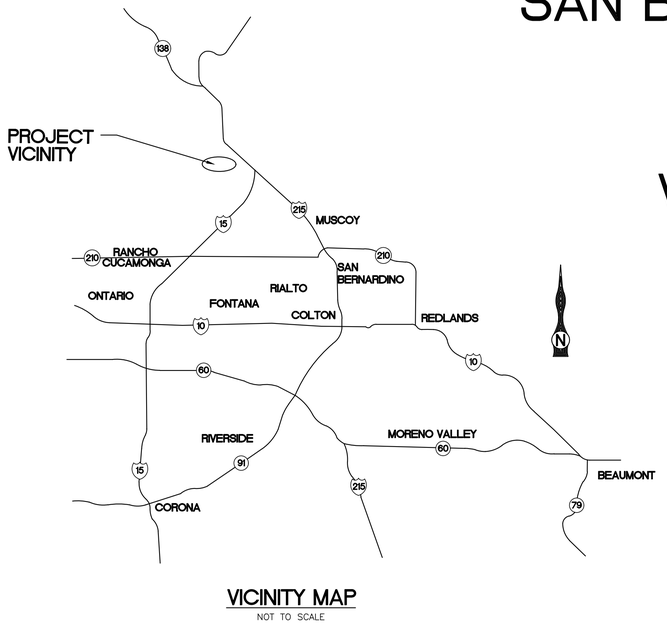
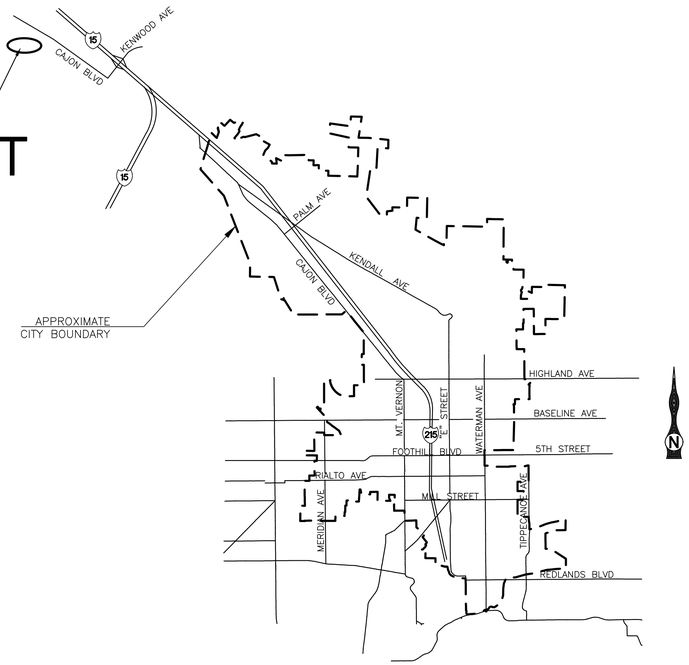
Appendix A – Project Engineering Plans

SAN BERNARDINO MUNICIPAL WATER DEPARTMENT
SPECIFICATION NO. XXXX
WELL NO. D-1264
VINCENT WELL STABILIZATION PROJECT



VICINITY MAP
NOT TO SCALE



LOCATION MAP
NOT TO SCALE

SHEET INDEX

SHEET NO.	DWG	DESCRIPTION
1	G1	TITLE SHEET
2	SV1	SURVEY PLAN
3	C1	SITE AND GRADING PLAN
4	C2	CONSTRUCTION DETAILS
5	C3	CONSTRUCTION DETAILS

CONSTRUCTION NOTES

1. PROTECT EXISTING FACILITY OR UTILIITY IN PLACE
2. REMOVE EXISTING CONCRETED RIPRAP
3. CONSTRUCT GABION SLOPE PROTECTION AS SHOWN ON GABION CONSTRUCTION PLAN ON DWG C1, AND PER CONSTRUCTION DETAILS ON DWGS C2 AND C3.

ABBREVIATIONS

AP	ANGLE POINT
BGA	BOTTOM OF GABION
DWG	DRAWING
DWGS	DRAWINGS
EXIST.	EXISTING
MIN.	MINIMUM
TGA	TOP OF GABION

WATER DEPARTMENT'S ENGINEER CERTIFICATE

THIS CERTIFIES THAT ON _____, I REVIEWED THE PLAN FOR THE VINCENT WELL STABILIZATION PROJECT, AND FOUND THAT IT MEETS THE MINIMUM REQUIREMENTS OF THE CALIFORNIA HEALTH AND SAFETY CODE.

_____ _____
MIGUEL J. GUERRERO DATE
DIRECTOR, WATER UTILITY
CA. R.C.E. 73239
EXPIRATION DATE: 12/31/2018
(909) 453-6100

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
811
TWO WORKING DAYS BEFORE YOU DIG

DECLARATION OF RESPONSIBLE CHARGE: ENGINEER OF WORK:

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER DESIGN OF THIS PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

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SIGNATURE RCE NO. 58953 DATE

REGISTERED PROFESSIONAL ENGINEER — MICHAEL J. GENTILE — No. 58953 Exp. 06-30-19 — CIVIL — STATE OF CALIFORNIA

CASC
Engineering and Consulting
1470 EAST COOLEY DRIVE, COLTON, CA 92324
PH. (909) 783-0101

MARK	REVISIONS	APPROVED	DATE	APPROVED	DATE

DESIGNED BY: MG DRAWN BY: MG CHECKED BY: RS DESIGN ENGINEER SBMWD ENGINEER

HORIZONTAL AND VERTICAL DATUM:

HORIZONTAL AND VERTICAL CONTROL POINTS ARE ESTABLISHED BY RAPID STATIC GPS OBSERVATION METHODS. GPS DATA WAS POST PROCESSED USING LOCAL NGS CORS STATIONS TO PRODUCE CCS NAD83 EPOCH 2010 ZONE F HORIZONTAL DATUM AND NAVD88 VERTICAL DATUM.

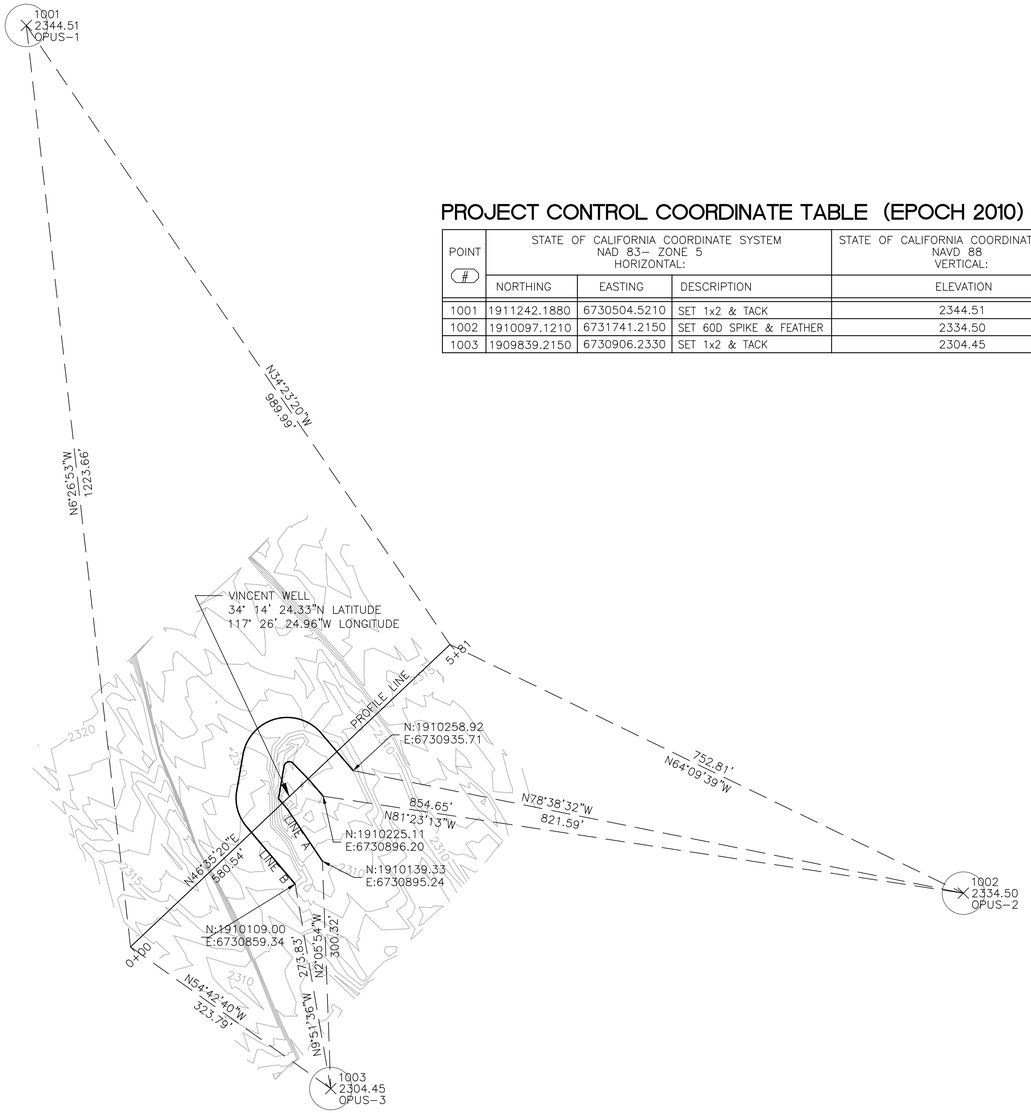
CITY OF SAN BERNARDINO
MUNICIPAL WATER DEPARTMENT

WELL NO. D-1264
VINCENT WELL STABILIZATION PROJECT
TITLE SHEET

DRAWING SCALES:
HORIZ: N/A VERT: N/A
C.O. NO.:
1682
DWG G1
SHEET 1 OF 5

90% SUBMITTAL

C-1682-1-G-G1.DWG



PROJECT CONTROL COORDINATE TABLE (EPOCH 2010)

POINT (#)	STATE OF CALIFORNIA COORDINATE SYSTEM NAD 83– ZONE 5 HORIZONTAL:			STATE OF CALIFORNIA COORDINATE SYSTEM NAVD 88 VERTICAL:
	NORTHING	EASTING	DESCRIPTION	ELEVATION
1001	1911242.1880	6730504.5210	SET 1x2 & TACK	2344.51
1002	1910097.1210	6731741.2150	SET 60D SPIKE & FEATHER	2334.50
1003	1909839.2150	6730906.2330	SET 1x2 & TACK	2304.45

GRAPHIC SCALE 1"=100'
100 0 100 200 300

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MUNICIPAL WATER DEPARTMENT

WELL NO. D-1264
VINCENT WELL STABILIZATION PROJECT
SURVEY PLAN

DRAWING SCALES:
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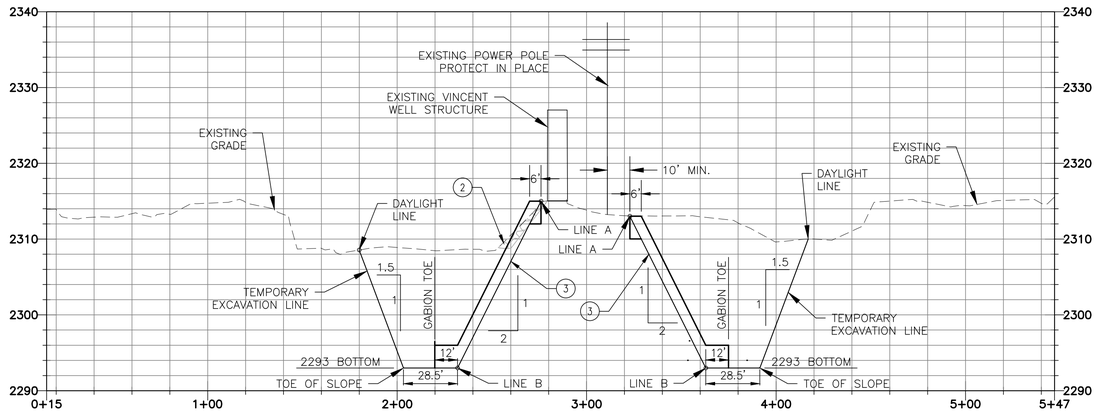
C.O. NO.:

DWG SV1
SHEET 2 OF 4

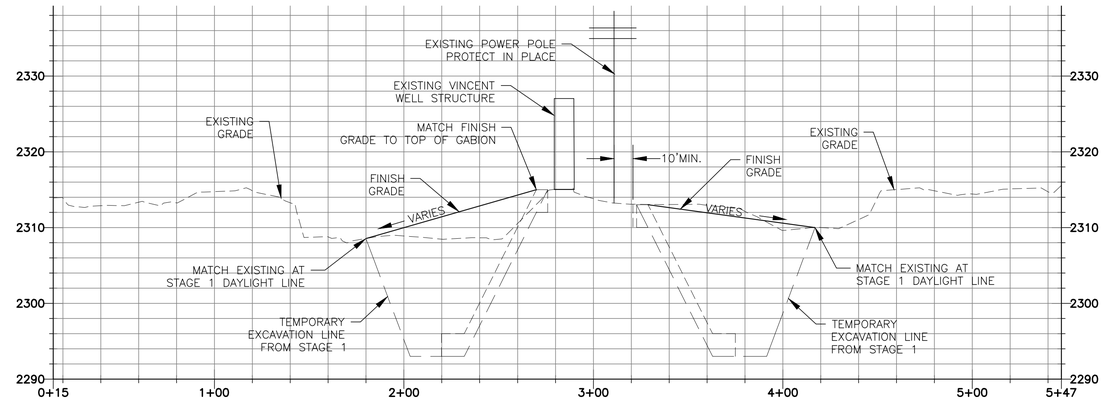
90% SUBMITTAL

C-1682-2-SV-SV1.DWG



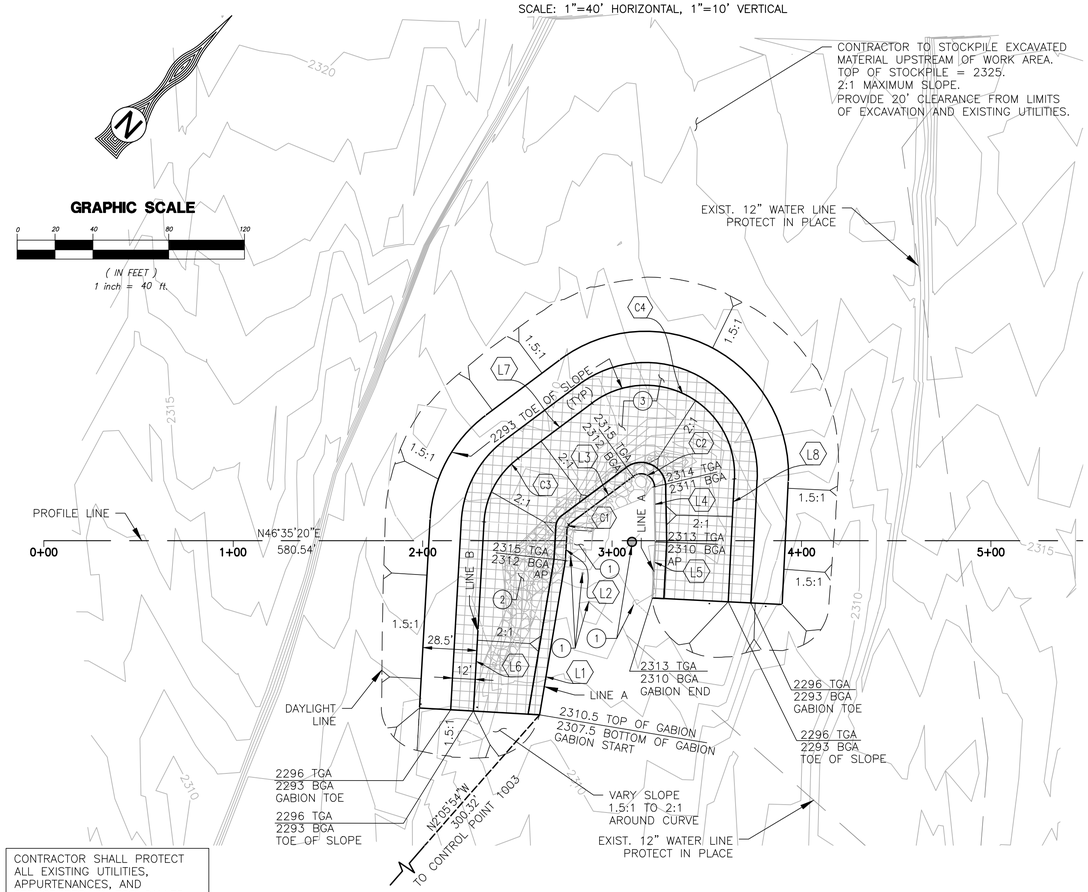
STAGE 1 - EXCAVATION AND GABION CONSTRUCTION PROFILE

SCALE: 1"=40' HORIZONTAL, 1"=10' VERTICAL



STAGE 2 - FINISH GRADING PROFILE

SCALE: 1"=40' HORIZONTAL, 1"=10' VERTICAL



STAGE 1 - EXCAVATION AND GABION CONSTRUCTION PLAN

CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES, APPURTENANCES, AND STRUCTURES UNLESS CALLED OUT EXPLICITLY FOR DEMOLITION AND REMOVAL

LINE DATA

LINE #	LENGTH	DIRECTION
L1	82.43'	S33° 54' 58.36"E
L2	17.60'	S40° 11' 17.50"E
L3	38.81'	S9° 47' 24.02"W
L4	29.09'	S44° 28' 09.68"E
L5	29.61'	S40° 33' 16.25"E
L6	100.00'	S40° 11' 17.50"E
L7	48.82'	S9° 47' 24.02"W
L8	65.00'	S40° 33' 16.25"E

CURVE DATA

CURVE#	LENGTH	RADIUS	DELTA
C1	1.74'	2.00'	49.98'
C2	15.38'	7.00'	125.92'
C3	39.25'	45.00'	49.98'
C4	106.36'	47.00'	129.66'

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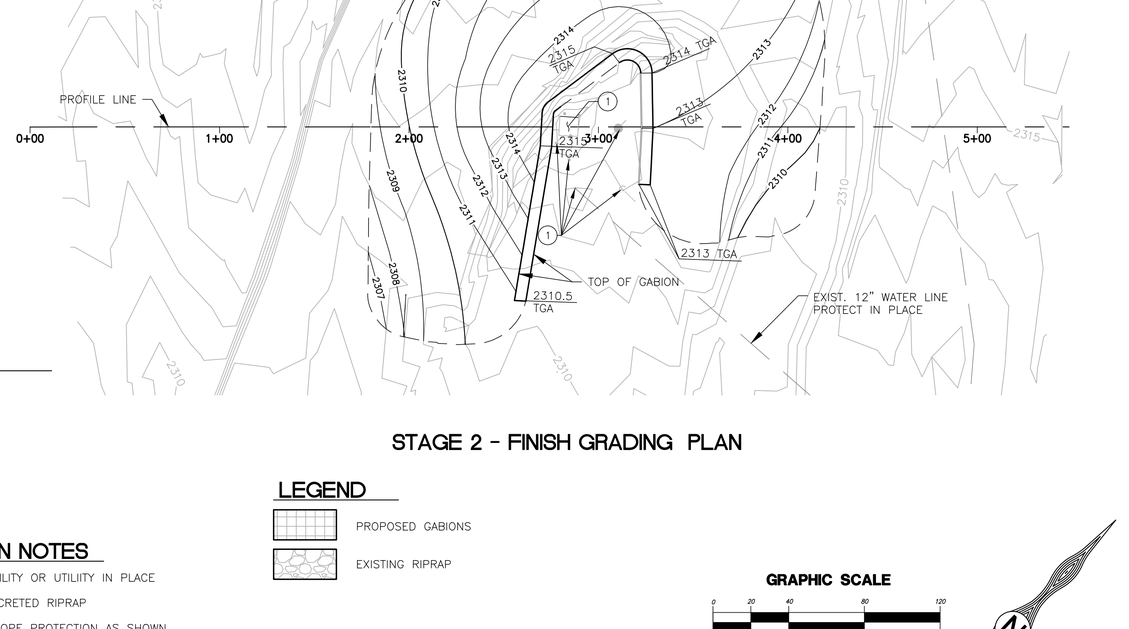

STAGE 2 - FINISH GRADING PLAN

LEGEND

- PROPOSED GABIONS
- EXISTING RIPRAP

GRAPHIC SCALE
0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

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MUNICIPAL WATER DEPARTMENT
WELL NO. D-1264
VINCENT WELL STABILIZATION PROJECT
SITE AND GRADING PLAN

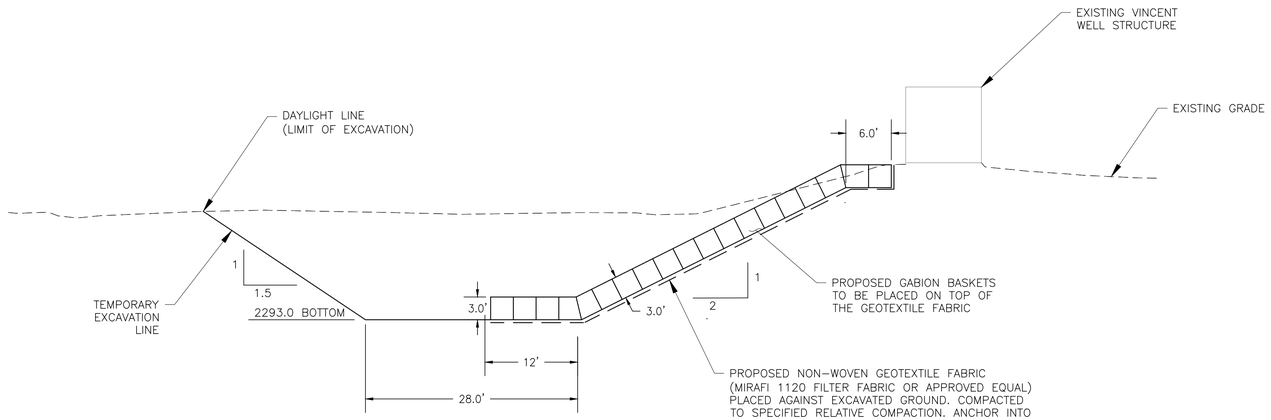
DRAWING SCALES:
HORIZ:1"=40' VERT:1"=10'
C.O. NO.:
1682
DWG C1
SHEET 3 OF 5

90% SUBMITTAL

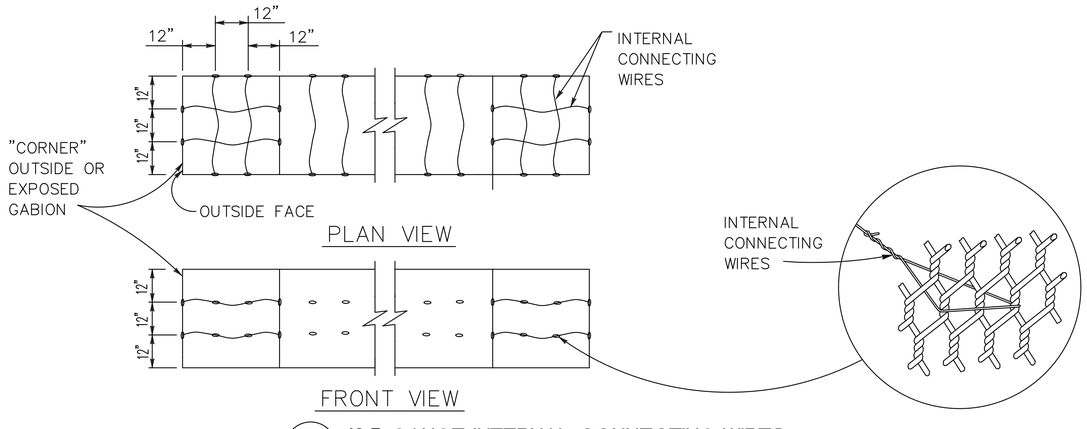
C-1682-3-C-C1.DWG

NOTES:

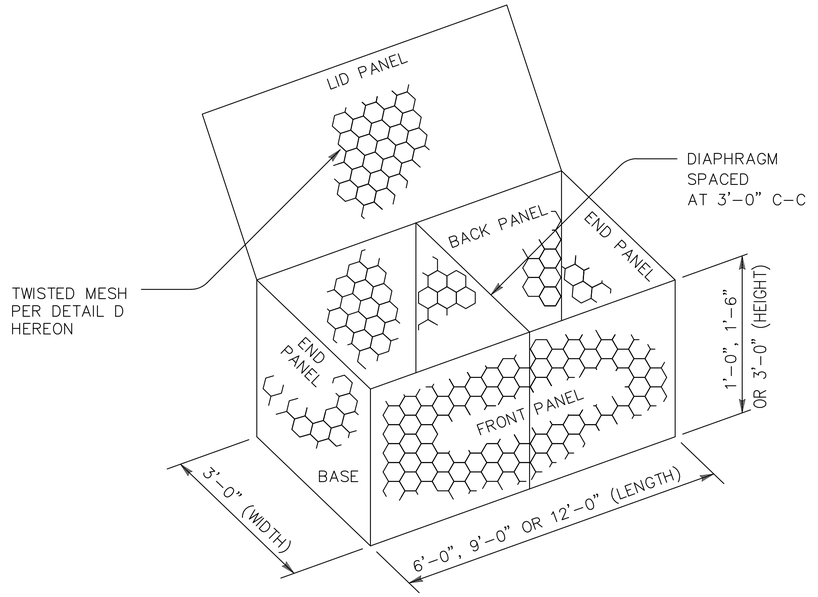
1. INTERNAL CONNECTING WIRE (13.5–GAGE) SHALL BE INSTALLED ACROSS WIDTH OF INTERIOR GABIONS AND ACROSS WIDTH AND LENGTH OF END GABIONS AS SHOWN IN DETAIL B HEREON.
2. INTERNAL CONNECTING WIRES ARE REQUIRED ON ALL GABIONS 3'–0" HIGH.
3. PREFORMED STIFFENERS (11–GAGE OR 9–GAGE) ARE AN ACCEPTABLE ALTERNATIVE TO INTERNAL CONNECTING WIRES. INSTALL THEM AS RECOMMENDED BY MANUFACTURER AT 1/3 POINTS.
4. PLACE ROCK IN END GABION CELL FIRST, AND CONTINUE BY FILLING INTERIOR GABION CELLS.
5. FOR GABION DIMENSIONS, REFER TO DETAIL E "STANDARD GABION SIZES" HEREON.
6. THE SIDE OF EXCAVATIONS AND ANY TEMPORARY EARTHWORKS PROFILES ARE TO BE REGULARLY INSPECTED AND MAINTAINED TO ENSURE THAT THEY REMAIN STABLE AND ARE NOT DETERIORATING THROUGH THE INGRESS OF WATER, DIRECT RAINFALL, OR GROUND WATER SEEPAGE OR ANY OTHER MEANS AND THE WORKS CAN BE CONSTRUCTED SAFELY AT ALL TIMES.
7. TEMPORARY DEWATERING MAY BE NEEDED TO KEEP THE GROUNDWATER AT LEAST FIVE (5) FEET BELOW EXCAVATED SLOPE.
8. VERTICAL EXCAVATION NEXT TO EXISTING SLAB AND NEAR EXISTING BUILDING SHOULD BE CAREFULLY MONITORED TO PREVENT DAMAGE TO THE EXISTING SLAB AND BUILDING.
9. DURING TEMPORARY EXCAVATION PROCESS, THE EXISTING SLAB SHOULD NOT BE LOADED WITH CONSTRUCTION EQUIPMENT AND WORKERS.
10. FILL GABIONS WITH ROCK MATERIAL AS SPECIFIED IN DETAIL F HEREON.



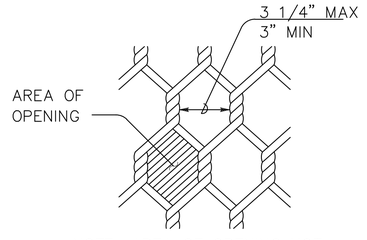
A TYPICAL GABION SECTION
NOT TO SCALE



B 13.5-GAUGE INTERNAL CONNECTING WIRES
NOT TO SCALE



C TYPICAL GABION BASKET DETAIL
NOT TO SCALE



NOTE: AREA OF OPENING NOT TO EXCEED 10.3 SQUARE INCHES

D TWISTED MESH DETAIL
NOT TO SCALE

STANDARD GABION SIZES				
LENGTH	WIDTH	HEIGHT	NUMBER OF DIAPHRAGMS	VOLUME CY
6'–0"	3'–0"	3'–0"	1	2.0
9'–0"	3'–0"	3'–0"	2	3.0
12'–0"	3'–0"	3'–0"	3	4.0

E TABLE OF STANDARD GABION SIZES
NOT TO SCALE

QUALITY CHARACTERISTIC	TEST METHOD	REQUIREMENT
APPARENT SPECIFIC GRAVITY (MINIMUM)	CALIFORNIA TEST 206	2.5
ABSORPTION (MAXUMUM %)	CALIFORNIA TEST 206	4.2
DURABILITY INDEX (MINIMUM)	CALIFORNIA TEST 229	52

DURABILITY ABSORPTION RATIO (DAR) = DURABILITY INDEX/(PERCENT ABSORPTION + 1)

IF THE DAR IS GREATER THAN 10, THE ABSORPTION MAY EXCEED 4.2 PERCENT
IF THE DAR IS GREATER THAN 24, THE DURABILITY INDEX MAY BE LESS THAN 52

ROCK GRADATION	
SCREEN SIZE (INCHES)	PERCENTAGE PASSING
12	100
4	0–5

NOTE: SELECT ROCK SUCH THAT THE SHAPES PROVIDE A STABLE STRUCTURE FOR THE REQUIRED SECTION. ANGULAR SHAPED ROCK MAY BE USED ON ANY PLANNED SLOPE. FLAT OR NEEDLE–SHAPED ROCK MUST NOT BE USED UNLESS THE INDIVIDUAL ROCK THICKNESS IS GREATER THAN 0.33 TIMES THE LENGTH.

F ROCK MATERIAL REQUIREMENTS
NOT TO SCALE

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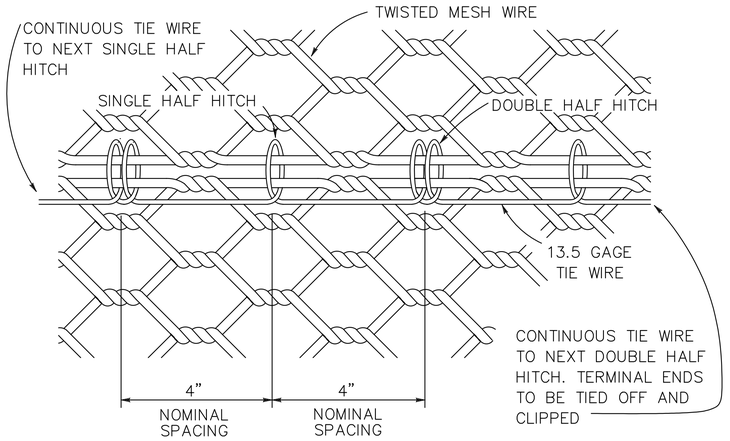
CONSTRUCTION DETAILS

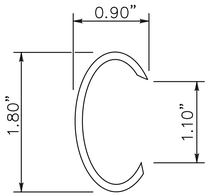
DRAWING SCALES:
HORIZ: N/A VERT: N/A
C.O. NO.:
1682
DWG C2
SHEET 4 OF 5

C–1682–4–C–C2.DWG

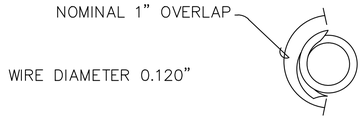
NOTES:



G – STANDARD TIE WIRE DETAIL
NOT TO SCALE



BEFORE CLOSURE



AFTER CLOSURE

NOTE: FASTENER DIMENSIONS ARE NOMINAL

H – ALTERNATIVE GABION JOINT MATERIAL FASTENER DETAIL
NOT TO SCALE

PROPERTIES	UNITS	SPECIFIED VALUES	TEST METHOD
MINIMUM MASS PER UNIT AREA	OZ/SY	8	ASTM D5261
MINIMUM GRAB STRENGTH	LBS	180	ASTM D4632
MINIMUM TEAR STRENGTH	LBS	50	ASTM D4533
MINIMUM PUNCTURE STRENGTH	LBS	75	ASTM D6241
MAXIMUM APPARENT OPENING SIZE (O_{95})	MM	0.21	ASTM D4491
PERMITTIVITY	S^{-1}	0.74	ASTM D4751

I – REQUIRED PROPERTY VALUES FOR GEOTEXTILE
NOT TO SCALE

TO ASSEMBLE TRANSITIONAL GABION BASKET:

STEP 1 CUT MESH ALONG JOINT BETWEEN FRONT PANEL AND BASE PANEL.

STEP 2 UNFASTEN END PANEL "A" FROM BASE PANEL AND ROTATE END PANEL "A". FASTEN END PANEL PANEL "A" TO BACK PANEL.

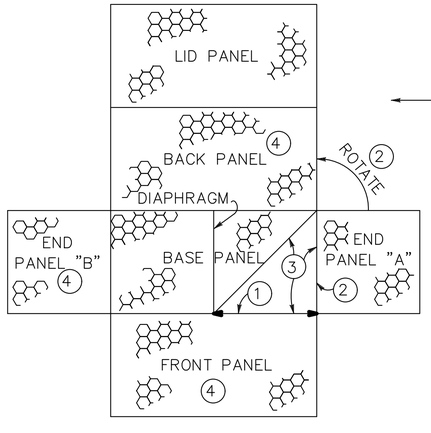
STEP 3 FOLD THE CUT PORTION OF THE BASE PANEL INTO UPRIGHT POSITION ALONG DIAGONAL FROM THE DIAPHRAGM TO THE CORNER OF THE BACK PANEL.

STEP 4 FOLD THE BACK PANEL, FRONT PANEL AND END PANEL "B" INTO UPRIGHT POSITIONS. FASTEN END PANEL "B" TO THE BACK PANEL AND THE FRONT PANEL.

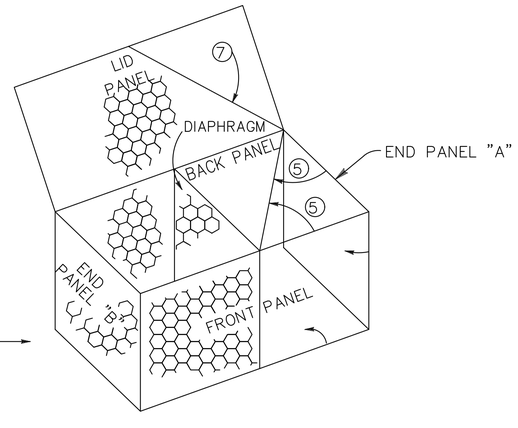
STEP 5 ROTATE END PANEL "A" AND THE CUT PORTION OF THE FRONT PANEL INWARD AGAINST THE UPTURNED PORTION OF THE BASE PANEL. FASTEN ALONG THE OVERLAPPED PORTION OF THE FRONT PANEL AND END PANEL "A". FASTEN THE OVERLAPPED PORTION OF THE FRONT PANEL AND END PANEL "A" TO THE FOLDED UPRIGHT PORTION OF THE BASE PANEL ALONG THE DIAGONAL (DESCRIBED IN STEP 3).

