available for use, compost is especially useful as an amendment to enhance soil structure and nutrient composition of the soil substrate. To ensure adequate quality of the compost, if used, it should be certified with the Seal of Testing Assurance by the U.S. Composting Council. Mycorrhizal Inoculants

Mycorrhizal fungi grow in beneficial association with plant roots in the soil and form unique structures known as mycorrhizae. The mycorrhizae play an important role in facilitating nutrient transfer from the soil to the plant roots. Mycorrhizal inoculants can be added to the soil to help provide the benefits of mycorrhizae; however, the effectiveness of such inoculants is not well established. To achieve the potential benefits of mycorrhizae, mycorrhizal inoculants or duff collected from vegetative litter at an adjacent site can be installed in planting sites. Alternatively, the inoculants can be added to a seed mix blend.

Slow-release Fertilizers

Fertilizers should be used sparingly on soils which support native plants. Since native plants are accustomed to drought conditions and low levels of nutrients in the soil, the use of fertilizers can promote the presence of exotic weeds which can outcompete native plants. The use of slow-release fertilizers can be suitable for native plants. Slow-release fertilizers release nutrients over a three-month to two-year period of time, providing the appropriate amount of nutrients for native plants. Installing slow-release fertilizer tablets in planting pits is recommended in some reclaimed soil conditions to provide a supplemental nutrient source for container plants. However, when included in broadcasted hydroslurry or mulch treatments, slow-release fertilizers can promote the establishment of grasses which may outcompete trees or shrubs. While this may be desirable in some areas, it could prevent establishment of woodland or shrubland vegetation types in other areas. Therefore slow-release fertilizers should be used sparingly or only in planting pits during revegetation efforts.

Mulch

Mulches include many different materials and can be applied on the soil surface or incorporated into the soil. Surface applications protect a site from erosion but do not have as much effect on soil composition as when they are incorporated into the soil. When incorporated, mulches can

act as organic amendments, increasing organic matter content, moisture infiltration, and nutrient cycling. Materials such as straw and wood residues (wood chips, bark, and sawdust) are commonly used as mulch. Straw mulches can be blown on to the surface of the soil and secured with a tackifying agent following seed application. Straw mulch application would be the easiest material to apply around existing planted vegetation if it is determined that performance standards are not being met and additional organic material is necessary. Other materials should be installed and incorporated into growth media material in advance of planting to avoid smothering seedlings.

While wood residues such as chips, bark, and sawdust can provide cheap organic matter for soils, they may not stay in place adequately on steep slopes. A layer of two to three inches of wood and bark mulch can be used around individual tree and large shrub plantings can help exclude weeds, improve moisture retention, and add organic matter to the soil.

Bonded Fiber Mulches

The addition of various types of bonded fiber mulches is an available option for blending with seed mixes that could contribute to both plant growth and soil stabilization. The mulches contain wood fibers and other inert materials that retain moisture while maintaining air circulation which promotes seed germination and plant growth. They also add organic material to the growing surface which contributes carbon and other nutrients. Soil-bonding agents are also added to the fiber mulches which provide excellent erosion control. The combined aspects of these materials make them an ideal option suited to the steep and inaccessible slopes in the PCRA. While these products are not currently proposed for use in revegetation, they may be a suitable alternative to fiber rolls on steeper, less accessible slopes.

Imported Topsoil or Fill

To augment existing topsoil supplies and ensure sufficient depths of growth media, clean imported topsoil or fill may be utilized as needed. Potential sources of this material should be evaluated for contamination and testing for pesticides, salts, and other plant growth impediments should be implemented if deemed necessary.

3.5.5 Timing Restrictions and Recommendations

Growth media earthwork activities, including soil development work, should occur during the dry season. Topsoil should not be moved or handled when wet. Organic amendments should be applied shortly before seeding and planting, if possible, to ensure optimal microbial activity.

3.5.6 South Resource Area Soil Preparation

In 2007 and 2008, greenfield roads and drill pads were regraded to original contours before native seed was spread over reclamation areas. Hay was spread over exposed soils after seeding to help prevent erosion and provide microclimates for germination. For roads and pads that have yet to be revegetated, these areas will be regraded to their original contour. This work will be done using soils that were sidecast during road and pad construction.

4.0 REVEGETATION

This section describes plant installation planned for the RPA as displayed in Appendix D, Figure 4. Revegetation will establish a self-sustaining vegetation cover that will, over time, control erosion, prevent off-site sedimentation, and attenuate visual contrasts where mined surfaces

are visible from offsite locations. Use of native shrubs and trees will assist in blending surfaces into the surrounding landscape. Revegetation efforts are planned to be implemented in stages following completion of each stage of growth media placement. Planting and maintenance should be conducted using an adaptive management approach, based on revegetation test plots that were initiated in 2008. A preliminary erosion control stage may be incorporated prior to the revegetation tasks listed below, to allow for specific site revegetation plans to be developed based on reclamation field conditions. The seed mix shown in Table 4 includes species that have proven successful in other revegetation efforts on the Quarry property and is recommended to provide erosion control and initial establishment of grasses and herbaceous species as needed in temporarily disturbed areas.

Table 4. Erosion control seed mix.

SCIENTIFIC NAME	COMMON NAME	PURE LIVE SEED (lb / acre)
Bromus carinatus	California brome	16.00
Elymus glaucus	blue wildrye	10.00
Lupinus nanus	sky lupine	5.00
Stipa pulchra	purple needlegrass	8.00
Plantago erecta	California plantain	3.00
Trifolium willdenovii	tomcat clover	3.00
Festuca microstachys	three weeks fescue	8.00
	TOTAL	**53.00**

Appendix A provides an extensive list of native species observed in undisturbed portions of the Quarry property, which may be or have previously been used in revegetation planting or seeding at the Quarry. Propagule availability, lead time needed for nursery production, and results of the test plots helped refine this list as reclamation progresses. The majority of seed and container plants used in the test plots came from on-site sources. A similar approach will be used for the reclamation revegetation effort. To date seed has been collected on-site, contract grown by local seed growing facilities, and the resulting seeds used for revegetation efforts. When onsite seed or plants are not available, local sources are used with an attempt to obtain the most local stock possible. Onsite and local stock is adapted to the specific microclimates of the RPA and reduces genetic mixing with nearby natural vegetation. The general plan for revegetation is to establish grasses, forbs, and shrubs on slopes with tree and shrub container plantings installed in deeper soils on the benches (Appendix D, Figure 4). The cooler north and east facing benches will support the most diverse tree plantings while some of the south facing benches will contain grey pine which can tolerate more extreme conditions.

Revegetation treatments for the RPA are described in detail in below sections. Table 5 shows acreages of each vegetation community being proposed per Revegetation Stage unit.

Though all revegetation areas within the RPA will be revegetated to meet performance criteria, key areas on ridgelines facing highly populated or frequently visited locations may require additional techniques to reach performance criteria more quickly to blend in with vegetated surroundings (Appendix D, Figure 4). These techniques may include tools such as irrigation when practical, enhanced growth media application (such as utilizing Soil Islands with deeper soil depths or elevated levels of organic components), emphasis on hydroseeding over broadcast seeding, and higher densities of container plantings.

Table 5. Approximate acreage of Revegetation Treatment Areas from each Revegetation Stage. Special Treatment Areas shown in Appendix D, Figure 4 are called out for optional additional treatments as described in Section 3.5.4 and 4.4.

Stage #	Target Vegetation Community	Acres by Soil Surface Treatment:					
		Course Overburden		Soil Backfill	Compacted Soils	Highwall Benches	
		Special Treatment Area	Normal	Normal	Normal	Special Treatment Area	Normal
Stage 1:	Oak Woodland	17.82	n/a	n/a	n/a	0.70	1.51
	Pine	21.83	0.00	n/a	n/a	22.57	n/a
	Shrub	4.38	174.49	n/a	n/a	21.24	33.94
Stage 2:	Oak Woodland	n/a	n/a	n/a	0.39	3.96	n/a
	Pine	36.99	n/a	n/a	n/a	3.10	n/a
	Shrub	21.72	n/a	n/a	14.27	12.97	n/a
Stage 3:	Oak Woodland	n/a	n/a	n/a	2.91	n/a	0.16
	Pine	n/a	n/a	n/a	n/a	n/a	n/a
	Shrub	n/a	n/a	94.73	84.13	n/a	31.03

4.1 Seeding

4.1.1 Project Area Seeding

In the main portions of the RPA (seeding for South Resource Area is described separately in Section 4.1.2), contoured surfaces would be amended as necessary and covered with grass, herb, and shrub species via seeding either bulk seed or through hydroseeding (a homogenous slurry of mulch, fertilizer, seed, and a binding agent) over the areas to be revegetated. Drainage ditches and access roads will be left bare until the completion of the contouring and slope seeding, at which time roads will be ripped and revegetated. The small area of steep benches throughout the RPA will not be recontoured, but they will be seeded. Appropriate native seed mixes for reclamation are listed in Table 6 and were tested in the test plots (see Section 5.0). A preliminary seed mix of shrubs and grasses is shown in Table 6, which includes species known to thrive in undisturbed adjacent habitats or observed to perform well in previous revegetation areas and test plot results. These species should be used, pending availability, for the earliest stages of the proposed reclamation project. The seed mix will be applied as necessary over the entire revegetation area.

Table 6. Preliminary species for RPA general seeding.

SCIENTIFIC NAME	COMMON NAME	PURE LIVE SEED (lb / acre)	BULK SEED (lb/acre)

SHRUBS			
Artemisia californica	California sagebrush	1.4	16
Baccharis pilularis	coyote brush	0.2	20
Eriogonum fasciculatum	California buckwheat	1.0	20
Salvia leucophylla	purple sage	0.7	2
Salvia mellifera	black sage	1.1	3
GRASSES AND HERBS			
Achillea millefolium	yarrow	1.7	2
Artemisia douglasiana	mugwort	0.1	1
Bromus carinatus	California brome	4.6	6
Elymus glaucus	blue wildrye	4.6	6
Eschscholzia californica	California poppy	1.2	2
Heterotheca grandiflora	telegraph weed	0.2	1
Acmispon americanus var. americanus	Spanish clover	0.7	1
Acmispon glaber	deerweed	1.5	2
Lupinus nanus	sky lupine	0.8	1
Melica californica	California melic	1.3	2
Stipa pulchra	purple needlegrass	2.9	4
Poa secunda	one-sided bluegrass	1.3	2
Trifolium willdenovii	tomcat clover	1.4	2
Total		**26.7**	**93**

4.1.2 South Resource Area Seeding

The majority of the exploratory drilling pads and roads were revegetated upon completion of the drilling project in 2007 and 2008. Drill pads were regraded to original contour and seeded with a native seed mix. Superfluous roads were ripped and seeded with native seed for erosion control. The seed mix and application rates used for the revegetation of the exploratory drill area is shown in Table 7. The exploratory drill areas were assessed in late summer of 2011 and were well vegetated and generally dominated by native vegetation. Portions of the drilling project area that were purposefully not revegetated in 2008 were predominantly historic roads necessary for providing access for on-going quarry operations. These areas were winterized upon completion of the drilling project to prevent erosion.

Table 7. South Resource Area Seed Mix

SCIENTIFIC NAME	COMMON NAME	PURE LIVE SEED (lb / acre)	BULK SEED (lb / acre)
GRASSES AND HERBS			
Bromus carinatus	California brome	16	21
Elymus glaucus	blue wildrye	10	13
Eschscholzia californica	California poppy	2.5	4.5

Festuca rubra	red fescue	8	11
Lupinus nanus	sky lupine	5	6.5
Trifolium wildenovii	tomcat clover	3	4
Plantago erecta	dotseed plantain	3	4
Festuca microstachys	small fescue	8	11
Total		55.5	75

4.2 Trees and Shrub Plantings

Trees and shrubs would be planted as container plants or seeds in the revegetation areas. Tree and shrub container plantings would occur on the benches where a deeper layer of topsoil and/or soil-building materials is applied to ensure adequate space for root development. To the extent practical, trees and shrubs to be planted will be generated from seeds collected from the Quarry property or from local sources. Shrubs should be planted at approximately 4.5-foot spacing and trees at 9-foot spacing in the designated planting areas. The remaining slopes and benches would be covered with shallower topsoil and/or soil-building materials and seeded with a grass/herb/shrub seed mix, without containerized tree and shrub plantings.

The north-facing benches can support a wider variety of tree and shrub species since they have less solar radiation and higher soil moisture (Appendix D, Figure 2). These north-facing benches would be revegetated with oak-dominated plantings along with the seeding treatment. The oaks would be a mixture of acorn and container plantings. East-facing benches normally support some oak woodland habitat but given the existing conditions with no shade and intense solar radiation, planted oaks would likely have high mortality in these areas. Therefore more visible east-facing benches would be planted with approximately 75 percent grey pine (*Pinus sabiniana*), a native tree species that is tolerant of drier conditions, along with approximately 25 percent other native tree and shrub plantings common to oak woodland habitats. The grey pines will establish more readily than oak seedlings in the sunnier and harsher conditions on the south-facing benches. As the pines develop they will provide a protected microclimate that will support oak woodland establishment and development that should occur over time through natural recruitment. This successional approach will facilitate more rapid woodland revegetation in more highly visible areas while allowing eventual oak woodland establishment.

The need for herbivory protection for specific species can be evaluated based on the results of initial plantings. Weed mats or several inches of mulch may be placed around planted trees and shrubs to reduce competition and retain moisture.

This plan is designed to provide appropriate conditions for planting so it is not dependent upon irrigation. The need for irrigation during initial establishment should be assessed during the adaptive management reclamation efforts. DriWater gel pac irrigation systems were tested in the test plots. DriWater is a biodegradable silica- based product that is buried next to the plants and slowly releases stored water into the soil. By planting a large number of acorns without irrigation, a more drought-tolerant stand of oaks may be established, increasing the chances of their survival. However, if monitoring during the first five years of the early revegetation stages indicate significant losses of plant material that threatens achievement of performance standards, the need for irrigation should be re-evaluated.

As with hydroseeding or seeding, adaptive management will be used to determine which tree and shrub species will be planted, the most effective spacing and location, and species to use in

replacement plantings if necessary. A preliminary list of trees and shrubs to be planted on benches of the RPA is provided in Appendix D, Table 4. Species selection and numbers will depend on propagule collection and availability.

Indicators of Sudden Oak Death (SOD) have been observed within the Permanente Quarry property, and many oak trees in the RPA are foliar hosts of *Phytophthora ramorum*, the pathogen that causes SOD syndrome, including coast live oak and canyon live oak. Foliar hosts are thought to be an important component in spreading SOD as the pathogen can fruit (sporulate) within one to three days on infected foliage. Known or suspected hosts of *P. ramorum* are listed by the California Oak Mortality Task Force (COMTF 2008). Species not known to be susceptible to *P. ramorum* (such as Valley oak, blue oak, and grey pine) will be more heavily represented in revegetation plantings than might be present in the RPA to reduce the susceptibility of the revegetation program. Mitigation measures for the RPA will include measures to prevent spread of SOD outside of the Permanente Quarry property.

4.3 Timing

All seeding should be performed and completed between September 1 and December 1 to take advantage of warm soil temperatures and winter rains for successful germination and establishment. Container planting should be performed during the winter season and completed by approximately the end of January to improve plant establishment.

4.4 Targeted Water Augmentation

To expedite plant growth in the “Special Treatment Area” identified in Appendix D, Figure 4, water resources may be augmented through either the installation of temporary water tanks and PVC pipes to distribute water to plants and seedlings or through the utilization of backpack sprayers or mobile water tanks with handheld hoses to allow laborers to target planted plants or germinated broadcasted seeds. Volumes of water application should depend on rain patterns and ambient heat.

5.0 MONITORING

5.1 Installation Monitoring

To ensure adherence to the guidelines of this revegetation plan, all implementation activities will be monitored by qualified individuals. Records will be kept of soil-building treatments applied, addition of soil amendments as determined to be necessary, and all plant and seed installation. Hydroseed records will include identification of the date of application and a description and map of the location where various seed mixes are applied. Additionally, installation of tree and shrub plantings will be documented to identify the location and approximate area planted, and the number of trees or shrubs planted or seeded.

5.2 Vegetation Monitoring

5.2.1 Project Area Vegetation Monitoring

Monitoring must be performed to document revegetation success. Following installation, each revegetation area should be monitored as necessary to determine if reseeding, irrigation, or soil amendments are necessary to demonstrate the performance criteria at the earliest possible time. Revegetation will be conducted in stages; therefore, monitoring of each stage will be stratified, commencing in a particular revegetation area upon completion of installation. Each

stage will be monitored until the area meets performance standards for two consecutive years without intervention. Revegetation sites shall be identified on a map and monitored to assure that standards are adequately achieved to within a minimum 80 percent confidence level as required by Reclamation Standards.

Soil Surface Treatment Differentiation – Due to available topsoil volumes, soil surface treatments will differ within the RPA. Because these soil surface treatments are anticipated to influence plant growth due to differences in organic matter availability, water holding capabilities, and compaction rates, plant establishment will predictably vary between growth media types. All vegetation monitoring plots shall be stratified to include multiple plots within each soil surface treatment area.

Tree and Shrub Planting Areas – Randomly selected plots will be monitored in planting areas, with the number of plots sampled suitable to attain 80 percent confidence in data results. In addition, both north- and south-facing areas should be represented in sampling. Container planting areas will be sampled using a nested approach as utilized in reference site data collection; other sampling methods may be used but will require appropriate conversion of species richness standards. The nested approach means that once a plot center is randomly selected, trees are assessed within a ten meter radius, shrubs within a five meter radius, and herbs within a one meter radius from the plot center. Monitors will identify and count all trees and shrubs surviving in their respective plots. Cover of all tree, shrub, and herb species within each layer will be estimated within each respective plot, and all species will be identified to the extent possible.

Seeded areas - Sampling plots will be selected randomly throughout the areas seeded with grasses, herbs, and shrubs to determine native species richness and percent cover of each species. As with the planting areas, sampling will occur in nested plots, with shrubs assessed within five meter radius and herbs within a one meter radius from the plot center. The number of plots for each installation stage will be selected in order to achieve an 80 percent confidence level in the performance results. Stratification of sampling areas may be necessary if the mix of shrubs and herbs varies greatly in different areas either due to variation in hydroseed applications or soil or other site conditions. For example, areas strongly dominated by herbs and grasses may instead be monitored using smaller sampling plots appropriate to grasslands.