STEP 6 FILL THE TRANSITIONAL GABION BASKET WITH ROCK AS PER SPECIFICATIONS.

STEP 7 CLOSE LID AND FOLD OVER CORNER OF LID PANEL. FASTEN ALONG LID PANEL EDGES.



FLAT LAYOUT OF GABION BASKET



ASSEMBLED TRANSITIONAL GABION BASKET

J – TRANSITIONAL GABION BASKET
NOT TO SCALE

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SHEET 5 OF 5

C-1682-5-C-C3.DWG

Appendix B – Air Quality Analysis

Vincent Well Stabilization Project
Construction Equipment Emissions

Operation	Emission Factor	Units	Equation Variables 1	Equation Variables 2	Emissions PM-10 lbs/day	Emissions ROG lbs/day	Emissions CO lbs/day	Emissions NOX lbs/day	Emissions SOX lbs/day
Excavation Equipment Exhaust Emissions			Pieces of Equipment	Operating Hours					
PM-10					0.0				
Excavator	0.018	lbs/hr	1	8	0.1				
Dozer	0.063	lbs/hr	1	8	0.5				
Scraper	0.054	lbs/hr	2	8	0.9				
Loader	0.024	lbs/hr	2	8	0.4				
Other Construction Equipment	0.014	lbs/hr	5	8	0.6				
Other Material Handling Equipment	0.025	lbs/hr	1	8	0.2				
	0.000	lbs/hr		8	0.0				
	0.000	lbs/hr		8	0.0				
	0.000	lbs/hr		8	0.0				
ROG						0.0			
Excavator	0.073	lbs/hr	1	8		0.6			
Dozer	0.212	lbs/hr	1	8		1.7			
Scraper	0.191	lbs/hr	2	8		3.1			
Loader	0.075	lbs/hr	2	8		1.2			
Other Construction Equipment	0.056	lbs/hr	5	8		2.3			
Other Material Handling Equipment	0.092	lbs/hr	1	8		0.7			
	0.000	lbs/hr		8		0.0			
	0.000	lbs/hr		8		0.0			
	0.000	lbs/hr		8		0.0			
CO							0.0		
Excavator	0.512	lbs/hr	1	8			4.1		
Dozer	0.801	lbs/hr	1	8			6.4		
Scraper	0.794	lbs/hr	2	8			12.7		
Loader	0.441	lbs/hr	2	8			7.0		
Other Construction Equipment	0.351	lbs/hr	5	8			14.0		
Other Material Handling Equipment	0.443	lbs/hr	1	8			3.5		
	0.000	lbs/hr		8			0.0		
	0.000	lbs/hr		8			0.0		
	0.000	lbs/hr		8			0.0		
NOX								0.0	
Excavator	0.404	lbs/hr	1	8				3.2	
Dozer	1.577	lbs/hr	1	8				12.6	
Scraper	1.334	lbs/hr	2	8				21.3	
Loader	0.475	lbs/hr	2	8				7.6	
Other Construction Equipment	0.352	lbs/hr	5	8				14.1	
Other Material Handling Equipment	0.650	lbs/hr	1	8				5.2	
	0.000	lbs/hr		8				0.0	
	0.000	lbs/hr		8				0.0	
	0.000	lbs/hr		8				0.0	
SOX									0.0
Excavator	0.001	lbs/hr	1	8					0.0
Dozer	0.002	lbs/hr	1	8					0.0
Scraper	0.003	lbs/hr	2	8					0.0
Loader	0.000	lbs/hr	2	8					0.0
Other Construction Equipment	0.001	lbs/hr	5	8					0.1
Other Material Handling Equipment	0.002	lbs/hr	1	8					0.0
	0.000	lbs/hr		8					0.0
	0.000	lbs/hr		8					0.0
	0.000	lbs/hr		8					0.0
				Total	2.6	9.5	47.8	64.1	0.1

Sources: Off-Road Mobile Source Emission Factors, SCAQMD 2020

Vincent Well Stabilization Project
Material Export/Import Emissions

Operation	Emission Factor	Units	Equation Variables		Emissions				
			1	2	PM-10 lbs/day	ROG lbs/day	CO lbs/day	NOX lbs/day	SOX lbs/day
Delivery Vehicle Emissions Onsite			# of trips per day	vmt					N/A
PM-10 Export Material	0.0010	lbs/mile	8	40	0.33				
Import Material	0.0010	lbs/mile	10	40	0.42				
ROG Export Material	0.0010	lbs/mile	8	40		0.3			
Import Material	0.0010	lbs/mile	10	40		0.4			
CO Export Material	0.0050	lbs/mile	8	40			1.6		
Import Material	0.0050	lbs/mile	10	40			2.0		
NOX Export Material	0.0117	lbs/mile	8	40				3.7	
Import Material	0.0117	lbs/mile	10	40				4.7	
				Total	0.7	0.7	3.6	8.4	----

Source: SCAQMD: Emission Factors for On-Road Heavy Heavy Duty Diesel Trucks 2021

Vincent Well Stabilization Project
GHG- Construction Equipment Emissions

Operation	Emission Factor	Units	Equation Variables 1	Equation Variables 2	GHG Emissions CO2 lbs/day	GHG Emissions CH4 lbs/day	GHG Emissions N2O g/day
Excavation Equipment Exhaust Emissions			Pieces of Equipment	Operating Hours			
CO2					0.0		
Excavator	120.0	lbs/hr	1	8	960.0		
Dozer	239.0	lbs/hr	1	8	1912.0		
Scraper	262.0	lbs/hr	2	8	4192.0		
Loader	109.0	lbs/hr	2	8	1744.0		
Other Construction Equipment	122.0	lbs/hr	5	8	4880.0		
Other Material Handling Equipment	141.0	lbs/hr	1	8	1128.0		
					0.0		
					0.0		
					0.0		
CH4						0.0	
Excavator	0.007	lbs/hr	1	8		0.1	
Dozer	0.019	lbs/hr	1	8		0.2	
Scraper	0.073	lbs/hr	2	8		1.2	
Loader	0.007	lbs/hr	2	8		0.1	
Other Construction Equipment	0.005	lbs/hr	5	8		0.2	
Other Material Handling Equipment	0.008	lbs/hr	1	8		0.1	
						0.0	
						0.0	
						0.0	
				Miles Per Day			
N2O*							0.0
Excavator	0.131	g/mile	1	2			0.3
Dozer	0.520	g/mile	1	2			1.0
Scraper	0.520	g/mile	2	2			2.1
Loader	0.100	g/mile	2	2			0.4
Other Construction Equipment	0.492	g/mile	5	2			4.9
Other Material Handling Equipment	0.492	g/mile	1	2			1.0
							0.0
							0.0
							0.0
				Total lbs/g/day	14816.00	1.75	9.69
				Total lbs/day	15551.07		
				Total MTCO2e	544.3		

Sources: Off-Road Mobile Source Emission Factors; SCAQMD 2020
Source N2O: California Climate Action Registry General Reporting Protocol, 2009I;
Table A9-8-C SCAQMD Handbook; Climate Leaders EPA, Section 3, Table 2
Duration: 3 Month (70 days) Construction Period

Vincent Well Stabilization Project
GHG- Material Export/Import Emissions

Operation		Emission Factor	Units	Equation Variables 1	Equation Variables 2	GHG Emissions CO2 lbs/day	GHG Emissions CH4 lbs/day	GHG Emissions N2O g/day
Delivery Vehicle Emissions Onsite				# of trips per day	vmt			
CO2	Export Material	4.214	lbs/mile	8	40	1348.48		
	Import Material	4.214	lbs/mile	10	40	1685.60		
CH4	Export Material	0.000	lbs/mile	8	40		0.0	
	Import Material	0.000	lbs/mile	10	40		0.0	
N2O	Export Material	0.000	g/mile	8	40			0.0
	Import Material	0.000	g/mile	10	40			0.0
					Total	3034.1	0.0	0.0
					Total lbs/day	3034.1		
					MTCO2e	**34.90**		

Source: SCAQMD: Emission Factors for On-Road Heavy Heavy Duty Diesel Trucks 2021
Source N2O: California Climate Action Registry General Reporting Protocol, 2009I;
Table A9-8-C SCAQMD Handbook; Climate Leaders EPA, Section 3, Table 2
Duration: 1 Month (23 days) Construction Period

Vincent Well Stabilization Project

HP: 0 to 100	0.059	HP: Greater than 100	0.0529

Values above are expressed in gallons per horsepower-hour/BSFC.

CONSTRUCTION EQUIPMENT

Construction Equipment	#	Hours per Day	Horsepower	Load Factor	Construction Phase	Fuel Used (gallons)
Excavator/Graders	1	8	187	0.410	Site Prep	2271.27
Other Material Handling Eqp.	0	0	168	0.400	Site Prep	0.00
Rubber Tired Dozer	2	8	247	0.400	Site Prep	2926.85
Tractors/Loaders/Backhoes	0	0	97	0.370	Site Prep	0.00
Concrete/Industrial Saws	0	0	81	0.730	Grading	0.00
Scraper	2	8	187	0.410	Grading	2271.27
Other Material Handling Eqp.	0	0	168	0.400	Grading	0.00
Rubber Tired Loader	2	8	247	0.400	Grading	2926.85
Tractors/Loaders/Backhoes	0	0	97	0.370	Grading	0.00
Bore/Drill Rig	0	0	221	0.500	Building Con.	0
Cranes	0	0	231	0.290	Building Con.	0.00
Forklifts	0	0	89	0.200	Building Con.	0.00
Generator Sets	0	0	84	0.740	Building Con.	0.00
Other Construction Eqp.	5	8	172	0.420	Building Con.	2140.04
Rubber Tired Dozer	0	0	247	0.400	Building Con.	0.00
Tractors/Loaders/Backhoes	0	0	97	0.370	Building Con.	0.00
Welders	0	0	46	0.450	Building Con.	0.00
Cement and Motor Mixers	0	0	9	0.560	Paving	0.00
Concrete/Industiral Saws	0	0	81	0.730	Paving	0.00
Dumpers/Tenders	0	0	16	0.380	Paving	0.00
Graders	0	0	187	0.410	Paving	0.00
Pavers	0	0	130	0.420	Paving	0.00
Paving Equipment	0	0	172	0.420	Paving	0.00
Rollers	0	0	80	0.380	Paving	0.00
Tractors/Loaders/Backhoes	0	0	97	0.370	Paving	0.00
Air Compressors	0	0	78	0.480	Architectual Coat.	0.00
					Total Fuel Used	**12536.28 (Gallons)**

Construction Phase	Days of Operation
Site Preparation	70
Grading	70
Building Construction	70
Paving	0
Architectual Coating	0

WORKER TRIPS

Construction Phase	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
Entire Project	24.0	70	40.0	1166.67
Grading	24.0	0	15.0	0.00
Building Construction Phase	24.0	0	15.0	0.00
Paving Phase	24.0	0	15.0	0.00
Architectural Coating	24.0	0	15.0	0.00
			Total	**1166.67**

Material Export/Import Trips

Construction Phase	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
Site Prepration Phase	7.4	8	40.0	994.59
Grading	7.4	0	40.0	0.00
Building Construction Phase	7.4	10	40.0	124.32
Paving Phase	7.4	0	0.0	0.00
			Total	**1118.92**

Total Gasoline Consumption (gallons)	**1166.67**
Total Diesel Consumption (gallons)	**13655.20**

Sources:

[1] United States Environmental Protection Agency. 2018. *Exhaust and Crankcase Emission Factors for Nonrod Compression-Ignition Engines in MOVES2014b.* July 2018. Available at: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100UXEN.pdf.

[2] United States Department of Transportation, Bureau of Transportation Statistics. 2018. *National Transportation Statistics 2018.* Available at: https://www.bts.gov/sites/bts.dot.gov/files/docs/browse-statistical-products-and-data/national-transportation-statistics/223001/ntentire2018q4.pdf.

Appendix C – Biological Resources Assessment

General Biological Resources Report
And Habitat Assessment
For the Vincent Well Flood Protection and Streambed Stabilization Improvement Project

San Bernardino Municipal Water Department
San Bernardino County, California

Prepared for:

San Bernardino Municipal Water Department
Attn: Emily Long, P.E. Associate Engineer
397 Chandler Place
San Bernardino, California 92408

Prepared June 2020

Prepared by:

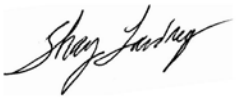
Jericho Systems, Inc.
Shay Lawrey, President
47 1st Street, Suite 1
Redlands, CA 92373

Certification

Jericho Systems, Inc.
47 1st Street, Suite 1
Redlands, CA 92373
(909) 915-5900

Contact: Shay Lawrey, President and Ecologist/Regulatory Specialist

Certification: I hereby certify that the statements furnished herein, and in the attached exhibits present data and information required for this Biological Resources Repot to the best of my ability, and the facts, statements, and information presented are true and correct to the best of my knowledge and belief. This report was prepared in accordance with professional requirements and standards. Fieldwork conducted for this assessment was performed by me. I certify that I have not signed a non-disclosure or consultant confidentiality agreement with the project proponent and that I have no financial interest in the project.



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Shay Lawrey, Ecologist/Regulatory Specialist

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1 Introduction

On behalf of the San Bernardino Municipal Water Department (Department), Jericho Systems, Inc. (Jericho) conducted a biological resources and habitat assessment for the SBMWD's proposed Vincent Well Flood Protection and Stream Stabilization Improvements Project (Project), located in San Bernardino County, California. The purpose of the biological resources and habitat assessment was to identify the following: potential for sensitive species or sensitive habitat within the project area; the potential need for focused surveys; and the potential need for required regulatory permits.

The Department was created in 1905 as a municipal utility of the City of San Bernardino Charter and is governed by a Board of Water Commissioners. The Department obtains 100 percent of its water from the Bunker Hill Groundwater Basin, a sub-basin of the San Bernardino Basin Area. Management of this groundwater basin is coordinated through the San Bernardino Valley Municipal Water District. The Department's service area has expanded to include portions of the City of San Bernardino and portions of unincorporated areas of the County of San Bernardino and is bounded on the north by the San Bernardino National Forest, on the east by the East Valley Water District and Redlands Municipal Utilities Department, on the south by the cities of Loma Linda and Colton, and on the west by the West Valley Water District, the city of Rialto, and the Muscoy Mutual Water Company.

The Department served a population of approximately 199,657 in 2015, which is expected to increase to approximately 234,800 by the year 2040. Customers are generally made up of single-family residential (51 percent), multifamily residential, commercial/industrial, municipal/ government, and landscape (*2015 San Bernardino Valley Regional Urban Water Management Plan* [UWMP]).

The Department has drawn 100 percent of its water from wells in the Bunker Hill Groundwater Basin, a sub-basin of the San Bernardino Basin Area (SBBA). Currently, water is derived from 57 groundwater wells located throughout its service area. The wells range from 50 to 1,300 feet in depth and have production capacities ranging from 50 to 3,500 gpm (2015 UWMP). Imported water is available to Department through the State Water Project water purchased from the San Bernardino Valley Municipal District. SBMWD has not used State Water Project water for direct potable use in the past five years and does not plan to use any in the future, except for water recharge projects.

The Vincent Well is one of the Department's water production wells that was originally constructed in the Cajon Wash in 1929 by the Muscoy Water Company, acquired by the Department in 1949, and redeveloped in the same location in 1968. The well was originally an 8-foot-wide by 69-foot deep metal caisson that contained weep holes for water collection. The Department redeveloped the well in 1968 by drilling within the existing caisson, an 8-inch diameter, 199-foot-deep production well. The well site contains the well, a small building that houses the well, and an associated electric utility pole that provides electricity. According to the Department records, the existing well building was replaced in 1983 in its current location, but there is no information as to when the building was originally constructed.

The Cajon Wash is an approximately 1,000-foot-wide braided channel that originates out of the San Gabriel mountains to the north and is a tributary to Lytle Creek to the south. Lytle Creek is a tributary to the Santa Ana River. The area of active low flow varies but is approximately 300 feet wide in the vicinity of the well.

1.1 Location

The Vincent Well is situated in the low-flow channel of Cajon Wash, within Section 19, Township 2 North, Range 5 West on the *Devore* U. S. Geological Survey's (USGS) 7.5-minute topographic map. More specifically, it is located west of Interstate 15 (I-15) and Cajon Boulevard, within the Cajon Wash,

approximately 2 miles northwest (upstream) of the I-15/I-215 interchange, in an unincorporated area of San Bernardino County, California at approximately 34.240102 latitude and -117.440237 longitude (Figure 1 and Figure 2).

1.2 Project Description

Over the years, the building and well infrastructure has been subject to extreme erosion from major storm events. In 2017, the well infrastructure was significantly compromised, and the Department obtained emergency permits from various agencies to place rock slope protection around the well site. The District is now seeking to provide a permanent solution to protect the well.

The proposed Project will construct a surface and subsurface stabilization system around the existing Vincent Well site. The proposed stabilization system will consist of a 3-foot-thick layer of gabion baskets laid along a 2:1 slope that will extend to 20 feet below existing grade. The top of the proposed baskets will be located at least 10 feet from the well building. The proposed layout of the 2:1 slope is in a horseshoe shape with the bottom of the horseshoe facing upstream of the well site. One horseshoe leg is on the west side of the well building, and the other leg is on the east side of the building. The layout leg on the west side will extend to approximately 80 feet south of the building. The layout leg on the east side will extend to approximately 20 feet south of the building (Figure 3).

The base width of the excavation will be 28 feet. Gabion baskets will be placed at the innermost 12 feet of the base and connected to the gabions along the slope. The entire system will be underlain by geotextile fabric.

The other slopes required to construct the system will be excavated at 1.5:1. Excavated material will be used to construct a berm upstream of the site to divert flows in Cajon Wash around the construction zone. After the gabions are in place, the excavated material will be used as backfill and finish grade material. The finish grade of the wash will return the natural channel to its existing grade, but the slope of the channels will be at least 20 feet clear of the existing building.

During construction, all existing utilities in the construction zone will be protected in place. The proposed construction area for stockpiling and construction will be placed around the work zone and is anticipated to be approximately 600 feet long by 600 feet wide, or approximately 8 acres.

The initial area of excavation is anticipated to encompass approximately 40,340 square feet or approximately 0.92 acre. Within that area, gabions will be installed within approximately 16,756 square feet, or approximately 0.38 acre. The remaining 23,584 square feet (0.54 acre) from the construction will be backfilled to the finished grade.

Approximately 16,240 cubic yards of soil will be excavated, backfilling approximately 15,840, and the balance of approximately 400 cubic yards will be exported. The gabion slope protection encompasses approximately 1,862 cubic yards with approximately 2,056 square yards of filter fabric that will be installed below grade.

Access to the site is via an existing graded road that extends from Cajon Boulevard, through the Cajon Wash, to the Vincent Well. The access road is approximately 2,368 linear feet from Cajon Boulevard to the well site and is approximately 12 feet wide. Of the approximately 2,368 linear feet, approximately 1,000 feet of the roadway (or approximately 0.28 acre) exists within the wash proper.

1.3 Environmental Setting

Located within Cajon Wash, the Project site is on the south side of the San Bernardino Mountains near the Devore area of San Bernardino County. The Devore area is subject to both seasonal and annual variations in temperature and precipitation. Average annual maximum temperatures typically peak at 96 degrees Fahrenheit (°F) in August and fall to an annual minimum temperature of 41° F in December. Average annual precipitation is greatest from December through March and reaches a peak in February (3.83 inches). Precipitation is lowest in the month of July (0.04 inches). Annual precipitation averages 22.6 inches. Hydrologically, the subject parcel is located within the Bunker Hill Hydrologic Sub-Area (HSA 801.52) which comprises a 124,791 -acre drainage area within the larger Santa Ana Watershed (HUC 18070203).

1.4 Site Conditions

The project site is within the Cajon Canyon Wash. The area site area is completely surrounded by the Cajon wash, and the San Bernardino National Forest.

Habitat within the survey area primarily consists of sandy river wash, scale broom scrub (*Lepidospartum squamatum* Shrubland Alliance) and ceanothus chaparral (*Ceanothus* ssp. Shrubland Alliance). Surrounding land uses include floodplain, open space, and transportation corridor.

2 Methods

2.1 Literature Review

Prior to performing the surveys, available databases and documentation relevant to the project site was reviewed for documented occurrences of sensitive species in the area. The U.S. Fish and Wildlife Service (USFWS) threatened and endangered species occurrence data overlay, as well as the most recent versions of the California Natural Diversity Database (CNDDB), Calflora, and California Native Plant Society Electronic Inventory (CNPSEI) databases were searched for sensitive species data on the *Devore* and *Cajon* USGS 7.5-minute series quadrangles. The proposed project site is situated in the northern portion of the *Devore* quad. The site's proximity to the *Cajon* quad to the north, lead to its inclusion in the review. These databases contain records of reported occurrences of State- and/or federally-listed species or otherwise sensitive species and habitats that may occur within the vicinity of the project. The literature review included a review of standard field guides and texts on sensitive and non-sensitive biological resources, as well as federal register documents.

Other available technical information on the biological resources of the area was also reviewed including previous trapping surveys and recent findings.

2.2 Soils

Before conducting the surveys, soil maps for San Bernardino County were referenced online to determine the types of soil found within the Project site. Soils were determined in accordance with categories set forth by the United States Department of Agriculture (USDA) Soil Conservation Service and by referencing the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey (USDA 2020).

2.3 General Biological Survey

Jericho biologist Lauren Hall conducted a general biological resource and habitat assessment on March 17, 2020. The survey was conducted between the hours of 1:00 pm and 2:30 pm. Weather conditions during the survey were 80% cloud cover, 56° F with wind speed at 11 mph (BFT 3).

The survey included general coverage of the project impact area and adjacent 200-foot survey buffer of the surrounding areas and were focused on the following objectives: (1) recording of dominant vegetation communities; (2) floristic plant surveys; (3) general wildlife surveys; and habitat assessment for sensitive species. Wildlife species were detected during field surveys by sight, calls, tracks, scat, or other sign. In addition to species observed, expected wildlife usage of the site was determined according to known habitat preferences of regional wildlife species and knowledge of their relative distributions in the area.

The primary focus of the general biological surveys was to identify potential habitat for special status wildlife within the project area. In addition to the general biological resources assessment of the site, habitat assessments were conducted for several sensitive species for which potentially suitable habitat exists on-site and/or within the vicinity of the site. The suitability of habitat on-site was assessed for these species, taking into consideration the different habitat requirements and any Primary Constituent Elements (PCEs) defined for these species. Scientific nomenclature and common names for vertebrate species referred to in this report follow Collins (1997) and Fisher (2001) for amphibians and reptiles, Jones, et al., (1992) for mammals and American Ornithologists' Union (AOU) Check-list (2006) for birds.

2.4 Focused Protocol Surveys

Qualified and/or permitted biologists (when required) conducted focused protocol surveys for the following species using the most current survey guidelines and protocols issued by the regulatory agencies and as outlined in their respective permits:

- Southwestern arroyo toad (*Anaxyrus californicus*) [ARTO]
- San Bernardino kangaroo rat (*Dipodomys merriami parvus*) [SBKR],
- coastal California gnatcatcher (*Polioptila californica californica*) [CAGN]
- slender-horned spineflower (*Dodecahema leptoceras*) [spineflower]

<u>Southwestern Arroyo toad</u>

Ms. Lawrey and Mr. Lawrey conducted focused, presence/absence surveys for the federally-listed as endangered arroyo toad in accordance with the May 19, 1999 USFWS "Survey Protocol for the Arroyo Toad." Currently, surveys performed in accordance with the guidelines outlined in the USFWS protocol do not require a permit under section 10(a)(1)(A) of the Endangered Species Act of 1973, as amended. Ms. Lawrey and Mr. Smith conducted six surveys during the breeding season for arroyo toad between March 15 and July 1 on April 21 and 28, May 22 and 30 and June 23 and 30, 2020. The survey area encompassed all portions of the streambed and floodplain 2,500 feet upstream and 2,500 feet downstream of the Project site. Each survey included a diurnal and nocturnal survey component. The purpose of the daytime surveys was to evaluate the habitat suitability, map the habitat, and to look for egg masses, larvae and juveniles. The daytime surveys were conducted by walking slowly along stream margins and in adjacent habitat, visually searching for (but not disturbing) eggs, larvae, and juveniles. The nocturnal surveys were also conducted by walking slowly and carefully on the stream banks. Every few hundred feet, the surveyors would stop and remain still to listen for calls for approximately 15 minutes. The nighttime surveys were

initiated one hour after dusk and ended by midnight. Nighttime surveys were considered appropriate when the air temperature, at dusk, was 55 degrees Fahrenheit (° F) or greater, the weather conditions were good, and when the moon was not up in the sky illuminating the survey area (full or near full moon).

San Bernardino kangaroo rat (SBKR)

Jericho's permitted SBKR biologist, Shay Lawrey (USFWS permit number TE 094308-4) initiated the presence/absence SBKR survey on the evening of Tuesday May 5, 2020. Trapping continued until the morning of Sunday May 10, 2020. A total of 150 12-inch Sherman live traps (product number SLK; H.B. Sherman Traps, Tallahassee, FL) were set within four trap-lines, with spacing between each trap at approximately 10 meters. Each trap was baited after dusk with mixture of rolled oats and commercially-formulated small mammal feed (seed) that included a millet seed. Traps were inspected at midnight and again at dawn. All animals were identified and released unharmed at the point of capture. Notes included weather conditions such as temperature, wind speed, cloud cover, precipitation and moon phase. Site characteristics such as soils, topography, the condition of the plant communities, and evidence of human use of the site were also noted.

Coastal California gnatcatcher (CAGN)

Jericho's permitted CAGN biologists, Brian Karpman (USFWS 10(A) permit number: TE – 01768B-1) conducted presence/absence surveys for California Gnatcatcher according to the USFWS presence/ absence survey protocol published in 1997. Nine focused surveys visits were conducted between January 6 and April 11, 2020. The surveys were conducted between dawn and 12 PM avoiding inclement weather that could affect target species detection. Recorded vocalizations were played in suitable habitat and discontinued if California Gnatcatchers were located or potential predators were present.

Slender-horned spineflower

Mr. Karpman also conducted the botanical focused surveys for the slender-horned spineflower on May 1 and May 4, 2020 by walking transects after verifying the nearest reference population was in bloom.

3 Results

According to the CNDDB, CNPSEI, and other relevant literature and databases, approximately 44 sensitive species and 3 sensitive habitats have been documented to occur in the *Devore* and *Cajon* USGS 7.5-minute series quadrangles. This list of sensitive species and habitats includes any State- and/or federally-listed threatened or endangered species, California Department of Fish and Wildlife (CDFW) designated Species of Special Concern (SSC), and otherwise Special Animals. "Special Animals" is a general term that refers to all the taxa the CNDDB is interested in tracking, regardless of their legal or protection status. This list is also referred to as the list of "species at risk" or "special status species." The CDFW considers the taxa on this list to be those of greatest conservation need.

The only sensitive habitat community documented and/or observed on-site is RAFSS.

Of the approximately 44 sensitive species identified in the *Devore* and *Cajon* quadrangles, 9 (two plant species and seven animal species) are State- and/or federally-listed as threatened or endangered species. Table 1 lists the federally-listed species documented in the *Devore* and *Cajon* quadrangles and provides a project impact affects determination. The following State- and/or federally-listed species and designated critical habitats have been documented within the project vicinity (approximately 3 miles):

- arroyo toad
- San Bernardino kangaroo rat
- coastal California gnatcatcher
- slender-horned spineflower
- San Bernardino kangaroo rat Critical Habitat
- southwestern arroyo toad Critical Habitat

Although not a State- or federally-listed as threatened or endangered species, burrowing owl (*Athene cunicularia*) are considered a State and federal SSC and are a migratory bird protected by the international treaty under the Migratory Bird Treaty Act of 1918 and by State law under the California Fish and Game Code (CDFG Code #3513 & #3503.5). Burrowing owl have been documented within similar facilities. Therefore, burrowing owl will be included in the discussion below.

An analysis of the likelihood for occurrence of all sensitive species is provided in Table 2. This analysis considers species range as well as documentation within the vicinity of the project area. Plant species observed is identified on Table 3. Site photographs are contained in Appendix A.

3.1 Soils

After review of USDA Soil Conservation Service and by referencing the USDA NRCS Web Soil Survey (USDA 2020), it was determined that the Project site is located within the San Bernardino National Forest Area, California area CA**777**. Based on the results of the database search, two (2) soils types were observed in the area (Figure 4):

Soboba-Hanford families association, 2 to 15 percent slopes (AbD). This soil is excessively drained with a high to very high capacity to transmit water. This soil consists of alluvium, typically ranges in elevation from 1,600 to 4,000 feet amsl and is not considered prime farmland.

Riverwash-Soboba families association, 2 to 15 percent slopes (EsD). This soil is excessively drained with a high to very high capacity to transmit water. This soil consists of alluvium, typically ranges in elevation from 1,600 to 4,000 feet amsl and is not considered prime farmland.

3.2 Vegetation

The habitat found within the project area consists of scale broom scrub (*lepidospartum squamatus* shrubland alliance), and ceanothus chaparral (*ceanothus ssp.* shrubland alliance).

Plant species observed at the site include California sagebrush (*Artemisia californica*), hairy yerba santa (*Eriodictyon trichocalyx*), California buckwheat (*Eriogonum fasciculatum*), chaparral yucca (*Hesperoyucca whipplei*), scale broom (*Lepidospartum squamatum*), Yellow mustard (*hirschfeldia incana*), common fiddleneck (*Amsinckia intermedia*), white stemmed filaree (*Encelia farinose*), giant reed (*arundo donax*) and a mix of native and non-native grasses. A complete list of plant species observed during survey is provided in Appendix A.

3.3 Wildlife

All wildlife and wildlife signs observed and detected, including tracks, scat, carcasses, burrows, excavations, and vocalizations, were recorded. Additional survey time was spent in those habitats most

likely to be utilized by wildlife (native vegetation, wildlife trails, etc.) or in habitats with the potential to support state- and/or federal-listed or otherwise special status species. Notes were made on the general habitat types, species observed, and the conditions of the Project site.

No wildlife was observed at the time of the site visit.

3.4 Jurisdictional Waters

The Project site is located within the Lytle Creek Watershed, which contains riparian vegetation and flowing water.

Jericho prepared a Jurisdictional Delineation Report in April 2019 (Appendix B). The report concluded that the entire footprint of the Project is contained within the confines of Cajon Wash which is considered both State and federally jurisdictional.

3.5 Sensitive Habitats

3.5.1 Riversidean Alluvial Fan Sage Scrub (RAFSS)

The only sensitive habitat community present within the project vicinity is RAFSS, which is a rare and sensitive plant community that is adapted to the harsh conditions of flooding. It grows on sandy, rocky alluvium deposited by streams that experience infrequent episodes of flooding. Scale broom (*Lepidospartum squamatum*) is the indicator species for this habitat type and is dominant, co-dominant, or conspicuous in the shrub canopy. Because alluvial fan sage scrub is characterized by its diversity, it can also be described as an intermediate between chaparral and sage scrub habitats, in that all three vegetation communities share similar floral components. However, the distinguishing factor is that alluvial fan sage scrub undergoes periodic scouring from frequent flooding events, creating three seral stages: pioneer, intermediate, and mature. The RAFSS habitat found within the Project area is pioneer to intermediate stage.

> *Findings*: Although this habitat is present in the Project vicinity and the CNDDB Database classifies the project area as RAFSS, this habitat is not present within the immediate Project area. The Project area is dominated by sandy wash with little to no vegetation. Therefore, the project will not result in impacts to RAFSS habitat. Figure 5 shows the mapped location of the RAFSS habitat from the CNDDB Database.

3.6 Special Status Plants

3.6.1 Slender-horned spineflower

The State- and federally-listed as endangered slender-horned spineflower (spineflower) is an annual plant in the *Polygonaceae* (buckwheat family). Plants have a distinctive basal rosette of leaves ranging from 3 to 8 centimeters (1.2 to 3.1 inches) in diameter. The leaves frequently become reddish at maturity. The flower stalks are branched and erect 3 to 10 centimeters (1.2 to 4 inches) tall and the flowers are white to pink in color. This spineflower is found in drought prone habitats where germination is likely related to rainfall. This spineflower is typically found in alluvial fan scrub on benches and terraces away from active channels in areas receiving little surface disturbance from flooding, but subject to sheet or overland flows (Boyd *et al.* 1989; Rey-Vizgirdas 1994; Wood and Wells 1997). Within San Bernardino County, there are currently only eight (8) occurrences of this species known to be extant, within three (3) drainages; the upper Santa Ana River, Lytle Creek, and Cajon Canyon (USFWS 2010). This spineflower typically flowers between April

and May (CNPS, 2019).. Individual plants are difficult to detect because they are small and occur in relatively small, isolated patches across often extensive floodplain habitat. Additionally, plant densities may be low during drought conditions. Its numbers vary greatly from year to year according to rainfall, and in years of low rainfall it may not come up at all. Slender-horned spineflower's usual habitat is open, slightly depressed sites within mature shrublands of broad alluvial systems (Allen, 1996; Wood and Wells, 1996). Occupied habitat is found on relatively flat surfaces with substrates ranging in age from about 100 years to several thousand years since the material was last deposited or scoured by flooding. Surrounding vegetation varies among sites and apparently does not affect habitat suitability. Young and coauthors (2000) found that slender-horned spineflower does not require mycorrhizal associations, although it can host some mycorrhizae species.

> *Findings*: Per the literature review, the nearest documented spineflower occurrence (2013) is approximately 0.6 mile northwest (upstream) of the project area, within an upper terrace on the north side of the Cajon Wash. However, no spineflower were observed within the project area during the focused survey. Therefore, spineflower is considered absent from the project site and the project **will not affect** this species.

3.7 Special Status Wildlife

According to the CNDDB, and other relevant literature and databases, four State- and/or federally-listed threatened or endangered wildlife species are documented within 3 miles of the project site. Additionally, there are several other sensitive wildlife species that are particularly important in this region, which are either documented to occur on the vicinity or have a high likelihood of occurring on the site. These special status wildlife species are described below.