Revegetated areas should be monitored in late spring or early summer to ensure that most plants will be identifiable to the species level. Monitoring will be conducted by a qualified biologist with experience in plant identification. After monitoring data has been collected, a report summarizing the success of revegetation efforts, comparison of data to Year 5 performance standards, any observed obstacles to achieving performance standards, and any remedial actions recommended will be prepared and submitted to Lehigh by October 15 of that year. This will allow for proper timing of remedial plantings and/or seeding if determined to be necessary.

5.2.2 South Resource Area Revegetation Monitoring

Preliminary monitoring of the drill project revegetation areas occurred in October 2011. Because the soil preparation and seeding in this area was meant to be temporary to address erosion concerns and not reflect true reclamation, sampling plots were not conducted to measure average cover and species assemblage. However, field observations indicated a very successful revegetation effort to date. Reclaimed areas supported significant plant cover and native species composition. Formal monitoring will commence upon completion of revegetation

of the drilling project area, concurrent with monitoring of other portions of the Phase 1 reclamation. The same methodology described in Section 5.2.1 above for the seeded areas will be used here.

5.3 Performance Standards

5.3.1 Project Area Performance Standards

Performance standards describe the minimum targets for species richness and percent cover for hydroseed and planting areas. Performance standards represent anticipated conditions five years after installation, based on a study of reference sites in the vicinity conducted by WRA and test plot results. SMARA requirements state that performance standards must be met for two consecutive years without significant human intervention prior to release of financial assurances. Revegetation of approximately 625 acres in the RPA is intended to create approximately 20-40 percent coverage of native tree and shrub habitat interspersed among grasses within five years of installation. Planting areas on south-facing benches of the RPA would be dominated by shrubs while planting areas on north- and east-facing benches will eventually be dominated by trees and shrubs.

Reference site data were used to develop an achievable set of performance standards; however a reference sites did not investigate differences in parameters associated with different soil surface treatments. Standards were adapted based on WRA's best professional judgement to reflect anticipated differences plant establish to create achievable performance standards (Tables 8 through 11). Native species richness targets have been chosen to reflect data collected from the reference sites and test plot results and then adjusted for anticipated soil surface treatments These densities and percent cover values reflect the expected growth of trees and shrubs in the first five years of the revegetation areas.

Reference data values for percent cover and density of trees and shrubs describe mature woody communities that have not seen significant disturbance in decades. While the target plant communities of the revegetation areas should eventually blend with these mature communities, they cannot be expected to achieve similar characteristics over only five years of growth. Instead, shrub and tree planting areas are designed to mimic pioneering plant communities that will continue to develop and dominate the benches and slopes over several decades through tree growth and natural regeneration.

Table 8. Proposed five-year performance standards for RPA revegetation for Coarse Overburden Soil Treatment Areas						
	Oak Woodland (north- and northeast facing benches)		Pine Woodland (east-facing benches)		Seed Areas shrub/grassland mix	
	Wood Plants	Herbs	Woody Plants	Herbs	Woody Plants	Herbs
Richness (avg. native species per plot)**	2	2	2	2	1*	1*
Density (avg. native individuals per acre)	300	-	250	-	-	-
Canopy Cover	20%		20%		20%	

* Performance standards for seeded areas may need to be adjusted to reflect feasible five-year results of the species mix ultimately selected based on test plot results and early revegetation efforts during the reclamation period. In particular, the balance between shrub and herbaceous species cover may vary.
** Richness standards are based on plot sizes used in reference data collection and described in this Plan: 10m-radius plots for trees, 5m-radius plots for shrubs, and 1m-radius plots for herbs/grasses.

Table 9. Proposed five-year performance standards for RPA revegetation for Soil Backfill Soil Treatment and Created Revegetation Islands Areas						
	Oak Woodland (north- and northeast facing benches)		Pine Woodland (east-facing benches)		Seed Areas shrub/grassland mix	
	Wood Plants	Herbs	Woody Plants	Herbs	Woody Plants	Herbs
Richness (avg. native species per plot)**	5	3	4	3	3*	3*
Density (avg. native individuals per acre)	470	-	345	-	-	-
Canopy Cover	40%		40%		40%	

* Performance standards for seeded areas may need to be adjusted to reflect feasible five-year results of the species mix ultimately selected based on test plot results and early revegetation efforts during the reclamation period. In particular, the balance between shrub and herbaceous species cover may vary.
** Richness standards are based on plot sizes used in reference data collection and described in this Plan: 10m-radius plots for trees, 5m-radius plots for shrubs, and 1m-radius plots for herbs/grasses.

Table 10. Proposed five-year performance standards for RPA revegetation for General Compacted Soils Soil Treatment Areas						
	Oak Woodland (north- and northeast facing benches)		Pine Woodland (east-facing benches)		Seed Areas shrub/grassland mix	
	Wood Plants	Herbs	Woody Plants	Herbs	Woody Plants	Herbs
Richness (avg. native species per plot)**	4	2	3	2	2*	2*
Density (avg. native individuals per acre)	400	-	300	-	-	-
Canopy Cover	20%		20%		20%	

* Performance standards for seeded areas may need to be adjusted to reflect feasible five-year results of the species mix ultimately selected based on test plot results and early revegetation efforts during the reclamation period. In particular, the balance between shrub and herbaceous species cover may vary.
** Richness standards are based on plot sizes used in reference data collection and described in this Plan: 10m-radius plots for trees, 5m-radius plots for shrubs, and 1m-radius plots for herbs/grasses.

Table 11. Proposed five-year performance standards for RPA revegetation for Highwall Berm*** Soil Treatment Areas						
	Oak Woodland (north- and northeast facing benches)		Pine Woodland (east-facing benches)		Seed Areas shrub/grassland mix	
	Wood Plants	Herbs	Woody Plants	Herbs	Woody Plants	Herbs
Richness (avg. native species per plot)**	5	3	4	3	3*	3*
Density (avg. native individuals per acre)	200	-	150	-	-	-
Canopy Cover	20%		20%		20%	

* Performance standards for seeded areas may need to be adjusted to reflect feasible five-year results of the species mix ultimately selected based on test plot results and early revegetation efforts during the reclamation period. In particular, the balance between shrub and herbaceous species cover may vary.
** Richness standards are based on plot sizes used in reference data collection and described in this Plan: 10m-radius plots for trees, 5m-radius plots for shrubs, and 1m-radius plots for herbs/grasses.
***Density and canopy cover is reduced for this treatment because only benches, not high walls, will tolerate seeding or planting. See Appendix 4, Figure 5.

5.4 Performance Standards for Weed Control

In addition to vegetation monitoring to assess the success of revegetation efforts, the density of weeds (non-native invasive plants) will be assessed as part of vegetation sampling described in Section 5.2.

Reference plots were surveyed by WRA in undisturbed natural grassland habitat in and adjacent to the Quarry property to assess native and non-native species richness and cover. The reference plots contained 28 species, 13 of which were non-native, and an additional 8 are listed as invasive species in the California Invasive Plant Council's (Cal-IPC) Inventory (Cal-IPC 2006). Although two of the seven native species recorded had the highest cover, the next ten species with the highest cover were non-native or invasive species. Non-native and invasive species accounted for over 50 percent of the vegetative cover. Therefore, performance standards were developed that took this information into account.

5.4.1 Project Area Weed Control Performance Standards

For the purposes of RPA maintenance and monitoring, non-native non-graminoid plants listed in the Cal-IPC Inventory (2006) as highly invasive will be considered invasive weeds subject to control and performance standards. If invasive weeds are found to exceed a combined 10 percent relative cover over all sampled quadrats in the RPA Project Areas, weed abatement activities will commence. The following species in particular have been identified as invasive species present on the quarry property and should be included as subject to this performance standard: yellow star thistle (*Centaurea solstitialis*, annual), black mustard (*Brassica nigra*, annual), stinkwort (*Dittrichia graveolens*, annual), pampas grass (*Cortaderia* spp., perennial), and fennel (*Foeniculum vulgare*, perennial). Although some of these species are only listed as moderately invasive by Cal-IPC, they should be managed promptly because they are currently present in large numbers in the RPA and could impede establishment of native cover. Invasiveness rankings in the Cal-IPC Inventory may change over time based on new information, and the rank of non-native plants found within the reclamation area

5.4.2 South Resource Area Weed Control Performance Standards

For the purposes of South Resource Area maintenance and monitoring, non-native non-graminoid plants listed in the Cal-IPC Inventory (2006) as highly invasive will be considered invasive weeds subject to control and performance standards. If invasive weeds are found to exceed a combined 10 percent relative cover over all sampled quadrats in the Exploration Area, weed abatement activities will commence. The same species listed in the Project Area Weed Control Performance Standards (5.4.1) above should be included as subject to this performance standard and should be managed promptly because they are currently present in large numbers on the quarry property and could impede establishment of native cover.

5.5 Adaptive Management

The operators responsible for revegetation efforts to date in the RPA have experienced success with adaptive strategies. The strategy described above may prove to be less efficient than other strategies developed at a later date. Therefore, if a different planting strategy is implemented in the RPA in which the above performance standards and monitoring guidelines cannot be followed, a revision to this revegetation plan will be submitted as a substitute for this document or portions thereof.

6.0 MAINTENANCE

Maintenance of revegetation areas across the site will take place as necessary based on post-revegetation monitoring and the evaluation of meeting performance standards.

6.1 General Maintenance

Maintenance of revegetation areas shall consist of reseeding or replanting unsuccessful revegetation efforts, weed control to limit the extent of noxious weeds, and repair of erosion damage. If significant rills or gullies are identified in the RPA that could contribute to sedimentation outside the RPA, remedial actions will include reseeding of the area with an approved erosion control seed mix, and if necessary, slope stabilization measures will be undertaken.

If revegetation efforts are not successful with regard to the performance standards outlined in Section 5.3 of this report within five years following initial seeding, the under-performing areas will be reevaluated to determine the measures necessary to improve performance. If necessary, these areas will be reseeded and/or replanted with methods modified as needed. This may include the use of container stock and irrigation or simply additional seeding during a wet winter season. Prior to reseeding, the operator shall evaluate previous revegetation practices to identify cultural methods to benefit the overall revegetation effort. If, after a site is reseeded, revegetation efforts still do not yield satisfactory results, additional reseeding or other intervention methods may be required.

Weed control is necessary to reduce the occurrence of undesirable invasive and noxious species of plants that may invade the RPA and where weeds could interfere with revegetation efforts or increase fire hazards, as specified in SMARA regulations. Weeds are undesired, generally introduced, and invasive plants that can compete with revegetation efforts. However, many introduced species occur widely in the region and are common in both the surrounding active Quarry and adjacent natural open space lands. Eradication of all weeds is therefore unachievable; therefore, specific noxious plant species are targeted for control.

As described in Section 5.4, species listed by Cal-IPC (2006) as highly invasive will be considered problematic and will be targeted during maintenance of this revegetation effort if they exceed the designated threshold of ten percent cover. Invasive plant species typically found in the RPA and in surrounding lands include yellow star thistle (*Centaurea solstitialis*, annual), black mustard (*Brassica nigra*, annual), stinkwort (*Dittrichia graveolens*, annual), pampas grass (*Cortaderia* spp., perennial), and fennel (*Foeniculum vulgare*, perennial). Weed control methods may include chemical and mechanical removal techniques depending on the species and number of individuals encountered. Priorities in weed abatement should focus on those species listed as highly invasive, in addition to other weeds that directly threaten the successful establishment and survival of revegetation species. The percent cover of weeds, abatement measures recommended and undertaken, and other observations on weed control will be included in vegetation monitoring reports. Weed abatement responsibilities may cease once performance standards have been met for each stage of revegetation efforts, unless invasive species in completed revegetation areas are deemed a threat to nearby efforts still in progress.

7.0 REFERENCES

Cal-IPC. 2006. California Invasive Plant Inventory. Cal-IPC Publication 2006-02. California Invasive Plant Council: Berkeley, CA. Available: www.cal-ipc.org/inventory

California Association of Nurseries and Garden Centers (CANGC). 2008. *Phytophthora ramorum* Nursery Industry Best Management Practices Manual. September. Available at: http://www.suddenoakdeath.org/html/nursery_best_mgmt_practices.html

California Oak Mortality Task Force (COMTF). 2008. List of *P. ramorum* regulated hosts and associated plants. May. Available at: http://www.suddenoakdeath.org/html/host_plant_lists.html

GEI Consultants, Inc. 2019a. Biological Resources Report Permanente Quarry Reclamation Plan Amendment – Rock Plant Reserve Component. May.

GEI Consultants, Inc. 2019b. Biological Resources Report Permanente Quarry Reclamation Plan Amendment – North Highwall Lay-Back Component. May.

Kaplow, Dave. 2008. Personal Communication (telephone). President, Pacific Open Space Inc. and North Coast Native Nursery, Petaluma, California. June 25.

Lehigh Southwest Cement Company. 2019. Permanente Quarry Reclamation Plan. Produced by Benchmark Resources.

Munshower, Frank. 1994. Practical Handbook of Disturbed Land Revegetation. Boca Raton, Florida: CRC Press, Inc.

Newton, Gail, and Vic Claassen. 2003. Rehabilitation of Disturbed Lands in California: A Manual for Decision Making. Special Publication 123. California Geological Survey.

Ruth and Going Inc. 1984. Reclamation Plan Kaiser Cement Permanente Quarry. Prepared for the County of Santa Clara, October 1984.

Science Applications International Corporation (SAIC). 2004. Burton Mesa Mitigation Site Final Project Report, prepared for: Central Coast Water Authority. Buellton, California.

U.S. Department of Agriculture, Soil Conservation Service.1958. Soil Survey of Santa Clara Area, California. In cooperation with the University of California Agricultural Experiment Station.

URS Corporation. 2011. Permanente Creek Long Term Restoration Plan. March.

WRA, Inc. 2011. Biological Resources Assessment for the Permanente Quarry, Cupertino, Santa Clara County, California. July.

WRA, Inc. 2011. Revegetation Test Plot Program As-built Report for the Permanente Quarry, Cupertino, Santa Clara County, California. March.

This page left intentionally blank

APPENDIX A

PLANT LIST FOR PERMANENTE QUARRY REVEGETATION

Appendix A. Potential native plant palette for Lehigh Permanente Quarry upland revegetation. Species in bold were successfully established in previous revegetation efforts, or have colonized revegetation sites effectively, and should be included in seed mixes or planting palettes.

FAMILY	SCIENTIFIC NAME	COMMON NAME
NATIVE GRASSES		
Poaceae	*Bromus carinatus*	California brome
Poaceae	***Elymus glaucus***	**blue wildrye**
Poaceae	*Elymus multisetus*	big squirreltail grass
Poaceae	*Festuca occidentalis*	western fescue
Poaceae	*Festuca rubra*	red fescue
Poaceae	*Leymus triticoides*	creeping wild rye
Poaceae	*Melica californica*	California melic grass
Poaceae	***Nassella pulchra***	**purple needle grass**
Poaceae	*Vulpia microstachys*	three-weeks fescue
Poaceae	*Poa secunda*	one-sided bluegrass
NATIVE HERBS		
Asteraceae	*Achillea millefolium*	common yarrow
Asteraceae	*Achyrachaena mollis*	blow wives
Asteraceae	*Eriophyllum confertiflorum*	golden yarrow
Asteraceae	***Heterotheca grandiflora***	**telegraphweed**
Asteraceae	*Wyethia glabra*	smooth mule ears
Brassicaceae	*Streptanthus glandulosus* ssp. *glandulosus*	bristly jewelflower
Caryophyllaceae	*Silene californica*	California windmill pink
Fabaceae	*Lotus purshianus* var. *purshianus*	Spanish clover
Fabaceae	***Lotus scoparius***	**deerweed**
Fabaceae	*Lupinus bicolor*	miniature lupine
Fabaceae	*Lupinus microcarpus* var. *densiflorus*	chick lupine
Fabaceae	*Lupinus nanus*	sky lupine
Fabaceae	*Lupinus succulentus*	succulent lupine
Fabaceae	*Trifolium willdenovii*	tomcat clover
Hydrophyllaceae	*Nemophila menziesii*	baby blue eyes
Hydrophyllaceae	*Phacelia campanularia*	desert bells
Iridaceae	*Sisyrinchium bellum*	blue-eyed grass
Lamiaceae	*Salvia columbariae*	Chia
Liliaceae	*Chlorogalum pomeridianum*	soap plant
Linaceae	*Linum grandiflorum*	flowering flax
Nyctaginaceae	*Mirabilis californica*	California four o'clock
Onagraceae	*Camissonia ovata*	sun cup

FAMILY	SCIENTIFIC NAME	COMMON NAME
Onagraceae	*Clarkia purpurea* ssp. *Quadrivulnera*	winecup clarkia
Onagraceae	*Epilobium canum*	California fuchsia
Onagraceae	*Oenothera elata* var. *hookeri*	evening primrose
Papaveraceae	***Eschscholzia californica***	**California poppy**
Papaveraceae	*Stylomecon heterophylla*	wind poppy
Plantaginaceae	*Plantago erecta*	California plantain
Polemoniaceae	*Navarretia squarrosa*	skunkweed
Polygonaceae	*Eriogonum nudum*	naked buckwheat
Portulacaceae	*Calandrinia ciliata*	red maids
Rosaceae	*Fragaria vesca*	woodland strawberry
Scrophulariaceae	*Antirrhinum kelloggii*	Kellogg's snapdragon
Scrophulariaceae	*Castilleja exserta*	purple owl's clover
Scrophulariaceae	*Scrophularia californica*	bee plant
NATIVE SHRUBS		
Asteraceae	***Artemisia californica***	**California sagebrush**
Asteraceae	*Artemisia douglasiana*	California mugwort
Asteraceae	***Baccharis pilularis***	**coyote brush**
Caprifoliaceae	*Sambucus mexicana*	blue elderberry
Ericaceae	*Arctostaphylos glauca*	big berry manzanita
Ericaceae	*Arctostaphylos viscida*	white-leaf manzanita
Fabaceae	*Lupinus albifrons var. albifrons*	silver bush lupine
Grossulariaceae	*Ribes californicum*	hillside gooseberry
Grossulariaceae	*Ribes malvaceum*	chaparral currant
Lamiaceae	***Salvia leucophylla***	**purple sage**
Lamiaceae	***Salvia mellifera***	**black sage**
Malvaceae	*Malacothamnus fasciculatus*	chaparral bushmallow
Malvaceae	*Malacothamnus fremontii*	Fremont's bushmallow
Polygonaceae	***Eriogonum fasciculatum***	**California buckwheat**
Rhamnaceae	*Ceanothus cuneatus*	buckbrush
Rhamnaceae	*Ceanothus integerrimus*	deer brush
Rhamnaceae	*Ceanothus leucodermis*	chaparral whitethorn
Rhamnaceae	*Rhamnus californicus*	coffeeberry
Rhamnaceae	*Rhamnus crocea*	redberry
Rosaceae	***Adenostoma fasciculatum***	**chamise**
Rosaceae	*Cercocarpus betuloides*	birch-leaf mountain mahogany
Rosaceae	*Heteromeles arbutifolia*	toyon
Rosaceae	*Holodiscus discolor*	ocean spray

FAMILY	SCIENTIFIC NAME	COMMON NAME
Rosaceae	*Prunus ilicifolius*	holly-leaf cherry
Rosaceae	*Rosa californica*	wild rose
Scrophulariaceae	*Mimulus aurantiacus*	bush monkey flower
Sterculiaceae	*Fremontodendron californica*	flannel-bush
NATIVE TREES		
Aceraceae	*Acer macrophyllum*	Big leaf maple
Ericaceae	*Arbutus menziesii*	Pacific madrone
Fagaceae	*Quercus agrifolia*	coast live oak
Fagaceae	*Quercus chrysolepis*	canyon live oak
Fagaceae	*Quercus douglasii*	blue oak
Fagaceae	*Quercus wislizenii*	interior live oak
Hippocastanaceae	*Aesculus californica*	California buckeye
Pinaceae	***Pinus sabiniana***	**grey pine**
Pinaceae	*Pseudotsuga menziesii*	Douglas-fir
Taxodiaceae	*Sequoia sempervirens*	Redwood

APPENDIX B

SOIL LABORATORY REPORTS

Soil & Plant Laboratory, Inc
Leaders in Soil & Plant Testing Since 1946
www.soilandplantlaboratory.com

Locations:

352 Mathew St.
Santa Clara, CA 95050
(408) 727-0330

1594 North Main St.
Orange, CA 92867
(714) 282-8777

SANTA CLARA OFFICE
June 11, 2008
Report 08-162-0042
Analyses under Report 08-143-9035

WRA ENVIRONMENTAL
2169-G E. Francisco Blvd.
San Rafael, CA 94901

Attn: Ingrid Morken

RE: HANSON PERMANENTE QUARRY – CUPERTINO, JOB NO. 16143

Background

The 10 samples analyzed under Report #08-143-0035 represent soils in need of evaluation to determine their suitability to support native plant growth. Analytical results are discussed in a manner to help categorize desirable soil candidates to those less and undesirable for use.

Analytical Results

Best Soil Candidates

Samples represented by Pit #2 and East Dump Natives show favorable soil composition. Particle size data show a loam for Pit #2 and sandy loam for East Dump Native by USDA standards. Organic content at 6.6% and 7.4% in Pit #2 and East Dump native, respectively, is ample for natives. The pH values are moderately alkaline and with natural lime content high this indicates a strong buffering capacity to remain in this alkaline range. The pH is a bit higher than desired by most plants though some natives may be more alkaline tolerant. Dissipating the high lime may be of interest to prevent it from interfering with nutrient availability. Salinity, sodium and boron are very safely low in both and the SAR values show a proper balance. Nutritional data is comparable between the two and shows nitrogen, potassium, magnesium and sulfate deficient. Phosphorus and calcium are well supplied.

Secondary Soil Candidates

West Dump Native and Rock Plant Fines contain significantly greater silt and clay which indicates dense soil types that will hold water tightly and drain slowly. Both soils fall into the clay loam USDA classification. Silt plus clay at 65-75% indicates high moisture retention and slow drainage. Organic content is fair for natives in the West Dump Native while a bit low in the Rock Plant Fines. Organic content near 3.0% on a dry weight basis is in the range typically desired. Infiltration rates are estimated at 0.22 inch per hour.

Secondary Soil Candidates - continued

The pH in West Dump Native is slightly acidic and in the range preferred by most plants with natural lime favorably absent. The reaction level in Rock Plant Fines is at the upper end of the slightly alkaline range preferred by most plants and high lime content indicates pH is strongly buffered to remain in this range. This alkaline pH is likely suitable for most natives though dissipating high lime would be desirable to prevent antagonism of nutrient availability. Sodium and boron are safely low in both and the SAR values show a proper balance. Salinity is very slightly elevated in Rock Plant Fines and safely the reflection of abundant soluble calcium with salinity safely low in West Dump Native.

Nutritional data show nitrogen, phosphorus, and potassium low in both. Sulfate is additionally low in West Dump Native and well supplied in Rock Plant Fines. In West Dump Native, calcium is only fair relative to high magnesium. In Rock Plant Fines, magnesium is just fair relative to ample calcium.

Least Desirable Soil Candidate

The Basin Clean Out contains 50% clay and a combination of silt and clay at 85% which suggests very high moisture retention characteristics and very slow drainage. The USDA soil classification is clay and the infiltration rate is estimated at a slow 0.14 inch per hour. Organic content at 3.4% is sufficient for natives though greater organic matter would be desired to improve structure of this dense soil type. Salinity is very slightly elevated but safely the reflection of abundant soluble calcium. Sodium and boron are safely low and SAR value shows a proper balance. Nutritional data show nitrogen, phosphorus and potassium low. Calcium, magnesium and sulfate are well supplied. The pH is slightly alkaline and in the range preferred by most plants, though high lime is less than desirable.

Poor Soil Candidates

West Waste Rock, Pit #1 Topsoil and Crusher Site contain highly excessive gravel content and excessive coarse sands that in combination with a broad distribution between medium to fine sands, silt and clay *the susceptibility to consolidation is high*. The intermingling of these various particle sizes over time could result in a consolidated state impervious to air and water. Particle size data for West Waste Rock and Pit #1 Topsoil show sandy loam classifications by USDA standards and highly excessive gravel qualify these as “gravelly” and “very gravelly”, respectively. Greater clay content in the Crusher Site places this into the sandy clay loam textural class and excess gravel qualifies this as “gravelly”. Infiltration rates are estimated at 0.19 inch per hour and could be slower in a consolidated state. Organic content is low in all three for natives. The reaction level in West Waste Rock is at the upper end of the slightly alkaline range with unfavorable high lime content. The pH values in Pit#1 Topsoil and Crusher Site are moderately alkaline and higher than preferred by most plants with unfavorable high lime that will buffer pH to remain in this alkaline range. Salinity, sodium and boron are safely low throughout with SAR values showing a proper balance.

Poor Soil Candidates - continued

Nutrient levels show nitrogen and potassium low throughout with phosphorus fair in West Waste Rock and Pit #1 Topsoil. Sulfate is fair in the Crusher Site and otherwise well supplied. Calcium and magnesium are sufficient in all three.

The Pit 1 Fine Greenstone and West Main Topsoil contain significantly greater coarse sands with similar excessive gravel contents and the coarser particle make-up makes the *susceptibility to consolidation very high*. Particle size data indicate a loamy sand for Pit 1 Fine Greenstone and a sand for West Main Topsoil. Highly excessive gravel fractions qualify both as "very gravelly". Infiltration rates are estimated at a significantly slow 0.10 inch per hour and could be even slower when consolidated. Organic content is low in both. The pH levels fall in the moderately alkaline range with medium to high lime content which will buffer pH to remain in this range that may be a bit high for natives. Salinity is safely low in both as is boron. Sodium is slightly elevated in Pit 1 Fine Greenstone and the elevated SAR value indicates calcium and magnesium do not properly balance soluble sodium which can adversely impact soil permeability. Sodium is safely low in the West Main Topsoil and the SAR value shows a proper balance. Nitrogen and potassium are low in both. Magnesium is fair relative to ample calcium in the Pit 1 Fine Greenstone. Remaining major nutrients are otherwise sufficient.

HEIDI FISHER
Email only 5 pages. /dlb

WRA Environmental
2169-G E. Francisco Blvd.

San Rafael CA 94901

Soil & Plant Laboratory, Inc.
Leaders in Soil & Plant Testing Since 1946
352 Mathew Street Santa Clara, CA 95050 408-727-0330 (phone) 408-727-5125 (fax)
www.soilandplantlaboratory.com

Project : Hanson Permainente Quarry, Cupertino

COMPREHENSIVE SOIL ANALYSIS

Report No : **08-143-9035**
Purchase Order : Job 16143
Date Recd : 05/22/2008
Date Printed : 04/14/2009
Page : 2 of 2

Sample Description - Sample ID	Half Sat % / TEC	pH / Qual Lime	ECe dS/m	NO_3-N ppm	NH_4-N ppm	PO_4-P ppm	K ppm	Ca ppm	Mg ppm	Cu ppm	Zn ppm	Mn ppm	Fe ppm	Organic % dry wt.	Lab No.
	Sufficiency Factors														
Rock Plant Fines	29	7.6	3.8	20	7	14	64	2901	189					1.4	27561
	145	High		0.5		0.4	0.3	1.2	0.6						
West Main Topsoil	14	8.2	0.6	2	4	15	40	4491	1159					0.5	27562
	319	High		0.2		0.9	0.2	1.5	2.8						
Pit #1 Topsoil	17	7.8	2.6	3	5	17	42	2602	328					1.2	27563
	147	High		0.2		0.9	0.3	1.3	1.2						
Crusher Site	21	8.0	0.5	3	6	29	17	4811	738					1.0	27564
	299	High		0.2		1.2	0.1	1.3	1.5						

Saturation Extract Values						SAR	Gravel %		Percent of Sample Passing 2 mm Screen					USDA Soil Classification	Lab No.
									Sand						
Ca meq/L	Mg meq/L	Na meq/L	K meq/L	B ppm	SO_4 meq/L		Coarse 5 - 12	Fine 2 - 5	Very Coarse 1 - 2	Coarse 0.5 - 1	Med. to Very Fine 0.05 - 0.5	Silt .002-.05	Clay 0-.002		
27.9	8.3	10.2	0.9	0.12	31.6	2.4	0	0.3	0	0.6	24.2	42.6	32.6	Clay Loam	27561
3.0	2.5	0.7	0.1	0.02	2.3	0.4	23.4	36.0	44.6	21.4	22.8	8.0	3.2	Very Gravelly Sand	27562
21.7	11.6	2.8	0.3	0.09	33.1	0.7	20.6	21.8	12.2	12.4	33.2	25.6	16.6	Very Gravelly Sandy Loam	27563
2.7	1.7	0.7	0.1	0.03	2.0	0.5	12.1	19.2	15.4	12.2	24.2	23.0	25.2	Gravelly Sandy Clay Loam	27564

Sufficiency factor (1.0=sufficient for average crop) below each nutrient value. N factor based on 200 ppm constant feed. SAR = Sodium adsorption ratio. Half Saturation %=approx field moisture capacity. Nitrogen(N), Potassium(K), Calcium(Ca) and Magnesium(Mg) by sodium chloride extraction. Phosphorus(P) by sodium bicarbonate extraction. Copper(Cu), Zinc(Zn), Manganese(Mn) & Iron(Fe) by DTPA extraction. Sat. ext. method for salinity (ECe as dS/m),Boron (B), Sulfate(SO_4), Sodium(Na). Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm(1/2 inch) sieve. Particle sizes in millimeters. Organic percentage determined by Walkley-Black or Loss on Ignition.

* LOW , SUFFICIENT , HIGH

WRA Environmental
2169-G E. Francisco Blvd.

San Rafael CA 94901

Soil & Plant Laboratory, Inc.
Leaders in Soil & Plant Testing Since 1946
352 Mathew Street Santa Clara, CA 95050 408-727-0330 (phone) 408-727-5125 (fax)
www.soilandplantlaboratory.com

Project : Hanson Permainente Quarry, Cupertino

COMPREHENSIVE SOIL ANALYSIS

Report No : **08-143-9035**
Purchase Order : Job 16143
Date Recd : 05/22/2008
Date Printed : 04/14/2009

Sample Description - Sample ID	Half Sat % / TEC	pH / Qual Lime	ECe dS/m	NO_3-N ppm	NH_4-N ppm	PO_4-P ppm	K ppm	Ca ppm	Mg ppm	Cu ppm	Zn ppm	Mn ppm	Fe ppm	Organic % dry wt.	Lab No.
				Sufficiency Factors											
Pit #2	30	7.8	1.1	2	12	37	208	5883	265					6.7	27555
	312	High		0.2		1.0	0.5	1.2	0.4						
West Waste Rock	15	7.6	3.1	1	6	14	63	2672	232					1.2	27556
	146	High		0.2		0.8	0.5	1.5	1.0						
West Dump Native	28	6.9	0.6	1	5	13	37	5205	2866					2.5	27557
	494	None		0.1		0.4	0.1	0.8	3.5						
Pit 1 Fine Greenstone	11	7.8	2.7	1	4	15	40	1935	114					0.7	27558
	127	Medium		0.2		1.1	0.3	1.3	0.6						
East Dump Native	34	7.8	0.9	2	6	60	181	4063	93					7.4	27559
	207	High		0.1		1.5	0.7	1.2	0.2						
Basin Clean Out	36	7.5	4.1	1	7	15	46	3841	556					3.4	27560
	211	High		0.1		0.3	0.2	1.1	1.2						

Saturation Extract Values						SAR	Gravel %		Percent of Sample Passing 2 mm Screen					USDA Soil Classification	Lab No.
									Sand						
Ca meq/L	Mg meq/L	Na meq/L	K meq/L	B ppm	SO_4 meq/L		Coarse 5 - 12	Fine 2 - 5	Very Coarse 1 - 2	Coarse 0.5 - 1	Med. to Very Fine 0.05 - 0.5	Silt .002-.05	Clay 0-.002		
10.7	2.2	0.6	0.3	0.05	0.7	0.2	5.4	8.2	8.8	9.4	28.2	32.0	21.6	Loam	27555
24.6	9.1	6.2	0.3	0.15	34.5	1.5	16.1	18.7	19.8	15.2	29.2	20.5	15.3	Gravelly Sandy Loam	27556
2.5	3.4	0.8	0.1	0.04	0.5	0.5	4.6	6.3	6.4	7.4	20.6	27.0	38.6	Clay Loam	27557
3.6	1.4	21.8	0.2	0.98	21.0	13.9	7.3	29.5	27.5	23.8	35.1	9.8	3.8	Very Gravelly Loamy Sand	27558
8.7	1.0	0.4	0.4	0.09	0.5	0.2	6.5	7.3	8.1	12.8	48.5	21.8	8.8	Sandy Loam	27559
27.6	17.1	9.0	0.3	0.21	40.2	1.9	5.3	3.7	2.8	3.0	11	33.6	49.6	Clay	27560

Sufficiency factor (1.0=sufficient for average crop) below each nutrient value. N factor based on 200 ppm constant feed. SAR = Sodium adsorption ratio. Half Saturation %=approx field moisture capacity. Nitrogen(N), Potassium(K), Calcium(Ca) and Magnesium(Mg) by sodium chloride extraction. Phosphorus(P) by sodium bicarbonate extraction. Copper(Cu), Zinc(Zn), Manganese(Mn) & Iron(Fe) by DTPA extraction. Sat. ext. method for salinity (ECe as dS/m),Boron (B), Sulfate(SO_4), Sodium(Na). Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm(1/2 inch) sieve. Particle sizes in millimeters. Organic percentage determined by Walkley-Black or Loss on Ignition.

* LOW , SUFFICIENT , HIGH

Soil & Plant Laboratory, Inc
Leaders in Soil & Plant Testing Since 1946
www.soilandplantlaboratory.com

Locations:

352 Mathew St.
Santa Clara, CA 95050
(408) 727-0330

1594 North Main St.
Orange, CA 92867
(714) 282-8777

SANTA CLARA OFFICE
June 9, 2008
Report 08-149-0043

WRA ENVIRONMENTAL
2169-G E. Francisco Blvd.
San Rafael, CA 94901

Attn: Ingrid Morken

RE: HANSON PERMANENTE QUARRY – CUPERTINO, JOB NO. 16143
RE-VEGETATED SITES FOR COMPARISON

Background

The five samples received 5/28 were described as representing soils from sites that have been re-vegetated. Chemistry and particle size evaluation was requested to determine the discrepancies between areas and corresponding plant communities.

Summary/ Results

The pH values for East Dump Topsoil Source 1 & 2 and Reveg Slope West Dump show moderate alkalinity higher than preferred most plants, though likely suitable for some natives. East Dump Topsoil Source 2 and Reveg Slope West Dump do not contain any qualitative lime while East Dump Topsoil Source 1 contains medium natural lime. Reaction levels for Reveg East and West Pits are slightly alkaline and in the desired range with medium lime at Reveg West Pit and high natural lime at Reveg East Pit. Salinity, sodium and boron are comparable throughout and safely low throughout. The favorably low SAR values in all indicate calcium and magnesium properly balance soluble sodium.

Nutritional data show nitrogen low throughout with the exception of fair nitrogen at Reveg West Pit. At East Dump Topsoil Source 1 & 2, phosphorus and potassium are sufficient with magnesium low. Magnesium is also low at Reveg East Pit. Phosphorus and potassium are otherwise low and magnesium otherwise sufficient. Calcium is well supplied throughout with sulfate low to fair.

Organic content is low at Reveg Slope West Dump. Organic content is ample at Reveg East Pit and otherwise sufficient. Particle size analyses reveal sandy loam soils in all but Reveg West Pit which contains just slightly less clay qualifying this as a loamy sand. All contain highly excessive gravel fractions as well as very high coarse sands and range from very gravelly to gravelly qualifications. Infiltration rates are estimated on average of 0.22 inch per hour, but could be substantially slower in a consolidated state.

HEIDI FISHER Email only 3 pages.