3.7.1 Arroyo toad

The arroyo toad is a small, stocky, warty toad that is about 2 to 3 inches (in) (5.1 to 7.6 centimeters (cm)) in length (Stebbins 2003, p. 212). The skin of this toad is light olive green, gray, or light brown in color with a light-colored stripe shaped like a "V" across the head and eyelids. The belly is white or buff colored, usually without spots. Arroyo toads are found in low gradient, medium-to-large streams and rivers with intermittent and perennial flow in coastal and desert drainages in central and southern California, and Baja California, Mexico. Arroyo toads occupy aquatic, riparian, and upland habitats in the remaining suitable drainages within its range. Arroyo toads are breeding habitat specialists and require slow-moving streams that are composed of sandy soils with sandy streamside terraces (Sweet 1992, p. 23–28). Reproduction is dependent upon the availability of very shallow, still, or low-flow pools in which breeding, egg-laying, and tadpole development occur. Suitable habitat for the arroyo toad is created and maintained by periodic flooding and scouring that modify stream channels, redistribute channel sediments, and alter pool location and form. These habitat requirements are largely dependent upon natural hydrological cycles and scouring events (Madden-Smith et al. 2003, p. 3) (USFWS, 2014).

> *Findings*: Per the literature review, the nearest documented arroyo toad occurrence (2005) is approximately 2.1 miles northwest (upstream) of the project site. The project site does contain habitat that is considered suitable for arroyo toad. No arroyo toad were found during the focused protocol surveys conducted in 2020. Therefore, arroyo toad is considered absent from the project site and the project **will not affect** this species.

3.7.2 Burrowing owl

The burrowing owl (BUOW) is a ground dwelling owl typically found in arid prairies, fields, and open areas where vegetation is sparse and low to the ground. The BUOW is heavily dependent upon the presence of mammal burrows, with ground squirrel burrows being a common choice, in its habitat to provide shelter from predators, inclement weather and to provide a nesting place (Coulombe 1971). They are also known to make use of human-created structures, such as cement culverts and pipes, for burrows. BUOW spend a great deal of time standing on dirt mounds at the entrance to a burrow, or perched on a fence post or other low to the ground perch from which they hunt for prey. They feed primarily on insects such as grasshoppers, June beetles and moths, but will also take small rodents, birds, and reptiles. They are active during the day and night, but are considered a crepuscular owl; generally observed in the early morning hours or at twilight. The breeding season for BUOW is February 1 through August 31.

Throughout its range, the BUOW is vulnerable to habitat loss, predation, vehicular collisions, and destruction of burrow sites and poisoning of ground squirrels (Grinnell and Miller 1944, Zarn 1974, Remsen 1978). BUOW have disappeared from significant portions of their range in the last 15 years and, overall, nearly 60% of the breeding groups of owls known to have existed in California during the 1980s had disappeared by the early 1990s (Burrowing Owl Consortium 1993). The BUOW is not listed under the State or federal ESA, but is considered both a State and federal SSC. The BUOW is a migratory bird protected by the international treaty under the Migratory Bird Treaty Act of 1918 and by State law under the California Fish and Game Code (CDFG Code #3513 & #3503.5).

> *Findings*: Per the literature review, the nearest documented BUOW occurrence (2013) is approximately 6 miles southwest of the project area. There are no BUOW occurrences documented in the Project area.
>
> The general biological assessment survey was structured, in part, to detect BUOW. The survey consisted of walking transects spaced to provide 100% visual coverage of the project site. The result of the survey was that no evidence of BUOW was found in the survey area. No BUOW individuals or sign including burrows, pellets, feathers or white wash were observed. Per the definition provided in the *2012 CDFG Staff Report on Burrowing Owl Mitigation*, "Burrowing owl habitat generally includes, but is not limited to, short or sparse vegetation (at least at some time of year), presence of burrows, burrow surrogates or presence of fossorial mammal dens, well-drained soils, and abundant and available prey."
>
> Although the project area is mostly comprised of short, sparse vegetation and well-drained, friable soils, no suitably-sized burrows, burrow surrogates, or host burrowers were observed within the project area. Therefore, the project site is not suitable to support BUOW. No potential direct or indirect impacts to BUOW can be identified and no further action is required.

3.7.3 Coastal California gnatcatcher

The coastal California gnatcatcher (Polioptila californica californica) (CAGN) is thenominate and northernmost subspecies of California gnatcatcher (Atwood 1991, p. 118). It is a small, non-migratory songbird (passerine) that occurs along the Pacific coastal regions of southern California and northern Baja California, Mexico (Atwood 1991, p. 128). Coastal California gnatcatchers occur in or near coastal scrub vegetation communities (Woods 1921, p. 173; Atwood 1980, p. 67). Much of the species' current range within the United States is now or is anticipated to be covered by large, regional Habitat Conservation Plans (HCPs) permitted under section 10(a)(1)(B) of the Act and under the State of California's Natural

Community Conservation Planning (NCCP) Act. These regional plans have made substantive contributions to the species' conservation. (USFWS, 2010)

The range and distribution of the gnatcatcher is closely aligned with coastal scrub vegetation. This vegetation is typified by low (less than 1 meter (3 feet)), shrub and sub-shrub species that are often droughtdeciduous (O'Leary 1990, p. 24; Holland and Keil 1995, p. 163; Rubinoff 2001, p. 1376). Starting at the United States–Mexico border and continuing southward, the gnatcatcherassociated plant communities increasingly include succulent species. As defined by Westman (1983, pp. 6 and 10), the coastal scrub plant communities that overlap the range of the gnatcatcher include Venturan, Diegan, and Riversidean coastal sage scrub communities, and Martirian and Vizcainan coastal succulent scrub communities. (USFWS, 2010).

> *Findings*: Per the literature review, the nearest documented CAGN occurrence (2000) is approximately 3.2 miles southeast of the project area. There are no CAGN occurrences documented in the project area.
>
> Additionally, the site was surveyed by Jericho's Avian Biologist Brian Karpman. Mr. Karpman is a permitted biologist with the USFWS to conduct surveys for CAGN. The site was surveyed 9 times, as per protocol, between January 6, 2020 and April 11, 2020. No CAGN we detected during the protocol levy survey. A copy of the survey report can be found in Appendix C.

3.7.4 San Bernardino kangaroo rat

The federally-listed as endangered SBKR is one of three recognized subspecies of Merriam's kangaroo rat (*D. merriami*) in California. The Merriam's kangaroo rat is a small, burrowing rodent species that can be found within inland valleys and deserts of southwest United States of America and northern Mexico. The Dulzura kangaroo rat (*Dipodomys simulans*), the Pacific kangaroo rat (*Dipodomys agilis*) and the Stephens kangaroo rat (*Dipodomys stephensi*) occur in areas occupied by SBKR, but these other species have a wider habitat range. The SBKR, however, has a restricted southern California distribution, confined to certain inland valley scrub communities and, more particularly, to scrub communities occurring along rivers, streams, and drainages within the San Bernardino, Menifee, and San Jacinto valleys. Most of these drainages have been historically altered due to a variety of reasons including, mining, off-road vehicle use, road and housing development, and flood control efforts. This increased use of river floodplain resources resulted in a reduction in both the amount and quality of habitat available for the SBKR.

The USFWS listed the SBKR as endangered on September 24, 1998 and set aside 33,295 acres of critical habitat for the SBKR in 2002. The USFWS then revised that decision in 2008 after a lawsuit and cut the designation down to 7,779 acres in Riverside and San Bernardino counties. On January 10, 2011, a federal court struck down the 2008 designation. The ruling concluded that the USFWS improperly relied on "core habitat" to define critical habitat for the SBKR rather than specifying the physical and biological features essential for the kangaroo rat's conservation, as the law requires. The ruling reinstated the 2002 designation. The 2002 critical habitat rule for SBKR defined four Primary Constituent Elements (PCEs) that are essential to the conservation of SBKR. These PCEs are as follows: 1) Soil series consisting predominantly of sand, loamy sand, sandy loam, or loam; 2) Alluvial sage scrub and associated vegetation, such as coastal sage scrub and chamise chaparral, with a moderately open canopy; 3) River, creek, stream, and wash channels; alluvial fans; floodplains; floodplain benches and terraces; and historic braided channels that are subject to dynamic geomorphological and hydrological processes typical of fluvial systems within the historical range of the San Bernardino kangaroo rat; and 4) Upland areas proximal to floodplains with suitable habitat.

Findings: Per the literature review, the nearest documented SBKR occurrence (1982) is approximately 0.6 mile west (downstream) of the project site. The project site does contain habitat that is considered suitable for SBKR for the following reasons:

- *The site is located within the historic range of SBKR;*
- *The site is located within designated critical habitat for SBKR;*
- *The site is located within proximity of where SBKR have been found in the last 10 years;*
- *The soil series consists predominantly of sand and friable soils;*
- *There is alluvial sage scrub and associated vegetation, such as RAFSS with a moderately open canopy;*
- *A river and floodplain bench/terrace subject to dynamic geomorphological and hydrological processes typical of fluvial systems occurs in the area; and*
- *Upland areas proximal to the floodplains with suitable habitat occurs nearby*

Focused live-trapping surveys were conducted within the project area on May 5 through May 9, 2020, to determine the presence or absence of SBKR on site. The surveys were conducted by permitted biologist Shay Lawrey, per protocols established for the SBKR and as outlined in her federal 10a permit number TE-094308-4. The result of the focused survey was negative for SBKR (Appendix D). Therefore, SBKR are considered absent from the project area and the project **will not affect** this species.

3.8 USFWS Designated Critical Habitat

3.8.1 SBKR Critical Habitat

The 2002 critical habitat rule for SBKR defined four (4) PCEs that are essential to the conservation of SBKR. These PCEs are as follows:

1) Soil series consisting predominantly of sand, loamy sand, sandy loam, or loam;

2) Alluvial sage scrub and associated vegetation, such as coastal sage scrub and chamise chaparral, with a moderately open canopy;

3) River, creek, stream, and wash channels; alluvial fans; floodplains; floodplain benches and terraces; and historic braided channels that are subject to dynamic geomorphological and hydrological processes typical of fluvial systems within the historical range of the San Bernardino kangaroo rat; and

4) Upland areas proximal to floodplains with suitable habitat.

The 2002 critical habitat designation for the SBKR encompasses 33,295 acres of land in Riverside and San Bernardino counties, California. The areas designated as critical habitat for SBKR are identified in four separate units. The four units are within the geographical range of the SBKR and support the habitat the species requires for foraging, sheltering, reproduction, rearing of young, dispersal, and genetic exchange. The project site falls within the Lytle Creek and Cajon Creek critical habitat Unit (Unit 2), located in San Bernardino County. Unit 2 encompasses approximately 13,983 ac, and includes the Lytle Creek and Cajon Wash. The site is more specifically within Subunit A of Unit 2, which encompasses 12,289 ac and is comprised of primarily Cajon Wash. This unit contains upland refugia and tributaries that are occupied by

the species, active hydrological channels, floodplain terraces, and areas of habitat immediately adjacent to floodplain terraces.

Findings: The entire project site is mapped within Unit 2, Subunit A of designated SBKR critical habitat (Figure 6). The project proposes 1.62 acres of temporary impacts and 0.38 acre of permanent impacts. Therefore, the project will likely result in the loss of approximately 0.38 acre of suitable SBKR critical habitat.

The proposed construction would affect approximately 0.38 acre of SBKR critical habitat. As such, the project would affect approximately 0.003 percent of the total 12,289 acres of SBKR critical habitat that comprise Unit 2, Subunit A.

3.8.2 Arroyo Toad Critical Habitat

Based on our current knowledge of the biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, we determined the arroyo toad's PCEs are:

(1) Rivers or streams with hydrologic regimes that supply water to provide space, food, and cover needed to sustain eggs, tadpoles, metamorphosing juveniles, and adult breeding toads. Breeding pools must persist a minimum of 2 months for the completion of larval development. However, due to the dynamic nature of southern California riparian systems and flood regimes, the location of suitable breeding pools may vary from year to year. Specifically, the conditions necessary to allow for successful reproduction of arroyo toads are:

- Breeding pools that are less than 6 in (15 cm) deep;
- Areas of flowing water with current velocities less than 1.3 ft per second (40 cm per second); and
- Surface water that lasts for a minimum of 2 months during the breeding season (a sufficient wet period in the spring months to allow arroyo toad larvae to hatch, mature, and metamorphose).

(2) Riparian and adjacent upland habitats, particularly low-gradient (typically less than 6 percent) stream segments and alluvial streamside terraces with sandy or fine gravel substrates that support the formation of shallow pools and sparsely vegetated sand and gravel bars for breeding and rearing of tadpoles and juveniles; and adjacent valley bottomlands that include areas of loose soil where toads can burrow underground, to provide foraging and living areas for juvenile and adult arroyo toads.

(3) A natural flooding regime, or one sufficiently corresponding to natural, that: (A) Is characterized by intermittent or near-perennial flow that contributes to the persistence of shallow pools into at least mid-summer; (B) Maintains areas of open, sparsely vegetated, sandy stream channels and terraces by periodically scouring riparian vegetation; and (C) Also modifies stream channels and terraces and redistributes sand and sediment, such that breeding pools and terrace habitats with scattered vegetation are maintained.

(4) Stream channels and adjacent upland habitats that allow for movement to breeding pools, foraging areas, overwintering sites, upstream and downstream dispersal, and connectivity to areas that contain suitable habitat.

The 2010 critical habitat designation for the arroyo toad encompasses 98,366 acres of land in Los Angeles, Orange, San Diego, Monterey, Santa Barbara, Ventura, Riverside and San Bernardino counties, California.

The areas designated as critical habitat for arroyo toad and are identified in 22 separate units. The 22 units are within the geographical range of the arroyo toad and support the habitat the species requires for foraging, sheltering, reproduction, rearing of young, dispersal, and genetic exchange. The project site falls within the Upper Santa Ana River Basin/Cajon Wash critical habitat Unit (Unit 20), located in San Bernardino County. Unit 20 encompasses approximately 1,775 ac, and includes the Lytle Creek and Cajon Wash. This unit contains upland refugia and tributaries that are occupied by the species, active hydrological channels, floodplain terraces, and areas of habitat immediately adjacent to floodplain terraces.

Findings: The entire project site is mapped within Unit 20 of designated arroyo toad critical habitat (Figure 7). The project proposes 0.38 acre of permanent impacts and 1.62 acres of temporary impacts. Therefore, the project will likely result in the loss of approximately 0.38 acre of suitable arroyo toad critical habitat.

The proposed construction would affect approximately 0.38 acre of arroyo toad critical habitat. As such, the project would affect approximately 0.02 percent of the total 1,775 acres of arroyo toad critical habitat that comprise Unit 20.

4 Conclusions and Recommendations

4.1 Sensitive Biological Resources

No State- and/or federally-listed threatened or endangered species were observed on site during the reconnaissance-level field survey or the protocol level surveys for CAGN and SBKR. Additionally, none of the sensitive habitats identified during the literature review (RAFSS) exists within the project site.

4.1.1 San Bernardino kangaroo rat

SBKR have been documented in the project vicinity and there is suitable habitat within the project area. However, focused trapping surveys were conducted on May 05 through May 9, 2020, to determine the presence or absence of SBKR on site. The result of those surveys was negative for SBKR and this species is considered absent from the project site. The project **will not affect** this species.

Recommendation: Although SBKR were not detected on site during focused survey efforts, the following measures are recommended to avoid and/or minimize any potential impacts to SBKR:

- Exclusion fence should be installed around the entire proposed project footprint, including all work areas, to exclude SBKR from entering the work zone from adjacent areas. Specifications for the fencing will be to the goal of SBKR exclusion and will be approved by the USFWS.

- A qualified biologist should perform a visual pre-construction survey within the construction footprint immediately prior to ground disturbing activities.

- An employee education program for all construction personnel will be developed and implemented by a biologist familiar with SBKR and its habitat. For the life of the Project, each employee (including temporary contractors and subcontractors) will receive a training/awareness program prior to conducting any work on the site.

- Construction should be monitored by a qualified biologist.

4.1.2 Coastal California gnatcatcher

The State- and federally-listed threatened CAGN is documented to occur close to the project area. Furthermore, the PCEs for this species (RAFSS with proximal non-sage scrub habitats) are present within the project site and surrounding areas. Therefore, CAGN are assumed to be present adjacent the project area. The project **will not affect** this species.

Although there is potential habitat with the surrounding areas, there is no potential habitat for this species within the project footprint. Additionally, a protocol level survey was completed by a permitted biologist and no individuals were observed.

Recommendation: Although CAGN were not detected on site during focused survey efforts, the following measures are recommended to avoid and/or minimize any potential impacts to CAGN:

- Worker Environmental Awareness Program (WEAP) training should be developed and implemented by a biologist familiar with CAGN and its habitat and provided for all construction personnel. For the life of the project, each employee (including temporary contractors and subcontractors) will receive WEAP training prior to conducting any work on the site.

- The entire proposed project footprint including disturbance limits should be visually delineated prior to ground disturbance, using brightly colored flagging, orange construction fence, or similar visual marker. All project activities shall be restricted to the work area and existing access roads and no personnel or equipment shall venture outside the marked boundaries.

- It is recommended that a qualified biologist be present on site to monitor all initial ground disturbance, rough grading, and work that could potentially affect sensitive biological resources that may occur within the project area.

4.1.3 Burrowing Owl

No BUOW individuals or sign have been observed within the vicinity of the subject property, nor have BUOW been historically (within the last 3 years) identified on or adjacent to the site. Based on information presented above, BUOW are considered absent from the proposed project area and there is no risk of the proposed project resulting in a "taking" of this species. No focused surveys for this species are recommended.

Recommendation: A qualified biologist be present on site to monitor all initial ground disturbance, rough grading, and work that could potentially affect sensitive biological resources that may occur within the project area.

4.1.4 Arroyo toad

The arroyo toad is a federally listed species with the USFWS. This species has been documented and/or observed within the project vicinity. Focused surveys will be completed prior to project initiation, and any individuals found within the exclusionary fencing will be relocated to suitable habitat outside the project area. Therefore, the project **will not affect** this species.

Recommendation: The following measures are recommended to avoid and/or minimize any potential impacts to arroyo toad:

- Exclusion fence should be installed around the entire proposed project footprint, including all work areas, to exclude arroyo toad from entering the work zone from adjacent areas. Specifications for the fencing will be to the goal of arroyo toad exclusion and will be approved by the USFWS.

- A qualified biologist should perform a visual pre-construction survey within the construction footprint immediately prior to ground disturbing activities.

- An employee education program for all construction personnel will be developed and implemented by a biologist familiar with arroyo toad and its habitat. For the life of the Project, each employee (including temporary contractors and subcontractors) will receive a training/awareness program prior to conducting any work on the site.

- Construction should be monitored by a qualified biologist.

4.2 Nesting birds

Vegetation suitable for nesting birds does exist within the project site and adjacent areas. As discussed, most birds are protected by the MBTA.

Recommendation: In general, impacts to all bird species (common and special status) can be avoided by conducting work outside of the nesting season, which is generally January/February to August/September. If all work cannot be conducted outside of nesting season, a pre-construction nesting bird survey should be conducted by an avian biologist to determine the nesting status on site. If no nests are found, no further action would be required. If any active nests are identified within the action area, then a project-specific Nesting Bird Management Plan would be prepared. The plan would outline monitoring requirements and possible buffer strategies. No-work buffer area would be based on the species, nesting stage, nest location, presence of visual buffers, proximity, intensity and duration of activity in relationship to the nest.

4.3 USFWS Designated Critical Habitat

The project site is within USFWS designated critical habitat for SBKR and arroyo toad approximately 0.38 acre of the proposed project footprint contains the PCEs described by the USFWS for SBKR critical habitat and arroyo toad critical habitat. Therefore, it is likely the project will result in the loss of approximately 0.003 percent of the total 12,289 acres of SBKR critical habitat that comprise Unit 2, Subunit A. and approximately 0.02 percent of the total 1,775 acres of arroyo toad critical habitat that comprise Unit 20. Therefore, consultation with the USFWS will likely be required.

4.4 Jurisdictional Streambed Resources

The Project area occurs entirely within areas that are subject to Sections 404 and 401 of the Clean Water Act, which is regulated by the US Army Corps of Engineers and the Regional Water Quality Control Board, as well as California Fish and Game Code Section 1600 which is regulated by the California Department of Fish and Wildlife. Jurisdictional waters permits will be required for this Project. Refer to the Jurisdictional Delineation Report.

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TABLES

Table 1.
Federally-listed as Threatened, Endangered, Proposed, or Candidate Species
Documented in the *Devore* and *Cajon*, USGS 7.5-minute Quadrangles,
San Bernardino County, California

Common Name	Scientific Name	Status	Documented Locally	Found Adjacent	Found on Site	Suitable Habitat	Determination of Project Affects
Fish							
Mohave tui Chub	*Siphateles bicolor mohavensis*	FE/SE	No	No	No	No	No Affect
Plants							
slender-horned spineflower	*Dodecahema leptoceras*	FE/SE	Yes	No	No	Yes	No Affect
Santa Ana River woollystar	*Eriastrum densifolium* ssp. *sanctorum*	FE/SE	No	No	No	No	No Affect
Amphibians							
arroyo Toad	*Anaxyrus californicus*	FE/SE	Yes	No	No	Yes	No Affect with Mitigation Measures
Southern mountain yellow-legged frog	*Rana muscosa*	FE/SE	Yes	No	No	No	No Affect
Birds							
Southwestern willow flycatcher	*Empidonax traillii extimus*	FE/SE	Yes	No	No	No	No Affect
coastal California gnatcatcher	*Polioptila californica californica*	FT	Yes	No	No	No	No Affect
least Bell's vireo	*Vireo bellii pusillus*	FE/SE	No	No	No	No	No Affect
Mammals							
San Bernardino kangaroo rat	*Dipodomys merriami parvus*	FE	Yes	No	No	Yes	No Affect with Mitigation Measures

Table 2. CNDDB Sensitive Species Documented in the *Devore* and *Cajon*, USGS 7.5-minute Quadrangles

Scientific Name	Common Name	Federal/State Listing	Other Status	Habitat	Potential to Occur
Ambrosia monogyra	singlewhorl burrobrush	None, None	G5, S2, 2B.2	Chaparral, Sonoran desert scrub. Sandy soils. 5-475 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Anaxyrus californicus	arroyo toad	Endangered, None	G2G3, S2S3, CDFW-SSC	Semi-arid regions near washes or intermittent streams, including valley-foothill and desert riparian, desert wash, etc. Rivers with sandy banks, willows, cottonwoods, and sycamores; loose, gravelly areas of streams in drier parts of range.	Although habitat does occur on site for this species. The focused surveys completed for this species indicate that it is not present within the project area. Potential for occurrence is **low.**
Anniella stebbinsi	southern California legless lizard	None, None	G3, S3, CDFW-SSC	Generally south of the Transverse Range, extending to northwestern Baja California. Occurs in sandy or loose loamy soils under sparse vegetation. Disjunct populations in the Tehachapi and Piute Mountains in Kern County. Variety of habitats; generally in moist, loose soil. They prefer soils with a high moisture content.	Although suitable habitat is present on site for this species. This species was observed during the survey. Potential for occurrence is **low.**
Arizona elegans occidentalis	California glossy snake	None, None	G5T2, S2, CDFW-SSC	Patchily distributed from the eastern portion of San Francisco Bay, southern San Joaquin Valley, and the Coast, Transverse, and Peninsular ranges, south to Baja California. Generalist reported from a range of scrub and grassland habitats, often with loose or sandy soils.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Artemisiospiza belli belli	Bell's sage sparrow	None, None	G5T2T3, S3, CDFW-WL	Nests in chaparral dominated by fairly dense stands of chamise. Found in coastal sage scrub in south of range. Nest located on the ground beneath a shrub or in a shrub 6-18 inches above ground. Territories about 50 yds apart.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Asclepias nyctaginifolia	Mojave milkweed	None, None	G4?, S2, 2B.1	Mojavean desert scrub, pinyon and juniper woodland. 775-1605 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Asio otus	long-eared owl	None, None	G5, S3?, CDFW-SSC	Riparian bottomlands grown to tall willows and cottonwoods; also, belts of live oak paralleling stream courses. Require adjacent open land, productive of mice and the presence of old nests of crows, hawks, or magpies for breeding.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Aspidoscelis tigris stejnegeri	coastal whiptail	None, None	G5T5, S3, CDFW-SSC	Found in deserts and semi-arid areas with sparse vegetation and open areas. Also found in woodland & riparian areas. Ground may be firm soil, sandy, or rocky.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Athene cunicularia	burrowing owl	None, None	G4, S3, CDFW-SSC	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Batrachoseps gabrieli	San Gabriel slender salamander	None, None	G2G3, S2S3, USFS-S	Known only from the San Gabriel Mtns. Found under rocks, wood, and fern fronds, and on soil at the base of talus slopes. Most active on the surface in winter and early spring.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Bombus crotchii	Crotch bumble bee	None, Candidate Endangered	G3G4, S1S2	Coastal California east to the Sierra-Cascade crest and south into Mexico. Food plant genera include Antirrhinum, Phacelia, Clarkia, Dendromecon, Eschscholzia, and Eriogonum.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.

Scientific Name	Common Name	Federal/State Listing	Other Status	Habitat	Potential to Occur
Calochortus palmeri var. palmeri	Palmer's mariposa-lily	None, None	G3T2, S2, 1B.2	Meadows and seeps, chaparral, lower montane coniferous forest. Vernally moist places in yellow-pine forest, chaparral. 195-2530 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Calochortus plummerae	Plummer's mariposa-lily	None, None	G4, S4, 4.2	Coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest. Occurs on rocky and sandy sites, usually of granitic or alluvial material. Can be very common after fire. 60-2500 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Canbya candida	white pygmy-poppy	None, None	G3G4, S3S4, 4.2, USFS-S	Joshua tree woodland, Mojavean desert scrub, pinyon and juniper woodland. Gravelly, sandy, granitic places. 600-1460 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Chaetodipus fallax fallax	northwestern San Diego pocket mouse	None, None	G5T3T4, S3S4, CDFW-SSC	Coastal scrub, chaparral, grasslands, sagebrush, etc. in western San Diego County. Sandy, herbaceous areas, usually in association with rocks or coarse gravel.	Although suitable habitat is present on site for this species, none were observed in the focused trapping session for SBKR. Occurrence Potential for this species is **low**.
Chaetodipus fallax pallidus	pallid San Diego pocket mouse	None, None	G5T34, S3S4, CDFW-SSC	Desert border areas in eastern San Diego County in desert wash, desert scrub, desert succulent scrub, pinyon-juniper, etc. Sandy, herbaceous areas, usually in association with rocks or coarse gravel.	Although suitable habitat is present on site for this species, none were observed in the focused trapping session for SBKR. Occurrence Potential for this species is **low**.
Chorizanthe parryi var. parryi	Parry's spineflower	None, None	G3T2, S2, 1B.1, USFS-S	Coastal scrub, chaparral, cismontane woodland, valley and foothill grassland. Dry slopes and flats; sometimes at interface of 2 vegetation types, such as chaparral and oak woodland. Dry, sandy soils. 90-1220 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Chorizanthe xanti var. leucotheca	white-bracted spineflower	None, None	G4T3, S3, 1B.2, USFS-S	Mojavean desert scrub, pinyon and juniper woodland, coastal scrub (alluvial fans). Sandy or gravelly places. 365-1830 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Dipodomys merriami parvus	San Bernardino kangaroo rat	Endangered, Candidate Endangered	G5T1, S1, CDFW-SSC	Alluvial scrub vegetation on sandy loam substrates characteristic of alluvial fans and flood plains. Needs early to intermediate seral stages.	Although suitable habitat is present on site for this species, none were observed in the focused trapping session for SBKR. Occurrence Potential for this species is **low**.
Dodecahema leptoceras	slender-horned spineflower	Endangered, Endangered	G1, S1, 1B.1	Chaparral, cismontane woodland, coastal scrub (alluvial fan sage scrub). Flood deposited terraces and washes; associates include Encelia, Dalea, Lepidospartum, etc. Sandy soils. 200-765 m.	Although suitable habitat is present on site for this species, none were observed in the during the site visit. Occurrence Potential for this species is **low**.
Empidonax traillii extimus	southwestern willow flycatcher	Endangered, Endangered	G5T2, S1	Riparian woodlands in Southern California.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Eriastrum densifolium ssp. sanctorum	Santa Ana River woollystar	Endangered, Endangered	G4T1, S1, 1B.1	Coastal scrub, chaparral. In sandy soils on river floodplains or terraced fluvial deposits. 180-705 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Heuchera parishii	Parish's alumroot	None, None	G3, S3, 1B.3, USFS-S	Lower montane coniferous forest, subalpine coniferous forest, upper montane coniferous forest, alpine boulder & rock field. Rocky places. Sometimes on carbonate. 1340-3505 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Horkelia cuneata var. puberula	mesa horkelia	None, None	G4T1, S1, 1B.1, USFS-S	Chaparral, cismontane woodland, coastal scrub. Sandy or gravelly sites. 15-1645 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.

Scientific Name	Common Name	Federal/State Listing	Other Status	Habitat	Potential to Occur
Lepus californicus bennettii	San Diego black-tailed jackrabbit	None, None	G5T3T4, S3S4, CDFW-SSC	Intermediate canopy stages of shrub habitats & open shrub / herbaceous & tree / herbaceous edges. Coastal sage scrub habitats in Southern California.	Although suitable habitat is present on site for this species, none were observed in the during the site visit. Occurrence Potential for this species is **low**.
Lilium parryi	lemon lily	None, None	G3, S3, 1B.2, USFS-S	Lower montane coniferous forest, meadows and seeps, riparian forest, upper montane coniferous forest. Wet, mountainous terrain; generally in forested areas; on shady edges of streams, in open boggy meadows & seeps. 625-2930 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Lycium parishii	Parish's desert-thorn	None, None	G4, S1, 2B.3	Coastal scrub, Sonoran desert scrub. -3-570 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Malacothamnus parishii	Parish's bush-mallow	None, None	GXQ, SX, 1A	Chaparral, coastal sage scrub. In a wash. 305-455 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Nyctinomops femorosaccus	pocketed free-tailed bat	None, None	G4, S3, CDFW-SSC	Variety of arid areas in Southern California; pine-juniper woodlands, desert scrub, palm oasis, desert wash, desert riparian, etc. Rocky areas with high cliffs.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Opuntia basilaris var. brachyclada	short-joint beavertail	None, None	G5T3, S3, 1B.2, USFS-S	Chaparral, Joshua tree woodland, Mojavean desert scrub, pinyon and juniper woodland. Sandy soil or coarse, granitic loam. 425-2015 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Perognathus longimembris brevinasus	Los Angeles pocket mouse	None, None	G5T1T2, S1S2, CDFW-SSC	Lower elevation grasslands and coastal sage communities in and around the Los Angeles Basin. Open ground with fine, sandy soils. May not dig extensive burrows, hiding under weeds and dead leaves instead.	Although suitable habitat is present on site for this species, none were observed in the focused trapping session for SBKR. Occurrence Potential for this species is **low**.
Phrynosoma blainvillii	coast horned lizard	None, None	G3G4, S3S4, CDFW-SSC	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes. Open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant supply of ants and other insects.	Although suitable habitat is present on site for this species, none were observed in the during the site visit. Occurrence Potential for this species is **low**.
Polioptila californica californica	coastal California gnatcatcher	Threatened, None	G4G5T2Q, S2, CDFW-SSC	Obligate, permanent resident of coastal sage scrub below 2500 ft in Southern California. Low, coastal sage scrub in arid washes, on mesas and slopes. Not all areas classified as coastal sage scrub are occupied.	Although suitable habitat is present on site for this species, none were observed during the focused survey for this species. Occurrence Potential for this species is **low**.
Rana muscosa	southern mountain yellow-legged frog	Endangered, Endangered	G1, S1, CDFW-WL	Federal listing refers to populations in the San Gabriel, San Jacinto and San Bernardino mountains (southern DPS). Northern DPS was determined to warrant listing as endangered, Apr 2014, effective Jun 30, 2014. Always encountered within a few feet of water. Tadpoles may require 2 - 4 yrs to complete their aquatic development.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Rhinichthys osculus ssp. 3	Santa Ana speckled dace	None, None	G5T1, S1, CDFW-SSC	Headwaters of the Santa Ana and San Gabriel rivers. May be extirpated from the Los Angeles River system. Requires permanent flowing streams with summer water temps of 17-20 C. Usually inhabits shallow cobble and gravel riffles.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Riversidian Alluvial Fan Sage Scrub	Riversidian Alluvial Fan Sage Scrub	None, None	G1, S1.1	Coastal scrub	This habitat **does not** occur within the project area.

Scientific Name	Common Name	Federal/State Listing	Other Status	Habitat	Potential to Occur
Schoenus nigricans	black bog-rush	None, None	G4, S2, 2B.2, USFS-S	Marshes and swamps. Often in alkaline marshes. 120-1525 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Setophaga petechia	yellow warbler	None, None	G5, S3S4, CDFW-SSC	Riparian plant associations in close proximity to water. Also nests in montane shrubbery in open conifer forests in Cascades and Sierra Nevada. Frequently found nesting and foraging in willow shrubs and thickets, and in other riparian plants including cottonwoods, sycamores, ash, and alders.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Siphateles bicolor mohavensis	Mohave tui chub	Endangered, Endangered	G4T1, S1, CDFW-FP	Endemic to the Mojave River basin, adapted to alkaline, mineralized waters. Needs deep pools, ponds, or slough-like areas. Needs vegetation for spawning.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Southern Riparian Forest	Southern Riparian Forest	None, None	G4, S4	Riparian forest	This habitat **does not** occur within the project area.
Southern Sycamore Alder Riparian Woodland	Southern Sycamore Alder Riparian Woodland	None, None	G4, S4	Riparian woodland	This habitat **does not** occur within the project area.
Streptanthus bernardinus	Laguna Mountains jewelflower	None, None	G3G4, S3S4, 4.3	Chaparral, lower montane coniferous forest. Clay or decomposed granite soils; sometimes in disturbed areas such as streamsides or roadcuts. 1440-2500 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Symphyotrichum defoliatum	San Bernardino aster	None, None	G2, S2, 1B.2	Meadows and seeps, cismontane woodland, coastal scrub, lower montane coniferous forest, marshes and swamps, valley and foothill grassland. Vernally mesic grassland or near ditches, streams and springs; disturbed areas. 3-2045 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Symphyotrichum greatae	Greata's aster	None, None	G2, S2, 1B.3	Chaparral, cismontane woodland, broadleafed upland forest, lower montane coniferous forest, riparian woodland. Mesic canyons. 335-2015 m.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Taxidea taxus	American badger	None, None	G5, S3, CDFW-SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Thamnophis hammondii	two-striped gartersnake	None, None	G4, S3S4, CDFW-SSC	Coastal California from vicinity of Salinas to northwest Baja California. From sea to about 7,000 ft elevation. Highly aquatic, found in or near permanent fresh water. Often along streams with rocky beds and riparian growth.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.
Vireo bellii pusillus	least Bell's vireo	Endangered, Endangered	G5T2, S2	Summer resident of Southern California in low riparian in vicinity of water or in dry river bottoms; below 2000 ft. Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, Baccharis, mesquite.	Suitable habitat for this species does not occur onsite. Potential for occurrence is **low**.

Coding and Terms

E = Endangered T = Threatened C = Candidate FP = Fully Protected SSC = Species of Special Concern R = Rare

State Species of Special Concern: An administrative designation given to vertebrate species that appear to be vulnerable to extinction because of declining populations, limited acreages, and/or continuing threats. Raptor and owls are protected under section 3502.5 of the California Fish and Game code: "It is unlawful to take, possess or destroy any birds in the orders Falconiformes or Strigiformes or to take, possess or destroy the nest or eggs of any such bird."

State Fully Protected: The classification of Fully Protected was the State's initial effort in the 1960's to identify and provide additional protection to those animals that were rare or faced possible extinction. Lists were created for fish, mammals, amphibians and reptiles. Fully Protected species may not be taken or possessed at any time and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research and relocation of the bird species for the protection of livestock.

Global Rankings (Species or Natural Community Level):

G1 = Critically Imperiled – At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
G2 = Imperiled – At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
G3 = Vulnerable – At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
G4 = Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5 = Secure – Common; widespread and abundant.

Subspecies Level: Taxa which are subspecies or varieties receive a taxon rank (T-rank**)** attached to their G-rank. Where the G-rank reflects the condition of the entire species, the T-rank reflects the global situation of just the subspecies. For example: the Point Reyes mountain beaver, *Aplodontia rufa* ssp. *phaea* is ranked G5T2. The G-rank refers to the whole species range i.e., *Aplodontia rufa.* The T-rank refers only to the global condition of ssp. *phaea*.

State Ranking:

S1 = Critically Imperiled – Critically imperiled in the State because of extreme rarity (often 5 or fewer populations) or because of factor(s) such as very steep declines making it especially vulnerable to extirpation from the State.
S2 = Imperiled – Imperiled in the State because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the State.
S3 = Vulnerable – Vulnerable in the State due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation from the State.
S4 = Apparently Secure – Uncommon but not rare in the State; some cause for long-term concern due to declines or other factors.
S5 = Secure – Common, widespread, and abundant in the State.

California Rare Plant Rankings (CNPS List):

1A = Plants presumed extirpated in California and either rare or extinct elsewhere.
1B = Plants rare, threatened, or endangered in California and elsewhere.
2A = Plants presumed extirpated in California, but common elsewhere.
2B = Plants rare, threatened, or endangered in California, but more common elsewhere.
3 = Plants about which more information is needed; a review list.
4 = Plants of limited distribution; a watch list.

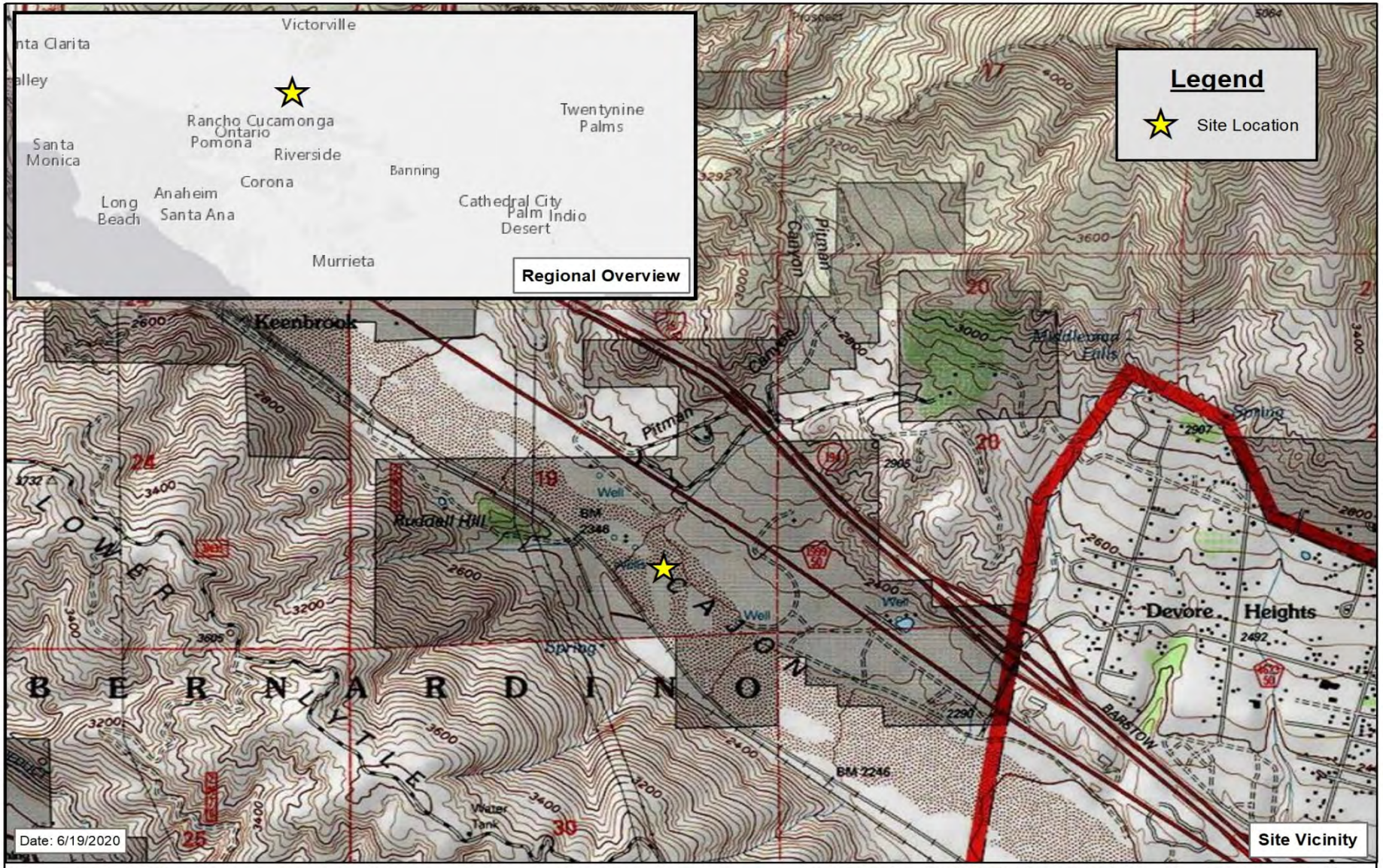
Threat Ranks:

.1 = Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 = Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
.3 = Not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

Table 3 – Plant Species Observed

Scientific Name	Common Name
Bromus diandrus	ripgut brome
Hordeum jubatum ssp. jubatum	foxtail barley
Pinus jeffreyi	Jeffery pine
Platanus racemosa	California sycamore
Eriodictyon californicum	California yerba santa
Eriodictycon trichocalyx var. *trichocalyx*	hairy yerba santa
Eriogonum fasciculatum	California buckwheat
Erodium cicutarium	Coastal heron's bill
Marah macrocarpa	chilicothe
Salvia mellifera	black sage
Phedra trifurca	Mormon tea
Arundo donax	giant reed
Nicotiana glauca	tree tobacco
Artemisia californica	California sagebrush
Hesperoyucca whipplei	chaparral yucca
Opuntia basilaris var. brachyclada	short joint beavertail
Lepidospartum squamatum	scale broom
Hirschfelida incana	yellow mustard
Amsinckia intermedia	common fiddleneck
Encelia farinose	white stemmed filaree

FIGURES



JERICHO SYSTEMS INCORPORATED

Figure 1 - Regional Overview
Site Vicinity

Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA

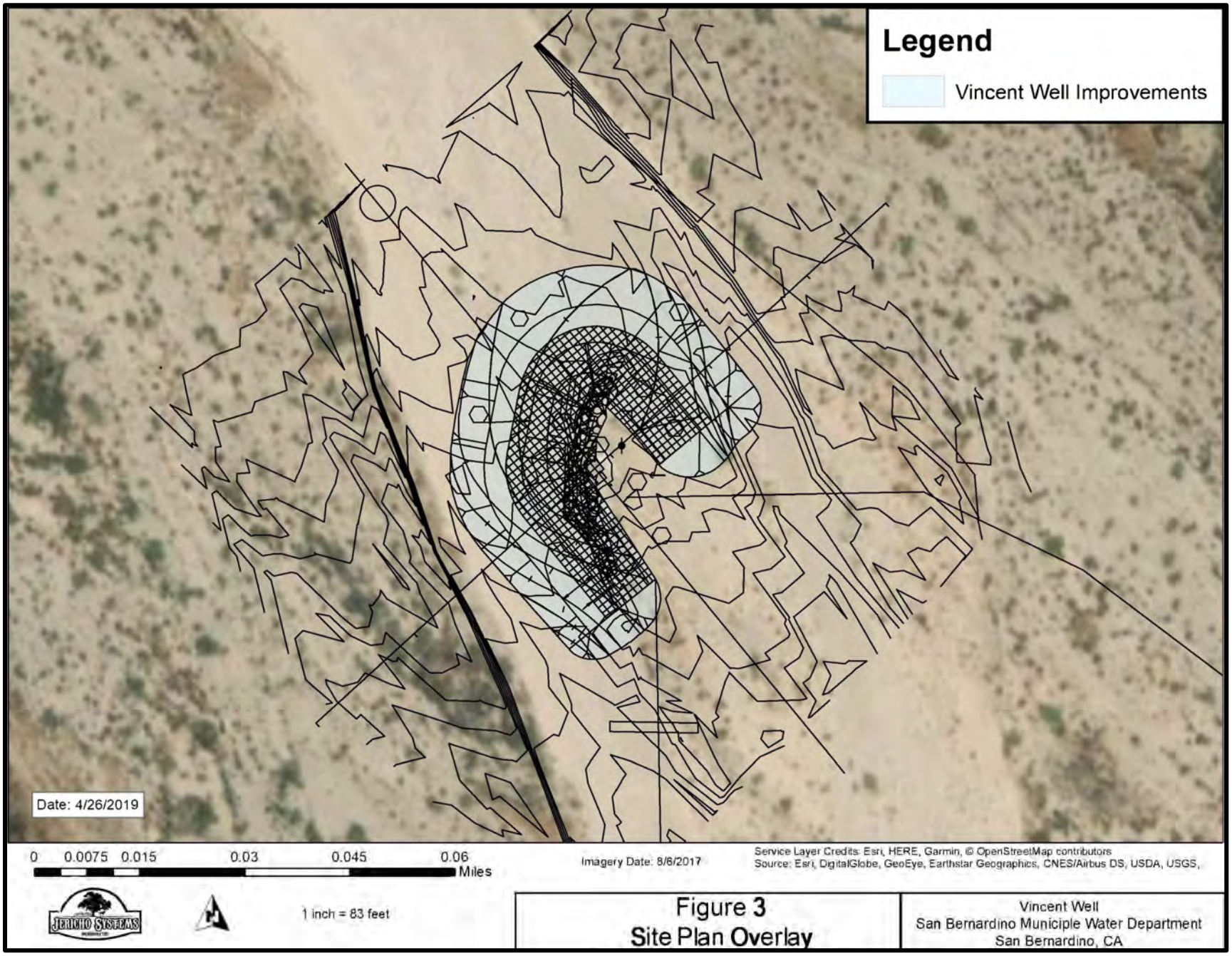
Imagery Date: 02/19/19

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

JERICHO SYSTEMS INCORPORATED

Figure 2 - Site Location

Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA


Legend
Vincent Well Improvements
Date: 4/26/2019
0 0.0075 0.015 0.03 0.045 0.06
Miles
Imagery Date: 8/6/2017
Service Layer Credits: Esri, HERE, Garmin, © OpenStreetMap contributors
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,
JERICHO SYSTEMS
1 inch = 83 feet
Figure 3
Site Plan Overlay
Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA

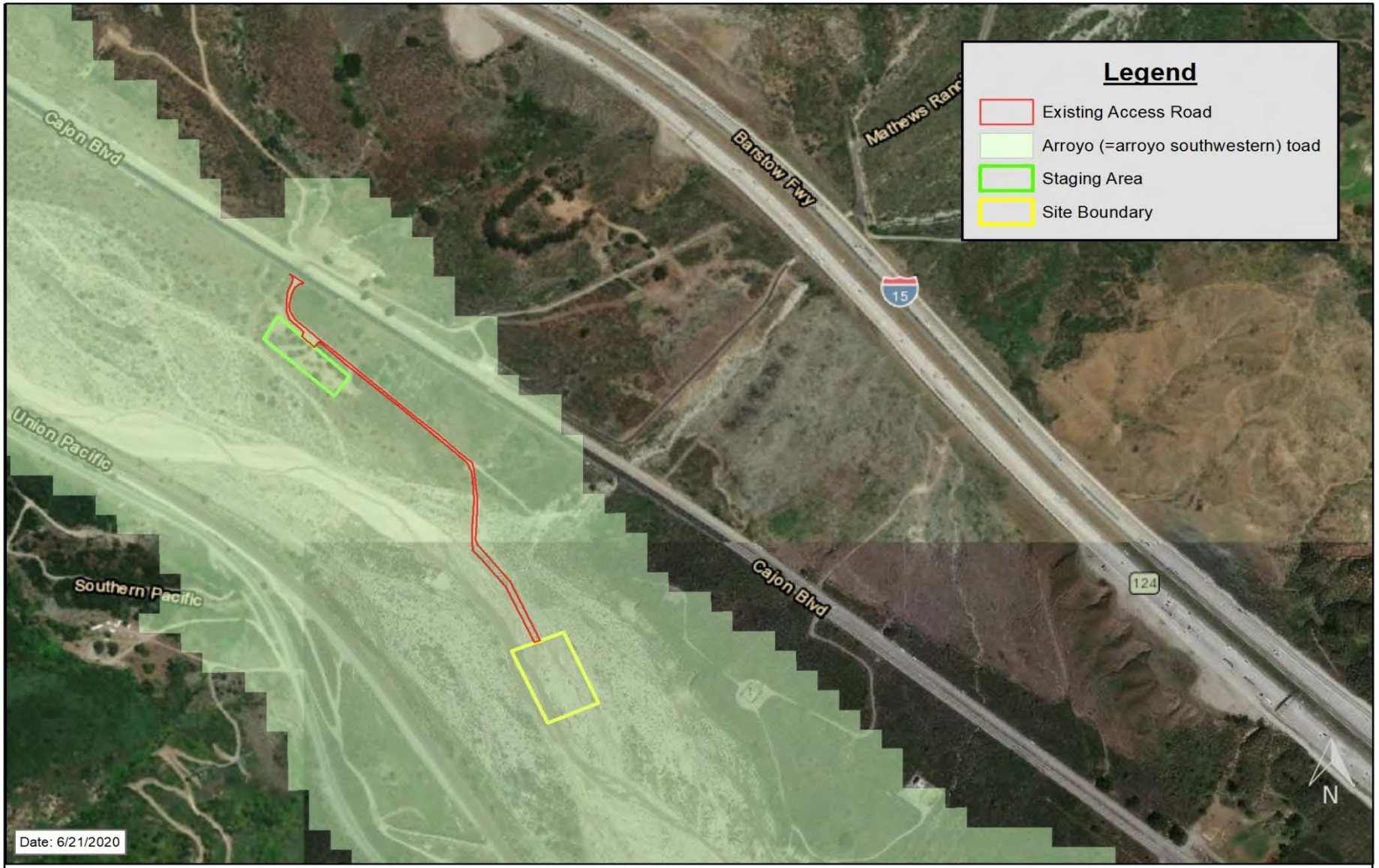

Legend
Existing Access Road
Staging Area
Site Boundary
Soboba-Hanford familes association
Riverwash-Soboba families association
Cajon Blvd
Mathews Ranch
Southern Pacific
Date: 6/21/2020
0 0.0375 0.075 0.15 0.225 0.3
Miles
Imagery Date: 02/19/19
Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
JERICHO SYSTEMS INCORPORATED
Figure 4 - Soils
Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA

Figure 5 - Sensitive Habitat Overlay

Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA

Figure 6 - SBKR Critical Habitat

Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA



JERICHO SYSTEMS INCORPORATED

Figure 7 - Arroyo Toad Critical Habitat

Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA

Appendix A
Site Photographs

	Photo 1 – Existing access road. Facing southeast.
	Photo 2 – Existing access road. Facing south, showing the right turn toward the river.

	Photo 3 – Staging area. Facing east.
	Photo 4 – Staging area. Facing south.

	Photo 5 – Proposed project area. Facing south. Showing structure to be protected.

	Photo 6 – Unvegetated sandy wash adjacent to project area. Facing south.

Appendix B
Jurisdictional Delineation Report

47 1st Street, Suite 1
Redlands, CA 92373-4601
(909) 307-5633

April 19, 2019

Emily Long, P.E. Associate Engineer
San Bernardino Municipal Water Department
Engineering Section
397 Chandler Place
San Bernardino, CA 92408

RE: Jurisdictional Delineation Report
Vincent Well Flood Protection and Stream Stabilization Improvements Spec. No. 1682
Cajon Wash, Devore, CA

Dear Ms. Long:

Jericho Systems Inc. is pleased to present this formal jurisdictional delineation (JD) conducted for the San Bernardino Municipal Water Department (Department) for the proposed Vincent Well Flood Protection and Stream Stabilization Improvement (Project). This letter report presents regulatory framework, methods, and results of our update of jurisdictional waters found in the proposed Project construction envelope. A summary of the regulatory framework applicable to this Project is provided in Attachment A.

BACKGROUND

The Department was created in 1905 as a municipal utility of the City of San Bernardino Charter and is governed by a Board of Water Commissioners. The Department obtains 100 percent of its water from the Bunker Hill Groundwater Basin, a sub-basin of the San Bernardino Basin Area. Management of this groundwater basin is coordinated through the San Bernardino Valley Municipal Water District. The Department's service area has expanded to include portions of the City of San Bernardino and portions of unincorporated areas of the County of San Bernardino and is bounded on the north by the San Bernardino National Forest, on the east by the East Valley Water District and Redlands Municipal Utilities Department, on the south by the cities of Loma Linda and Colton, and on the west by the West Valley Water District, the city of Rialto, and the Muscoy Mutual Water Company.

The Department served a population of approximately 199,657 in 2015, which is expected to increase to approximately 234,800 by the year 2040. Customers are generally made up of single-family residential (51 percent), multifamily residential, commercial/industrial, municipal/ government, and landscape (*2015 San Bernardino Valley Regional Urban Water Management Plan* [UWMP])

The Department has drawn 100 percent of its water from wells in the SBBA. Currently, water is derived from 57 groundwater wells located throughout its service area. The wells range from 50 to 1,300 feet in depth and have production capacities ranging from 50 to 3,500 gpm (2015 UWMP). Imported water is available to Department through the State Water Project water purchased from the San Bernardino Valley Municipal District. SBMWD has not used State Water Project water for direct potable use in the past five years and does not plan to use any in the future, except for water recharge projects.

The Vincent Well is one of the Department's water production wells that was originally constructed in the Cajon Wash in 1929 by the Muscoy Water Company, acquired by the Department in 1949, and redeveloped in the same location in 1968. The well was originally an 8-foot-wide by 69-foot deep metal caisson that contained weep holes for water collection. The Department redeveloped the well in 1968 by drilling within the existing caisson, an 8-inch diameter, 199-foot-deep production well. The well site contains the well, a small building that houses the well, and an associated electric utility pole that provides electricity. According to the Department records, the existing well building was replaced in 1983 in its current location, but there is no information as to when the building was originally constructed.

The Cajon Wash is an approximately 1,000 foot-wide braided channel that originates out of the San Gabriel mountains to the north and is a tributary to Lytle Creek to the south. Lytle Creek is a tributary to the Santa Ana River. The area of active low flow varies but is approximately 300 feet wide in the vicinity of the well.

Over the years, the building and well infrastructure has been subject to extreme erosion from flashy storms. In 2017, the well infrastructure was significantly compromised, and the Department obtained emergency permits from various agencies to place rock slope protection around the well site. The District is now seeking to provide a permanent solution to protect the well.

LOCATION

The Vincent Well is situated in the low-flow channel of Cajon Wash, within Section 19, Township 2 North, Range 5 West on the *Devore* U. S. Geological Survey's (USGS) 7.5-minute topographic map. More specifically, it is located west of Interstate 15 (I-15) and Cajon Boulevard, within the Cajon Wash, approximately 2 miles northwest (upstream) of the I-15/I-215 interchange, in an unincorporated area of San Bernardino County, California at approximately 34.240102 latitude and -117.440237 longitude (Figure 1 and Figure 2).

The well and well house are situated at approximately 2,309 feet mean sea level (msl) (Figure 3 and Figure 4). The actual elevation of the low flow channel of the wash varies with seasonal storms, but is roughly at the same elevation as the well infrastructure.

Project activities, including construction and the stockpile, will occur at the well site and within approximately 20 feet of the existing well infrastructure. The Project improvements will face north, to prevent the erosion as the water in the wash travels south, downstream. Access to the proposed Project site will be via an existing graded, unimproved access road that provides access from the west side of Cajon Boulevard through the wash, to the Vincent Well (Figure 5).

PROJECT DESCRIPTION

The proposed Project will construct a surface and subsurface stabilization system around the existing Vincent Well site. The proposed stabilization system will consist of a 3-foot-thick layer of gabion baskets laid along a 2:1 slope that will extend to 20 feet below existing grade. The top of the proposed baskets will be located at least 10 feet from the well building. The proposed layout of the 2:1 slope is in a horseshoe shape with the bottom of the horseshoe facing upstream of the well site. One horseshoe leg is on the west side of the well building, and the other leg is on the east side of the building. The layout leg on the west side will extend to approximately 80 feet south of the building. The layout leg on the east side will extend to approximately 20 feet south of the building (Figure 6).

The base width of the excavation will be 28 feet. Gabion baskets will be placed at the innermost 12 feet of the base and connected to the gabions along the slope. The entire system will be underlain by geotextile fabric.

The other slopes required to construct the system will be excavated at 1.5:1. Excavated material will be used to construct a berm upstream of the site to divert flows in Cajon Wash around the construction zone. After the gabions are in place, the excavated material will be used as backfill and finish grade material. The finish grade of the wash will return the natural channel to its existing grade, but the slope of the channels will be at least 20 feet clear of the existing building.

During construction, all existing utilities in the construction zone will be protected in place. The proposed construction area for stockpiling and construction will be placed around the work zone and is anticipated to be approximately 600 feet long by 600 feet wide, or approximately 8.2 acres.

The initial area of excavation is anticipated to encompass approximately 40,340 square feet or approximately 0.92 acre. Within that area, gabions will be installed within approximately 16,756 square feet, or approximately 0.38 acre. The remaining 23,584 square feet (0.54 acre) from the construction will be backfilled to the finished grade.

Approximately 16,240 cubic yards of soil will be excavated, backfilling approximately 15,840, and the balance of approximately 400 cubic yards will be exported. The gabion slope protection encompasses approximately 1,862 cubic yards with approximately 2,056 square yards of filter fabric that will be installed below grade.

Access to the site is via an existing graded road that extends from Cajon Boulevard, through the Cajon Wash, to the Vincent Well. The access road is approximately 2,368 linear feet from Cajon Boulevard to the well site and is approximately 12 feet wide. Of the approximately 2,368 linear feet, approximately 1,000 feet of the roadway (or approximately 0.28 acre) exists within the wash proper.

ENVIRONMENTAL SETTING

Located within Cajon Wash, the Project site is on the south side of the San Bernardino Mountains near the Devore area of San Bernardino County. The Devore area is subject to both seasonal and annual variations in temperature and precipitation. Average annual maximum temperatures typically peak at 96 degrees Fahrenheit (°F) in August, and fall to an annual minimum temperature of 41° F in December. Average annual precipitation is greatest from December through March and reaches a peak in February (3.83 inches). Precipitation is lowest in the month of July (0.04 inches). Annual precipitation averages 22.6 inches.

Soils in the project area consist of Riverwash-Soboba families association, 2 to 15 percent slopes. These series are characteristically excessively drained soils comprised of alluvium and is typical of alluvial flats. They consist of very cobbly sand to very cobbly loamy fine sand. Hydrologically, the subject parcel is located within the Bunker Hill Hydrologic Sub-Area (HSA 801.52) which comprises a 124,791 -acre drainage area within the larger Santa Ana Watershed (HUC 18070203).

The project site and associated access road are within habitat consisting primarily of scale broom scrub (*Lepidospartum squamatum* Shrubland Alliance) and ceanothus chaparral (*Ceanothus* ssp. Shrubland Alliance). Surrounding land uses include floodplain, open space, and transportation corridor.

STUDY METHODOLGY

The jurisdictional delineation was conducted using literature review and a field survey. Prior to the field visit, available databases and documentation relevant to the project site were reviewed. Historical aerial photographs were also examined to gain an understanding of the impact of land use on natural drainage patterns in the area. The U.S. Fish and Wildlife Service National Wetland Inventory and the Environmental Protection Agency (EPA) Water Program "My Waters" data layers were also reviewed to determine whether any hydrologic features and wetland areas had been documented within the vicinity of the site. Similarly, the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) soil maps for San Bernardino County were used to identify the soil series in the area and to check these soils to determine whether they are regionally identified as hydric soils. A complete list of references is provided as part of report.

The update JD was completed on December 28, 2018 with a follow up on January 3, 2019 by Jericho Biologist Regulatory Specialist Todd White. He conducted a Jurisdictional Delineation (JD) survey within the Project area based of the Plan set provided by the Department. Follow up plans on access and stock-pile locations were provided by the Department to Jericho on April 3, 2019. Those locations were reviewed in the field by Mr. White on April 4, 2019 to identify and delineate jurisdictional features subject to oversight by the California Department of Fish and Wildlife (CDFW), Regional Water Quality Control Board (RWQCB) and/or the U.S. Army Corps of Engineers (USACE). Delineators performed field delineation surveys following the methods set forth in:

- *Final Regional Supplement to the Corps of Engineers Wetland Delineation Manual Arid West Region (Version 2.0) (USACE 2008);*
- *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States;*
- *USACE Updated Datasheet for the Identification of the OHWM in the Arid West Region of the Western United States, July 2010*
- *Other established practices for conducting jurisdictional delineations per CDFW, RWQCB and USACE guidance.*

Representative photographs have been included in this report where necessary to indicate diversity of major differences in feature distribution along the survey area. Mr. White assessed the Project site for indicators of active surface flow.

The lateral extent of USACE jurisdiction was measured at the Active Flood Plain as directed in the 2010 Guidance document for determination of the Ordinary High Watermark (OHWM), which is indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and the presence of litter and debris.

Evaluation of CDFW jurisdiction followed guidance in the Fish and Game Code and *A Review of Stream Processes and Forms in Dryland Watersheds* (CDFW, 2010). Specifically, CDFW jurisdiction was delineated by measuring the elevations of land that confine a stream to a definite course when its waters rise to their highest level and to the extent of associated riparian vegetation. In the absence of riparian vegetation outside top of bank, the lateral extent of the CDFW jurisdiction encompasses the bank-full width which is measured from the top-to-top of each bank slope.

Other channel aspects assessed included bank height and morphology, substrate type, and vegetation within the streambed and adjacent to the streambed. The site was also assessed for indicators of wetlands (presence

of hydrophytic vegetation, staining, cracked soil, ponding, etc). Depressions/ponded areas where water appears likely to collect were also evaluated.

Wetland Hydrology Evaluation Criteria

Hydrophytic vegetation. Hydrophytic vegetation is plant life that grows, and is typically adapted for life, in permanently or periodically saturated soils. The hydrophytic vegetation criterion is met if more than 50 percent of the dominant plant species from all strata (tree, shrub, and herb layers) is considered hydrophytic. Hydrophytic species are those included on the 2013 National Wetland Plant List (Arid West Region) (Lichvar, 2013). Each species on the list is rated according to a wetland indicator category, as shown in Table 1. To be considered hydrophytic, the species must have *wetland indicator status*, i.e., be rated as OBL, FACW or FAC.

Table 1: Wetland Indicator Vegetation Categories

Category	Probability
Obligate Wetland (OBL)	Almost always occur in wetlands (estimated probability >99%)
Facultative Wetland (FACW)	Usually occur in wetlands (estimated probability 67 to 99%)
Facultative (FAC)	Equally likely to occur in wetlands and non-wetlands (estimated probability 34 to 66%)
Facultative Upland (FACU)	Usually occur in non-wetlands (estimated probability 67 to 99%)
Obligate Upland (UPL)	Almost always occur in non-wetlands (estimated probability >99%)

Hydric Soil. Soil maps from the USDA-NRCS Web Soil Survey (USDA 2015) were reviewed for soil types found within the subject property. Hydric soils are saturated or inundated long enough during the growing season to develop anaerobic conditions that favor growth and regeneration of hydrophytic vegetation. There are a number of indirect indicators that may signify the presence of hydric soils including hydrogen sulfide generation, the presence of iron and manganese concretions, certain soil colors, gleying, and the presence of mottling. Generally, hydric soils are dark in color or may be gleyed (bluish, greenish, or grayish), resulting from soil development under anoxic (without oxygen) conditions. Bright mottles within an otherwise dark soil matrix indicate periodic saturation with intervening periods of soil aeration. The hydric soil criterion is satisfied at a location if soils in the area can be inferred or observed to have a high groundwater table, if there is evidence of prolonged soil saturation, or if there are any indicators suggesting a long-term reducing environment in the upper part of the soil profile. Reducing conditions are most easily assessed using soil color. Soil colors were evaluated using the Munsell Soil Color Charts (Gretag/Macbeth, 2000).

Wetland Hydrology. The wetland hydrology criterion is satisfied at a location based upon conclusions inferred from field observations that indicate an area has a high probability of being inundated or saturated (flooded, ponded, or tidally influenced) long enough during the growing season to develop anaerobic conditions in the surface soil environment, especially the root zone (USACE, 1987 and 2008b).

RESULTS

The entire footprint of the Project is contained within the confines of Cajon Wash which is considered both State and federally jurisdictional. The regulatory framework applicable to this Project is provided in Attachment A.

The proposed Project is within the riparian zone which is the border or banks of a river or stream, or the area influence by that river or stream. Riparian zones support diverse and abundant terrestrial wildlife species, protect stream banks and adjacent land from erosion, and contribute

significantly to aquatic communities by providing shade, cover from predators, nutrients, a buffer from nearby land use activities, and a filter for overland soil erosion." (California Rivers Assessment, 1984)

The jurisdictions are generally described below, and more fully described in Attachment A.

Clean Water Act Jurisdictional Waters

Waters of the U.S. (WoUS) are defined as: "*All waters used in interstate or foreign commerce; all interstate waters including interstate wetlands; all other waters such as intrastate lakes, rivers, streams (including intermittent and ephemeral streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes or natural ponds, where the use, degradation, or destruction of which could affect interstate commerce; impoundments of these waters; tributaries of these waters; or wetlands adjacent to these waters*". The Federal Clean Water Act (CWA) jurisdiction exists over the following:

1. all traditional navigable waters (TNWs);
2. all wetlands adjacent to TNWs;
3. non-navigable tributaries of TNWs that are relatively permanent (RPW) (i.e., tributaries that typically flow year-round or have continuous flow at least seasonally); and
4. every water body determined to have a significant nexus with TNWs.

Cajon Wash provides a significant nexus to a TNW since it is tributary to the Santa Ana River which is tributary to the Pacific Ocean. Therefore, the Project area is subject to the jurisdiction of the CWA.

No wetlands were found onsite.

State of California Jurisdiction

The Project area meets the criteria of streambed subject to the California Fish and Game Code Section 1600 (FGC Section 1600) jurisdiction because defined channel bed and banks are present.

Table 2 includes a list of jurisdictional areas identified on the proposed project survey area, including average OHWM and bank-full width as well as temporary and permanent impact acreages. Area of impact was measured in each case by OHWM (Waters of the United States) and by bank-to-bank width (Waters of the State of California). The Jurisdictional Delineation Figures (Figures 1 Attachment B) identify all on-site jurisdictional areas.

Table 2: Summary of Acreages of Jurisdictional Waters on site

	TEMPORARY IMPACTS (Acres)*		**PERMANENT IMPACTS (Acres)**	
Feature	**WoUS -USACE**	**State streambed – CDFW and RWQCB**	**WoUS -USACE**	**State streambed – CDFW and RWQCB**
Cajon Creek	8.1	8.1	0.38	0.38

*Calculated as 8.2 acres of construction area and staging, plus 0.28 acre of access road, minus 0.38 acre of permanent impacts from the gabion structure that will be within the construction area.

CONCLUSIONS

The Project area occurs entirely within areas that are subject to Sections 404 and 401 of the CWA, which is regulated by the USACE and RWQCB, and FGC Section 1600 which is regulated by the CDFW.

The Project may also impact the sensitive Riversidian Alluvial Sage Scrub (RSS) habitat, as well as has the potential to impact sensitive species Arroyo toad, slender-horned spine flower, Santa Ana River woollystar, San Bernardino kangaroo rat and possibly California gnatcatcher. Any impacts to these species will also require consultations with the U.S. Fish and Wildlife Service (USFWS) and CDFW to determine if Incidental Take permits will be required under the California and federal Endangered Species Acts. Consultation with the USFWS will occur during the 404 permitting process with the USACE. Consultation with CDFW will occur during the Section 1600 permitting process.

FGC Section 1600 Compliance

This Project will require a Streambed Alteration Agreement from the CDFW. The CDFW will also require the Department to demonstrate compliance with the California Environmental Quality Act (CEQA) prior to issuing any permit. The CEQA document, as well as all follow-on permitting, will likely require either focused studies for sensitive species, or an assumed incidental take for the species. In any event, mitigation will be required.

Clean Water Act Compliance

The Project will require CWA Sections 401/404 permits from the RWQCB and USACE respectively. The area of permanent impact could qualify as a Section 404 Nationwide Permit from the USACE.

Mitigation

During the various permitting processes, mitigation will be required to offset the permanent impacts to jurisdictional streambed as well as endangered species. While the actual ratio will be determined by the agencies, Jericho's experience is that the federal and State agencies typically require a minimum of 2:1 mitigation as impact ratios.

Mitigation may occur through the purchase of in lieu fee credits from an authorized bank or by providing permittee responsible mitigation by way of environmental restoration, creation, enhancement, and management with accompanying Habitat Mitigation Reporting Plan (HMMP). Included within the USACE's Special Public Notice on Restoration Guidelines and Monitoring Requirements (2004), Lewis (1990) defined these these terms to mean:

- **Restoration** –the process of reestablishing the site to a defined, indigenous, historical state
- **Creation** - the process of creating a new habitat where one did not exist before
- **Enhancement** - the alteration of a site for improvement to a targeted state
- **Management** - actions that ensure project goals will be met, long- and short-term

Please do not hesitate to contact me at 909-915-5900 should you have any questions or require further information.