Soil & Plant Laboratory, Inc
Leaders in Soil & Plant Testing Since 1946
www.soilandplantlaboratory.com

WRA Environmental
2169-G E. Francisco Blvd.
San Rafael, CA 94901

COMPREHENSIVE SOIL ANALYSIS
(AO5-1, AO5-2 or AO5-3)

Samples Rec'd: 5/28/08

Santa Clara Office
Lab No. 08-149-0043
Hanson Permanente Quarry Cupertino
P.O. No. Job 16143

Sample #	Half Sat%/ TEC	pH/ Qual Lime	ECe	NO_3 N	NH_4 N	PO_4 P	K	Ca	Mg	Cu	Zn	Mn	Fe	Organic % dry wt.	Sample Description & Log Number
27712	15	7.8	0.6	10	1	8	67	5685	907					0.8	Reveg Slope West Dump
	360	None		0.4		0.5	0.2	1.6	2.0						0.608-G5800 SC-40

Sample #	Saturation Extract Values: Ca me/l	Mg me/l	Na me/l	K me/l	B ppm	SO_4 me/l	SAR	Percent of Sample Passing 2 mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to V. Fine 0.05-.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
27712	3.7	2.5	0.6	0.1	0.01	1.3	0.3	30.0	23.7	24.3	12.2	32.0	18.1	13.4	Very Gravelly Sandy Loam

6/ 9/08

Sufficiency factor (1.0=sufficient for average crop) below each nutrient value. N factor based on 200 ppm constant feed. SAR = Sodium adsorption ratio. Half Saturation %=approx field moisture capacity. Nitrogen(N), Potassium(K), Calcium(Ca) and Magnesium(Mg) by sodium chloride extraction. Phosphorus(P) by sodium bicarbonate extraction. Copper(Cu), Zinc(Zn), Manganese(Mn) & Iron(Fe) by DTPA extraction. Sat. ext. method for salinity (ECe as dS/m), Boron(B), Sulfate(SO_4), Sodium(Na) and SAR. TEC(listed below Half Sat) = Est.Total Exchangeable Cations(meq/kg). Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm(1/2 inch) sieve. Particle sizes in millimeters.

Soil & Plant Laboratory, Inc
Leaders in Soil & Plant Testing Since 1946
www.soilandplantlaboratory.com

WRA Environmental
2169-G E. Francisco Blvd.
San Rafael, CA 94901

COMPREHENSIVE SOIL ANALYSIS
(AO5-1, AO5-2 or AO5-3)

Samples Rec'd: 5/28/08

Santa Clara Office
Lab No. 08-149-0043
Hanson Permanente Quarry Cupertino
P.O. No. Job 16143

Sample #	Half Sat%/ TEC	pH/ Qual Lime	ECe	NO3 N	NH4 N	PO4 P	K	Ca	Mg	Cu	Zn	Mn	Fe	Organic % dry wt.	Sample Description & Log Number
				Parts Per Million Parts Dry Soil											
27708	22	7.5	1.0	11	2	10	150	7553	330					4.8	Reveg East Pit
	404	High		0.3		0.4	0.4	1.6	0.5						0.7308-G5796 SC-40
27709	19	7.4	0.6	23	4	9	118	7216	1086					3.7	Reveg West Pit
	452	Med		0.7		0.4	0.3	1.5	1.7						0.6608-G5797 SC-40
27710	17	8.0	0.7	11	1	17	124	2723	78					3.0	East Dump Topsoil Source 1
	143	Med		0.4		0.8	0.7	1.3	0.3						0.8708-G5798 SC-40
27711	22	7.9	0.8	11	4	24	214	3304	161					3.8	East Dump Topsoil Source 2
	181	None		0.3		0.9	0.8	1.1	0.4						1.0108-G5799 SC-40

Sample #	Saturation Extract Values: Ca me/l	Mg me/l	Na me/l	K me/l	B ppm	SO4 me/l	SAR	Percent of Sample Passing 2 mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to V. Fine 0.05-.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
27708	5.9	1.0	0.3	0.1	0.05	1.0	0.2	22.4	26.8	24.8	14.8	26.8	18.8	14.8	Very Gravelly Sandy Loam
27709	3.4	2.6	0.4	0.1	0.04	0.7	0.2	15.6	31.9	28.9	15.6	36.0	14.1	5.4	Very Gravelly Loamy Sand
27710	6.1	0.8	0.5	0.2	0.01	1.8	0.3	14.8	17.7	18.9	11.0	43.7	17.0	9.4	Gravelly Sandy Loam
27711	12.3	2.3	1.1	0.4	0.01	2.4	0.4	27.0	11.4	10.1	9.6	46.9	19.0	14.4	Very Gravelly Sandy Loam

6/ 9/08

Sufficiency factor (1.0=sufficient for average crop) below each nutrient value. N factor based on 200 ppm constant feed. SAR = Sodium adsorption ratio. Half Saturation %=approx field moisture capacity. Nitrogen(N), Potassium(K), Calcium(Ca) and Magnesium(Mg) by sodium chloride extraction. Phosphorus(P) by sodium bicarbonate extraction. Copper(Cu), Zinc(Zn), Manganese(Mn) & Iron(Fe) by DTPA extraction. Sat. ext. method for salinity (ECe as dS/m), Boron(B), Sulfate(SO_4), Sodium(Na) and SAR. TEC(listed below Half Sat) = Est.Total Exchangeable Cations(meq/kg). Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm(1/2 inch) sieve. Particle sizes in millimeters.

WRA Environmental
2169-G E. Francisco Blvd.
San Rafael CA 94901

Soil & Plant Laboratory, Inc.
Leaders in Soil & Plant Testing Since 1946
352 Mathew Street Santa Clara, CA 95050 408-727-0330 (phone) 408-727-5125 (fax)
www.soilandplantlaboratory.com

SOIL FERTILITY AND MICRONUTRIENT ANALYSIS

Project : Hanson Permanente - Cupertino

Report No : **08-179-0041**
Purchase Order :
Date Printed : 07/01/2008
Date Recd : 06/27/2008

Sample Description - Sample Id - Plant Name	HalfSat %	pH s.u.	NO_3-N ppm	NH_4-N ppm	PO_4-P ppm	K ppm	Ca ppm	Mg ppm	Cu ppm	Zn ppm	Mn ppm	Fe ppm	Saturation Extract B ppm	SO_4 meq/L	Na meq/L	K meq/L	Ca meq/L	Cl meq/L	ECe dS/m	OM %	Lab No
	TEC	Qual. Lime	Sufficiency Factor										Sufficiency Factor		(SAR)		Mg meq/L				
West Waste Rock									0.9	0.5	5	16									28512
East Dump Native									1.5	6.4	6	28									28513
Green Stone Slide									0.8	0.8	4	13									28514
Rock Plant Fines									2.2	3.6	9	25									28515
West Main Topsoil									0.8	0.8	6	33									28516
Pit #1 Topsoil									1.3	1.3	4	19									28517
East Dump Topsoil Site 4									1.3	2.5	4	21									28518
East Dump Topsoil Site 5									2.5	2.4	8	72									28519

Sufficiency factor (1.0=sufficient for average crop) below each nutrient value. N factor based on 200 ppm constant feed. The value below sodium (Na) result is the SAR = Sodium adsorption ratio. Half Saturation %=approx field moisture capacity. Major elements, Nitrogen(N),Potassium(K), Calcium(Ca) and Magnesium(Mg) by sodium chloride extraction. Phosphorus(P) by sodium bicarbonate extraction. Copper(Cu), Zinc(Zn), Manganese(Mn) & Iron(Fe) by DTPA extraction. TEC(listed below Half Sat.) = Est.Total Exchangeable Cations (meq/kg).

* LOW , SUFFICIENT, HIGH

Soil & Plant Laboratory, Inc
Leaders in Soil & Plant Testing Since 1946
www.soilandplantlaboratory.com

Locations:

352 Mathew St.
Santa Clara, CA 95050
(408) 727-0330

1594 North Main St.
Orange, CA 92867
(714) 282-8777

SANTA CLARA OFFICE
July 24, 2008
Report 08-196-0046

WRA ENVIRONMENTAL
2169-G E. Francisco Blvd.
San Rafael, CA 94901

Attn: Ingrid Morken

RE: HANSON PERMANENTE QUARRY – CUPERTINO, JOB NO. 16143
SOIL DEVELOPMENT

Background

The 9 soil blends created in the laboratory on 7/14 represent the percentages of mineral topsoils and compost as requested. The blends were submitted to the laboratory for chemistry, fertility and particle size evaluation with regards to their feasibility for use in revegetation of areas with California natives.

Analytical Results

Particle size data for the Blend 2 (20% Waste Rock, 20% Pit 1 Fine Greenstone, 40% Plant Fines, 20% Compost) shows a sandy clay loam classification by USDA standards. The soils infiltration rate is estimated at a slow 0.18 inch per hour. Blend 3 (35% Pit 1 Fine Greenstone, 41% Plant Fines, 24% Compost) Blend 8 (28% West Main, 50% Plant Fines, 22% Compost) and Blend 9 (16% Pit 1 Fine Greenstone, 16% West Main, 46% Plant Fines, 22% Compost) all contain slightly higher silt content as a reflection of the Plant Fines which places these into the loam textural class. Infiltration rates are estimated on average of a slow 0.14 inch per hour. The remaining blends contain less silt and clay which qualifies these as sandy loam textural classes. Infiltration rates are estimated on average of a slow 0.11 inch per hour. All 9 of the soil blends are qualified as “very gravelly” and this qualifier is applied for greater than 35% combined gravel. The greater the diversity of gravel combined with coarse sands increases the susceptibility to consolidation of these various particle sizes and the tendency is highest in Blend 4 (81% Pit 1 Fine Greenstone, 19% Compost) Blend 5 (36% Waste Rock, 43% Pit 1 Fine Greenstone, 21% Compost) and Blend 9 (16% Pit 1 Fine Greenstone, 16% West Main, 46% Plant Fines, 22% Compost). Blend 1 (73% Waste Rock, 27% Compost) also shows a significant degree of susceptibility to consolidation with the remaining blends high to moderate.

Organic content at 4.0% in Blend 2 (20% Waste Rock, 20% Pit 1 Fine Greenstone, 40% Plant Fines, 20% Compost) is well supplied for natives. The 5.1% organic matter in Blend 4 (81% Pit 1 Fine Greenstone, 19% Compost) and Blend 6 (32% Waste Rock, 68% East Dump) is also well supplied for natives. The 5.6% in Blend 3 (35% Pit 1 Fine Greenstone, 41% Plant Fines, 24% Compost) and 6.3% in Blend 8 (28% West Main,

50% Plant Fines, 22% Compost) is ample. The 6.8% organic matter in Blend 9 (16% Pit 1 Fine Greenstone, 16% West Main, 46% Plant Fines, 22% Compost) as well as the 7.0% in Blend 1 (73% Waste Rock, 27% Compost) are abundant for natives. The 8.5% organic matter in Blend 5 (36% Waste Rock, 43% Pit 1 Fine Greenstone, 21% Compost) and the 10.1% organic matter in Blend 7 (25% Pit 1 Fine Greenstone, 75% East Dump) are ample as well.

The pH is moderately alkaline for Blend 6 (32% Waste Rock, 68% East Dump) and Blend 7 (25% Pit 1 Fine Greenstone, 75% East Dump) with natural lime medium. These values are a bit higher than preferred by most plants but likely suitable for natives. The remaining pH values are slightly alkaline and suitable for natives. Natural lime is absent in Blend 4 (81% Pit 1 Fine Greenstone, 19% Compost) and medium in Blend 5 (36% Waste Rock, 43% Pit 1 Fine Greenstone, 21% Compost) and is favorable. Natural lime content is otherwise high and indicates pH will be strongly buffered to remain in the alkaline range.

Salinity is safely low in Blend 6 (32% Waste Rock, 68% East Dump) and Blend 7 (25% Pit 1 Fine Greenstone, 75% East Dump) with sodium levels correspondingly safely low as well. The remaining samples, which contained the compost addition, show elevated salinity as a result of elevated sodium. The baseline soil results from Report #'s 08-143-0035 & 08-149-0043 did not reveal any significant concern relative to sodium. The South Valley Organics Compost would appear to be the source of the excess sodium. The elevated SAR values are a reflection of the sodium excess which would not be an issue when using compost safely low in sodium. Boron remains safely low throughout.

Nutritional data show iron continuing at low levels in all the blends. For Blend 6 (32% Waste Rock, 68% East Dump) and Blend 7 (25% Pit 1 Fine Greenstone, 75% East Dump) magnesium is low relative to ample calcium. Calcium is quite ample throughout. Zinc and manganese are low in these blends as well with copper additionally low in Blend 7 (25% Pit 1 Fine Greenstone, 75% East Dump). Zinc is low in Blend 4 (81% Pit 1 Fine Greenstone, 19% Compost) as well as Blend 5 (36% Waste Rock, 43% Pit 1 Fine Greenstone, 21% Compost). Remaining major and minor nutrients are sufficient to well supplied.

Comments

Nutritive values show a favorable improvement in overall fertility of the blends, as a result of the nutrient rich compost addition. The Waste Rock and Pit 1 Fine Greenstone blended with the East Dump still show excellent fertility and organic content, even with magnesium potentially low. The excess sodium of the South Valley Organics Compost is contributing to elevated salinity and SAR values. Evaluating the intended compost product prior to use is suggested to assure all troublesome salts are safely low. Elevated salinity could impair seed germination and be toxic to tender seedlings.

The compost addition was based on a target of 4.8% organic matter. This was achieved and even

surpassed with the compost rates, with the exception of Blend 2 which was slightly lower though still well supplied for natives. The compost addition is felt to be within appropriate ranges and to simplify, incorporating 25% Compost on a volume basis would provide ample organic matter for healthy establishment of the natives. The only soil blends that do not apply are the Waste Rock and Pit 1 Fine Greenstone amended only with the East Dump which in itself provides ample organic matter.

Particle size distribution is quite similar between the Waste Rock and Pit 1 Fine Greenstone though the Waste Rock generally contains greater larger gravel. Blend 4, Pit 1 Fine Greenstone with Compost, and Blend 5 being Waste Rock, Pit 1 Fine Greenstone and Compost display nearly comparable particle size results. There is no significant improvement from blending the Waste Rock with the Pit 1 Fine Greenstone and consideration might be given to the energy expenditure of blending these two similar sources.

The logistics behind using the Plant Fines might be hindered by the issue of obtaining a homogenous soil blend with the other gravelly sources. The very high moisture content of the plant fines would need to be reduced for incorporation, however we found that drying of this material resulted in a dense, hard soil comparable to adobe brick that had to be pulverized for use in the blends. The addition of the Plant Fines does increase silt and clay content of the final blends thus decreasing gravel and coarse sands which is advantageous, but again the feasibility of achieving a homogenous blend may prove to be very difficult.

The best soil candidates are limited to Blend 6 & 7 which are predominantly the East Dump material. The second best candidates are those that contain 40% and 50% Plant Fines i.e. Blend 2, 3 & 8. Blends 2 & 3 are so similar and again the Pit 1 Fine Greenstone and Waste Rock are so similar that these are interchangeable. The 40% Plant Fines is the minimum amount of this material suggested for the blends in order to make some beneficial impact on soil texture. The next best candidate would be Blend 9. The Waste Rock or Pit 1 Fine Greenstone with just the Compost addition, Blends 1 & 4, provides the attributes of ample organic matter and abundant fertility for native plant establishment, though the coarse, diverse soil composition is less than desired. A blend of 75% Waste Rock or Pit 1 Fine Greenstone with 25% Compost would be a suitable blend to achieve adequate organic matter. The 75% Waste Rock or Pit 1 Fine Greenstone could be divided at any percentage if this of interest.

Heidi Fisher

HEIDI FISHER
Email only 5 pages. /dlb

WRA Environmental
2169-G E. Francisco Blvd.

San Rafael CA 94901

Soil & Plant Laboratory, Inc.
Leaders in Soil & Plant Testing Since 1946
352 Mathew Street Santa Clara, CA 95050 408-727-0330 (phone) 408-727-5125 (fax)
www.soilandplantlaboratory.com

Project : Hanson Permanente - Soil Development

COMPREHENSIVE SOIL ANALYSIS

Report No : **08-196-9046**
Purchase Order :
Date Recd : 07/14/2008
Date Printed : 04/14/2009

Sample Description - Sample ID	Half Sat % / TEC	pH / Qual Lime	ECe dS/m	NO_3-N ppm	NH_4-N ppm	PO_4-P ppm	K ppm	Ca ppm	Mg ppm	Cu ppm	Zn ppm	Mn ppm	Fe ppm	Organic % dry wt.	Lab No.
				Sufficiency Factors											
1)73% Waste Rock & 27% Compost	16	7.3	5.2	9	27	58	511	2549	417	1.5	4.3	13	13	7.0	28846
	164	High		1.1		3.1	3.2	1.2	1.5	0.9	0.7	1.0	0.2		
2)20% Waste, 20% Pit 1 Fine Greenstone, 40% Fines, 20% Compost	17	7.4	6.4	12	24	45	427	2282	255	1.9	5.3	12	14	4.0	28847
	141	High		1.1		2.2	2.7	1.1	1.0	1.2	0.8	0.8	0.2		
3)35% Pit 1 Fine Greenstone, 41% Plant Fines, 24% Compost	16	7.3	7.3	11	23	31	376	2174	253	1.7	4.3	11	13	5.6	28848
	137	High		1.1		1.6	2.7	1.2	1.0	1.2	0.8	0.9	0.2		
4)81% Pit 1 Fine Greenstone & 19% Compost	11	7.6	3.5	11	18	31	273	2138	214	1.1	1.2	8	9	5.1	28849
	153	None		1.4		2.5	2.1	1.2	0.9	0.8	0.2	0.7	0.2		
5)36% Waste, 43% Pit 1 Fine Greenstone, 21% Compost	13	7.4	5.3	10	26	32	378	2263	285	1.1	3.0	9	11	8.5	28850
	155	Medium		1.4		2.1	2.7	1.3	1.2	0.8	0.5	0.8	0.2		
6)32% Waste, 68% East Dump	22	7.7	1.9	118	46	24	167	3282	141	1.2	2.7	3	9	5.1	28851
	174	Medium		3.8		0.9	0.8	1.2	0.4	0.5	0.3	0.1	0.1		

Saturation Extract Values						SAR	Gravel %		Percent of Sample Passing 2 mm Screen					USDA Soil Classification	Lab No.
									Sand			Silt	Clay		
Ca meq/L	Mg meq/L	Na meq/L	K meq/L	B ppm	SO_4 meq/L		Coarse 5 - 12	Fine 2 - 5	Very Coarse 1 - 2	Coarse 0.5 - 1	Med. to Very Fine 0.05 - 0.5	.002-.05	0-.002		
29.0	17.4	10.9	8.1	0.46	23.5	2.3	58.9	12.9	22.6	14.0	29.1	17.4	16.8	Very Gravelly Sandy Loam	28846
29.5	15.5	28.1	7.9	0.47	26.2	5.9	32.4	9.3	11.1	8.5	31	26.5	22.9	Very Gravelly Sandy Clay Loam	28847
30.0	15.3	34.0	9.8	0.51	26.2	7.1	47.6	8.1	13.6	9.7	25.4	29.5	21.8	Very Gravelly Loam	28848
7.1	2.9	26.5	2.5	0.65	15.1	11.8	28.8	27.8	28.4	23.1	32.2	9.4	6.9	Very Gravelly Sandy Loam	28849
19.9	10.0	29.2	5.3	0.54	22.2	7.6	34.5	28.7	30.6	17.3	28.7	12.4	10.9	Very Gravelly Sandy Loam	28850
17.1	3.0	2.2	0.5	0.08	16.6	0.7	39.0	9.1	11.5	12.5	39.6	20.5	15.9	Very Gravelly Sandy Loam	28851

Sufficiency factor (1.0=sufficient for average crop) below each nutrient value. N factor based on 200 ppm constant feed. SAR = Sodium adsorption ratio. Half Saturation %=approx field moisture capacity. Nitrogen(N), Potassium(K), Calcium(Ca) and Magnesium(Mg) by sodium chloride extraction. Phosphorus(P) by sodium bicarbonate extraction. Copper(Cu), Zinc(Zn), Manganese(Mn) & Iron(Fe) by DTPA extraction. Sat. ext. method for salinity (ECe as dS/m),Boron (B), Sulfate(SO_4), Sodium(Na). Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm(1/2 inch) sieve. Particle sizes in millimeters. Organic percentage determined by Walkley-Black or Loss on Ignition.

* LOW , SUFFICIENT , HIGH

WRA Environmental
2169-G E. Francisco Blvd.

San Rafael CA 94901

Soil & Plant Laboratory, Inc.
Leaders in Soil & Plant Testing Since 1946
352 Mathew Street Santa Clara, CA 95050 408-727-0330 (phone) 408-727-5125 (fax)
www.soilandplantlaboratory.com

Project : Hanson Permanente - Soil Development

COMPREHENSIVE SOIL ANALYSIS

Report No : **08-196-9046**
Purchase Order :
Date Recd : 07/14/2008
Date Printed : 04/14/2009

Sample Description - Sample ID	Half Sat % / TEC	pH / Qual Lime	ECe dS/m	NO_3-N ppm	NH_4-N ppm	PO_4-P ppm	K ppm	Ca ppm	Mg ppm	Cu ppm	Zn ppm	Mn ppm	Fe ppm	Organic % dry wt.	Lab No.
				Sufficiency Factors											
7)25% Pit 1 Fine Greenstone, 75% East Dump	22	8.2	1.0	103	40	29	177	2986	84	1.0	2.9	2	9	10.1	28852
	170	Medium		3.2		1.1	0.8	1.1	0.2	0.5	0.3	0.1	0.1		
8)28% West Main, 50% Plant Fines, 22% Compost	21	7.2	5.9	13	27	47	616	3025	450	1.9	5.7	16	16	6.3	28853
	183	High		1.0		1.9	2.8	1.1	1.2	0.8	0.6	0.8	0.2		
9)16% Pit 1 Fine Greenstone, 16% West Main, 46% Fines, 22% Compost	18	7.3	6.7	12	25	50	469	2739	405	1.7	4.8	12	15	6.8	28854
	172	High		1.0		2.3	2.6	1.1	1.3	0.9	0.7	0.8	0.2		

Saturation Extract Values						SAR	Gravel %		Percent of Sample Passing 2 mm Screen					USDA Soil Classification	Lab No.
									Sand						
Ca meq/L	Mg meq/L	Na meq/L	K meq/L	B ppm	SO_4 meq/L		Coarse 5 - 12	Fine 2 - 5	Very Coarse 1 - 2	Coarse 0.5 - 1	Med. to Very Fine 0.05 - 0.5	Silt .002-.05	Clay 0-.002		
4.1	0.5	7.0	0.4	0.07	4.5	4.6	39.3	13.2	17.1	13.8	37.7	18.4	13.0	Very Gravelly Sandy Loam	28852
34.0	25.1	11.1	4.6	0.40	25.3	2.0	44.6	9.5	10.7	4.8	21	36.5	27.0	Very Gravelly Loam	28853
32.9	22.6	23.2	6.3	0.44	25.8	4.4	31.1	26.8	13.4	8.9	23.4	30.4	23.9	Very Gravelly Loam	28854

Sufficiency factor (1.0=sufficient for average crop) below each nutrient value. N factor based on 200 ppm constant feed. SAR = Sodium adsorption ratio. Half Saturation %=approx field moisture capacity. Nitrogen(N), Potassium(K), Calcium(Ca) and Magnesium(Mg) by sodium chloride extraction. Phosphorus(P) by sodium bicarbonate extraction. Copper(Cu), Zinc(Zn), Manganese(Mn) & Iron(Fe) by DTPA extraction. Sat. ext. method for salinity (ECe as dS/m),Boron (B), Sulfate(SO_4), Sodium(Na). Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm(1/2 inch) sieve. Particle sizes in millimeters. Organic percentage determined by Walkley-Black or Loss on Ignition.

* LOW , SUFFICIENT , HIGH

Soil & Plant Laboratory, Inc
Leaders in Soil & Plant Testing Since 1946
www.soilandplantlaboratory.com

Locations:

352 Mathew St.
Santa Clara, CA 95050
(408) 727-0330

1594 North Main St.
Orange, CA 92867
(714) 282-8777

SANTA CLARA OFFICE
February 27, 2009
Report 09-054-0030

WRA ENVIRONMENTAL
2169-G E. Francisco Blvd.
San Rafael, CA 94901

Attn: Geoff Smick

RE: PERMANENTE QUARRY – CUPERTINO, JOB NO. 16143

Background

The 10 samples received 2/23 represent native topsoil that will be striped and stockpiled and later spread in areas for re-vegetation with California natives. The sample descriptions provided are referenced on the attached data sheets.

Analytical Results

Particle size data for Samples 09, G4, C8, 05 and C5-wetter show clay loam classifications by USDA standards. The abundance of silt and clay at about 60% indicates characteristics of high moisture retention and slow drainage. Slightly higher sand fractions for C7 and G3 place these into the sandy clay loam textural class. Even greater sand content and less silt and clay in Samples 07, 06 and C5-dryer place these into the sandy loam classification.

Gravel fractions are only slightly elevated in Sample G4 qualifying this as “gravelly” and only slightly increases the susceptibility to consolidation. Gravel content is moderate in Samples 06 and G3 qualifying these as “gravelly”, and combined with elevated coarse sands the susceptibility to consolidation is moderate. Highly excessive gravel content in Sample C5-drier qualifies this as “very gravelly” which significantly increases the susceptibility to consolidation.

The infiltration rates are an estimation based upon soil texture and the clay loam classifications are estimated to have an infiltration rate of 0.22 inch per hour. The sandy clay loam for C7 is estimated at 0.27 inch per hour while high gravel content in G3 makes this slightly slower at 0.21 inch per hour. The sandy loam of Samples 07 is estimated at 0.36 inch per hour while higher gravel content in Sample 06 makes this slower at 0.28 inch per hour. Even higher gravel content in Sample C5-drier decreases the infiltration rate to 0.22 inch per hour.

Organic content for Sample G3 is low for natives while Samples 05 and 06 are ample in organic matter. Organic content is sufficient for natives in Samples C7 and 07. All other areas are a bit low given their corresponding fine textures and greater clay. Modest supplementation would be of benefit to improve soil structure.

The reaction levels for Samples G4, C8, G3 and C5-wetter fall into the slightly alkaline range preferred by most plants, including natives. All other areas are moderately alkaline and a bit higher than preferred by natives. Natural lime is favorably low in Samples 06 and C5-drier and otherwise absent. This will allow for some beneficial pH adjustment where desired. Potentially troublesome salinity, sodium and boron are very safely low throughout and the SAR values indicate calcium and magnesium properly balance soluble sodium.

Available nutrient levels show nitrogen, manganese, sulfate and boron low throughout with the exception of sufficient nitrogen in Sample 07 and sufficient sulfate in 09. Boron deficiency is extremely rare. Zinc is also low in all but C7 and C5-drier. Phosphorus is fair in Sample 09 and otherwise sufficient to well supplied. Potassium is low in Samples 09, G4, C8, G3 and C5-wetter. Calcium is particularly ample in Samples 07, G4, 06 and C5-wetter & drier. Magnesium is low in Samples 07, 06 and C5-drier in comparison to the ample calcium levels. Magnesium is ample in Sample C8 and C5-wetter, though adequately balanced with sufficient calcium. In Sample G3, magnesium is excessive with calcium just equal in the saturation extract. Copper is low in Samples 05, 06, G3 and C5-wetter. Iron is low in Samples G4, G3 and C5-wetter while iron is ample in C7 and 07. All other major and minor elements are otherwise sufficient.

Comments

Samples C7 and 07 are the most favorable topsoil candidates given their desirable soil compositions with adequate organic matter. The elevated alkalinity will readily adjust into the slightly alkaline range given the adequate inclusion of soil sulfur as suggested below. No other supplementation would be required.

Sample 05 is also quite favorable given the ample organic content and suitable soil texture. A modest rate of soil sulfur would slightly adjust the alkalinity and no other amendments would be required.

Samples 09, G4, C8 and C5-wetter contain greater clay content and therefore higher moisture retention characteristics. However overall texture is quite suitable and increasing organic content very modestly would help improve soil structure for the long term. Utilizing green waste compost abundant in nutrients and particularly potassium at the modest rate suggested below would address the potassium deficits and sufficiently boost organic content to improve soil structure. A modest rate of soil sulfur is also suggested for Sample 09 for some beneficial pH adjustment.

Organic content in Sample 06 is quite ample and favorable however excessive gravel and coarse sand fractions moderately increase the susceptibility for soil particles to consolidate over time and the result would be decreased porosity and drainage capacity. The ample organic matter would be of benefit to offset the gravel fractions, in the short term at least. Sample 06 is a marginal topsoil candidate based on the texture limitations and if you choose to utilize this soil then the recommendation for adjusting pH with soil sulfur is the only requirement.

Sample G3 is not a desirable topsoil candidate given the combination of poor soil structure and serpentine like characteristics where magnesium is excessive and potassium deficient. Calcium is insufficient relative to the magnesium excess, which can impair plant development. An abundant addition of agricultural gypsum as well as organic matter would be required to begin to correct the shortcomings and plant survivability given the serpentine character may still be questionable.

Sample C5-drier is an unsuitable topsoil candidate given the very poor soil structure and high tendency to lock up and provide inadequate aeration and drainage. Increasing organic content could help offset the gravel fractions in the short term though long term suitability would be marginal at best. This soil is not suggested for use.

Recommendations

The soil sulfur treatment could be broadcast along the surface prior to stripping and stockpiling the soils and should get mixed sufficiently during the stockpiling process. This would provide a jump start on pH adjustment. The organic amendment could also be handled in the same manner.

The following rates of soil sulfur and amendment should be applied to the following areas as indicated. The following rates are to treat a soil depth of 6-inches.

	Amount / 1000 square feet	
Samples C7 & 07:	8 pounds	Soil Sulfur
Samples G4, C8 & C5-wetter:	2-1/2 cubic yards	Green waste Compost
Sample 09:	2-1/2 cubic yards 8 pounds	Green waste Compost Soil Sulfur
Sample 05:	8 pounds	Soil Sulfur
Sample 06:	12 pounds	Soil Sulfur
*Sample G3:	4 cubic yards 130 pounds	Green waste Compost Agricultural Gypsum

* Using the G3 soil is not suggested however.

The Green waste compost will adequately supplement potassium nutrition while the soil sulfur will adjust pH closer to 7.3.

Nitrogen fertilization may be left to your discretion and could rely upon a very modest rate of an organic fertilizer such as Blood Meal or Alfalfa Meal used at 1/3 of the suggested rate.

HEIDI FISHER
Email 6 pages.

WRA Environmental
2169-G E. Francisco Blvd.

San Rafael CA 94901

Soil & Plant Laboratory, Inc.
Leaders in Soil & Plant Testing Since 1946
352 Mathew Street Santa Clara, CA 95050 408-727-0330 (phone) 408-727-5125 (fax)
www.soilandplantlaboratory.com

Project : Permanente - Cupertino - 16143

COMPREHENSIVE SOIL ANALYSIS

Report No : **09-054-0030**
Purchase Order :
Date Recd : 02/23/2009
Date Printed : 02/26/2009

Sample Description - Sample ID	Half Sat % / TEC	pH / Qual Lime	ECe dS/m	NO_3-N ppm	NH_4-N ppm	PO_4-P ppm	K ppm	Ca ppm	Mg ppm	Cu ppm	Zn ppm	Mn ppm	Fe ppm	Organic % dry wt.	Lab No.
				Sufficiency Factors											
Soil Sample 1 - C7 1/27/09	17	7.9	0.7	15	4	27	151	1950	200	2.0	8.6	6	224	3.5	32855
	116	None		0.6		1.4	1.1	1.1	0.8	1.4	1.6	0.5	4.2		
Soil Sample 2 - 07 1/27/09	11	8.0	0.5	14	5	25	155	2399	63	1.0	2.8	5	161	2.6	32856
	128	None		0.9		1.9	1.3	1.6	0.3	0.8	0.6	0.5	3.5		
Soil Sample 4 - 09 1/27/09	22	7.9	0.6	10	4	15	105	2847	833	2.0	2.1	9	145	2.8	32857
	211	None		0.3		0.6	0.4	0.9	2.0	0.8	0.2	0.4	1.5		
Soil Sample 5 - G4 1/27/09	21	7.6	0.4	11	4	19	67	5712	865	2.4	1.3	6	42	2.2	32858
	356	None		0.4		0.7	0.2	1.4	1.6	0.7	0.1	0.2	0.3		
Soil Sample 6 - C8 1/27/09	19	7.6	0.5	10	4	20	52	2843	1374	1.9	1.1	8	85	2.5	32859
	255	None		0.4		0.9	0.2	0.9	3.3	0.7	0.1	0.4	0.9		
05 - 02/12/09	22	7.8	0.5	10	15	27	221	4607	947	1.8	5.0	8	129	7.1	32860
	312	None		0.6		1.0	0.7	1.1	1.8	0.5	0.4	0.3	1.1		

Saturation Extract Values						SAR	Gravel %		Percent of Sample Passing 2 mm Screen					USDA Soil Classification	Lab No.
									Sand						
Ca meq/L	Mg meq/L	Na meq/L	K meq/L	B ppm	SO_4 meq/L		Coarse 5 - 12	Fine 2 - 5	Very Coarse 1 - 2	Coarse 0.5 - 1	Med. to Very Fine 0.05 - 0.5	Silt .002-.05	Clay 0-.002		
4.3	1.3	1.0	0.3	0.05	0.9	0.6	5.0	9.0	5.6	8.0	38.2	26.6	21.6	Sandy Clay Loam	32855
2.9	0.8	0.6	0.4	0.09	0.7	0.5	8.0	4.6	3.0	8.0	47.6	23.8	17.6	Sandy Loam	32856
4.0	2.3	0.8	0.1	0.05	2.2	0.5	9.8	4.6	9.0	6.2	22.9	22.3	39.6	Clay Loam	32857
2.0	1.2	0.5	0.1	0.04	0.6	0.4	9.2	6.4	7.0	9.4	27.8	18.3	37.4	Gravelly Clay Loam	32858
2.4	1.5	0.6	0.1	0.05	0.7	0.5	5.8	8.4	5.6	6.6	31.9	20.4	35.5	Clay Loam	32859
3.0	1.6	0.7	0.2	0.08	0.8	0.5	4.6	9.0	7.4	7.6	28.9	28.4	27.7	Clay Loam	32860

Sufficiency factor (1.0=sufficient for average crop) below each nutrient value. N factor based on 200 ppm constant feed. SAR = Sodium adsorption ratio. Half Saturation %=approx field moisture capacity. Nitrogen(N), Potassium(K), Calcium(Ca) and Magnesium(Mg) by sodium chloride extraction. Phosphorus(P) by sodium bicarbonate extraction. Copper(Cu), Zinc(Zn), Manganese(Mn) & Iron(Fe) by DTPA extraction. Sat. ext. method for salinity (ECe as dS/m),Boron (B), Sulfate(SO_4), Sodium(Na). Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm(1/2 inch) sieve. Particle sizes in millimeters. Organic percentage determined by Walkley-Black or Loss on Ignition.

* LOW , SUFFICIENT , HIGH

WRA Environmental
2169-G E. Francisco Blvd.