Sincerely,

Shay Lawrey, President
Ecologist/Regulatory Specialist

Attachments:

Attachment A – Regulatory Framework and Relative Regulatory Agencies
Attachment B – Figures
Attachment C – Feature Photos
Attachment D – Project Plans

Regulatory Framework and Relevant Regulatory Agencies

Clean Water Act (CWA)

The CWA is the principal federal law that governs pollution in the nation's lakes, rivers, and coastal waters. Originally enacted in 1972 as a series of amendments to the Federal Water Pollution Control Act of 1948 the Act was last amended in 1987. The overriding purpose of the CWA is to "restore and maintain the chemical, physical and biological integrity of the nation's waters." The statute employs a variety of regulatory and non-regulatory tools to eliminate the discharge of pollutants into the nation's waters and achieve water quality that is both "swimmable and fishable". Section 303 of CWA requires that states establish ambient water quality standards for water bodies, consisting of the beneficial use or uses of a water body (e.g. recreation, public water supply, etc.), and the water quality criteria necessary to protect the use or uses. Section 303(d) requires states to identify waters that are impaired by pollution, even after application of pollution controls.

Discharges of dredged or fill material in waters of the United States (WUS) are regulated pursuant to Section 404 of the CWA. WUS are defined as follows:

- All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
- All interstate waters including interstate wetlands;
- All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters: (i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or (ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (iii) Which are used or could be used for industrial purpose by industries in interstate commerce;
- All impoundments of waters otherwise defined as WUS under the definition;
- Tributaries of WUS;
- The territorial seas;
- Wetlands adjacent to WUS (other than waters that are themselves wetlands).

In the Arid West Region non-wetland waters are identified by the ordinary high water mark (OHWM) in ephemeral and intermittent channels (USACE, 2008a). The OHWM is as: "…that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impresses on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas." Identification of OHWM involves assessments of stream geomorphology and vegetation response to the dominant stream discharge. Determining whether any non-wetland water is a jurisdictional WoUS involves further assessment in accordance with the regulations, case law, and clarifying guidance as discussed below. Wetlands are defined as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

Sections 404 and 401 of the Federal CWA are founded on a connection, or nexus, between the water body in question and traditionally navigable waters, such as the Pacific Ocean or interstate commerce.

California Fish and Game Code

Sections 1600 to 1616 of the California Fish and Game Code require any person, state, or local government agency or public utility to notify the California Department of Fish and Game (CDFG) before beginning any activity that will substantially modify a river, stream, or lake. Impacts to features that meet the definition of streambed in Section 1600 of the FGC would require a Lake and Streambed Alteration Agreement.

U.S. Army Corps of Engineers

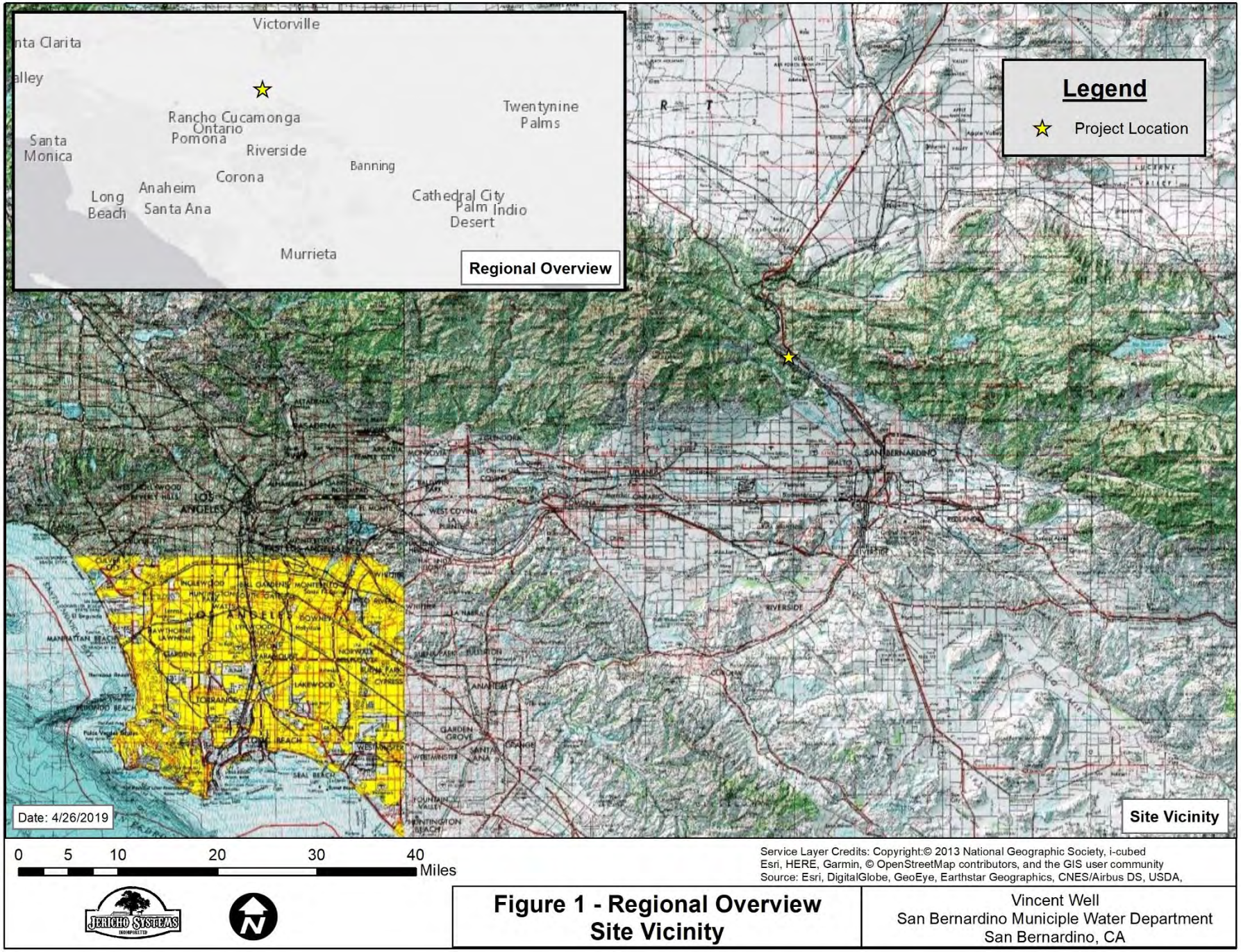
The USACE regulates discharges of dredged or fill material into waters of the United States. Waters of the United States include wetlands and non-wetland bodies of water that meet specific criteria. The USACE' regulatory jurisdiction pursuant to Sections 404 and 401 of the Federal CWA is founded on a connection, or nexus, between the water body in question and interstate commerce. This connection may be direct through a tributary system linking a stream channel with traditional navigable waters used in interstate or foreign commerce, or may be indirect, through a nexus identified in the USACE regulations. One of the mechanisms adopted by Congress to achieve restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters is a prohibition on the discharge of any pollutants, including dredged or fill material, into "navigable waters" except in compliance with other specified sections of the Act.

Regional Water Quality Control Board

The RWQCB's regulatory jurisdiction is pursuant to Section 401 of the Federal CWA. The RWQCB typically regulates discharges of dredged or fill material into Waters of the United States, however they also have regulatory authority over waste discharges into Waters of the State, which may be isolated, under the Porter-Cologne Water Quality Control Act issued by the State Water Resources Board. In the absence of a nexus with the Corps, the Regional Board requires the submittal of a Waste Discharge Requirement (WDR) application, which must include a copy of the project Stormwater Pollution Prevention Plan (SWPPP) and a copy of the project Water Quality Management Plan (WQMP), otherwise called a Standard Urban Stormwater Management Plan (SUSMP). The Regional Board's role is to ensure that disturbances in the stream channel do not cause water quality degradation.

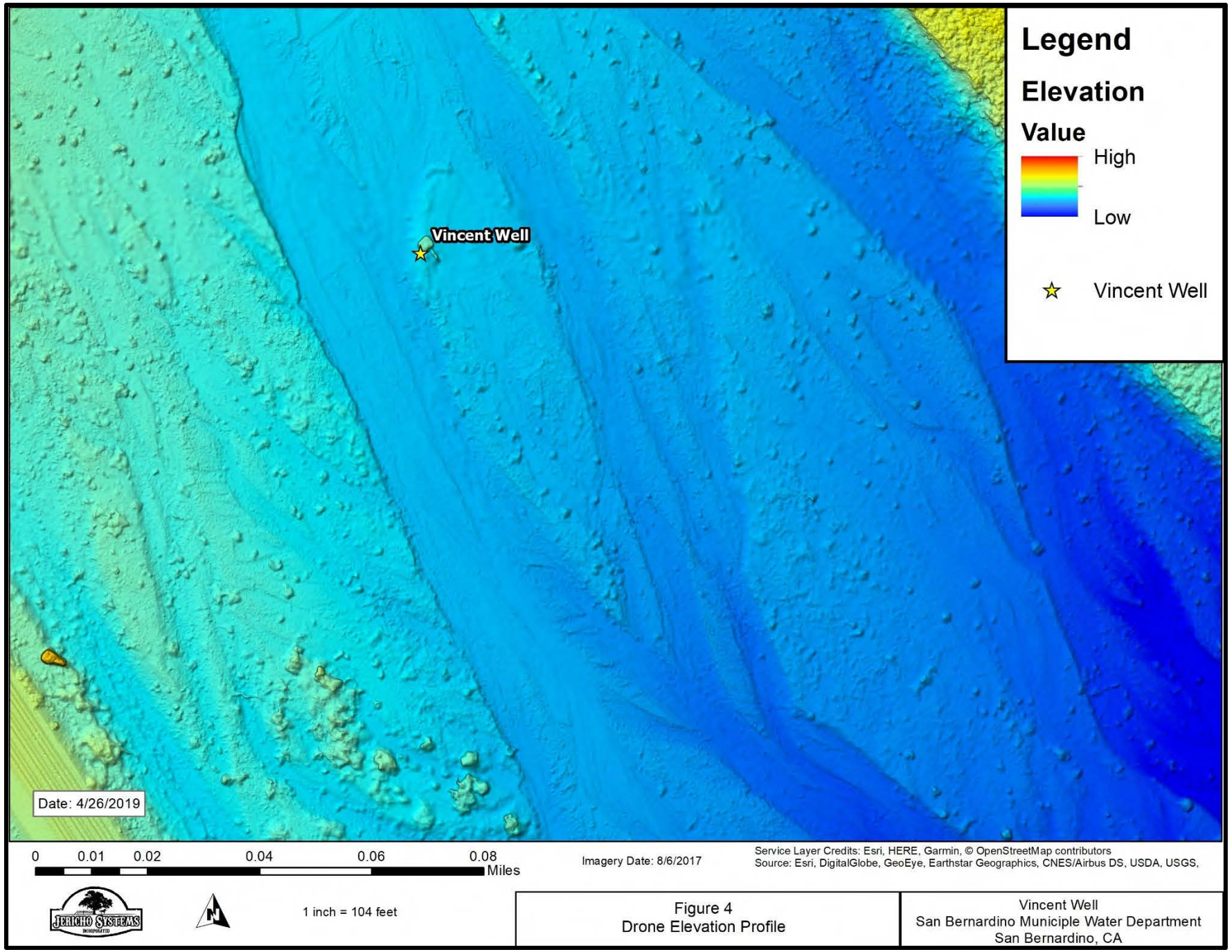
California Department of Fish and Wildlife (formerly Fish and Game)

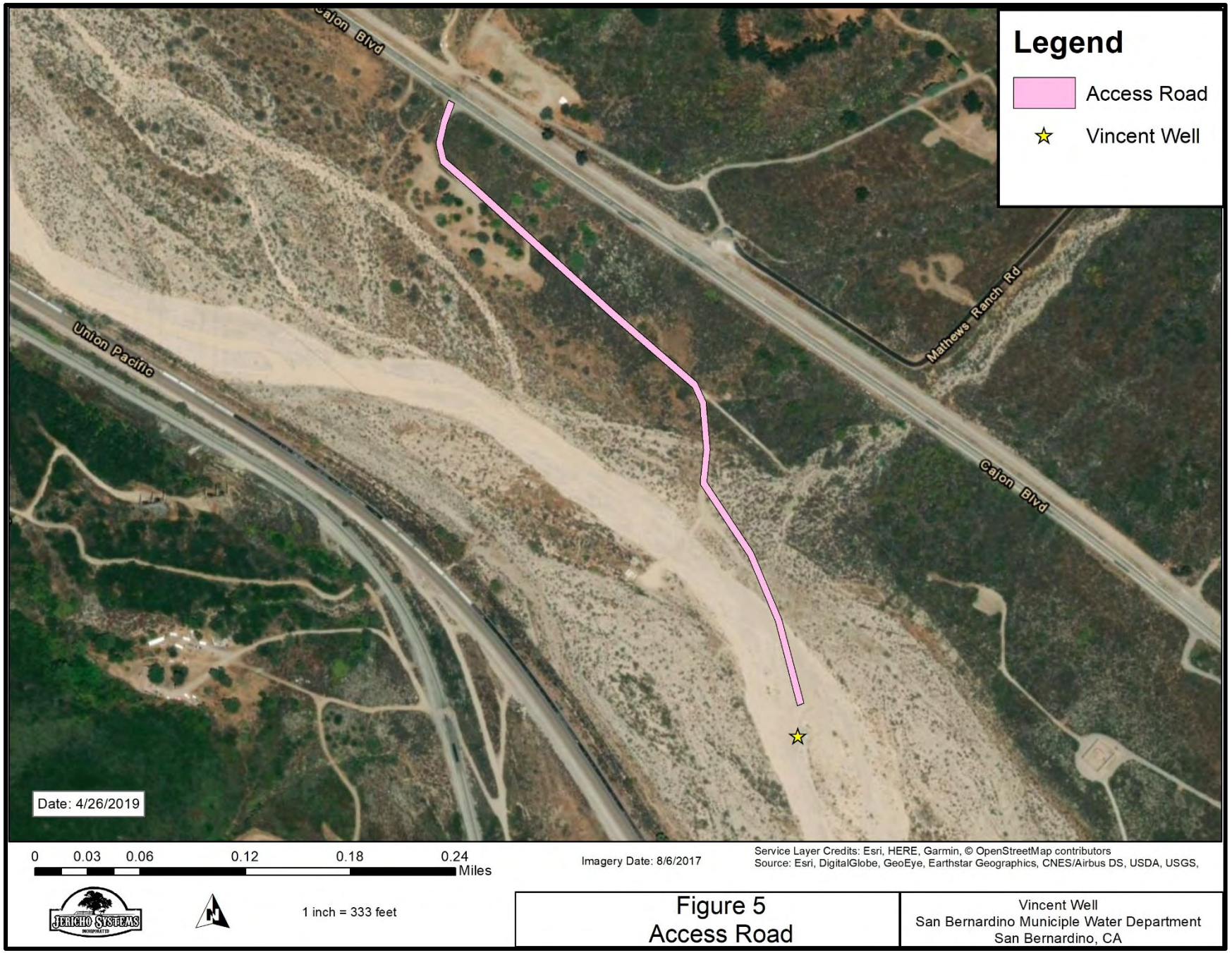
Unlike the Corps, CDFW regulates not only the discharge of dredged or fill material, but all activities that alter streams and lakes and their associated habitats. The CDFW, through provisions of the California Fish and Game Code (Sections 1601-1603), is empowered to issue agreements for any alteration of a river, stream, or lake where fish or wildlife resources may be adversely affected. Streams (and rivers) are defined by the presence of a channel bed and banks, and at least an intermittent flow of water. The CDFW typically extends the limits of their jurisdiction laterally beyond the channel banks for streams that support riparian vegetation. In these situations, the outer edge of the riparian vegetation is generally used as the lateral extent of the stream and CDFW jurisdiction. CDFW regulates wetland areas only to the extent that those wetlands are a part of a river, stream, or lake as defined by CDFW.


Victorville
Rancho Cucamonga
Ontario
Pomona
Riverside
Corona
Anaheim
Santa Ana
Long Beach
Santa Monica
Banning
Twentynine Palms
Cathedral City
Palm Desert
Indio
Murrieta
Regional Overview
Legend
Project Location
Site Vicinity
Date: 4/26/2019
0 5 10 20 30 40 Miles
Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA,
JERICHO SYSTEMS
Figure 1 - Regional Overview
Site Vicinity
Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA


Legend
Vincent Well
Access Points
Mathews Ranch Rd
Cajon Blvd
Date: 4/22/2019
0 0.03 0.06 0.12 0.18 0.24
Miles
Imagery Date: 8/6/2017
Service Layer Credits: Esri, HERE, Garmin, © OpenStreetMap contributors
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,
1 inch = 333 feet
Figure 2
Site Location
Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA


Vincent Well
Survey Area and Elevation Profile
Imagery Date: February 2018
2/2018
Legend
Elevation Profile
Vincent Well Survey Area
Well Location
Cajon Blvd
2309 ft
615 ft
0.4%
Graph: Min, Avg, Max Elevation: 2304, 2311, 2341 ft
Range Totals: Distance: 1144 ft Elev Gain/Loss: 47.4 ft, -32.2 ft Max Slope: 67.9%, -38.3% Avg Slope: 6.6%, -5.5%
2341 ft
2325 ft
2304 ft
2309 ft
0.4%
250 ft
500 ft
615 ft
750 ft
1000 ft
1144 ft
N
Google Earth
0
0.189
Miles
Imagery Date: 02/2018
Service Layer Credits: Esri, HERE, Garmin, © OpenStreetMap contributors
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,
Map Source: San Bernardino Municipal Water Department
JERICHO SYSTEMS
Figure 3
Elevation Profile
San Bernardino Municipal Water Department–
Vincent Well Jurisdictional Delineation


Legend
Elevation
Value
High
Low
Vincent Well
Vincent Well
Date: 4/26/2019
0 0.01 0.02 0.04 0.06 0.08
Miles
Imagery Date: 8/6/2017
Service Layer Credits: Esri, HERE, Garmin, © OpenStreetMap contributors
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,
JERICHO SYSTEMS
1 inch = 104 feet
Figure 4
Drone Elevation Profile
Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA


Legend
Access Road
Vincent Well
Cajon Blvd
Mathews Ranch Rd
Union Pacific
Cajon Blvd
Date: 4/26/2019
0 0.03 0.06 0.12 0.18 0.24
Miles
Imagery Date: 8/6/2017
Service Layer Credits: Esri, HERE, Garmin, © OpenStreetMap contributors
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,
JERICHO SYSTEMS INCORPORATED
1 inch = 333 feet
Figure 5
Access Road
Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA

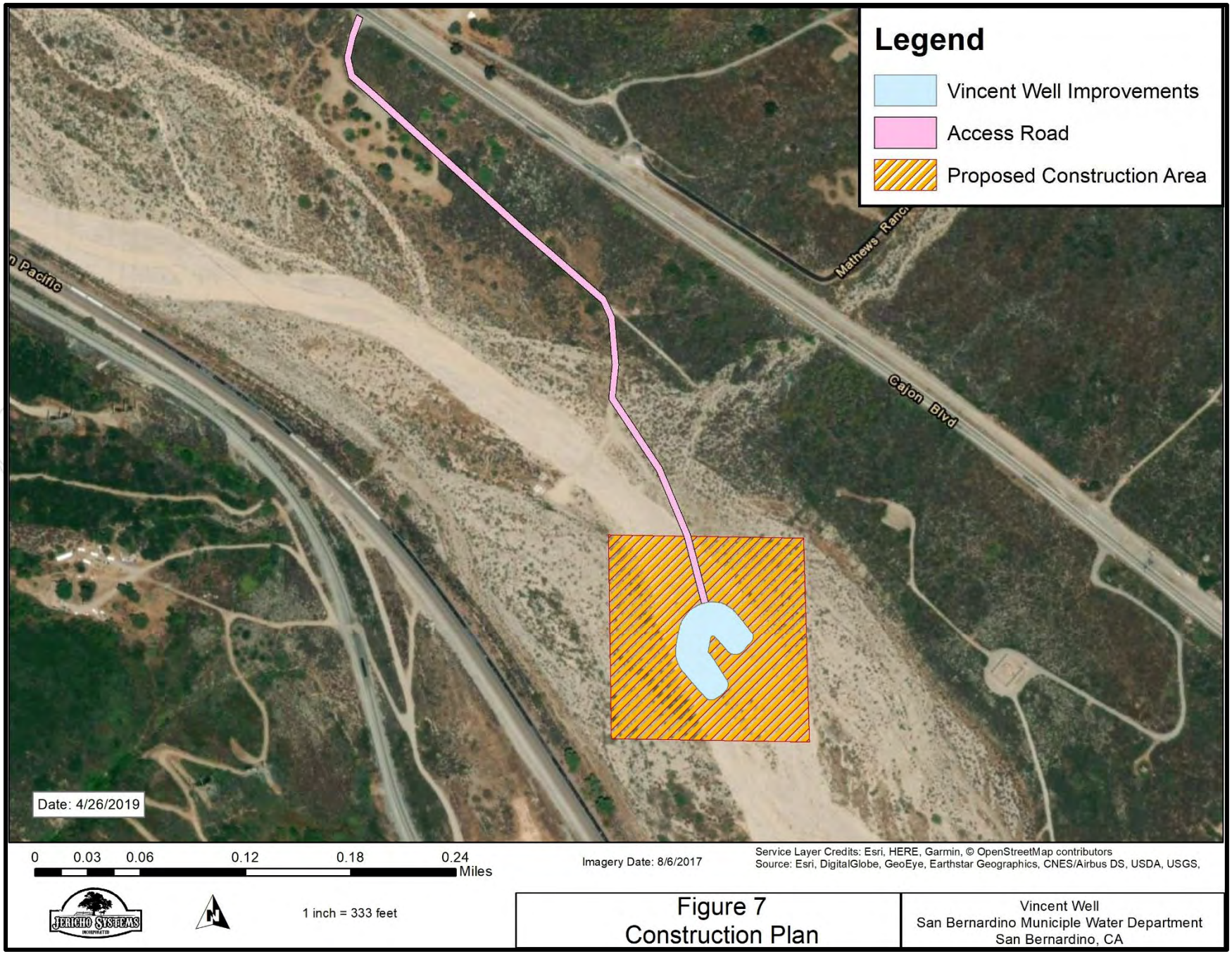
Date: 4/26/2019

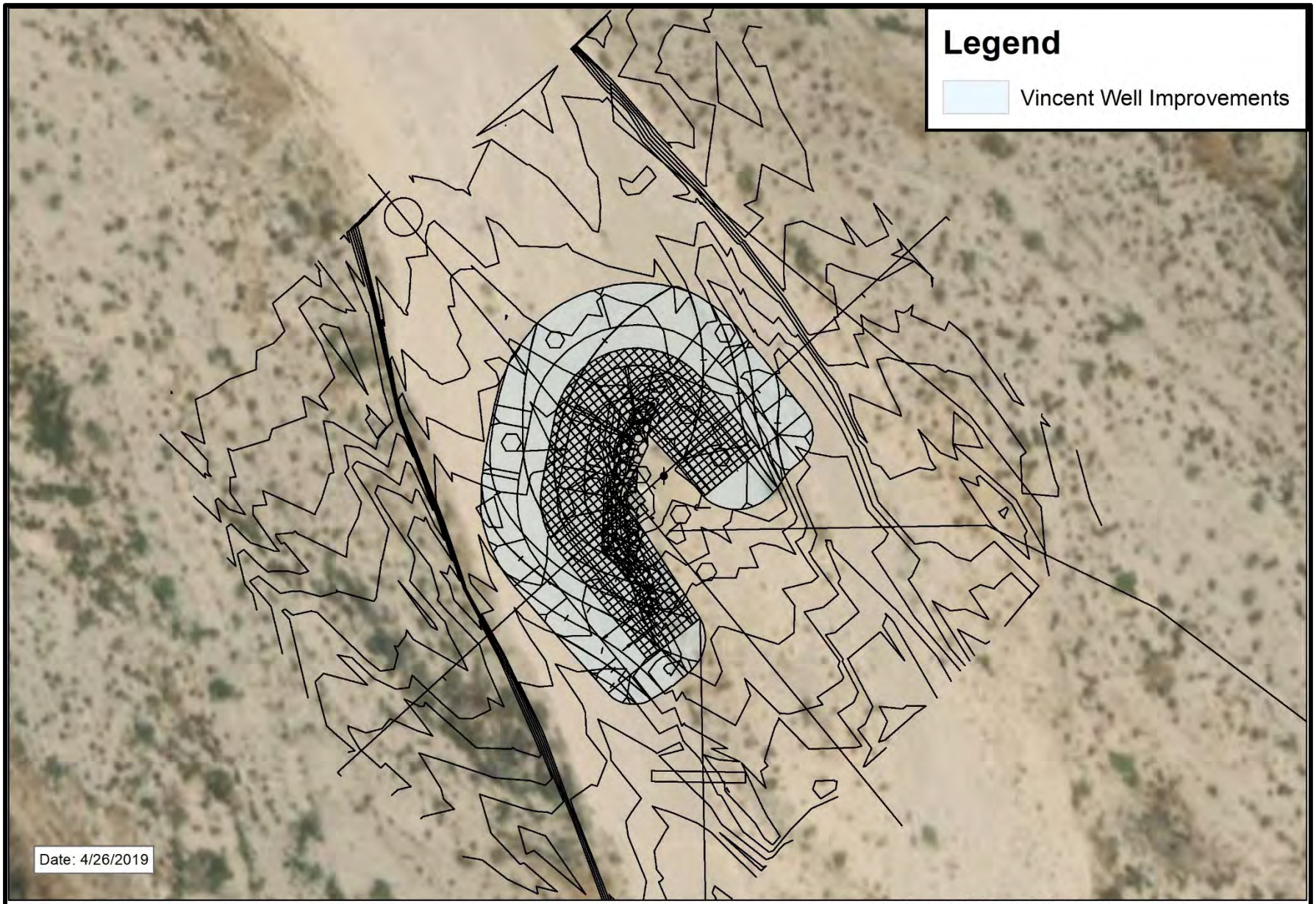
Figure not drawn to scale

Source: San Bernardino Municiple Water Department

Figure 6
General Construction Plan

Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA


Legend
Vincent Well Improvements
Access Road
Proposed Construction Area
Mathews Ranch
Cajon Blvd
Date: 4/26/2019
0 0.03 0.06 0.12 0.18 0.24
Miles
Imagery Date: 8/6/2017
Service Layer Credits: Esri, HERE, Garmin, © OpenStreetMap contributors
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,
1 inch = 333 feet
Figure 7
Construction Plan
Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA


Legend
Vincent Well Improvements
Date: 4/26/2019
0 0.0075 0.015 0.03 0.045 0.06
Miles
Imagery Date: 8/6/2017
Service Layer Credits: Esri, HERE, Garmin, © OpenStreetMap contributors
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,
JERICHO SYSTEMS
1 inch = 83 feet
Figure 8
Construction Plan Detail
Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA

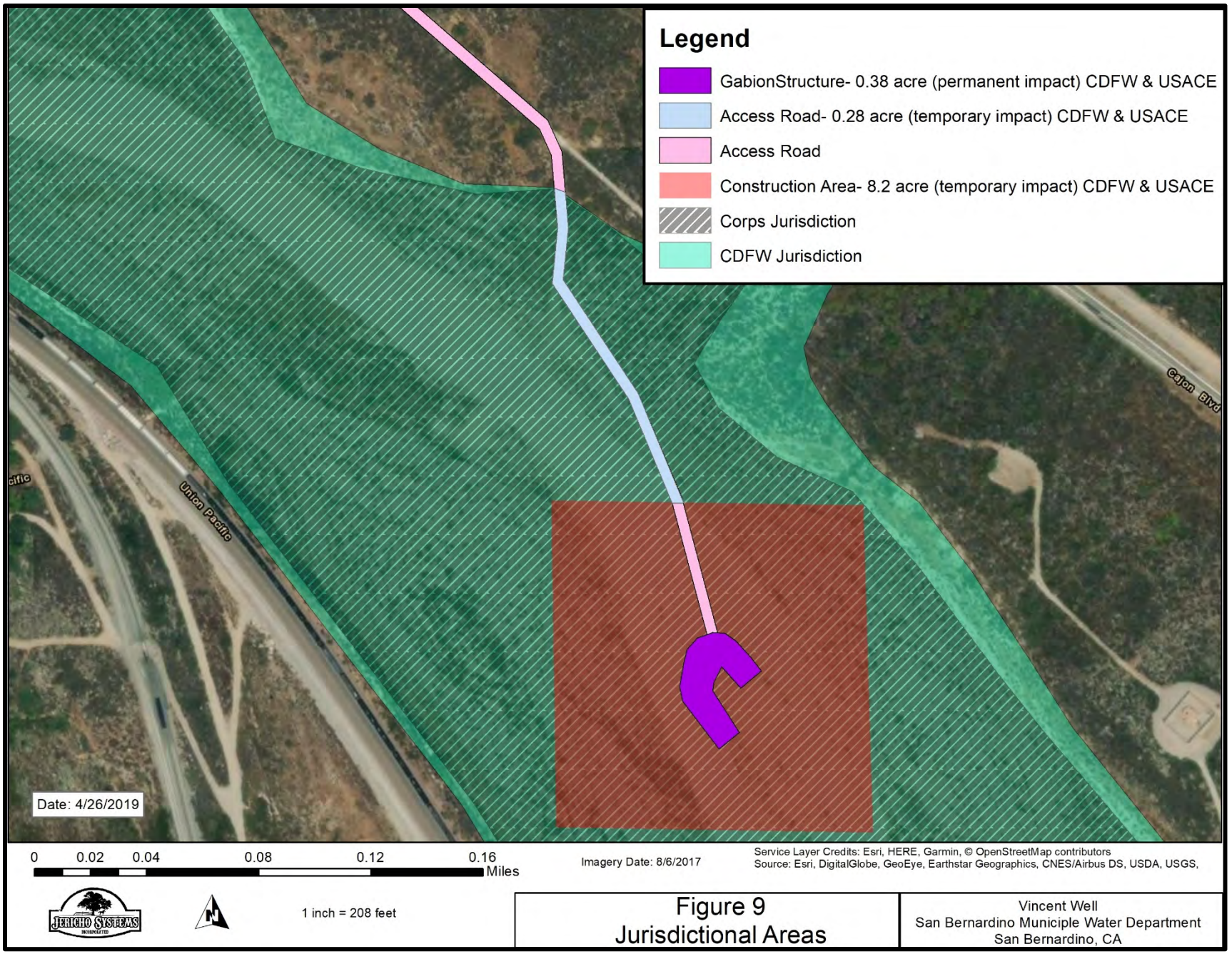
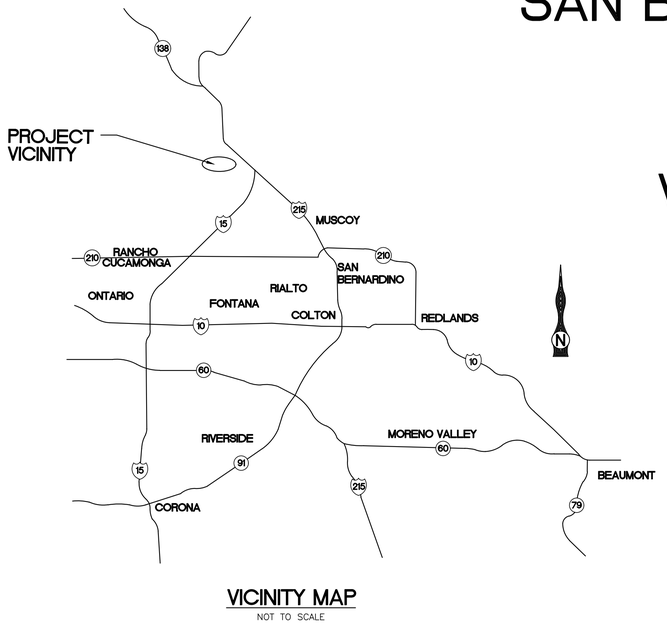

Legend
GabionStructure- 0.38 acre (permanent impact) CDFW & USACE
Access Road- 0.28 acre (temporary impact) CDFW & USACE
Access Road
Construction Area- 8.2 acre (temporary impact) CDFW & USACE
Corps Jurisdiction
CDFW Jurisdiction
Cajon Blvd
Union Pacific
Date: 4/26/2019
0 0.02 0.04 0.08 0.12 0.16
Miles
Imagery Date: 8/6/2017
Service Layer Credits: Esri, HERE, Garmin, © OpenStreetMap contributors
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,
JERICHO SYSTEMS
1 inch = 208 feet
Figure 9
Jurisdictional Areas
Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA

	Photo 1 – Looking downstream toward Vincent Well
	Photo 2 – 2nd view looking downstream towards of Vincent Well.

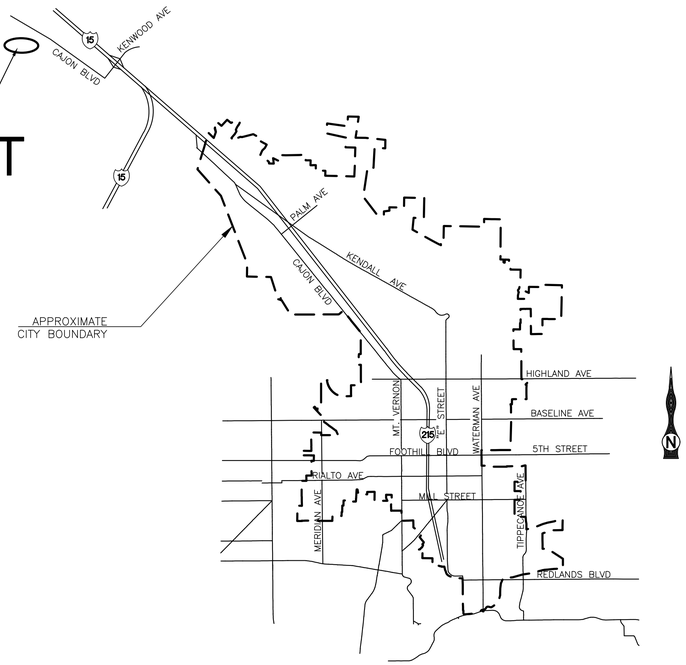
	Photo 3. Looking upstream towards Vincent well in recent scour area of Cajon Creek.
	Photo – 4 Site overview looking upstream at Vincent Well

ATTACHMENT D
PROJECT PRELIMINARY PLANS

SAN BERNARDINO MUNICIPAL WATER DEPARTMENT
SPECIFICATION NO. XXXX
WELL NO. D-1264
VINCENT WELL STABILIZATION PROJECT



VICINITY MAP
NOT TO SCALE



LOCATION MAP
NOT TO SCALE

SHEET INDEX

SHEET NO.	DWG	DESCRIPTION
1	G1	TITLE SHEET
2	SV1	SURVEY PLAN
3	C1	SITE AND GRADING PLAN
4	C2	CONSTRUCTION DETAILS
5	C3	CONSTRUCTION DETAILS

CONSTRUCTION NOTES

1. PROTECT EXISTING FACILITY OR UTILIITY IN PLACE
2. REMOVE EXISTING CONCRETED RIPRAP
3. CONSTRUCT GABION SLOPE PROTECTION AS SHOWN ON GABION CONSTRUCTION PLAN ON DWG C1, AND PER CONSTRUCTION DETAILS ON DWGS C2 AND C3.