San Rafael CA 94901

Soil & Plant Laboratory, Inc.
Leaders in Soil & Plant Testing Since 1946
352 Mathew Street Santa Clara, CA 95050 408-727-0330 (phone) 408-727-5125 (fax)
www.soilandplantlaboratory.com

Project : Permanente - Cupertino - 16143

COMPREHENSIVE SOIL ANALYSIS

Report No : **09-054-0030**
Purchase Order :
Date Recd : 02/23/2009
Date Printed : 02/26/2009

Sample Description - Sample ID	Half Sat %	pH	ECe dS/m	NO_3-N ppm	NH_4-N ppm	PO_4-P ppm	K ppm	Ca ppm	Mg ppm	Cu ppm	Zn ppm	Mn ppm	Fe ppm	Organic % dry wt.	Lab No.
	TEC	Qual Lime		Sufficiency Factors											
06 - 02/12/09	26	8.1	0.7	10	6	41	289	4904	123	1.3	5.1	9	124	5.5	32861
	258	Low		0.3		1.3	0.9	1.2	0.2	0.4	0.4	0.3	1.0		
G3 - 02/12/09	18	7.2	0.5	9	3	19	48	3975	2773	1.5	1.2	12	64	0.7	32862
	429	None		0.3		0.9	0.1	0.9	4.7	0.4	0.1	0.4	0.5		
C5 - 02/12/09 (wetter)	18	7.3	0.5	10	4	25	43	4287	1482	1.8	1.1	8	45	2.4	32863
	337	None		0.4		1.2	0.2	1.2	3.1	0.6	0.1	0.3	0.4		
C5 - 02/12/09 (drier)	21	8.0	0.8	14	5	54	281	2726	45	2.3	5.7	5	60	2.5	32864
	144	Low		0.5		2.2	1.6	1.2	0.1	1.2	0.8	0.3	0.9		

Saturation Extract Values						SAR	Gravel %		Percent of Sample Passing 2 mm Screen					USDA Soil Classification	Lab No.
									Sand						
Ca meq/L	Mg meq/L	Na meq/L	K meq/L	B ppm	SO_4 meq/L		Coarse 5 - 12	Fine 2 - 5	Very Coarse 1 - 2	Coarse 0.5 - 1	Med. to Very Fine 0.05 - 0.5	Silt .002-.05	Clay 0-.002		
4.5	0.7	0.6	0.7	0.11	1.1	0.3	14.2	13.2	10.8	9.0	41.1	24.3	14.8	Gravelly Sandy Loam	32861
1.6	1.6	0.9	0.1	0.05	0.5	0.7	13.0	14.0	12.2	12.0	30.6	16.0	29.2	Gravelly Sandy Clay Loam	32862
1.6	1.3	0.8	0.1	0.04	0.6	0.7	2.8	8.2	5.2	8.6	29.1	23.9	33.2	Clay Loam	32863
5.9	0.6	0.5	0.4	0.04	1.5	0.3	25.2	15.6	11.0	12.4	45.5	21.9	9.2	Very Gravelly Sandy Loam	32864

Sufficiency factor (1.0=sufficient for average crop) below each nutrient value. N factor based on 200 ppm constant feed. SAR = Sodium adsorption ratio. Half Saturation %=approx field moisture capacity. Nitrogen(N), Potassium(K), Calcium(Ca) and Magnesium(Mg) by sodium chloride extraction. Phosphorus(P) by sodium bicarbonate extraction. Copper(Cu), Zinc(Zn), Manganese(Mn) & Iron(Fe) by DTPA extraction. Sat. ext. method for salinity (ECe as dS/m),Boron (B), Sulfate(SO_4), Sodium(Na). Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm(1/2 inch) sieve. Particle sizes in millimeters. Organic percentage determined by Walkley-Black or Loss on Ignition.

* LOW , SUFFICIENT , HIGH

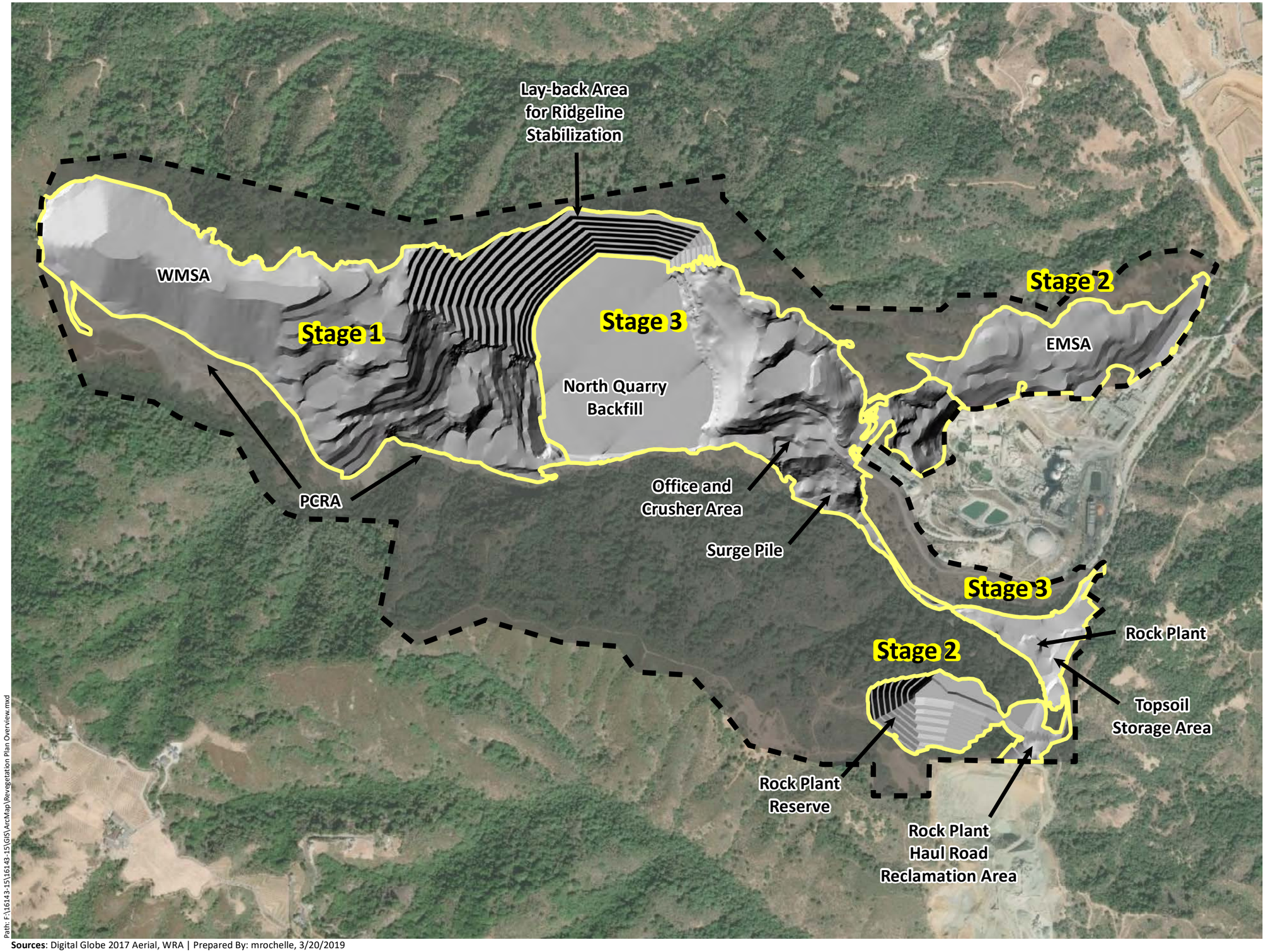
This page left intentionally blank

APPENDIX C

REVEGETATION PLAN FIGURES

Figure 1.
Revegetation Areas

Lehigh Permanente Quarry,
Santa Clara County,
California



Amended Reclamation Boundary - 1,312.3 ac.

Revegetation Stages:
Stage 1 - 298.5 ac.
Stage 2 - 95.4 ac.
Stage 3 - 229.7 ac.

N

0 1,000 2,000

Feet

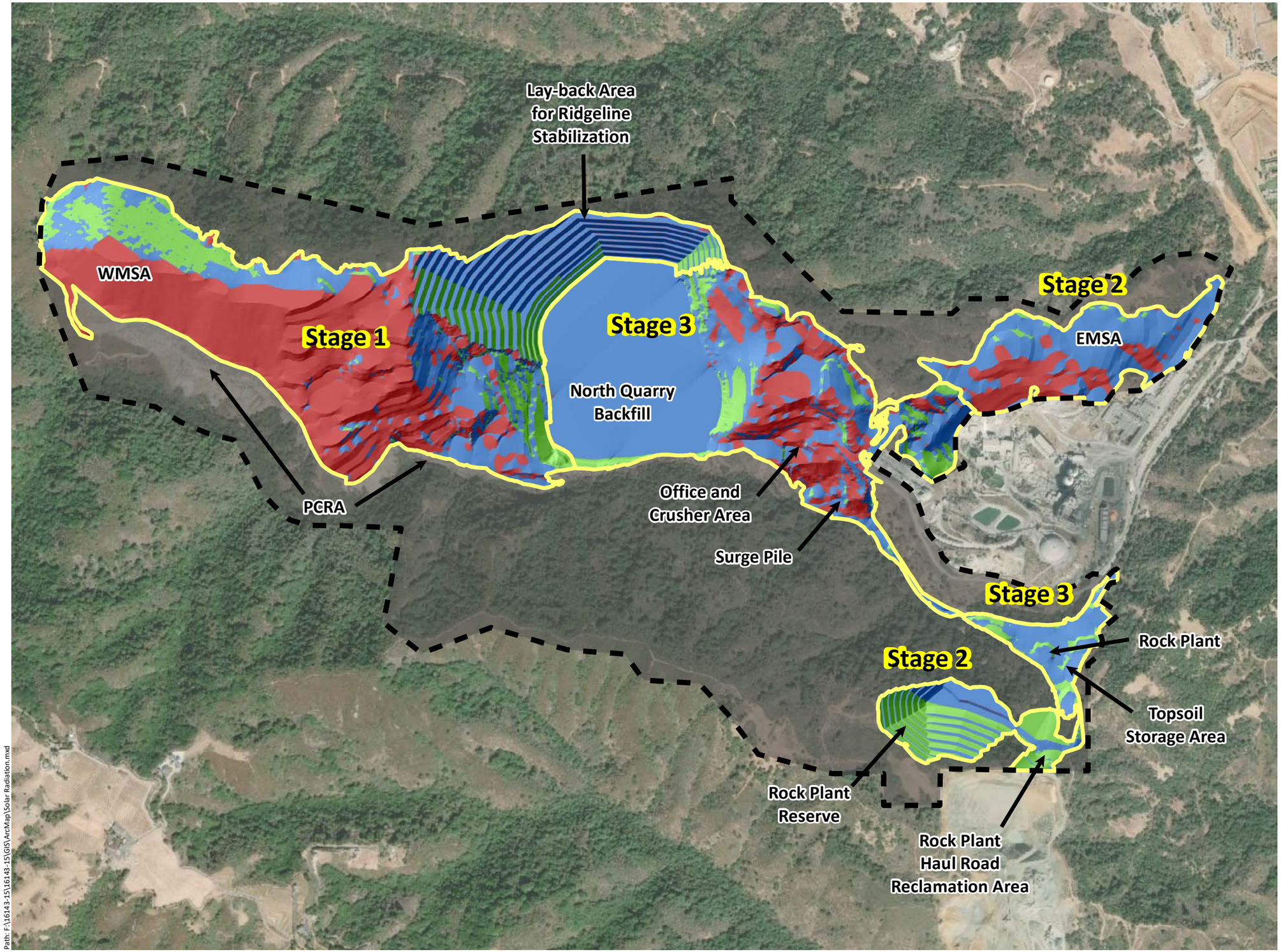
wra
ENVIRONMENTAL CONSULTANTS

Path: F:\16143-15\16143-15\GIS\ArcMap\Revgetation Plan Overview.mxd

Sources: Digital Globe 2017 Aerial, WRA | Prepared By: mrochelle, 3/20/2019

Figure 2.
Solar Radiation

Lehigh Permanente Quarry,
Santa Clara County,
California



Amended Reclamation Boundary - 1,312.3 ac.

Revegetation Stages:
Stage 1 - 298.5 ac.
Stage 2 - 95.4 ac.
Stage 3 - 229.7 ac.

Solar Radiation

- Low
- Medium
- High

N

0 1,000 2,000
Feet

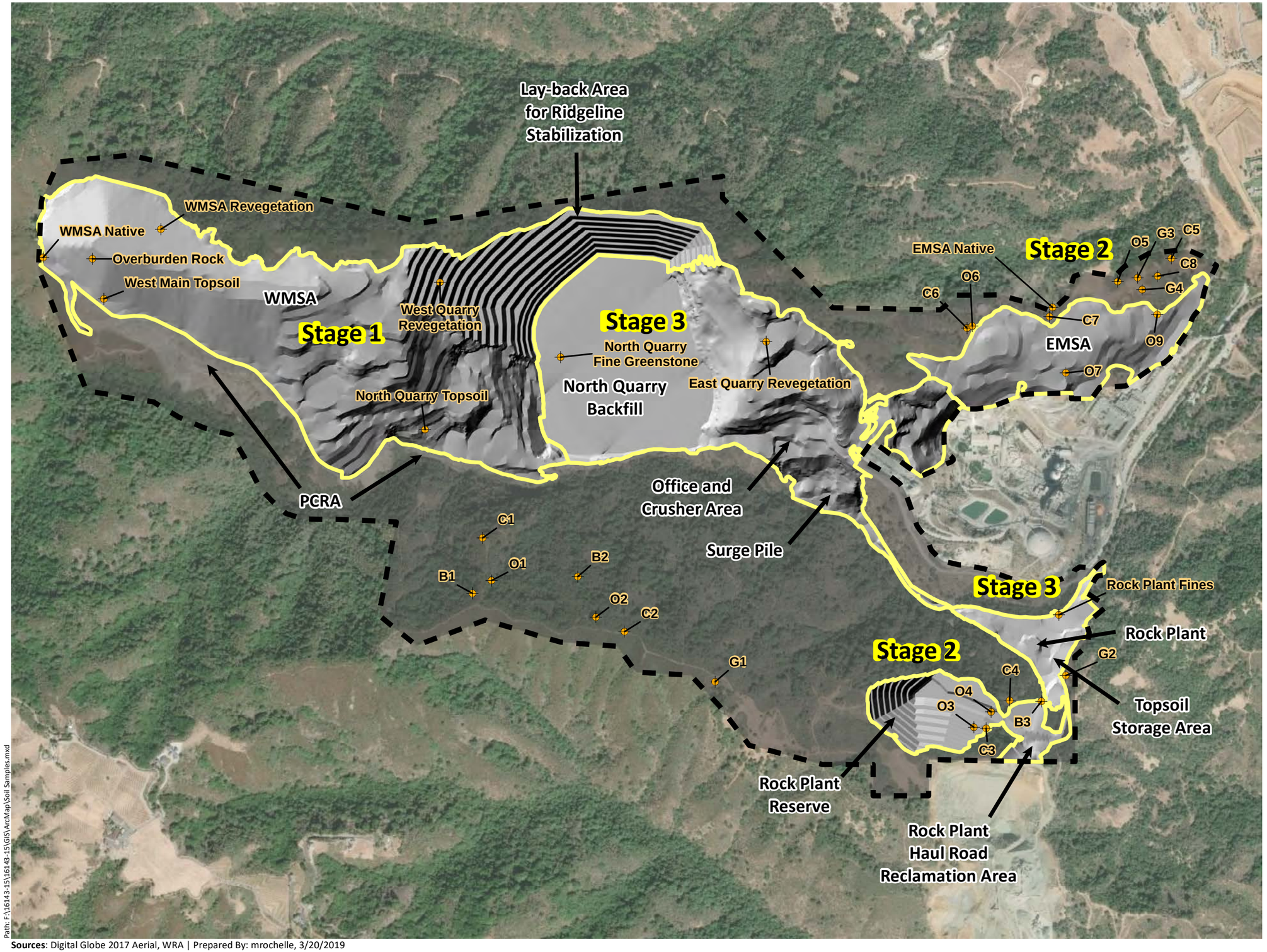
wra
ENVIRONMENTAL CONSULTANTS

Path: F:\16143-15\16143-15\GIS\ArcMap\Solar Radiation.mxd

Sources: Digital Globe 2017 Aerial, WRA | Prepared By: mrochelle, 3/20/2019

Figure 3.
Soil Sample Locations

Lehigh Permanente Quarry,
Santa Clara County,
California



Amended Reclamation Boundary - 1,312.3 ac.

Revegetation Stages:
Stage 1 - 298.5 ac.
Stage 2 - 95.4 ac.
Stage 3 - 229.7 ac.

Soil Sample Locations

N

0 1,000 2,000
Feet

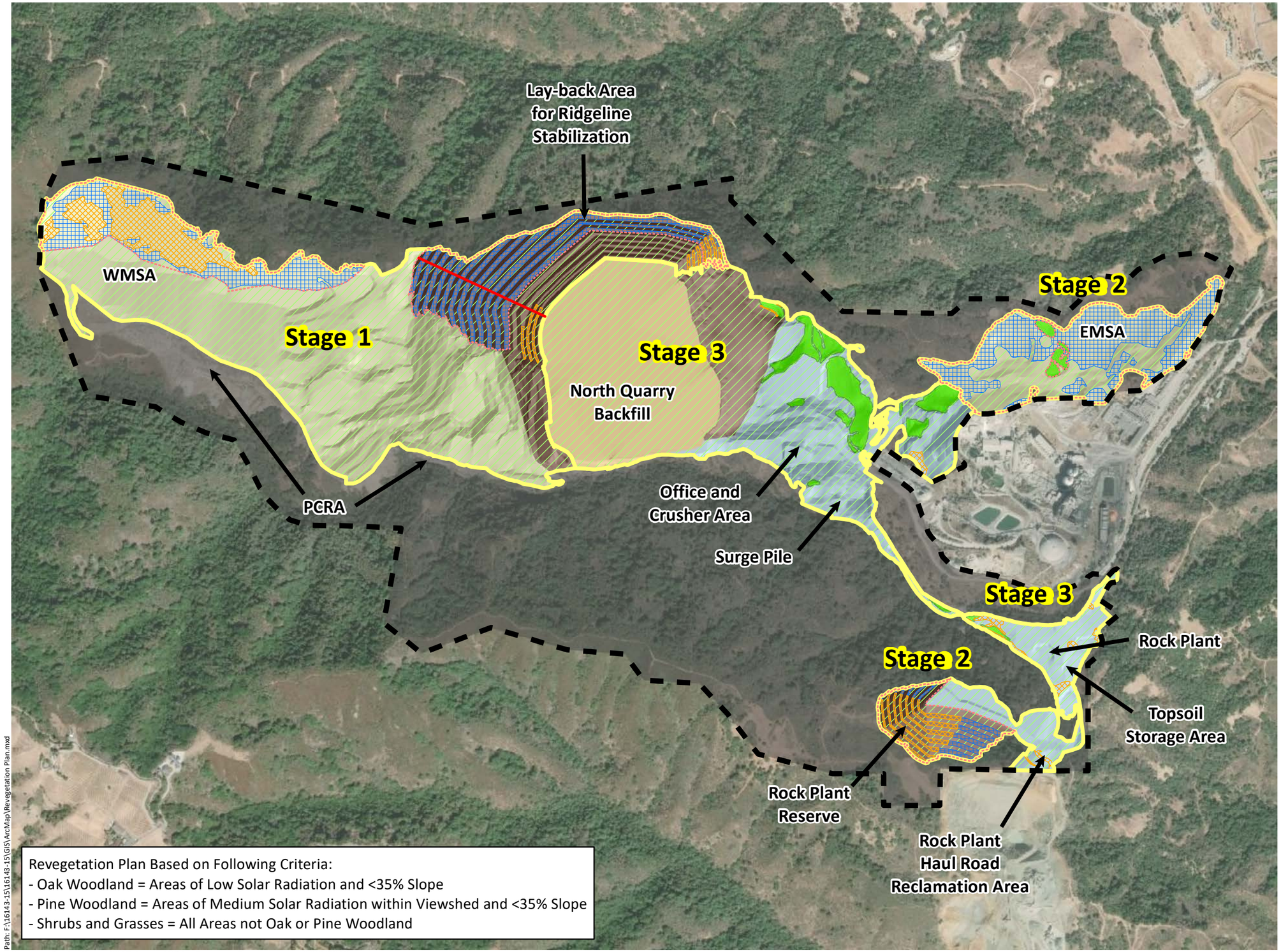
wra
ENVIRONMENTAL CONSULTANTS

Path: F:\16143-15\16143-15\GIS\ArcMap\Soil Samples.mxd

Sources: Digital Globe 2017 Aerial, WRA | Prepared By: mrochelle, 3/20/2019

Figure 4.
Revegetation Plan

Lehigh Permanente Quarry,
Santa Clara County,
California



Revegetation Plan Based on Following Criteria:
- Oak Woodland = Areas of Low Solar Radiation and <35% Slope
- Pine Woodland = Areas of Medium Solar Radiation within Viewshed and <35% Slope
- Shrubs and Grasses = All Areas not Oak or Pine Woodland

Amended Reclamation Boundary - 1,312.3 ac.

Revegetation Stages:
Stage 1 - 298.5 ac.
Stage 2 - 95.4 ac.
Stage 3 - 229.7 ac.

Areas Already Vegetated - 18.8 ac.

Soil Treatment Areas

Coarse Overburden - 277.2 ac.

Soil Backfill - 94.7 ac.

General Compacted Soils - 101.7 ac.

Highwall Benches - 131.2 ac.

Revegetation Plan

Oak Woodland - 27.4 ac.

Pine Woodland - 84.5 ac.

Shrubs and Grasses - 492.9 ac.

Special Treatment Areas - 167.3 ac.*

Cross Section used for Figure 5

* acreage overlaps with other vegetation communities

N

0 1,000 2,000

Feet

ENVIRONMENTAL CONSULTANTS

Path: F:\16143-15\16143-15\GIS\ArcMap\Revegetation Plan.mxd

Sources: Digital Globe 2017 Aerial, WRA | Prepared By: mrochelle, 3/20/2019

This page left intentionally blank

APPENDIX D

Test Plot Monitoring Results Report

Revegetation Test Plot Summary

Permanente Quarry

SANTA CLARA COUNTY, CALIFORNIA

Prepared For:
Lehigh Southwest Cement Company
24001 Stevens Creek Blvd.
Cupertino, CA 95014

WRA Contact:
Geoff Smick
smick@wra-ca.com

Date:
January 2019

WRA Project Number:
16143-15

2169-G East Francisco Blvd., San Rafael, CA 94702 (415) 454-8868 tel info@wra-ca.com www.wra-ca.com

This page left intentionally blank

TABLE OF CONTENTS

LIST OF APPENDICES

1.0 Introduction

The California Code of Regulations Section 3705 (b) requires that test plots be implemented if a proposed revegetation plan has not been demonstrated to work in similar situations elsewhere. A test plot program has been established in the RPA to determine appropriate materials and techniques to improve revegetation success throughout areas to be reclaimed. The specific objectives of the test plots are to assess the response of native seed mixes and container tree and shrub plantings to various soil blends and depths, using the available materials evaluated as described in Section 3.0.

Sixteen test plots were constructed on top of bare graded overburden rock at two locations within the RPA in the fall of 2008. Plots 1-12 and 16 were constructed at the relatively flat "Yeager Yard" site, and plots 13-15 were constructed at a sloped location within the EMSA (Figure 1). To test the response of the seed mixes and plantings to various soil treatments, the test plots each differ by soil composition and depth of soil. The soil treatments consisted of a combination of materials, including overburden rock, North Quarry fine greenstone material, rock plant fines, and imported compost. Each test plot was divided into four equal quadrants upon which four different native seed mixes were applied, followed by straw mulch and a hydroslurry of fertilizers and a tackifier. In addition, container plantings were installed in the 24- inch depth test plots (11, 12, and 16) in November 2009.

A summary of the test plot program is provided below. Additional details on design, construction, maintenance, and monitoring can be found in the *Revegetation Test Plot Program As-built Report* (WRA 2010). Results were assessed to evaluate the performance of each soil blend and planting palette to inform future revegetation efforts. This program has therefore met or exceeded compliance with section 3705(b).

2.0 Test Plot Design and Soil Treatments

The basic test plot design is similar at both the Yeager Yard and EMSA sites. The border of each test plot was outlined by certified weed-free straw bales. At Yeager Yard, plots 1-12 are each 50-foot (ft.) by 50-ft. squares, and plot 16 is a 25-ft. by 25-ft. square. At the EMSA, plots 13 and 14 are 100-ft. by 100-ft. squares, and plot 15 is a slightly reduced size due to site constraints (100 ft. x 100 ft. x 100 ft. x 40 ft.). The soil materials specific to each plot treatment were laid down and mixed on site as described below.

Test plot soil blends are comprised of various combinations of overburden rock, North Quarry fine greenstone, and Rock Plant fines originating from Quarry operations, as well as compost delivered from offsite. Compost was used in the test plots as a proxy for added topsoil intended for larger scale application. The soil treatments for all plots are listed in Table 1. Plots 1-6 and 10 are six inches in depth, plots 7-9 are 12 inches in depth, and plots 11, 12, and 16 are 24 inches in depth. At the EMSA site, plots 13, 14, and 15 are all six inches in depth.

The materials were blended together with construction equipment within each test plot to achieve a relatively uniform consistency. For the plots with multiple materials blended together, each material was added separately and then ripped or blended with the other material in sequence. The rock plant fines material included some consolidated chunks which required pulverizing before blending. Rocks over six inches in diameter were removed from the plots to the extent possible. The plots were compacted to approximately 90% and were finish graded to a smooth surface.

Following application of the soil blends, each plot was divided into four quadrants of equal area using six-inch certified weed-free straw wattles. Plots were numbered with a sign at the center of each plot. A stake was placed in the center of each quadrant and painted green, red, yellow, or blue to indicate the native seed mix applied to that quadrant. The test plot layouts at the Yeager Yard site and the EMSA are shown in Figures 2 and 3, respectively.

Table 1. Test plot soil treatments.

PLOT NUMBER	PLOT SIZE	SOIL TREATMENT DEPTH	MATERIAL COMPONENTS	COMPONENT PROPORTIONS	COMPONENT DEPTH (BEFORE BLENDING)
YEAGER YARD (flat)					
1	50' x 50'	6”	overburden rock	100%	6"
2	50' x 50'	6”	overburden rock compost	75% 25%	4.5" 1.5"
3	50' x 50'	6”	overburden rock compost	50% 50%	3" 3"
4	50' x 50'	6”	overburden rock Rock Plant fines Compost	35% 40% 25%	2" 2.5" 1.5"
5	50' x 50'	6”	fine greenstone compost	75% 25%	4.5" 1.5"
6	50' x 50'	6”	overburden rock Rock Plant fines fine greenstone compost	33% 17% 25% 25%	2" 1" 1.5" 1.5
7	50' x 50'	12”	overburden rock	75%	9"
			compost	25%	3"
8	50' x 50'	12”	overburden rock fine greenstone	37.5% 37.5%	4.5" 4.5"
			compost	25%	3"
9	50' x 50'	12”	overburden rock Rock Plant fines fine greenstone compost	25% 25% 25% 25%	3" 3" 3" 3"
10	50' x 50'	24”	overburden rock	75%	18"
			compost	25%	6"
11	50' x 50'	24”	fine greenstone	75%	18"
			compost	25%	6"
12	50' x 50'	24”	overburden rock Rock Plant fines fine greenstone compost	25% 25% 25% 25%	6" 6" 6" 6"
16	25' x 25'	24”	overburden rock fine greenstone compost	37.5% 37.5%	9" 9" 6"

				25%	
EMSA (sloped)					
13	100’ x 100’	6”	overburden rock	75%	4.5"
			compost	25%	1.5"
14	100’ x 100’	6”	overburden rock Rock Plant fines Compost	35% 40% 20%	2" 2.5" 1.5"
15	100’ x 100’ x	6”	fine greenstone	75%	4.5"
	100’ x 40’		compost	25%	1.5"

3.0 Seed and Amendment Application

A native shrub mix was applied manually with a belly grinder to all of the plots; the components of this mix are listed in Table 2. Four different native grass and herbaceous seed mixes were then applied manually with a belly grinder within the allocated quadrants of each plot. Components of these seed mixes are provided in Table 3. Following seeding at the test plots, straw mulch and a hydroslurry consisting of fertilizers and a tackifier was applied to all of the plots. At the EMSA site only, a mycchorhizal inoculant was included in the hydroslurry. The application rates of the straw and hydroslurry components are listed in Table 4.

Table 2. Native shrub seed mix applied to all test plots.

SCIENTIFIC NAME	COMMON NAME	PURE LIVE SEED (lb / acre)
Adenostoma fasciculatum	Chamise	1.50
Artemisia californica	California sagebrush	1.00
Artemisia douglasiana	Mugwort	0.10
Baccharis pilularis	coyote brush	0.10
Ceanothus cuneatus	Buckbrush	2.00
Eriodictyon californicum	yerba santa	0.50
Eriogonum fasciculatum	California buckwheat	1.50
Heteromeles arbutifolia	toyon	3.00
Mimulus aurantiacus	sticky monkeyflower	0.10
Salvia mellifera	black sage	1.00
	TOTAL	**10.80**

Table 3. Grass and herbaceous seed mixes applied to test plot quadrants.

SCIENTIFIC NAME	COMMON NAME	PURE LIVE SEED (lb / acre)
Native Seed Mix #1 (green quadrant)		
Achillea millefolium	white yarrow	0.75
Bromus carinatus	California brome	8.00
Clarkia purpurea ssp. *quadrivulnera*	clarkia	0.75
Elymus glaucus	blue wildrye	6.50
Heterotheca grandiflora	telegraph weed	0.15
Lotus purshianus	Spanish clover	2.50
Lotus scoparius	deerweed	4.00
Lupinus nanus	sky lupine	1.50
Nassella pulchra	purple needlegrass	3.00
Oenothera hookeri	evening primrose	1.25
Plantago erecta	California plantain	2.50
Vulpia microstachys	three weeks fescue	4.00
	TOTAL	**34.90**
Native Seed Mix #2 (red quadrant)		

Bromus carinatus	California brome	20.00
Elymus glaucus	blue wildrye	8.00
Vulpia microstachys	three weeks fescue	6.00
Trifolium willdenovii	tomcat clover	4.00
	TOTAL	**38.00**
Native Seed Mix #3 (yellow quadrant)		
Achillea millefolium	white yarrow	1.00
Bromus carinatus	California brome	10.00
Clarkia purpurea ssp. *quadrivulnera*	clarkia	0.76
Elymus glaucus	blue wildrye	10.00
Lotus purshianus	Spanish clover	3.00
Lotus scoparius	deerweed	6.00
Lupinus nanus	sky lupine	3.00
Oenothera hookeri	evening primrose	2.00
Vulpia microstachys	three weeks fescue	4.00
	TOTAL	**39.76**
Native Seed Mix #4 (blue quadrant)		
Achillea millefolium	yarrow	1.00
Bromus carinatus	California brome	9.00
Elymus glaucus	blue wildrye	8.00
Eriogonum nudum	naked buckwheat	0.25
Eriophyllum confertiflorum	golden yarrow	0.05
Festuca occidentalis	western fescue	6.00
Leymus triticoides	creeping wildrye	2.00
Lotus purshianus	Spanish clover	3.00
Melica californica	California melic	3.00
Plantago erecta	California plantain	3.00
Poa secunda	one-sided bluegrass	3.00
Scrophularia californica	beeplant	0.25
Sisyrinchium bellum	blue eyed grass	1.00
Vulpia microstachys	three weeks fescue	8.00
	TOTAL	**47.55**

Table 4. Mulch and hydroslurry application rates used in test plots.

TREATMENT	APPLICATION RATE (lb / acre)
Weed-free sterile wheat straw mulch	4000
“Fiber Wood” organic mulch	2000
Plantago-based M-binder (tackifier)	200
42-0-0 Sulphur-coated urea	175
0-0-50 Sulfate “potash”	175
mychorrhizal inoculant (EMSA site only)	120

4.0 Test Plot Plantings

Plants were installed in the test plots by a landscape contractor in November 2009. Plants were installed in 24 inch-deep soil treatment plots 11, 12, and 16. The planting design was arranged to ensure that two of each species was tested within each soil and plant care treatment combination. Planting space was very limited in the smaller-sized Plot 16, so a simplified planting and treatment scheme was devised for this plot. A plant list for the completed plant installation is provided in Table 5.

Table 5. Trees and shrubs installed in test plots in November 2009.

SCIENTIFIC NAME	COMMON NAME	SIZE*	PLOT 11	PLOT 12	PLOT 16	TOTAL NUMBER
Arbutus menziesii	Pacific madrone	DP	8	8	3	19
Pinus sabiniana	grey pine	TB	8	8	3	19
Quercus agrifolia	coast live oak	TP	8	8	3	19
Quercus douglasii	blue oak	LT6 (two LT4)	8	8	3	19
Cercocarpus betuloides	mountain mahogany	TB	8	8	3	19
Heteromeles arbutifolia	toyon	1G	8	8	3	19
Quercus berberidifolia	scrub oak	TB	8	8	3	19
Rhamnus californica	coffeeberry	TB	8	8	3	19
Ribes californicum	hillside gooseberry	TB	8	8	3	19
		TOTAL	72	72	27	171

*DP = 10” tall DeePot; TB = 5.5” tall treeband; TP = 14” tall 1 gallon Treepot; LT6(4) = 6(4)” deep leach tube; 1G = one gallon pot

General planting guidelines for RPA revegetation specify planting trees on a minimum of 9-foot centers, with shrubs interspersed among the trees at 4.5-foot centers. The test plots are not likely to be maintained for more than 5 to 10 years, so the test plot design did not need to account for the expected full-grown size of these specimens. Therefore, plants were installed in a grid pattern with spacing between plants ranging from 3.5 to 5 feet. The plantings were concentrated in the center of each plot to prevent competition with seed treatments on a portion of each plot quadrant. Small container sizes with high depth to width ratios were selected, as availability allowed, to improve survival and mimic likely large-scale planting conditions.

In addition to planting, two types of plant care treatments were installed in various combinations in each plot. These treatments include applying mulch and using DriWater gel pacs, a biodegradable silica-based product that is buried next to the plants and slowly releases stored water into the soil. The straw wattles delimiting the four seed treatment quadrants in each plot were used to designate plant care treatment combinations. Each plot includes four different treatment combinations: mulch only (yellow quadrant), DriWater only (green quadrant), mulch and DriWater (blue quadrant), and no treatment (red quadrant). Due to the small size of Plot 16, planting was limited to one individual of each species per treatment, and a combined mulch and DriWater treatment was not installed in the blue quadrant.

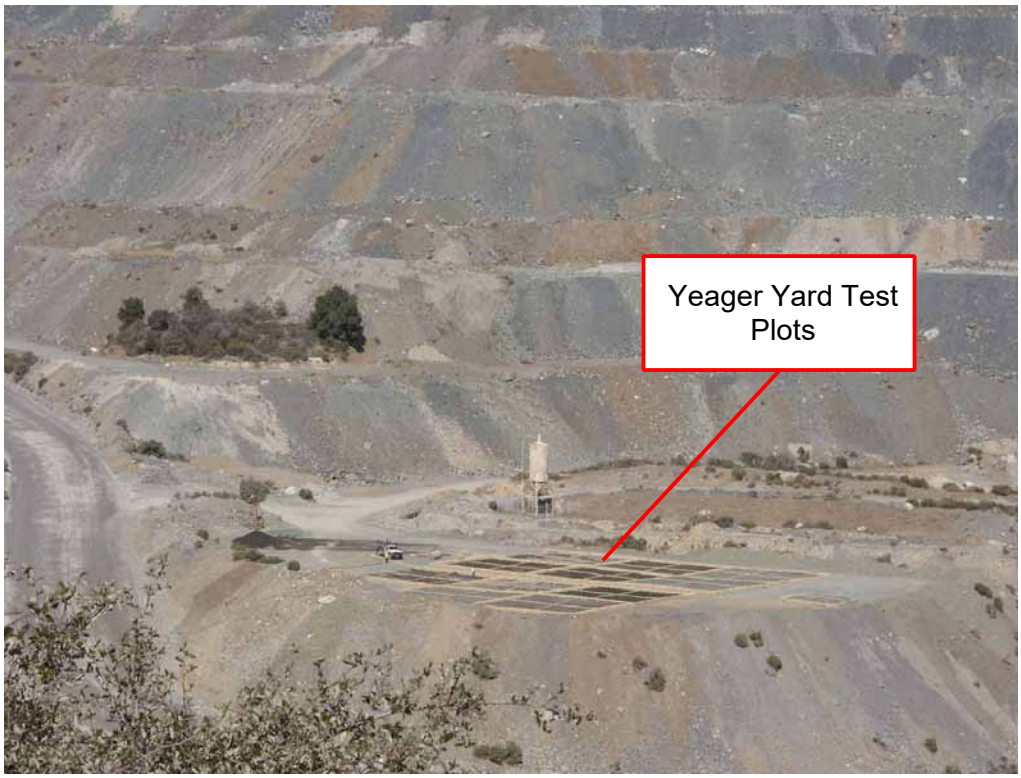
Weed control in areas surrounding the test plots was conducted to prevent invasion from species that will also be targeted in future revegetation efforts. Weeding within plots was conducted in all plots for uniformity.