ABBREVIATIONS

AP	ANGLE POINT
BGA	BOTTOM OF GABION
DWG	DRAWING
DWGS	DRAWINGS
EXIST.	EXISTING
MIN.	MINIMUM
TGA	TOP OF GABION

WATER DEPARTMENT'S ENGINEER CERTIFICATE

THIS CERTIFIES THAT ON _____, I REVIEWED THE PLAN FOR THE VINCENT WELL STABILIZATION PROJECT, AND FOUND THAT IT MEETS THE MINIMUM REQUIREMENTS OF THE CALIFORNIA HEALTH AND SAFETY CODE.

_____ _____
MIGUEL J. GUERRERO DATE
DIRECTOR, WATER UTILITY
CA. R.C.E. 73239
EXPIRATION DATE: 12/31/2018
(909) 453-6100

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DECLARATION OF RESPONSIBLE CHARGE: ENGINEER OF WORK:

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SIGNATURE RCE NO. 58953 DATE

REGISTERED PROFESSIONAL ENGINEER — MICHAEL J. GENTILE — No. 58953 Exp. 06-30-19 — CIVIL — STATE OF CALIFORNIA

CASC
Engineering and Consulting
1470 EAST COOLEY DRIVE, COLTON, CA 92324
PH. (909) 783-0101

MARK	REVISIONS	APPROVED	DATE	APPROVED	DATE

DESIGNED BY: MG DRAWN BY: MG CHECKED BY: RS — DESIGN ENGINEER — SBMWD ENGINEER

HORIZONTAL AND VERTICAL DATUM:

HORIZONTAL AND VERTICAL CONTROL POINTS ARE ESTABLISHED BY RAPID STATIC GPS OBSERVATION METHODS. GPS DATA WAS POST PROCESSED USING LOCAL NGS CORS STATIONS TO PRODUCE CCS NAD83 EPOCH 2010 ZONE F HORIZONTAL DATUM AND NAVD88 VERTICAL DATUM.

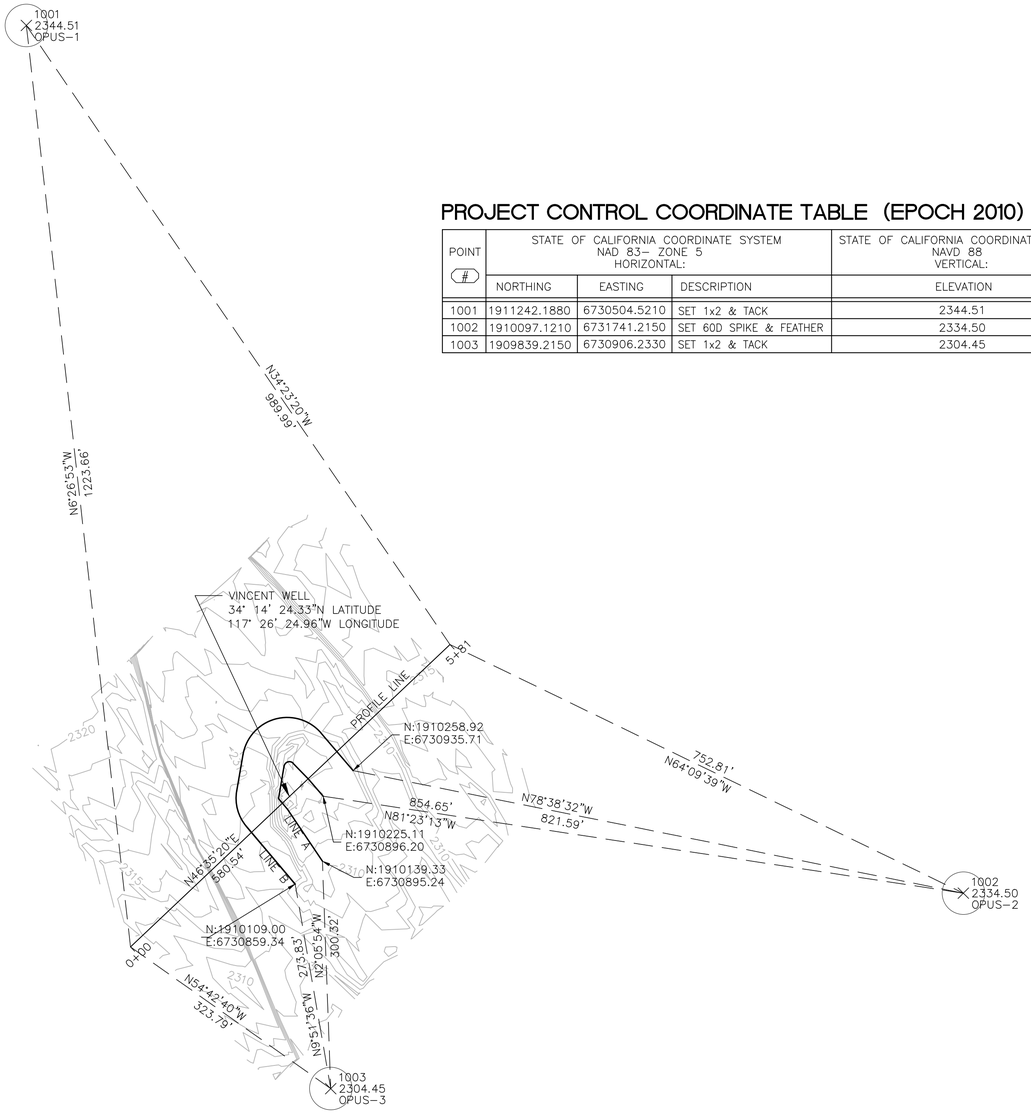
CITY OF SAN BERNARDINO
MUNICIPAL WATER DEPARTMENT

WELL NO. D-1264
VINCENT WELL STABILIZATION PROJECT
TITLE SHEET

DRAWING SCALES:
HORIZ: N/A VERT: N/A
C.O. NO.:
1682
DWG G1
SHEET 1 OF 5

90% SUBMITTAL

C-1682-1-G-G1.DWG



PROJECT CONTROL COORDINATE TABLE (EPOCH 2010)

POINT (#)	STATE OF CALIFORNIA COORDINATE SYSTEM NAD 83– ZONE 5 HORIZONTAL:			STATE OF CALIFORNIA COORDINATE SYSTEM NAVD 88 VERTICAL:
	NORTHING	EASTING	DESCRIPTION	ELEVATION
1001	1911242.1880	6730504.5210	SET 1x2 & TACK	2344.51
1002	1910097.1210	6731741.2150	SET 60D SPIKE & FEATHER	2334.50
1003	1909839.2150	6730906.2330	SET 1x2 & TACK	2304.45

GRAPHIC SCALE 1"=100'
100 0 100 200 300

UNDERGROUND SERVICE ALERT
DIG ALERT IDENTIFICATION
CALL: TOLL FREE
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TWO WORKING DAYS BEFORE YOU DIG

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CITY OF SAN BERNARDINO
MUNICIPAL WATER DEPARTMENT

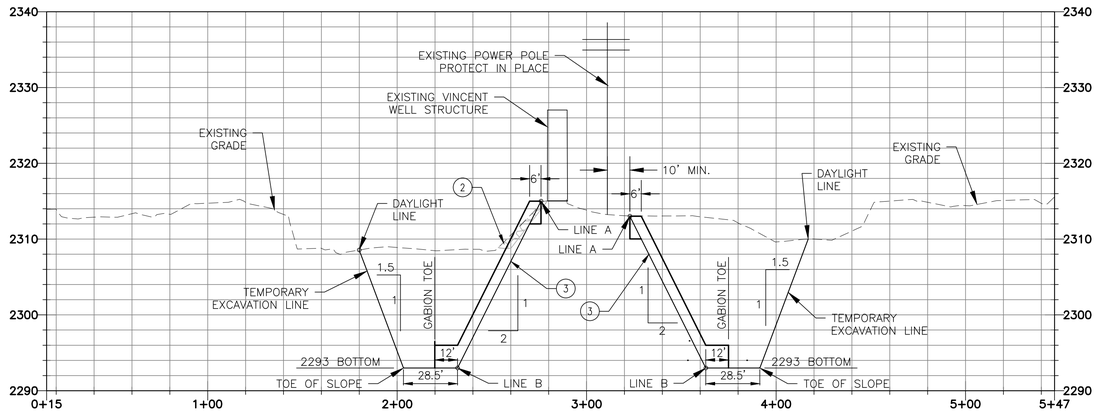
WELL NO. D-1264
VINCENT WELL STABILIZATION PROJECT
SURVEY PLAN

DRAWING SCALES:
HORIZ: N/A VERT: N/A
C.O. NO.:

DWG SV1
SHEET 2 OF 4

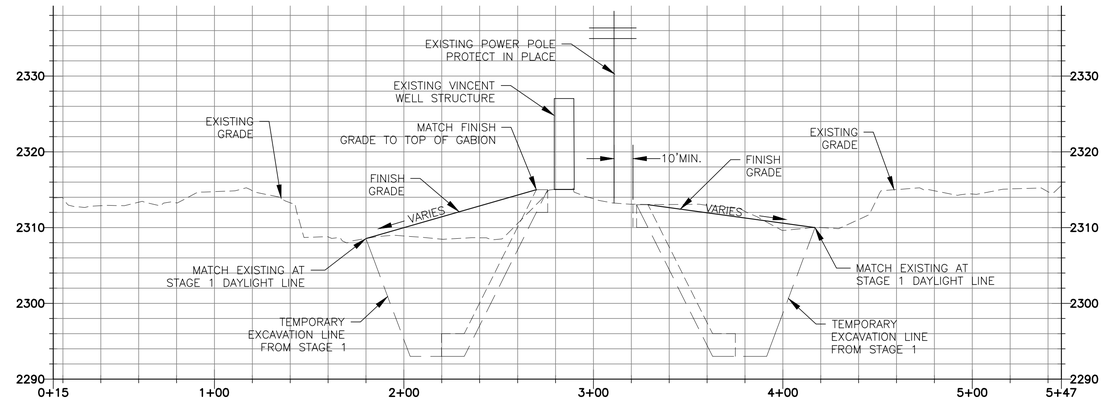
90% SUBMITTAL

C-1682-2-SV-SV1.DWG



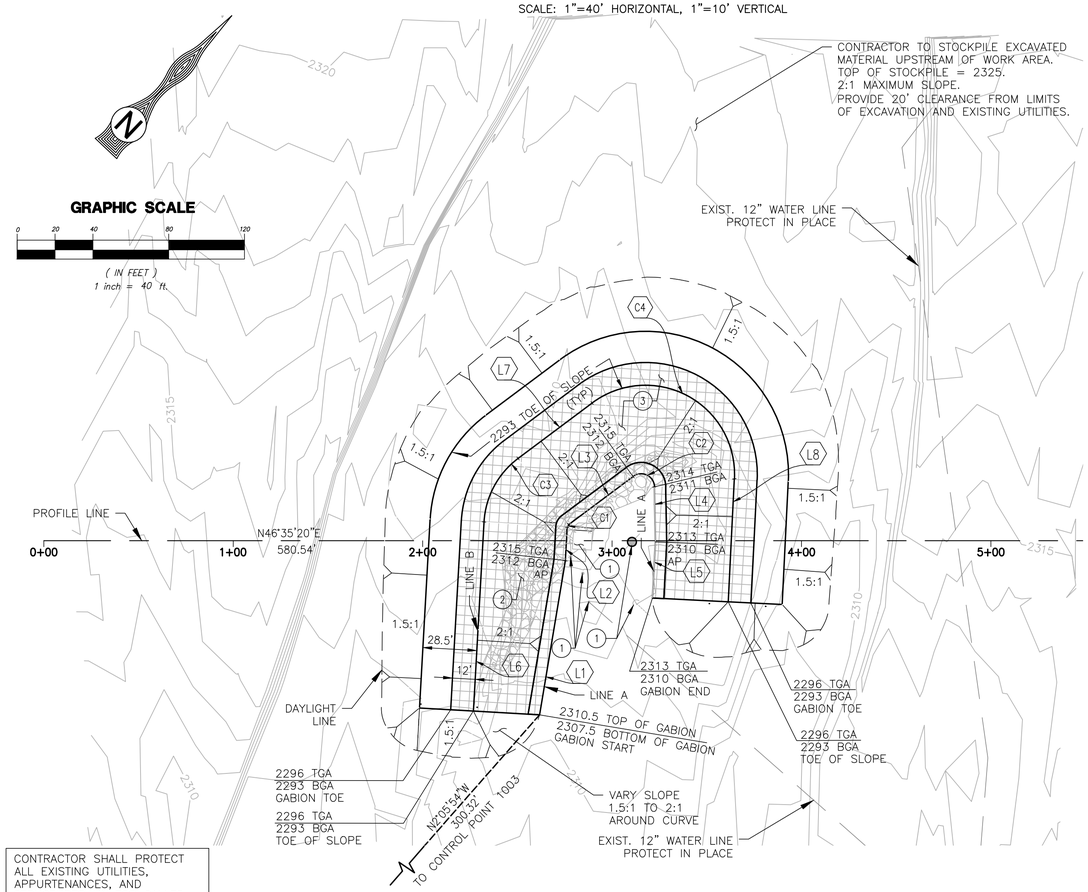
STAGE 1 - EXCAVATION AND GABION CONSTRUCTION PROFILE

SCALE: 1"=40' HORIZONTAL, 1"=10' VERTICAL



STAGE 2 - FINISH GRADING PROFILE

SCALE: 1"=40' HORIZONTAL, 1"=10' VERTICAL



STAGE 1 - EXCAVATION AND GABION CONSTRUCTION PLAN

CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES, APPURTENANCES, AND STRUCTURES UNLESS CALLED OUT EXPLICITLY FOR DEMOLITION AND REMOVAL

LINE DATA

LINE #	LENGTH	DIRECTION
L1	82.43'	S33° 54' 58.36"E
L2	17.60'	S40° 11' 17.50"E
L3	38.81'	S9° 47' 24.02"W
L4	29.09'	S44° 28' 09.68"E
L5	29.61'	S40° 33' 16.25"E
L6	100.00'	S40° 11' 17.50"E
L7	48.82'	S9° 47' 24.02"W
L8	65.00'	S40° 33' 16.25"E

CURVE DATA

CURVE#	LENGTH	RADIUS	DELTA
C1	1.74'	2.00'	49.98'
C2	15.38'	7.00'	125.92'
C3	39.25'	45.00'	49.98'
C4	106.36'	47.00'	129.66'

ABBREVIATIONS

AP	ANGLE POINT
BGA	BOTTOM OF GABION
DWG	DRAWING
DWGS	DRAWINGS
EXIST.	EXISTING
MIN.	MINIMUM
TGA	TOP OF GABION

CONSTRUCTION NOTES

1. PROTECT EXISTING FACILITY OR UTILIITY IN PLACE
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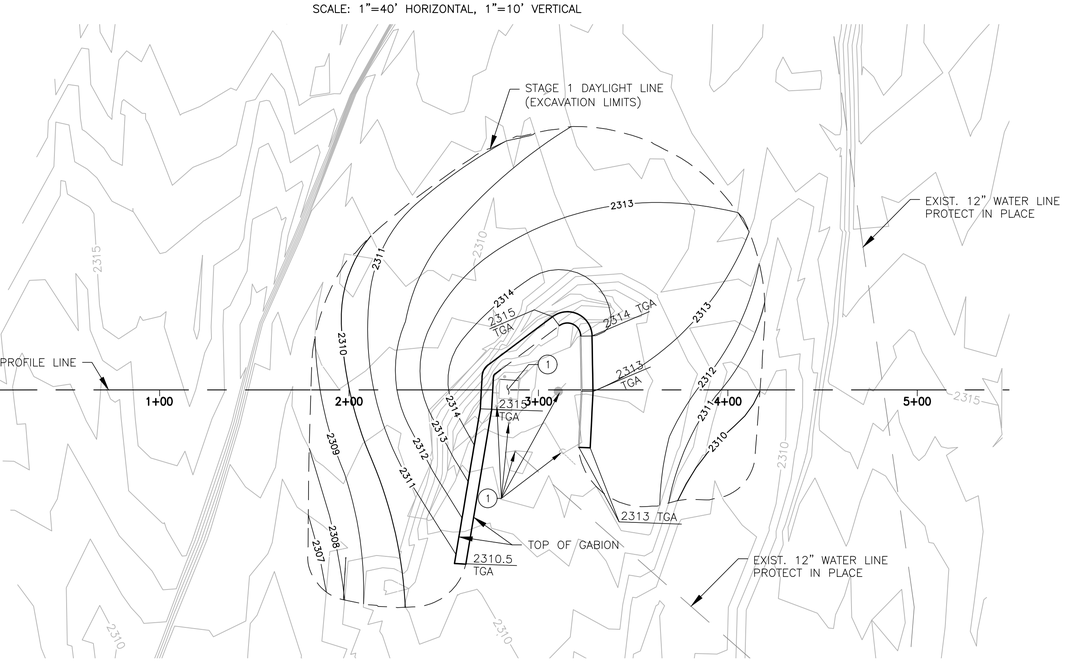

STAGE 2 - FINISH GRADING PLAN

LEGEND

- PROPOSED GABIONS
- EXISTING RIPRAP

GRAPHIC SCALE
0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

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CITY OF SAN BERNARDINO
MUNICIPAL WATER DEPARTMENT
WELL NO. D-1264
VINCENT WELL STABILIZATION PROJECT
SITE AND GRADING PLAN

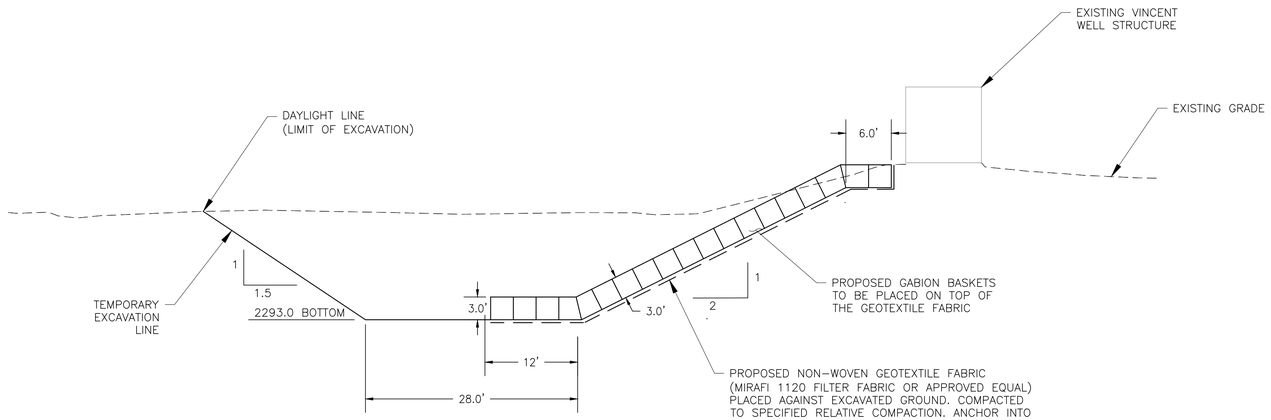
DRAWING SCALES:
HORIZ:1"=40' VERT:1"=10'
C.O. NO.:
1682
DWG C1
SHEET 3 OF 5

90% SUBMITTAL

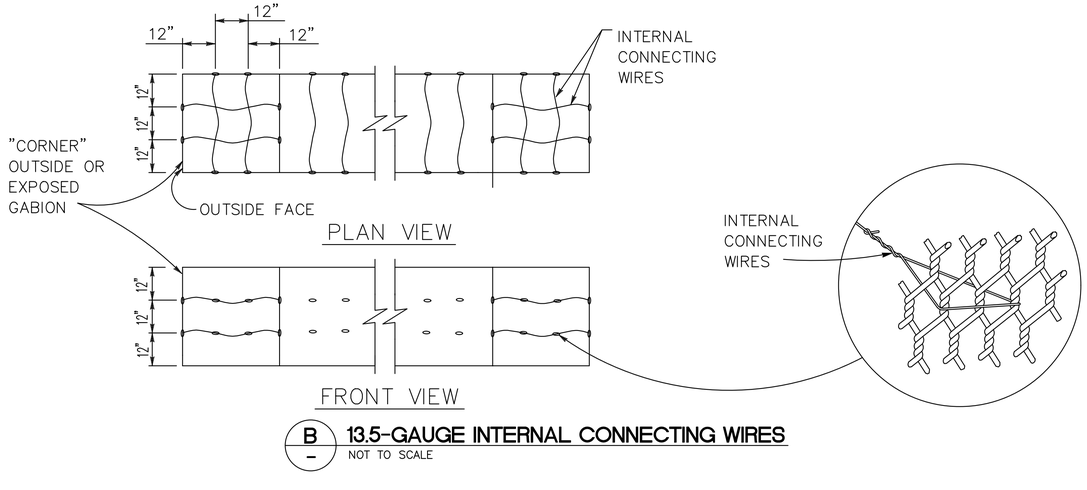
C-1682-3-C-C1.DWG

NOTES:

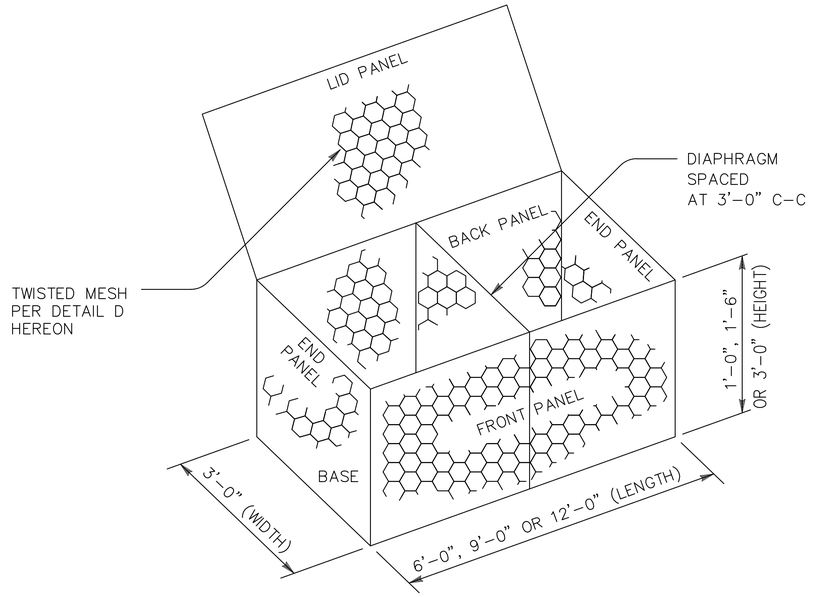
1. INTERNAL CONNECTING WIRE (13.5–GAGE) SHALL BE INSTALLED ACROSS WIDTH OF INTERIOR GABIONS AND ACROSS WIDTH AND LENGTH OF END GABIONS AS SHOWN IN DETAIL B HEREON.
2. INTERNAL CONNECTING WIRES ARE REQUIRED ON ALL GABIONS 3'–0" HIGH.
3. PREFORMED STIFFENERS (11–GAGE OR 9–GAGE) ARE AN ACCEPTABLE ALTERNATIVE TO INTERNAL CONNECTING WIRES. INSTALL THEM AS RECOMMENDED BY MANUFACTURER AT 1/3 POINTS.
4. PLACE ROCK IN END GABION CELL FIRST, AND CONTINUE BY FILLING INTERIOR GABION CELLS.
5. FOR GABION DIMENSIONS, REFER TO DETAIL E "STANDARD GABION SIZES" HEREON.
6. THE SIDE OF EXCAVATIONS AND ANY TEMPORARY EARTHWORKS PROFILES ARE TO BE REGULARLY INSPECTED AND MAINTAINED TO ENSURE THAT THEY REMAIN STABLE AND ARE NOT DETERIORATING THROUGH THE INGRESS OF WATER, DIRECT RAINFALL, OR GROUND WATER SEEPAGE OR ANY OTHER MEANS AND THE WORKS CAN BE CONSTRUCTED SAFELY AT ALL TIMES.
7. TEMPORARY DEWATERING MAY BE NEEDED TO KEEP THE GROUNDWATER AT LEAST FIVE (5) FEET BELOW EXCAVATED SLOPE.
8. VERTICAL EXCAVATION NEXT TO EXISTING SLAB AND NEAR EXISTING BUILDING SHOULD BE CAREFULLY MONITORED TO PREVENT DAMAGE TO THE EXISTING SLAB AND BUILDING.
9. DURING TEMPORARY EXCAVATION PROCESS, THE EXISTING SLAB SHOULD NOT BE LOADED WITH CONSTRUCTION EQUIPMENT AND WORKERS.
10. FILL GABIONS WITH ROCK MATERIAL AS SPECIFIED IN DETAIL F HEREON.



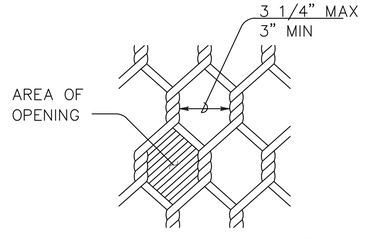
A – TYPICAL GABION SECTION
NOT TO SCALE



B – 13.5–GAUGE INTERNAL CONNECTING WIRES
NOT TO SCALE



C – TYPICAL GABION BASKET DETAIL
NOT TO SCALE



NOTE: AREA OF OPENING NOT TO EXCEED 10.3 SQUARE INCHES

D – TWISTED MESH DETAIL
NOT TO SCALE

STANDARD GABION SIZES				
LENGTH	WIDTH	HEIGHT	NUMBER OF DIAPHRAGMS	VOLUME CY
6'–0"	3'–0"	3'–0"	1	2.0
9'–0"	3'–0"	3'–0"	2	3.0
12'–0"	3'–0"	3'–0"	3	4.0

E – TABLE OF STANDARD GABION SIZES
NOT TO SCALE

QUALITY CHARACTERISTIC	TEST METHOD	REQUIREMENT
APPARENT SPECIFIC GRAVITY (MINIMUM)	CALIFORNIA TEST 206	2.5
ABSORPTION (MAXUMUM %)	CALIFORNIA TEST 206	4.2
DURABILITY INDEX (MINIMUM)	CALIFORNIA TEST 229	52

DURABILITY ABSORPTION RATIO (DAR) = DURABILITY INDEX/(PERCENT ABSORPTION + 1)

IF THE DAR IS GREATER THAN 10, THE ABSORPTION MAY EXCEED 4.2 PERCENT
IF THE DAR IS GREATER THAN 24, THE DURABILITY INDEX MAY BE LESS THAN 52

ROCK GRADATION	
SCREEN SIZE (INCHES)	PERCENTAGE PASSING
12	100
4	0–5

NOTE: SELECT ROCK SUCH THAT THE SHAPES PROVIDE A STABLE STRUCTURE FOR THE REQUIRED SECTION. ANGULAR SHAPED ROCK MAY BE USED ON ANY PLANNED SLOPE. FLAT OR NEEDLE–SHAPED ROCK MUST NOT BE USED UNLESS THE INDIVIDUAL ROCK THICKNESS IS GREATER THAN 0.33 TIMES THE LENGTH.

F – ROCK MATERIAL REQUIREMENTS
NOT TO SCALE

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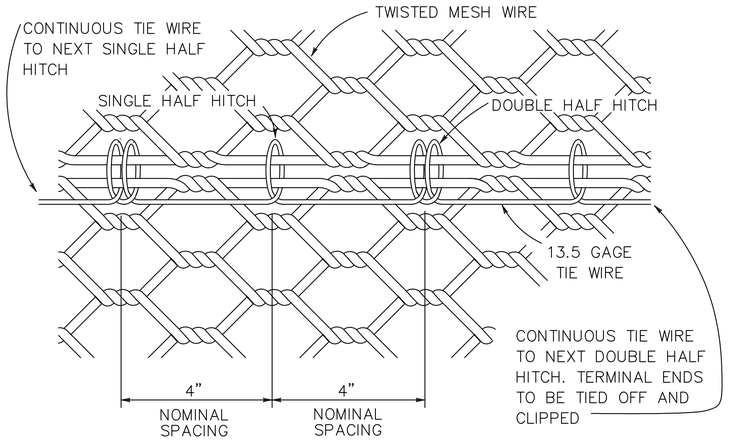
CITY OF SAN BERNARDINO
MUNICIPAL WATER DEPARTMENT
WELL NO. D–1264
VINCENT WELL STABILIZATION PROJECT
CONSTRUCTION DETAILS

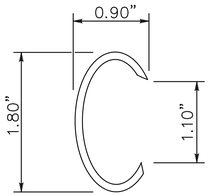
DRAWING SCALES: HORIZ: N/A VERT: N/A
C.O. NO.: 1682
DWG C2
SHEET 4 OF 5

C–1682–4–C–C2.DWG

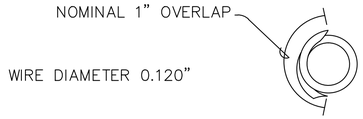
NOTES:



G – STANDARD TIE WIRE DETAIL
NOT TO SCALE



BEFORE CLOSURE



AFTER CLOSURE

NOTE: FASTENER DIMENSIONS ARE NOMINAL

H – ALTERNATIVE GABION JOINT MATERIAL FASTENER DETAIL
NOT TO SCALE

PROPERTIES	UNITS	SPECIFIED VALUES	TEST METHOD
MINIMUM MASS PER UNIT AREA	OZ/SY	8	ASTM D5261
MINIMUM GRAB STRENGTH	LBS	180	ASTM D4632
MINIMUM TEAR STRENGTH	LBS	50	ASTM D4533
MINIMUM PUNCTURE STRENGTH	LBS	75	ASTM D6241
MAXIMUM APPARENT OPENING SIZE (O_{95})	MM	0.21	ASTM D4491
PERMITTIVITY	S^{-1}	0.74	ASTM D4751

I – REQUIRED PROPERTY VALUES FOR GEOTEXTILE
NOT TO SCALE

TO ASSEMBLE TRANSITIONAL GABION BASKET:

STEP (1) CUT MESH ALONG JOINT BETWEEN FRONT PANEL AND BASE PANEL.

STEP (2) UNFASTEN END PANEL "A" FROM BASE PANEL AND ROTATE END PANEL "A". FASTEN END PANEL PANEL "A" TO BACK PANEL.

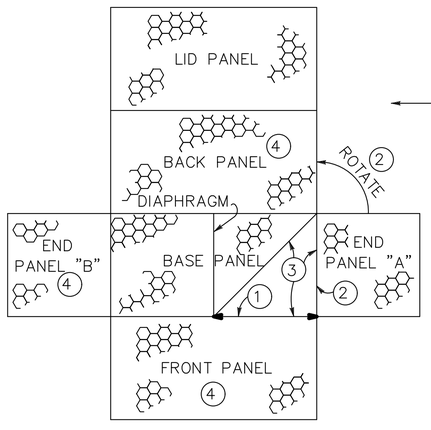
STEP (3) FOLD THE CUT PORTION OF THE BASE PANEL INTO UPRIGHT POSITION ALONG DIAGONAL FROM THE DIAPHRAGM TO THE CORNER OF THE BACK PANEL.

STEP (4) FOLD THE BACK PANEL, FRONT PANEL AND END PANEL "B" INTO UPRIGHT POSITIONS. FASTEN END PANEL "B" TO THE BACK PANEL AND THE FRONT PANEL.

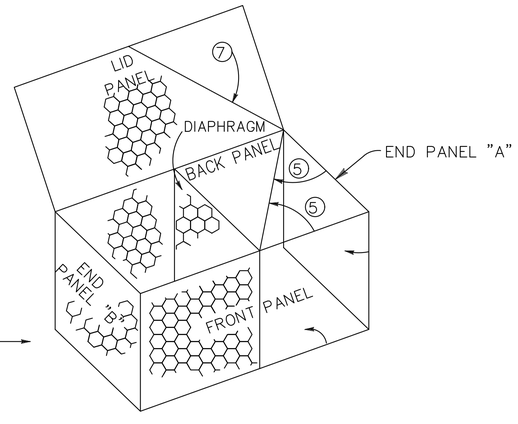
STEP (5) ROTATE END PANEL "A" AND THE CUT PORTION OF THE FRONT PANEL INWARD AGAINST THE UPTURNED PORTION OF THE BASE PANEL. FASTEN ALONG THE OVERLAPPED PORTION OF THE FRONT PANEL AND END PANEL "A". FASTEN THE OVERLAPPED PORTION OF THE FRONT PANEL AND END PANEL "A" TO THE FOLDED UPRIGHT PORTION OF THE BASE PANEL ALONG THE DIAGONAL (DESCRIBED IN STEP 3).

STEP (6) FILL THE TRANSITIONAL GABION BASKET WITH ROCK AS PER SPECIFICATIONS.

STEP (7) CLOSE LID AND FOLD OVER CORNER OF LID PANEL. FASTEN ALONG LID PANEL EDGES.



FLAT LAYOUT OF GABION BASKET



ASSEMBLED TRANSITIONAL GABION BASKET

J – TRANSITIONAL GABION BASKET
NOT TO SCALE

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
811
TWO WORKING DAYS BEFORE YOU DIG

DECLARATION OF RESPONSIBLE CHARGE: ENGINEER OF WORK:
I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER DESIGN OF THIS PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.
I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE SAN BERNARDINO MUNICIPAL WATER DEPARTMENT IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

SIGNATURE RCE NO. 58953 DATE

REGISTERED PROFESSIONAL ENGINEER — MICHAEL J. GENTILE — No. 58953 Exp. 06-30-19 — CIVIL — STATE OF CALIFORNIA

CASC
Engineering and Consulting
1470 EAST COOLEY DRIVE, COLTON, CA 92324
PH. (909) 783-0101

MARK	REVISIONS	APPROVED	DATE	APPROVED	DATE

DESIGNED BY: MG DRAWN BY: MG CHECKED BY: RS | DESIGN ENGINEER | SBMWD ENGINEER

HORIZONTAL AND VERTICAL DATUM:
HORIZONTAL AND VERTICAL CONTROL POINTS ARE ESTABLISHED BY RAPID STATIC GPS OBSERVATION METHODS. GPS DATA WAS POST PROCESSED USING LOCAL NGS CORS STATIONS TO PRODUCE CCS NAD83 EPOCH 2010 ZONE F HORIZONTAL DATUM AND NAVD88 VERTICAL DATUM.

CITY OF SAN BERNARDINO
MUNICIPAL WATER DEPARTMENT
WELL NO. D-1264
VINCENT WELL STABILIZATION PROJECT
CONSTRUCTION DETAILS

DRAWING SCALES:
HORIZ: N/A VERT: N/A
C.O. NO.:
1682
DWG C3
SHEET 5 OF 5

C-1682-5-C-C3.DWG

Appendix C
CAGN Focused Survey Report

JERICHO SYSTEMS INC.
Progress & Preservation

47 1st Street, Suite 1
Redlands, CA 92373-4601
(909) 307-5633

May 19, 2020

Stacy Love
Recovery Permit Coordinator
Carlsbad Fish and Wildlife Office
6010 Hidden Valley road, Suite 101

Subject: 45-Day Report—Presence/Absence Surveys for California Gnatcatcher (*Polioptila californica*) in Support of Jericho Systems Inc Vincent Wells, San Bernardino County, California

Dear Ms. Love:

This letter and attached information is intended to satisfy the 45-day reporting requirements for the 2020 non-breeding season presence/absence surveys for California Gnatcatcher (*Polioptila californica*) conducted by Brian Karpman biologists for Jericho Systems Inc for the Vincent Wells project. Below you will find a summary of survey methods and results, and attached are Figures 1and 2 comprising maps of the region and survey area.

SURVEY AREA

The survey area is directly adjacent to historic route 66(Cajon Blvd) in the city of San Bernardino. The access road to Vincent Wells connects to route 66 on the south side and bends to head south east. The road cuts through thick scrub dominated by mature artemisia mixed with buckwheat. There are a few large Mexican elderberries and some non-native trees within the site. The habitat varies in thickness on either side of the road from 50 to 150 feet. The staging area is set within an existing area approximately 1.5 acres in the north west section of the project. The entire survey area consists approximately of 20 acres of scrub.

SURVEY METHODS

Presence/absence surveys for California Gnatcatcher summarized in this report were conducted by permitted biologists: Brian Karpman (USFWS 10(A) permit number: TE – 01768B-1).
Focused surveys were conducted according to the USFWS presence/absence survey protocol published in 1997. Nine focused surveys visits were conducted between January 6th and April 11th. The surveys were conducted between dawn and 12:00 PM avoiding inclement weather that could affect target species detection. Recorded vocalizations were played in suitable habitat and discontinued if California Gnatcatchers were located or potential predators were present.

SURVEY RESULTS

Survey Date	CAGN Survey #	Start Time	End Time	Air Temp. (F)	Cloud Cover	Wind Speed (MPH)
1/6/2020	1	6:25 am	9:30 am	56-65 F	0%	4-9 mph
1/20/2020	2	8:20 am	10:20 am	53-60 F	90%-100%	0 mph
2/5/2020	3	9:20 am	11:00 am	53-61 F	0 %	3-6 mph
2/16/2020	4	9:30 am	12:00 pm	68-70 F	0%	4-6 mph
3/3/2020	5	9:00 am	10:45 am	64-66 F	0%	5-10 mph
3/17/2020	6	8:50 am	10:55 am	47-50F	60%	4-7 mph
3/27/2020	7	9:45 am	10:45 am	53-55F	20%	2-4 mph
4/3/2020	8	8:50 am	10:50 am	57-59F	0%	0-2 mph
4/11/2020	9	10:am	12:00 am	57-59 F	0%	4-6 mph

CALIFORNIA GNATCATCHER

No California Gnatcatchers were detected during survey.

CONCLUSIONS

Based on the results of the surveys, California Gnatcatchers were not present in the Vincent Well Project Area at that time of surveys.

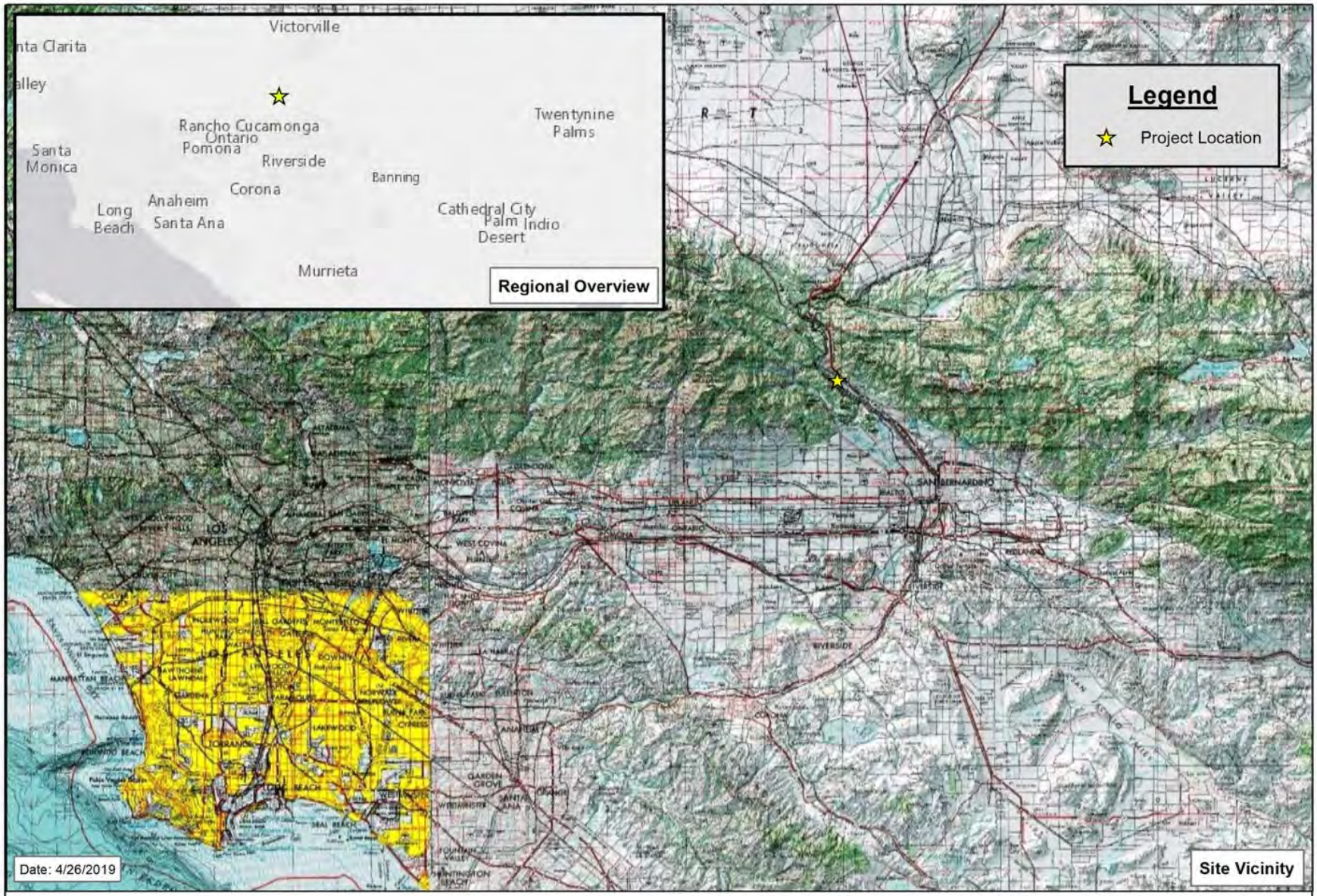
Please do not hesitate to contact me with any questions at 714 454 7784.

Sincerely,

Brian Karpman
(USFWS 10(A) permit number: TE-01768-1)

Attachments

Figure 1 – Regional Overview and Vicinity
Figure 2 – Construction Plan


Victorville
nta Clarita
alley
Rancho Cucamonga
Ontario
Pomona
Twentynine
Palms
Santa
Monica
Riverside
Banning
Corona
Anaheim
Long
Beach
Santa Ana
Cathedral City
Palm
Desert
Indio
Murrieta
Regional Overview
Legend
Project Location
Date: 4/26/2019
Site Vicinity
0 5 10 20 30 40
Miles
Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA,
JERICHO SYSTEMS
Figure 1 - Regional Overview
Site Vicinity
Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA

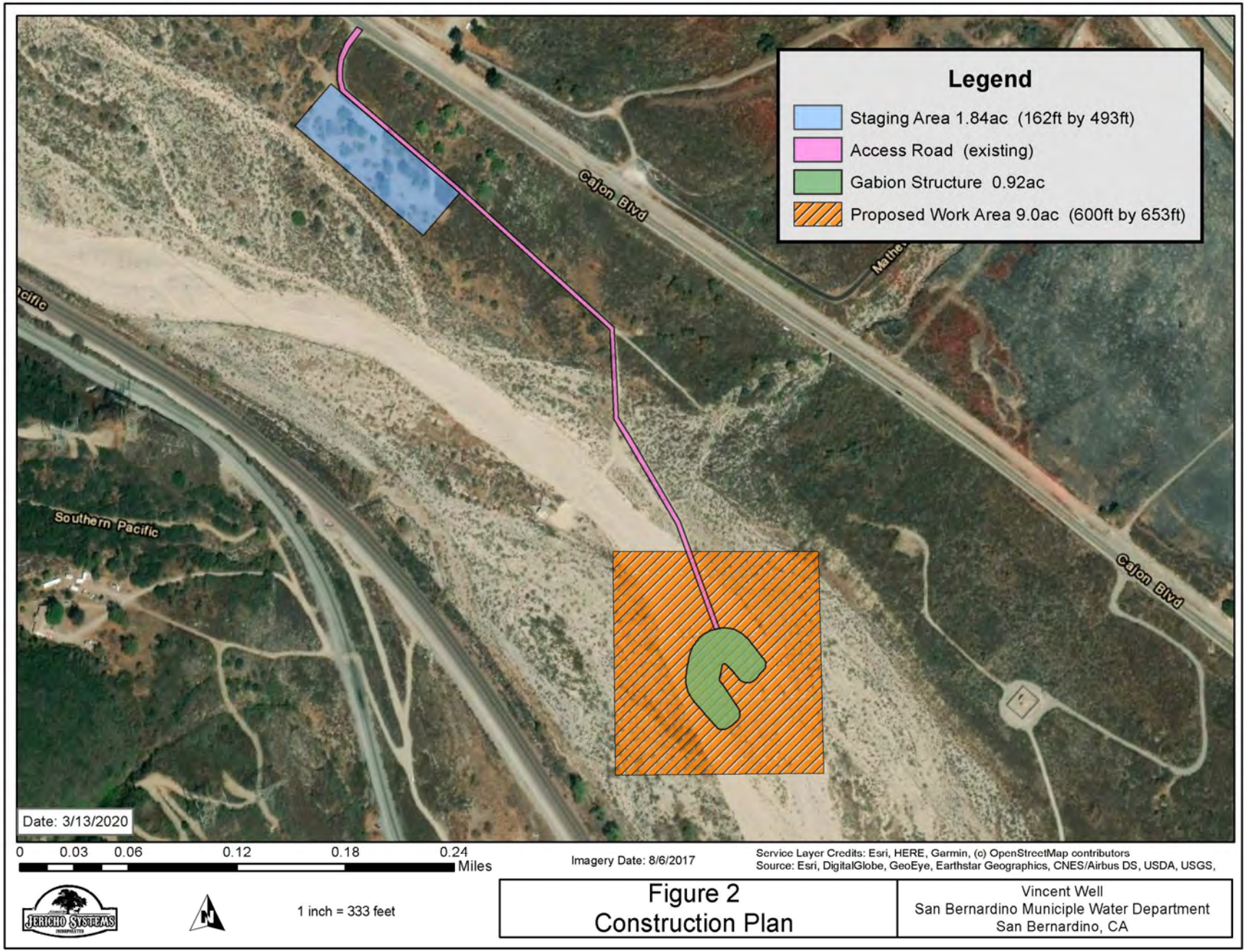


Figure 2
Construction Plan

Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA

Appendix D
SBKR Focused Survey Report

JERICHO SYSTEMS INC.
Progress & Preservation

47 1st Street, Suite 1
Redlands, CA 92373-4601
(909) 307-5633

July 1, 2020

Stacey Love
Recovery Permit Coordinator
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, CA 92008

RE: 45-day San Bernardino kangaroo rat (*Dipodomys merriami parvus*) survey under USFWS permit number TE-094308-4.

Dear Stacey Love,

This letter report contains the findings of my May 2020 presence/absence survey for San Bernardino kangaroo rat (*Dipodomys merriami parvus* [SBKR]) Vincent Well Repair Project (Project) in Cajon Creek. Project activities, including construction and the stockpile, will occur at the well site and within approximately 20 feet of the existing well infrastructure. The Project improvements will face north, to prevent the erosion as the water in the wash travels south, downstream. Access to the proposed Project site will be via an existing graded, unimproved access road that provides access from the west side of Cajon Boulevard through the wash, to the Vincent Well.

The Project area contains primary constituent elements for SBKR and is mapped within SBKR designated critical habitat. Therefore, presence/absence surveys were warranted. Following a 15-Day Notification to the U. S. Fish and Wildlife Service (USFWS), the study site was surveyed for the federally-listed as endangered SBKR by permitted biologist Shay Lawrey from May 5-10, 2020. **No SBKR** were trapped during the survey.

Site Location:

The Vincent Well project site is situated in the low-flow channel of Cajon Wash, within Section 19, Township 2 North, Range 5 West on the *Devore* U. S. Geological Survey's (USGS) 7.5-minute topographic map. More specifically, it is located west of Interstate 15 (I-15) and Cajon Boulevard, within the Cajon Wash, approximately 2 miles northwest (upstream) of the I-15/I-215 interchange, in an unincorporated area of San Bernardino County, California at approximately 34.240102 latitude and -117.440237 longitude (Figure 1 and Figure 2).

Species Background:

The SBKR is one of several kangaroo rat species in its range. The Dulzura (*Dipodomys simulans*), the Pacific kangaroo rat (*D. agilis*) and the Stephens kangaroo rat (*D. stephensi*) occur in areas occupied by the SBKR, but these other species have a wider habitat range. The habitat of the SBKR is confined to primary and secondary alluvial fan scrub habitats, with sandy soils deposited by fluvial (water) rather than aeolian (wind) processes. Burrows are dug in loose soil, usually near or beneath shrubs. The SBKR is confined to inland valley scrub communities, and more particularly, to scrub communities occurring along rivers, streams and drainage.

The SBKR is restricted to three main populations (San Jacinto, Lytle Creek/Cajon Wash and Santa Ana River) that are fragmented by human development and much of the preserved habitat is bisected by roads and railroads. The past habitat losses for SBKR and potential future losses prompted the emergency listing of the SBKR as an endangered species.

Methods

Ms. Lawrey has over fifteen years of experience with SBKR and is a biologist permitted (USFWS permit number TE 094308-4) by the USFWS to trap and handle SBKR. Ms. Lawrey initiated the survey on the evening of Tuesday May 05, 2020. Trapping continued until the morning of Sunday May 10, 2020. A total of 150 12-inch Sherman live traps (product number SLK; H.B. Sherman Traps, Tallahassee, FL) were set within four trap-lines, with spacing between each trap at approximately 10 meters. Each trap was baited after dusk with mixture of rolled oats and commercially-formulated small mammal feed (seed) that included a millet seed. Traps were inspected at midnight and again at dawn. All animals were identified and released unharmed at the point of capture.

Notes included weather conditions such as temperature, wind speed, cloud cover, precipitation and moon phase. Site characteristics such as soils, topography, the condition of the plant communities, and evidence of human use of the site were also noted.

Results and Conlusions:

The site conditions presented good quality of habitat for SBKR. Sign of small mammal activity was apparent within the Riversidean alluvial fan sage scrub habitat withn the Cajon Wash floodplain. Soils were fine and sandy with areas of gravel, cobble and boulder. The Project site and associated access road are within habitat consisting primarily of scale broom scrub (*Lepidospartum squamatum* Shrubland Alliance) and ceanothus chaparral (*Ceanothus* ssp. Shrubland Alliance). Surrounding land uses include floodplain, open space, and transportation corridor.

Trapping occurred in clear skies, moderate winds and low moon illumination with overnight low temperatures ranging from 58 to 53 degrees Fahrenheit (° F).

Table 1.
Survey Dates of Trap Night, Weather Conditions, and Moon Phases

Survey Dates	% Cloud Cover	Wind (BFT)	Overnight Low Temp (°F)	Precipitation	Moon Phase
05/05/2020	5	2	58	0	Waxing Gibbous
05/06/2020	5	1	59	0	Waxing Gibbous
05/07/2020	0	3	62	0	Full Moon
05/08/2020	0	2	63	0	Waning Gibbous
05/09/2020	0	2	61	0	Waning Gibbous

Sign of various small mammals were observed within the areas of the trap lines set within the study site, with four (4) native rodent species trapped. **No SBKR** were trapped**.**

Table 2.
Species captured

Species	Trap Night
Big-eared woodrat (*Netoma macrotis*)	14
deer mouse (*Peromyscus maniculatus*)	65
San Diego pocket mouse (*Chaetodipus fallax*)	32
Delzura kangaroo rat (*D. simulans*)	2

Conclusions:

Although the site contains habitat conditions suitable for SBKR occupation, SBKR are absent based on the focused-protocol survey results. Project implementation at this site would not affect this species.

Certification:

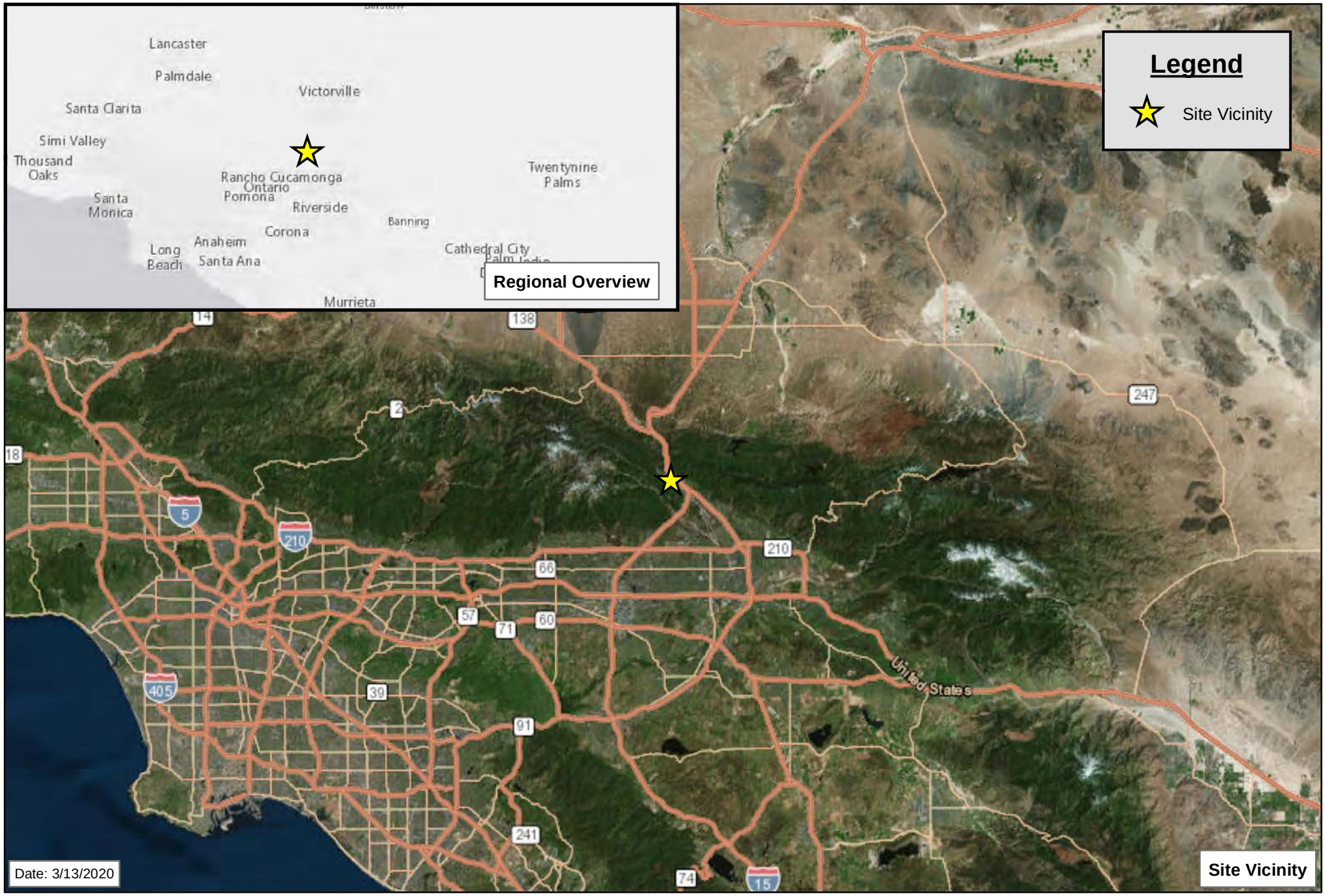
I hereby certify that the statements furnished herein, and in the attached exhibits present data and information required for this Biological Survey to the best of my ability, and the facts, statements, and information presented are true and correct to the best of my knowledge and belief. This report was prepared in accordance with professional requirements and recommended protocols issued in (USFWS permit No. TE-094308-4).

If you have any questions or need any clarifications, feel free to contact me at (909) 915-5900 or at shay@jericho-systems.com.

Sincerely,

Shay Lawrey, President
Ecologist/Regulatory Specialist
USFWS permit number TE 094308-4

Attachments:
Figures
Site Photographs

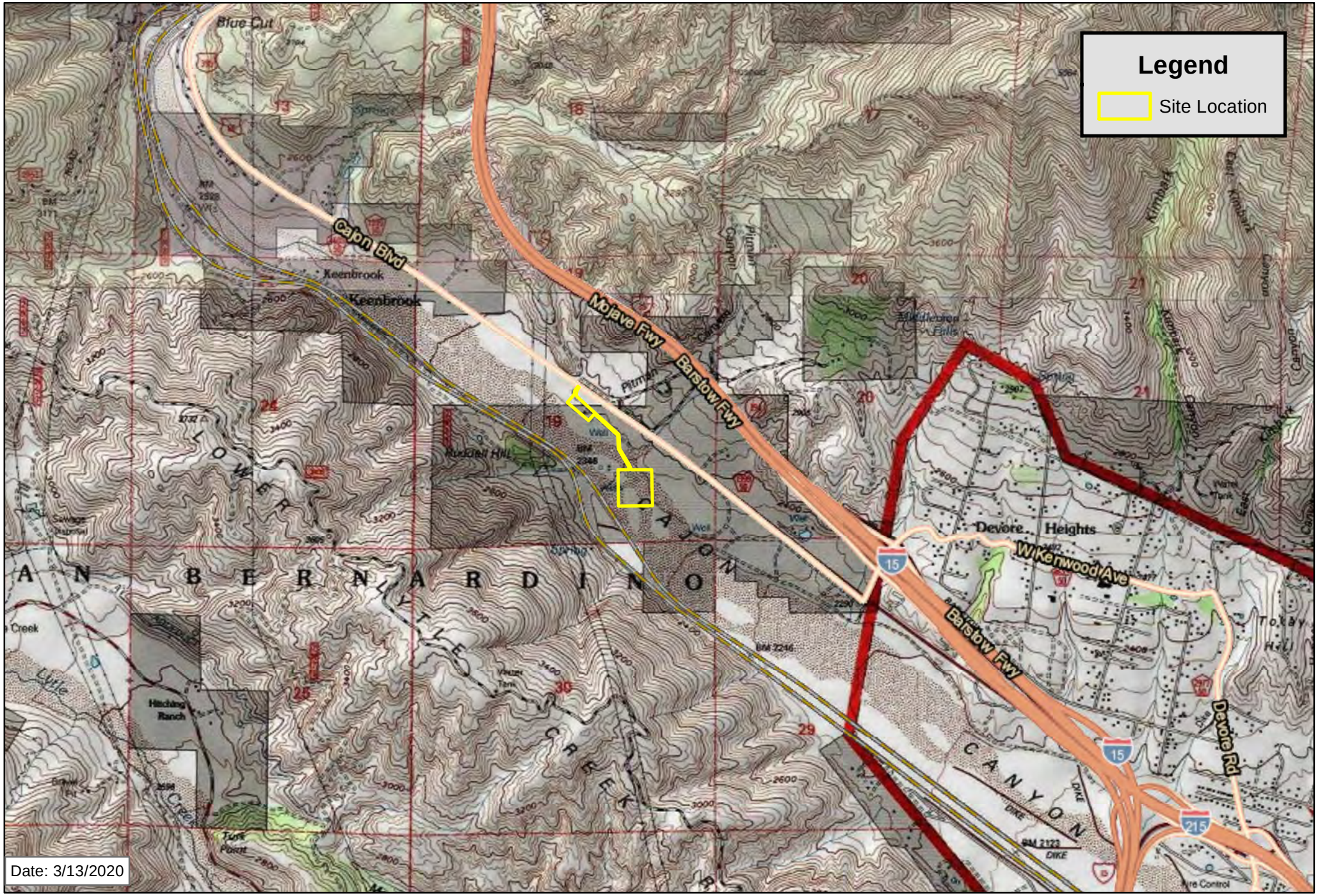


Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA,

JERICHO SYSTEMS

Figure 1 - Regional Overview
Site Vicinity

Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA



0 0.2 0.4 0.8 1.2 1.6 Miles

Imagery Date: 8/6/2017

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors
Copyright:© 2013 National Geographic Society, i-cubed

1 inch = 2,261 feet

Figure 2
Site Location

Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA

Imagery Date: 8/6/2017

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

JERICHO SYSTEMS INCORPORATED

1 inch = 2,261 feet

Figure 3
Site Location

Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA

Figure 4
Construction Plan

Vincent Well
San Bernardino Municiple Water Department
San Bernardino, CA

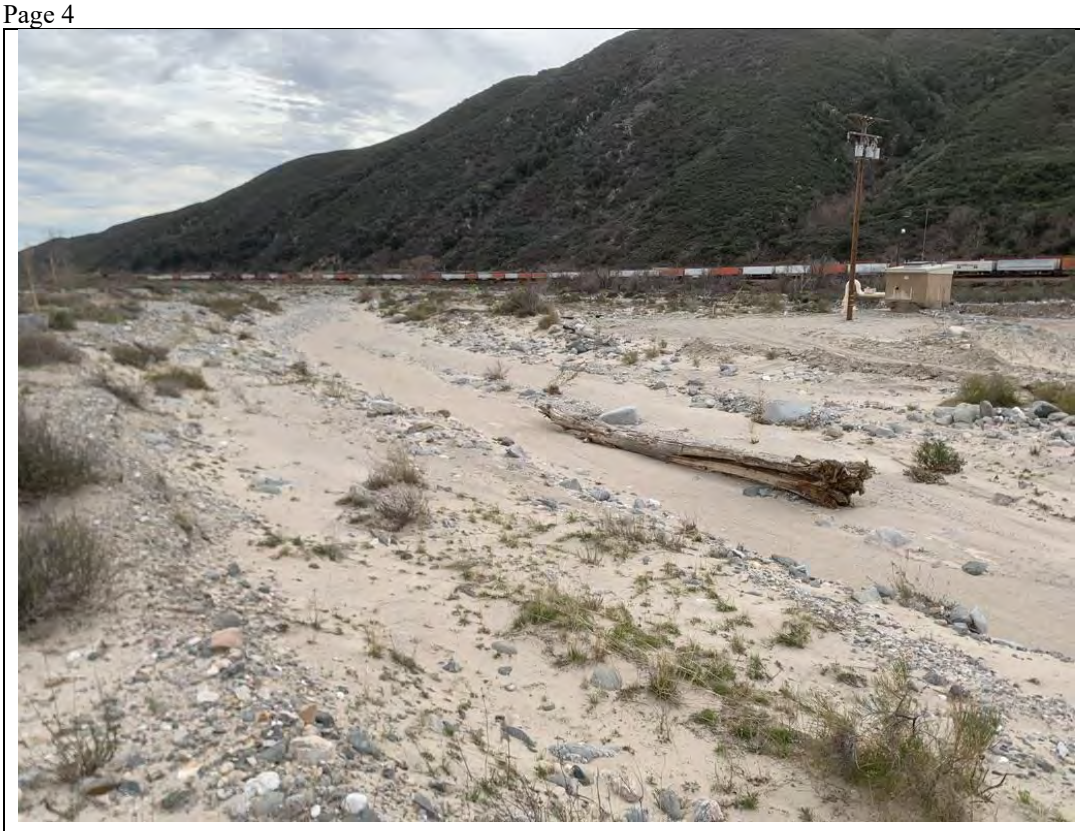
	Photo 1 – Looking downstream toward Vincent Well
	Photo 2 – Looking upstream towards Vincent well.

	Photo 3. Work area of Vincent Well looking downstream from access road..
	Photo – 4 Site overview looking upstream at Vincent Well

	Photo 5. Staging area located adjacent to access road.
	Photo 6. Access Road. Looking towards Vincent Well work area approach.

Appendix D – Cultural Resources Assessment

HISTORICAL/ARCHAEOLOGICAL RESOURCES SURVEY REPORT

VINCENT WELL FLOOD PROTECTION AND STREAM STABILIZATION IMPROVEMENTS PROJECT

Near the City of San Bernardino
San Bernardino County, California

For Submittal to:

Municipal Water Department
City of San Bernardino
1350 S. E Street
San Bernardino, CA 92408

Prepared for:

Jericho Systems
47 North 1st Street, Suite 1
Redlands, CA 92373-4601

Prepared by:

CRM TECH
1016 East Cooley Drive, Suite A/B
Colton, CA 92324

Bai "Tom" Tang, Principal Investigator
Michael Hogan, Principal Investigator

April 24, 2020
CRM TECH Contract No. 3577

Title: Historical/Archaeological Resources Survey Report: Vincent Well Flood Protection and Stream Stabilization Improvements Project, near the City of San Bernardino, San Bernardino County, California

Author(s): Bai "Tom" Tang, Principal Investigator
Terri Jacquemain, Historian/Report Writer
Daniel Ballester, Archaeologist/Field Director

Consulting Firm: CRM TECH
1016 East Cooley Drive, Suite A/B
Colton, CA 92324
(909) 824-6400

Date: April 24, 2020

For Submittal to: Municipal Water Department
City of San Bernardino
290 North D Street
San Bernardino, CA 92401
(909) 384-5141

Prepared for: Julie Gilbert
Jericho Systems
47 North 1st Street, Suite 1
Redlands, CA 92373-4601
(909) 307-5633

USGS Quadrangle: Devore, Calif., 7.5' quadrangle (Section 19, T2N R5W, San Bernardino Baseline and Meridian)

Project Size: Approximately 12 acres

Keywords: Cajon Pass area; Phase I historical/archaeological resources survey; Brown's Toll Road and former U.S. Route 66; no impact on "historical resources" per CEQA

MANAGEMENT SUMMARY

Between January and April 2020, at the request of Jericho Systems, Inc., CRM TECH performed a cultural resources study for the Vincent Well Flood Protection and Stream Stabilization Improvements Project in the Cajon Pass area near the City of San Bernardino, San Bernardino County, California. The project area comprises the site of Vincent Well within the Cajon Wash, a staging area, and a 2,370-linear-foot access road from Cajon Boulevard, measuring approximately 12 acres in total. It is located on the southwestern side of Cajon Boulevard and near its intersection with Mathews Ranch Road, in the east half of Section 19, T2N R5W, San Bernardino Baseline and Meridian.

The City of San Bernardino Municipal Water Department, as the lead agency for the project, required the study in compliance with the California Environmental Quality Act (CEQA). The purpose of this study is to provide the Department with the necessary information and analysis to determine whether the project would cause a substantial adverse change to any "historical resources," as defined by CEQA, that may exist in or around the project area. In order to identify such resources, CRM TECH conducted a historical/ archaeological resources records search, pursued historical background research, contacted Native American representatives, and carried out an intensive-level field survey on the entire project area.

Through the various avenues of research, this study did not encounter any "historical resources," as defined by CEQA and associated regulations, within the project boundaries. Outside but adjacent to the project area, the segment of Cajon Boulevard nearby is considered an extension of Site 36-002910 (U.S. Route 66), which meets the definition of a "historical resource," but the proposed project has no potential to cause a substantial adverse change in the significance of the site.

Based on these findings, CRM TECH recommends to the City of San Bernardino Municipal Water Department a finding of *No Impact* regarding "historical resources," including archaeological resources. No further cultural resources investigation is recommended for the project unless construction plans undergo such changes as to include areas not covered by this study. However, if buried cultural materials are encountered during any earth-moving operations associated with the project, all work within 50 feet of the discovery should be halted or diverted until a qualified archaeologist can evaluate the nature and significance of the finds.

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

Between January and April 2020, at the request of Jericho Systems, Inc., CRM TECH performed a cultural resources study for the Vincent Well Flood Protection and Stream Stabilization Improvements Project in the Cajon Pass area near the City of San Bernardino, San Bernardino County, California (Fig. 1). The project area comprises the site of Vincent Well within the Cajon Wash, a staging area, and a 2,370-linear-foot access road from Cajon Boulevard, measuring approximately 12 acres in total. It is located on the southwestern side of Cajon Boulevard and near its intersection with Mathews Ranch Road, in the east half of Section 19, T2N R5W, San Bernardino Baseline and Meridian (Figs. 2, 3).

The City of San Bernardino Municipal Water Department, as the lead agency for the project, required the study in compliance with the California Environmental Quality Act (CEQA; PRC §21000, et seq.). The purpose of this study is to provide the Department with the necessary information and analysis to determine whether the project would cause a substantial adverse change to any "historical resources," as defined by CEQA, that may exist in or around the project area.

In order to identify such resources, CRM TECH conducted a historical/archaeological resources records search, pursued historical background research, contacted Native American representatives, and carried out an intensive-level field survey on the entire project area. The following report is a complete account of the methods, results, and final conclusion of the study. Personnel who participated in the study are named in the appropriate sections below, and their qualifications are provided in Appendix 1.