5.0 Test Plot Results

Observed trends indicate that all soil materials added to overburden rock help to increase total plant cover and grass cover in particular. While shrub cover was low after the first two years, shrub density was fairly high with many small individuals observed. A higher cover of grasses appears to suppress shrub establishment, which is particularly true in plots with higher percentages of compost. Deeper and richer compost-laden plots mimic grassland soils more so than typical scrub soils which promotes grass growth. Test plots with larger amounts of overburden rock supported lower cover, fewer grasses, and a greater number of shrub seedlings, although they are small and develop slowly. These results were used to refine the recommended seed mixes listed in the 2019 Revegetation Plan Update. In particular, species that were seeded but never observed were omitted from the proposed plant palette while species that performed well were retained. The quantity of some native annual grass seed was reduced to prevent overcompetition with shrubs, a target natural community.

This page left intentionally blank.

Appendix A Photos



Appendix A - Revegetation and Test Plot Photographs

Top: Yeager Yard Test Plots (October 21, 2008)

Bottom: EMSA Test Plots (October 21, 2008)

wra
ENVIRONMENTAL CONSULTANTS

Top: Test plot construction at Yeager Yard: Blending soil materials (October 17, 2008)

Bottom: Early spring growth of hydroseed in the EMSA test plots (February 2, 2009)

wra
ENVIRONMENTAL CONSULTANTS

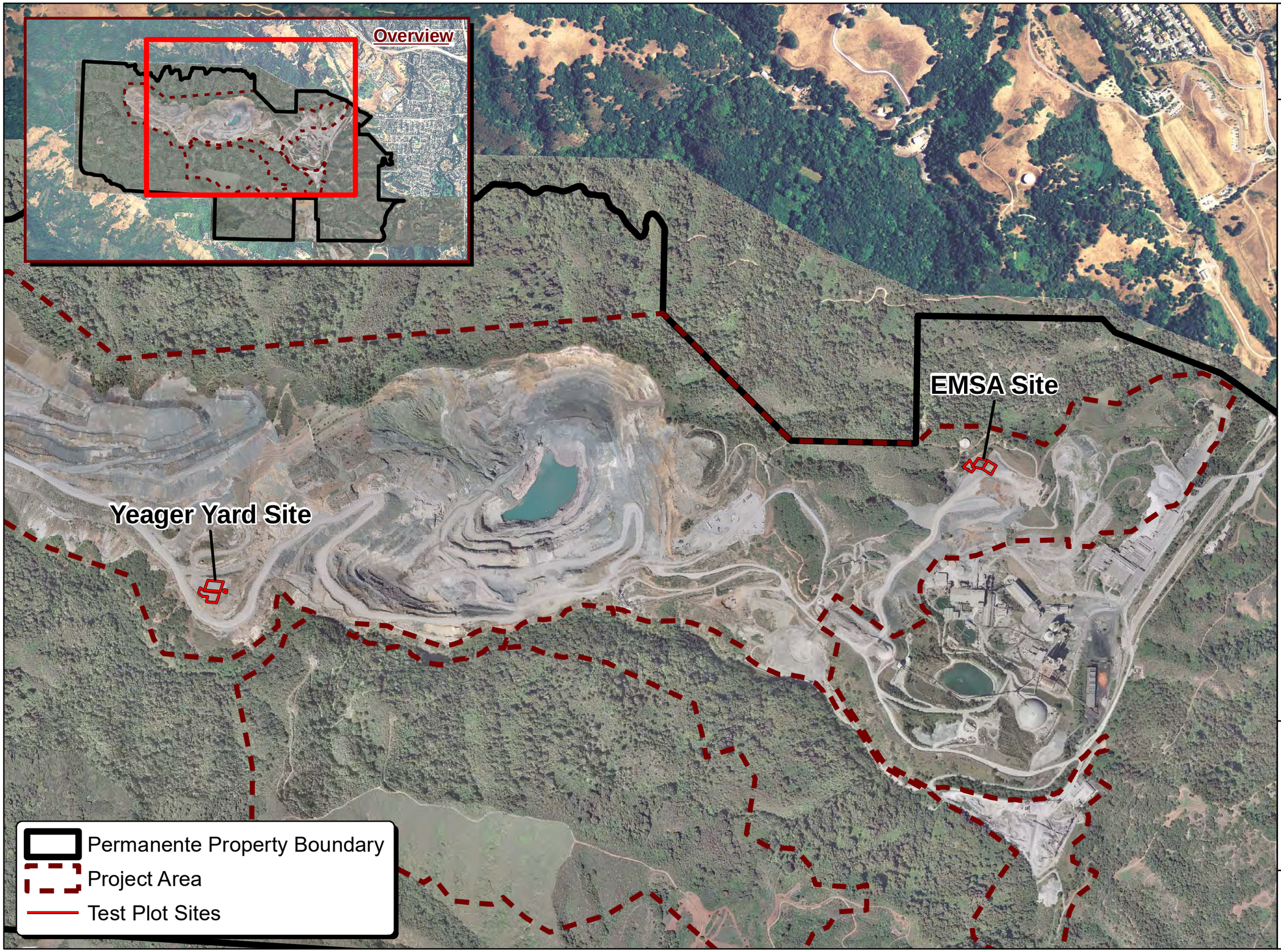
Previous successful revegetation areas supporting dense cover of native shrubs.

Top: East Quarry Revegetation area (photo May 27, 2008).

Bottom: Revegetation site above the “boneyard” in the EMSA (photo February 12, 2009).

wra
ENVIRONMENTAL CONSULTANTS

Appendix B Figures



ENVIRONMENTAL CONSULTANTS

Lehigh Permanente Quarry,
Santa Clara County,
California

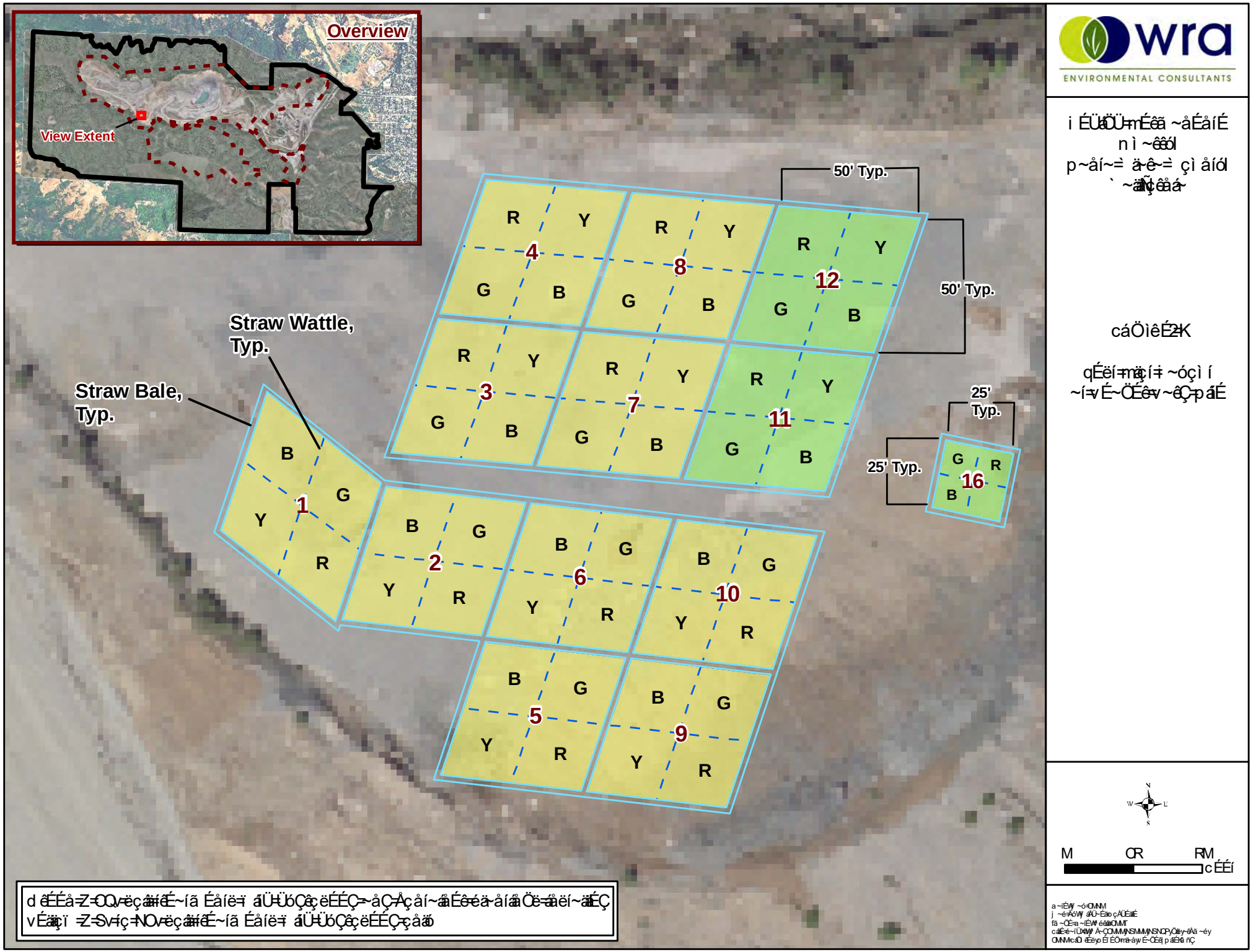
Figure 1.

Test Plot
Location Map

N
W E
S

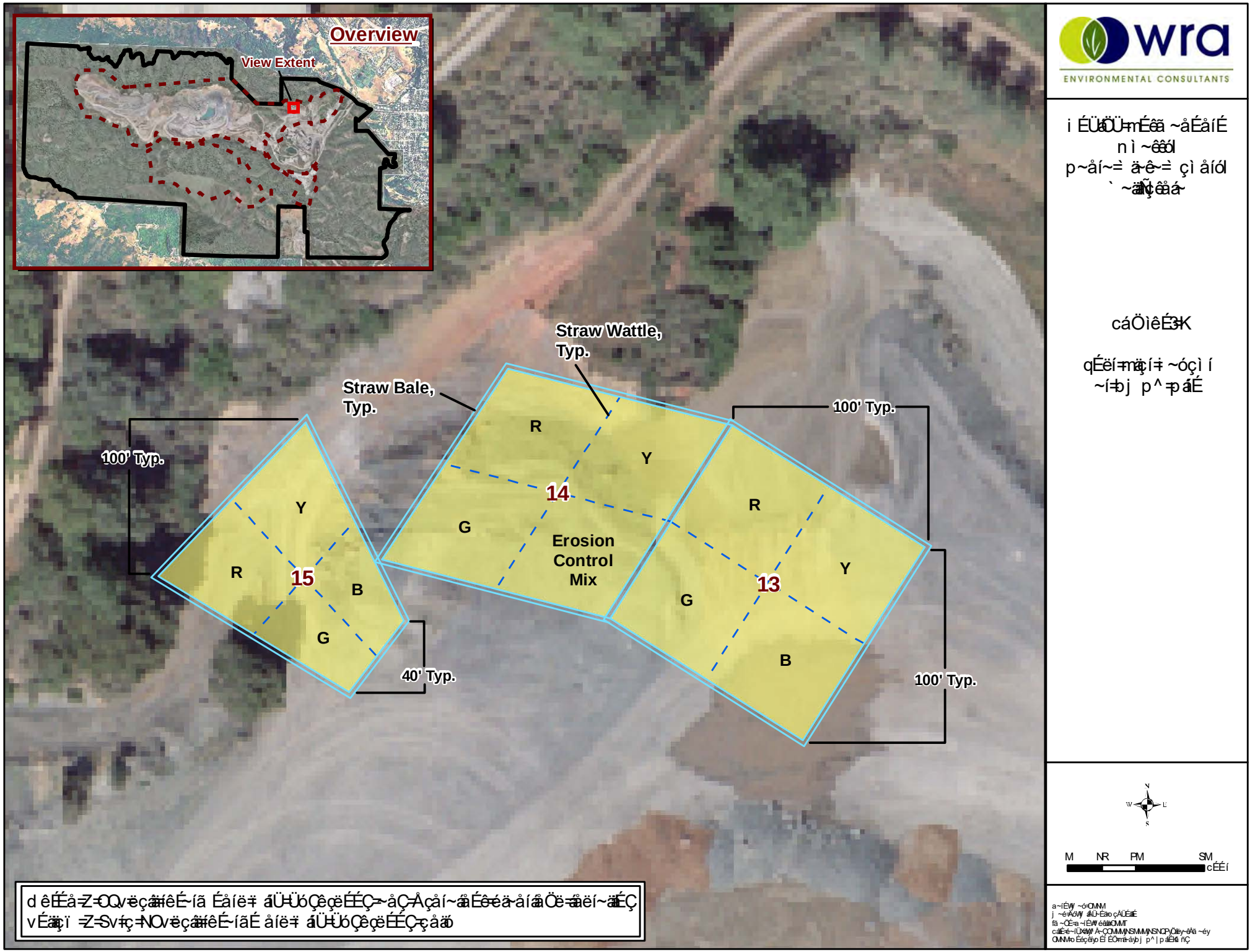
0 500 1,000 2,000
Feet

Date: May 2010
Map by: Michael Rochelle
Image Date: April 2007
File path; I:\Acad2000\16000\16143\gis\arcmap\
2010 Reports\Revegetation\Test Plot Location.mxd



wra
ENVIRONMENTAL CONSULTANTS

d êÉÉå=Z=OQv=ëçâáíÉ~íã Éåíë=ï áÜ=ÜóÇâçëÉÉÇ=~åÇ=Åçåí~ãÉêë=éà~åíãÖë=ãëí~ãÉÇ
vÉâçï =Z=Sv=íç=NOv=ëçâáíÉ~íã Éåíë=ï áÜ=ÜóÇâçëÉÉÇ=çåãë



d êÉÉå=Z=OQvëçåíêÉ~íã Éåíë÷ áÜ=ÜóÇêçëÉÉÇ=~åÇ=Åçåí~åÉêé=åíåÖë=åëí~äÉÇ
vÉäçï =Z=Sv÷ç=NOvëçåíêÉ~íãÉ åíë÷ áÜ=ÜóÇêçëÉÉÇ=çåäó

wra
ENVIRONMENTAL CONSULTANTS

i ÉÜåÖÜ=mÉêã ~åÉåíÉ
n ì ~êêóí
p~åí~= ä~ê~= çì åíóí
` ~äÇçéåá~

cáÖìêÉ3K

qÉëí=äç í÷ ~óçì í
~í÷þj p^=páÉ

M NR PM SM cÉÉí

a~íÉíí ~ó÷OMM
j ~é÷ÅóÅí åÜ=Éäroçáí ÉäÉ
fä ~ÖÉ=a ~íÉíí éáäÉOMMT
cáÉé~íÜÉäí Á~ÇOMMMNSMMMNSNOPÜÉey~éÅä ~éy
OMMMo Éé çêäyo Éí ÉÖmá~äyþj p^| pá Éä ñÇ

This page left intentionally blank

APPENDIX F-2
PCRA REVEGETATION SPECIFICATIONS

Memorandum

To: Brent Zacharia, Waterways Consulting

From: Ingrid Morken,
Landscape Architect, WRA

cc: Talia Flagan, Lehigh Southwest Cement Company; Geoff Smick, WRA

Date: November 14, 2018

Subject: 90% Permanente Creek Restoration Plan Design Review

WRA reviewed the design memorandum and revegetation plans (Sheets L1 to L6) in the "Permanente Creek Restoration Plan – Draft 90% Level Submittal," dated November 2, 2018, from Waterways Consulting. In this memorandum, we provide comments on the revegetation plans based on consistency with the 70% submittal of the revegetation plans prepared by WRA (dated 11/1/2017) and our recommendations for optimal revegetation establishment.

Sheet L1:

We understand that *Umbellularia californica* (California bay laurel) will be removed from the plant palette in Table 1 because it is a vector for *Phytophthora ramorum*, the fungus which causes sudden oak death.

Sheet L2:

We recommend applying the seed mix below for the floodplain planting areas which includes species appropriate for intermittently wet conditions. The seed mix includes native species appropriate for the site in pure live seed (PLS) pounds per acre.

Proposed Floodplain Planting Area Seed Mix

Scientific Name	Common Name	Application Rate (PLS Pounds / Acre)
Bromus californica	California brome	10.0
Elymus glaucus	blue wildrye	8.0
Elymus triticoides	creeping wildrye	6.0
Festuca microstachys	small fescue	8.0
Hordeum brachyantherum	meadow barley	6.0
Sisyrinchium bellum	blue-eyed grass	1.0
Stipa pulchra	purple needlegrass	5.0
Trifolium willdenovii	tomcat clover	4.0
	Total	**48.0**

2169-G East Francisco Blvd., San Rafael, CA 94901 (415) 454-8868 tel (415) 454-0129 fax info@wra-ca.com www.wra-ca.com

In addition, we recommend that *Festuca rubra* (red fescue) be removed from the upland and riparian seed mix in Table 2 and that the annual herb *Trifolium willdenovii* (tomcat clover) be added to this seed mix at an application rate of approximately 4 PLS pounds per acre to provide more erosion control.

Sheet L6:

The typical planting plans are appropriate for the 90% submittal; however, we recommend that more specific information on elevation ranges relative to the stream hydrology be added to the plans in the 100% submittal if necessary for ensuring that plants are installed in suitable locations.

Additional Recommendations:

We recommend that foliage protection cages be installed as needed for plantings susceptible to wildlife browsing. In particular, we recommend that cages be installed for container plantings of the following species: *Acer macrophyllum* (big leaf maple), *Aesculus californica* (California buckeye), *Alnus rhombifolia* (white alder), *Arbutus menziesii* (madrone), *Artemisia californica* (California sage), *Prunus ilicifolia* (hollyleaf cherry), *Quercus agrifolia* (coast live oak), *Salix laevigata* (red willow), *Salix lasiolepis* (arroyo willow), and *Sambucus nigra* ssp. *caerula* (blue elderberry). Plantings should be monitored for wildlife browsing following installation and cages be added to other species as needed if browsing is observed.

Our understanding is that a temporary drip irrigation system will be used for the container plantings, and that the irrigation plans will be included in the 100% submittal. We support this approach for irrigation.

Please contact us with any comments or questions on these recommendations.