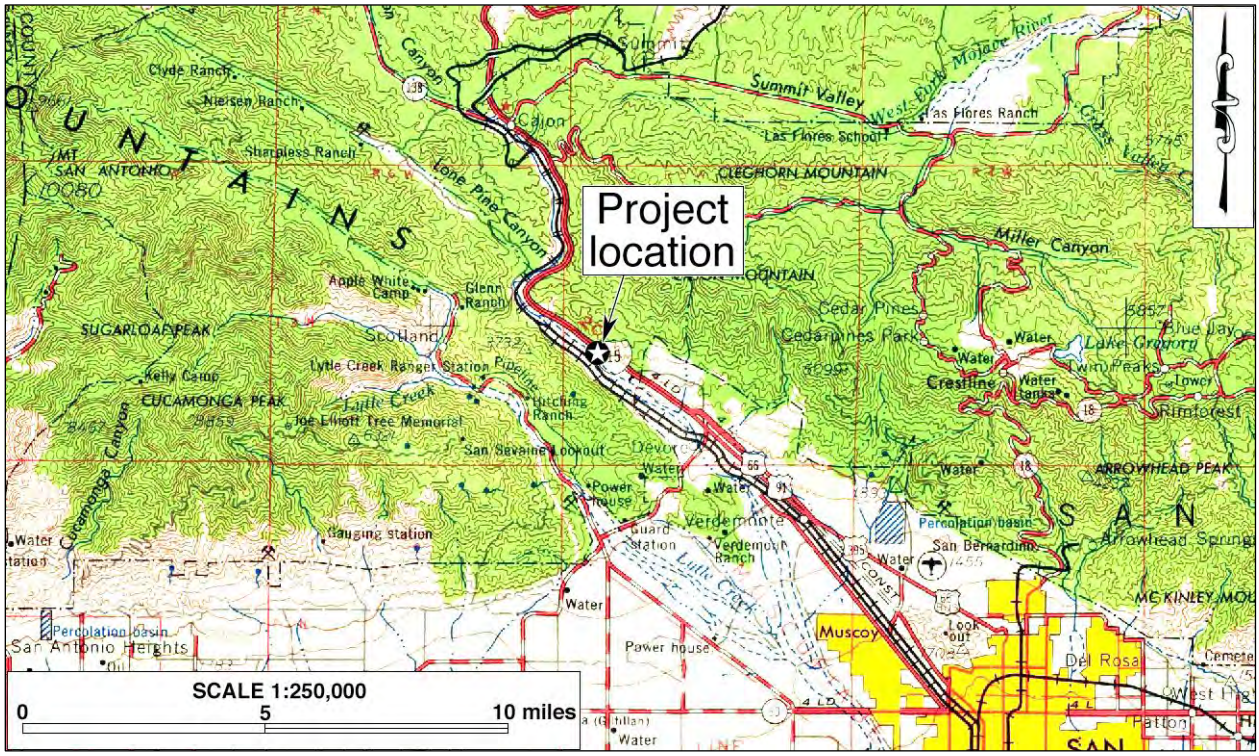


Figure 1. Project vicinity. (Based on USGS San Bernardino, Calif., 120'x60' quadrangle [USGS 1969])

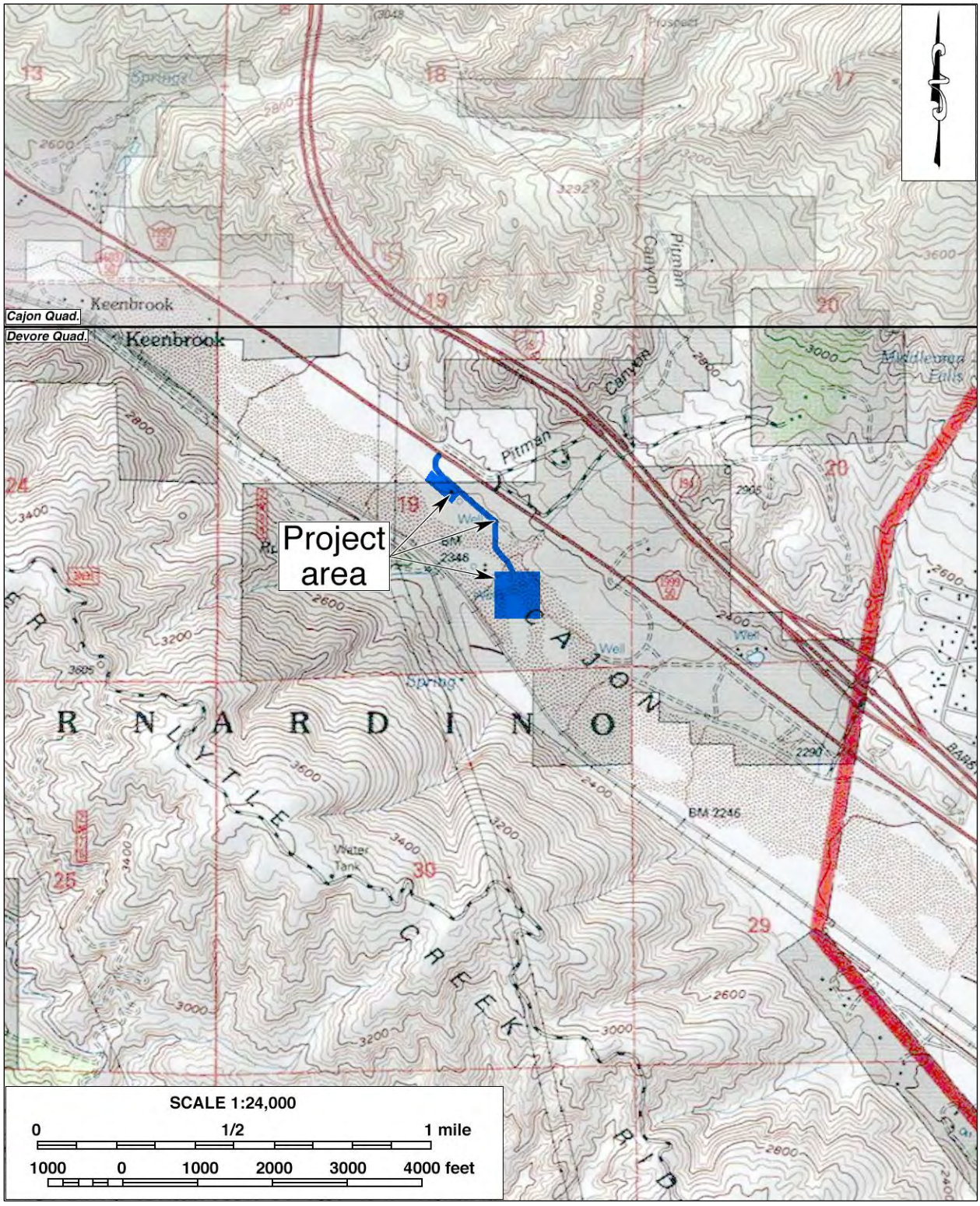


Figure 2. Project area. (Based on USGS Cajon and Devore, Calif., 7.5' quadrangles [USGS 1996a; 1996b])

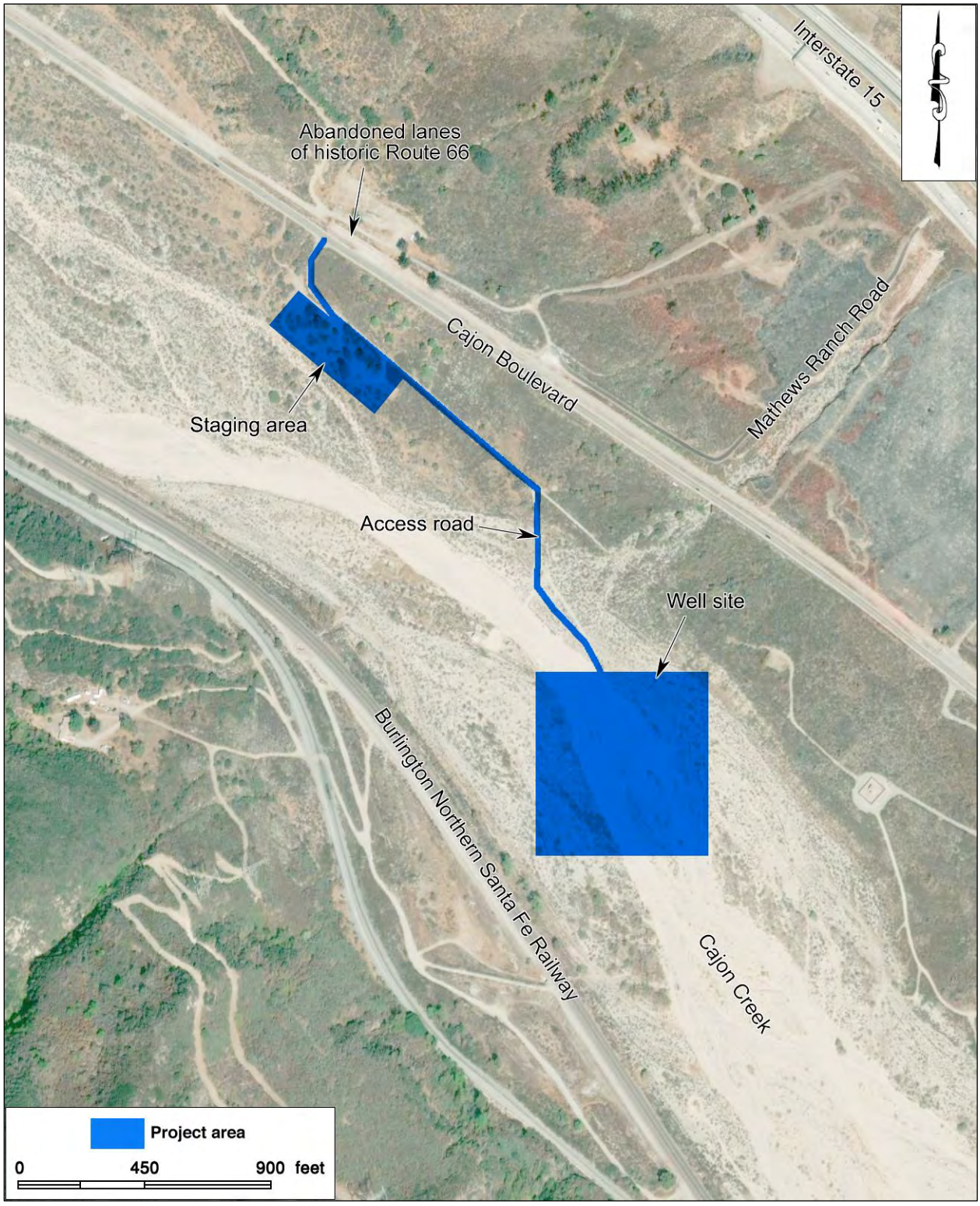


Figure 3. Aerial view of the project area.

SETTING

CURRENT NATURAL SETTING

The Cajon Pass is located in a narrow canyon between the San Gabriel Mountains to the west and the San Bernardino Mountains to the east. Both of these mountain ranges are parts of the Transverse Range that separate the Los Angeles Basin and the San Bernardino Valley on the south from the Mojave Desert on the north. The climate and environment of this region are typical of the southern California desert country, marked by extremes in temperature and aridity. In the Cajon Pass area, summer highs reach well over 100ºF, and winter lows dip below freezing. Average annual precipitation is roughly 16 inches, most of which occurs between November and March.

The access road in the project area is paved with weathered asphalt until it reaches the staging area, after which it is graded but unpaved. Beyond the staging area, the road and the well site are located within the northwest-southeast trending Cajon Creek wash between Cajon Boulevard (formerly U.S. Route 66) to the northeast and the Burlington Northern Santa Fe Railway (formerly the Atchison, Topeka and Santa Fe Railway) to the southwest (Fig. 3). The ground surface in the project vicinity has been greatly disturbed by past flooding events and by construction activities associated with the existing well, the access road, and the well house in the project area (Fig. 4).

The surface soils are rocky, gravelly, and sandy over a relatively level terrain, with elevations ranging between 2,300 feet and 3,020 feet above mean sea level, declining slightly to the southeast. The vegetation belongs to the coastal sage scrub community, dominated by sage and yerba santa but also including buckwheat, chamise, and other small shrubs and grasses. A group of pine and oak trees are found in the staging area, which was once occupied by a beekeeping colony of considerable size (NETR Online 2010-2016) but currently hosts only a few hive boxes.

Figure 4. Overview of the project area. (Photograph taken on February 27, 2020; view to the northwest)

CULTURAL SETTING

Prehistoric Context

The earliest evidence of human occupation in inland southern California was discovered below the surface of an alluvial fan in the northern portion of the Lakeview Mountains in Riverside County, overlooking the San Jacinto Valley, with radiocarbon dates clustering around 9,500 B.P. (Horne and McDougall 2008). Another site found near the shoreline of Lake Elsinore, close to the confluence of Temescal Wash and the San Jacinto River, yielded radiocarbon dates between 8,000 and 9,000 B.P. (Grenda 1997). Additional sites with isolated Archaic dart points, bifaces, and other associated lithic artifacts from the same age range have been found in the nearby Cajon Pass area, typically atop knolls with good viewsheds (Basgall and True 1985; Goodman and McDonald 2001; Goodman 2002; Milburn et al. 2008).

The cultural history of southern California has been summarized into numerous chronologies, including the works of Chartkoff and Chartkoff (1984), Warren (1984), and others. The prehistory of the inland region specifically has been addressed by O'Connell et al. (1974), McDonald, et al. (1987), Keller and McCarthy (1989), Grenda (1993), Goldberg (2001), and Horne and McDougall (2008). Although the beginning and ending dates of different cultural horizons vary in different parts of the region, the general framework of the prehistory of inland southern California can be divided into three primary periods:

- Paleoindian Period (ca. 18,000-9,000 B.P.): Native peoples of this period created fluted spearhead bases designed to be hafted to wooden shafts. The distinctive method of thinning bifaces and spearhead preforms by removing long, linear flakes leaves diagnostic Paleoindian markers at tool-making sites. Other artifacts associated with the Paleoindian toolkit include choppers, cutting tools, retouched flakes, and perforators. Sites from this period are very sparse across the landscape and most are deeply buried.
- Archaic Period (ca. 9,000-1,500 B.P.): Archaic sites are characterized by abundant lithic scatters of considerable size with many biface thinning flakes, bifacial preforms broken during manufacture, and well-made groundstone bowls and basin metates. As a consequence of making dart points, many biface thinning waste flakes were generated at individual production stations, which is a diagnostic feature of Archaic sites.
- Late Prehistoric Period (ca. 1,500 B.P.-contact): Sites from this period typically contain small lithic scatters from the manufacture of small arrow points, expedient groundstone tools such as tabular metates and unshaped manos, wooden mortars with stone pestles, acorn or mesquite bean granaries, ceramic vessels, shell beads suggestive of extensive trading networks, and steatite implements such as pipes and arrow shaft straighteners.

Ethnohistoric Context

The Cajon Pass area is part of the traditional territory of the Serrano people. The basic written sources on Serrano culture are Kroeber (1925), Strong (1929), and Bean and Smith (1978). The following ethnographic discussion of the Serrano is based on these sources. "Serrano" was derived from a Spanish term meaning "mountaineer" or "highlander." They settled mostly on elevated terraces, hills, and finger ridges near where flowing water emerged from the mountains. Serrano

territory is centered at the San Bernardino Mountains, but also includes part of the San Gabriel Mountains, much of the San Bernardino Valley, and the Mojave River valley in the southern portion of the Mojave Desert, reaching as far east as the Cady, Sheep Hole, and Coxcomb Mountains.

Prior to European contact, Serrano subsistence was gleaned from the surrounding landscape, exploiting nearly all of the resources available to acquire food, shelter, and clothing as well as to create ornaments and decorations. Common tools were made from locally sourced materials as well as those procured through trade or travel. Lithic tools included manos and metates, mortars and pestles, hammerstones, fire drills, awls, arrow straighteners, and stone knives and scrapers. Wood, horn, and bone spoons and stirrers; baskets and pottery vessels were also used.

Although contact with Europeans may have occurred as early as 1771 or 1772, Spanish influence on Serrano lifeways was minimal until the 1810s, when a mission *asistencia* was established on the southern edge of Serrano territory. Between then and the end of the mission era in 1834, most of the Serrano in the western portion of their traditional territory were removed to the nearby missions. In the eastern portion, a series of punitive expeditions in 1866-1870 resulted in the death or displacement of almost all remaining Serrano population in the San Bernardino Mountains. Today, most Serrano descendants are affiliated with the San Manuel Band of Mission Indians, the Morongo Band of Mission Indians, or the Serrano Nation of Indians.

Historic Context

In 1772, a small force of Spanish soldiers under the command of Pedro Fages, military *comandante* of Alta California, became the first Europeans to travel through the Cajon Pass area (Beck and Haase 1974:15; Robinson 1989:7). However, the mountain pass' significance as an important passage between the San Bernardino Valley and the Mojave Desert was not recognized immediately. In the decades after Fages' expedition, pioneer Spanish and American explorers such as Francisco Garcés (in 1776) and Jedediah Smith (in 1826 and 1827) crossed the San Bernardino Mountains by way of the Mojave River Valley, following the ancient Mojave Indian Trail (Hoover et al. 1966:317). It was not until the early 1830s, with the establishment of the Old Spanish Trail, a historic pack-train road between Santa Fe and Los Angeles, that Cajon Pass became the preferred route across the mountains (*ibid.*).

Since the 1830s, Cajon Pass has remained one of Southern California's primary gateways to the rest of the country. In the late 1840s and early 1850s, when the famous wagon road known as the Mormon Trail or the Salt Lake Trail was established, it traversed the Cajon Pass area along the same route as the earlier Old Spanish Trail (Ellerbe 1904:130; Hoover et al. 1966:317-319). During the 1860s, it is estimated as many as 2,000 emigrant wagons traveled annually on the Mormon Trail from Salt Lake City to Southern California (Robinson 1958:36).

In 1861, John Brown, Sr., a prominent early settler in the San Bernardino Valley, built an improved toll road in Cajon Canyon under franchise from the County of San Bernardino (Robinson 1989:51). This was followed by the construction of the California Southern Railroad (a subsidiary of the Atchison, Topeka and Santa Fe Railway) in 1885 (Serpico 1988:21-22), the National Old Trails Highway (U.S. Route 66) in the 1910s-1930s (Scott and Kelly 1988:31; Casebier 1989:149), and the modern Interstate Highway 15 (I-15), all of which run through Cajon Canyon in the vicinity of the

project area. While Euroamerican settlement activities in the Cajon Pass area began at least by the early 1870s, they were relatively limited during the historic period in comparison to the fertile valley below. As a result, the area's position as an important nexus of regional and national transportation thoroughfares constitutes the main theme of its historical heritage.

RESEARCH METHODS

RECORDS SEARCH

On January 29 and February 5, 2020, CRM TECH archaeologists Nina Gallardo and Ben Kerridge completed the records search at the South Central Coastal Information Center (SCCIC) on the campus of California State University, Fullerton. During the records search, Gallardo and Kerridge examined maps and records on file at the SCCIC for previously identified cultural resources and existing cultural resources reports within a one-mile radius of the project area. Previously identified cultural resources include properties designated as California Historical Landmarks, Points of Historical Interest, or San Bernardino County Landmarks, as well as those listed in the National Register of Historic Places, the California Register of Historical Resources, or the California Historical Resources Inventory.

HISTORICAL RESEARCH

Historical background research for this study was conducted by CRM TECH historian Terri Jacquemain. Sources consulted during the research included published literature in local history, historic maps of the Cajon Pass area, and aerial photographs of the project vicinity. Among the maps consulted for this study were U.S. General Land Office (GLO) land survey plat maps dated 1886 and 1887 and U.S. Geological Survey (USGS) topographic maps dated 1901-1996, which are collected at the Science Library of the University of California, Riverside, and the California Desert District of the U.S. Bureau of Land Management, located in Moreno Valley. The aerial photographs, taken in 1938-2018, are available at the Nationwide Environmental Title Research (NETR) Online website and through the Google Earth software.

NATIVE AMERICAN PARTICIPATION

On January 17, 2020, CRM TECH submitted a written request to the State of California Native American Heritage Commission (NAHC) for a records search in the commission's Sacred Lands File. Following NAHC's recommendations and previously established consultation protocol, CRM TECH subsequently contacted the Gabrieleño Band of Mission Indians–Kizh Nation in writing on January 27, 2020, for additional information on potential Native American cultural resources in the project vicinity. Correspondence between CRM TECH and the Native American representatives is attached to this report in Appendix 2.

FIELD SURVEY

On February 27, 2020, CRM TECH archaeologist Daniel Ballester carried out the intensive-level field survey of the project area. The well site and the staging area were surveyed by walking a series of parallel transects oriented in the north-south or northeast-southwest direction and spaced 10 to 15

meters (approximately 30-50 feet) apart, while the linear portion of the project area was surveyed along two transects placed on either side the of the existing road at a distance of approximately 10 meters from each other. In this way, the ground surface in the entire project area was systematically and carefully examined for any evidence of human activities dating to the prehistoric or historic period (i.e., 50 years ago or older). Ground visibility ranged from poor (30%) to excellent (80%) depending on the density of the scattered vegetation growth, which was considered to be adequate for this location in light of the past disturbances to the ground surface.

RESULTS AND FINDINGS

RECORDS SEARCH

SCCIC records indicate that the northeastern portion of the well site was included in the area surveyed in 1991 prior to the installation a new well nearby (McKenna 1991; #2250 in Fig. 5), while the entire project area was covered by a large reconnaissance-level study that did not include a systematic field survey (not mapped in Fig. 5). Six other surveys were completed along the segment of Cajon Boulevard adjacent to the project area (Fig. 5). Despite these past survey efforts in the vicinity, no cultural resources were recorded specifically within or adjacent to the project boundaries.

Within the one-mile scope of the records search, SCCIC records show at least 20 additional studies on various tracts of land and linear features (Fig. 5). In all, however, only roughly 10% of the land within the scope of the records search has been surveyed for cultural resources, which resulted in the identification of 10 historical/archaeological sites. All 10 of the sites dated to the historic period, including the Atchison, Topeka and Santa Fe Railway and five minor culverts and a loading dock on the rail line, all recorded to the southwest the project area. The other three sites were recorded to the northeast of the project area and represented the Devore Garage and two refuse scatters. None of these 10 sites were found in the immediate vicinity of the project area, and thus none of them require further consideration during this study.

In addition to these 10 sites, the segment of Cajon Boulevard adjacent to the project area is known to have been formerly a part of the famed U.S. Route 66, which has been recorded elsewhere in San Bernardino County as Site 36-002910 (CA-SBR-2910H). As one of the first transcontinental automobile highways to be completed in the U.S., an important route for the dust bowl migration in the 1930s, and a celebrated symbol of Americana in mid-20th century pop culture, Site 36-002910 was previously determined to be eligible for listing in the National Register of Historic Places (OHP 2000:140). For the purpose of this study, the segment of Cajon Boulevard adjacent to the project area is considered an extension of the recorded site.

HISTORICAL RESEARCH

Historical sources consulted for this study confirm that the project area is situated at the nexus of a number of—and several generations of—major transportation arteries between the Mojave Desert and the San Bernardino Valley. Among these were the Old Spanish Trail and the Salt Lake Trail of the 1830s-1850s, John Brown's Toll Road of the 1860s, the Santa Fe and other railroads after the

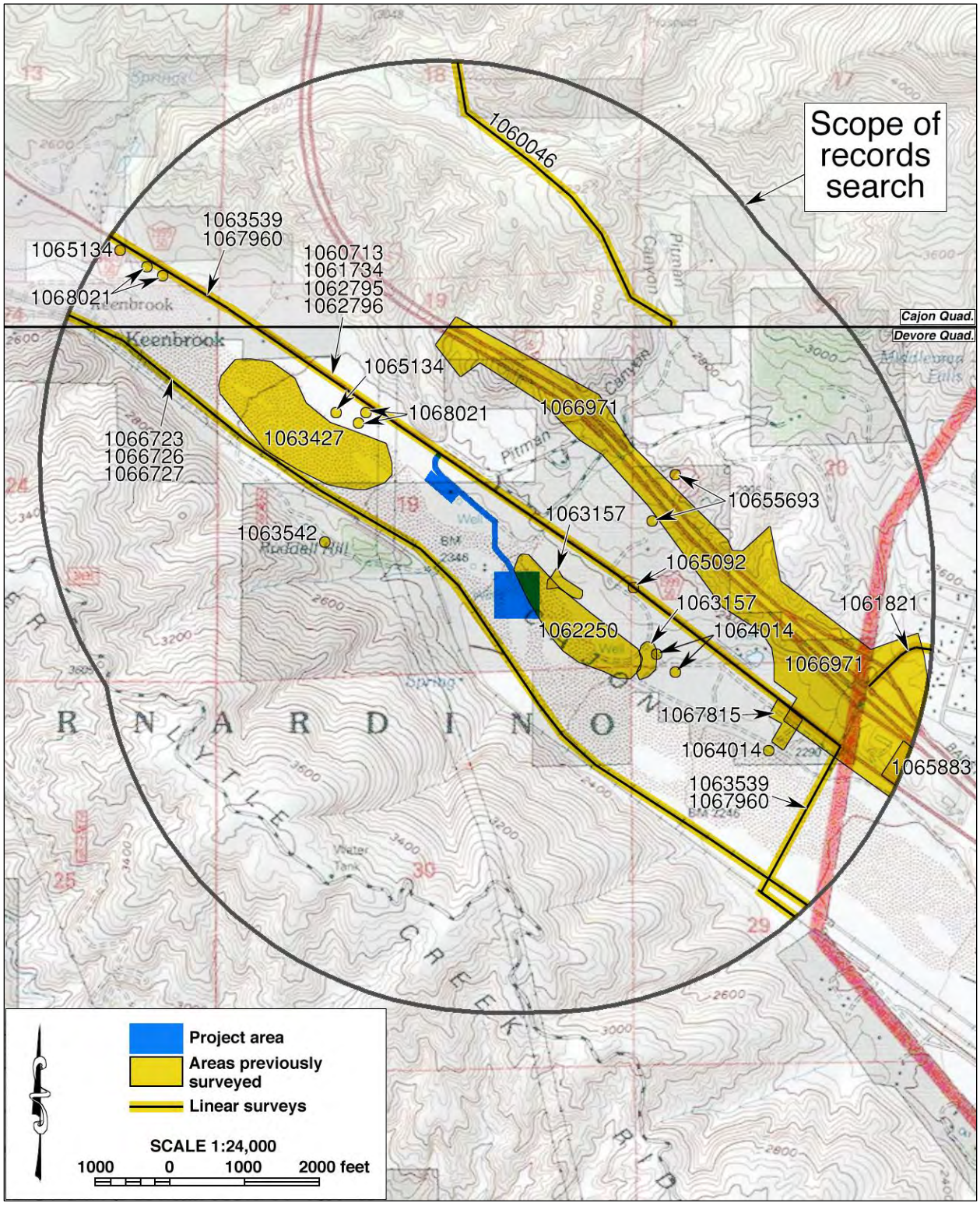


Figure 5. Previous cultural resources studies in the vicinity of the project area, listed by SCCIC file number. Locations of historical/archaeological resources are not shown as a protective measure.

1880s, U.S. Route 66 in the early and mid-20th century, and finally today's I-15 after the 1980s (Figs. 6-8; NETR Online 1938-1980). Also observed in the 1860s-1880s among the transportation arteries was an irrigation ditch roughly along the course of Cajon Creek (Fig. 6). In the 1890s, the main road through the Cajon Pass was mapped as running near the bottom of the Cajon Creek wash and across portions of the project area (Fig. 7). This road was undoubtedly the direct successor to the Cajon Pass Toll Road built by John Brown, Sr., in 1861 (Robinson 1989:51). After Brown's franchise from the County of San Bernardino expired around 1881, the county took over the road and turned it into a public highway (*ibid.*).

In the 1910s-1930s, when the National Old Trails Highway was completed as a hard-surface automobile road through the Cajon Pass, a slightly different alignment was selected at a higher elevation from the old toll road, along that of present-day Cajon Boulevard

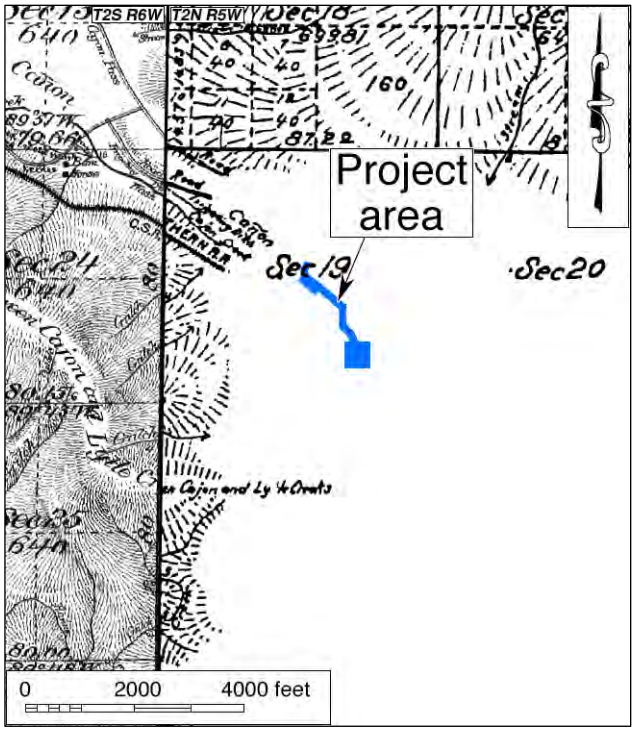


Figure 6. The project area and vicinity in 1869-1885. (Source: GLO 1886; 1887)

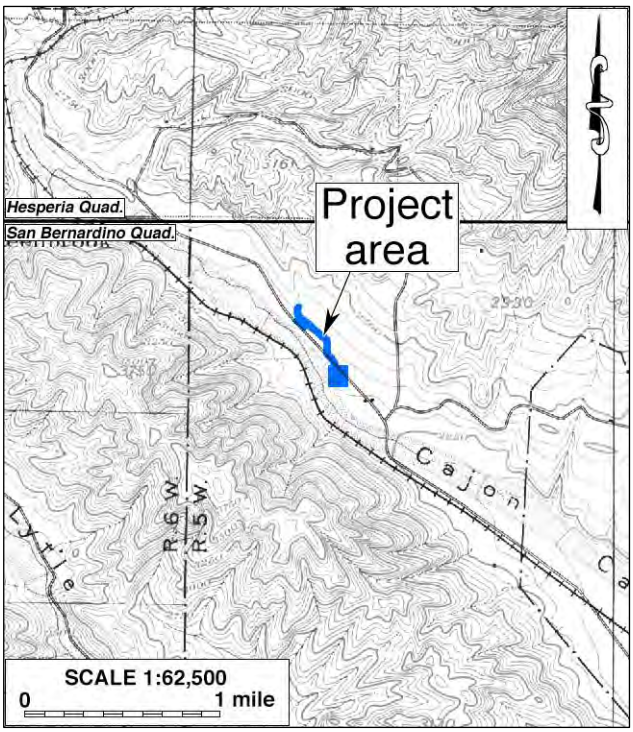


Figure 7. The project area and vicinity in 1893-1899. (Source: USGS 1901; 1902)

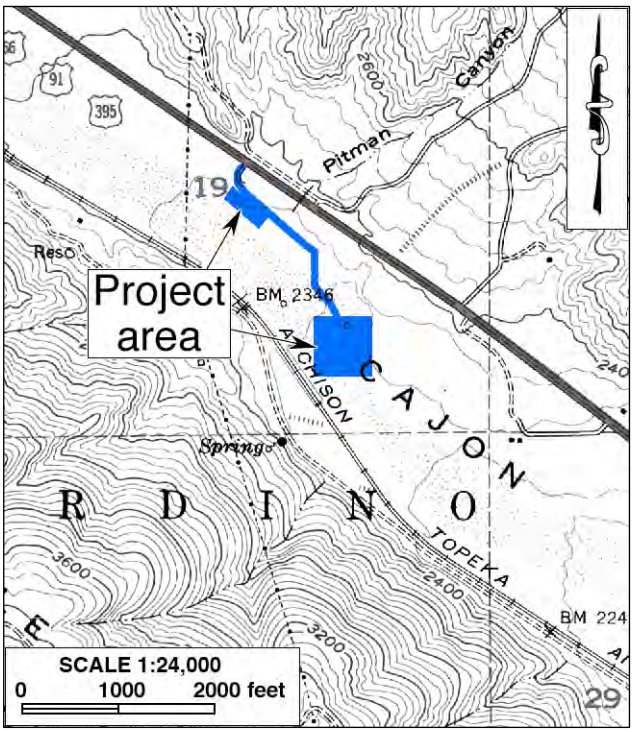


Figure 8. The project area and vicinity in 1952-1954. (Source: USGS 1954)

(NETR Online 1938; Fig. 8). In the 1926 National Highway System, the National Old Trails Highway was designated a part of U.S. Route 66, while the segment in Cajon Canyon was also co-signed as Routes 91 and 395 (Fig. 8). Between 1952 and 1959, it was expanded into a divided highway with two traffic lanes in each direction and a wide median between them (NETR Online 1952; 1959). What is now Cajon Boulevard corresponded to the southbound lanes of the highway, which appear to have been added at that time (NETR Online 1959). By the 1980s, the status and importance of Route 66 was greatly reduced when the I-15 was completed some 1,500 feet further to the northeast (NETR Online 1966-1980).

Despite its location in this busy transportation corridor, the project area, lying within an active wash, evidently remained vacant and undeveloped throughout the historic period (Figs. 6-8; NETR Online 1938-1980). The only man-made feature known to be present within the project boundaries was the forerunner of the access road, which was in existence at least by 1952 and may have been as early as 1938 in a slightly different configuration (NETR Online 1938; 1952). The existing well and the well house in the project area evidently dates to sometime between 1980 and 1994, well after the end of the historic period (NETR Online 1980; 1994). No other permanent features were found within the project boundaries from the historic maps and aerial photographs (Figs. 6-8; NETR Online 1938-2016; Google Earth 1994-2018). As mentioned above, the staging area has been used for beekeeping in recent years, where more than 100 hive boxes were observed in 2012-2018 (Google Earth 2012-2018).

NATIVE AMERICAN PARTICIPATION

In response to CRM TECH's inquiry, NAHC states in a letter dated January 24, 2020, that the Sacred Lands File identified unspecified Native American cultural resource(s) in the vicinity of the project area but referred further inquiry regarding such resource(s) to the Gabrieleño Band of Mission Indians–Kizh Nation. When contacted by CRM TECH via e-mail, Brandy Salas, Tribal Administrative Specialist, replies in an e-mail dated February 11 that the Gabrieleño Band of Mission Indians–Kizh Nation would like to seek government-to-government consultation with the City of San Bernardino Municipal Water Department regarding this project. The responses from NAHC and Ms. Salas, along with a referral list provided by NAHC for other potential tribal contacts in the region, are attached to this report in Appendix 2 for reference by the Department in future consultation efforts.

FIELD SURVEY

The field survey encountered no potential "historical resources" of either prehistoric or historical origin within the project area. Field observations confirm that the existing well and the well house, a small concrete block building, are clearly modern in appearance and consistent to a 1980s-1990s origin, as suggested by the historical aerial photographs (Fig. 9). The access road consists of an asphalt-paved segment on the northwestern end and a mechanically graded but unpaved segment on the southeastern end (Fig. 9). Although known to be more than 50 years of age, it is today a generic, nondescript minor road that demonstrates no particularly historical characters.

Outside but adjacent to the northern end of the project area, Cajon Boulevard was historically the southbound lanes of U.S. Route 66 (Site 36-002910), as noted above. Today, it remains in use as a

Figure 9. Existing built-environment features within or adjacent to the project area. *Clockwise from upper left*: existing well, view to the west; Cajon Boulevard at the intersection with the access road, view to the west; paved segment of the access road, view to the northwest; unpaved segment of the access road, view to the southeast. (Photographs taken on February 27, 2020)

two-lane country road with narrow hard shoulders and no curbs, while the northbound lanes of Route 66 and the former median lie abandoned to the northeast side (Fig. 9). In comparison to the abandoned lanes further from the project area, the current appearance of Cajon Boulevard reflects the results of upgrading and maintenance in recent decades. As a working component of the modern transportation infrastructure, it, too, demonstrates no distinctively historical characters.

DISCUSSION

CEQA establishes that "a project that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment" (PRC §21084.1). "Substantial adverse change," according to PRC §5020.1(q), "means demolition, destruction, relocation, or alteration such that the significance of a historical resource would be impaired." As defined by PRC §5020.1(j), "'historical resource' includes, but is not limited to, any object, building, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California."

More specifically, CEQA guidelines state that the term "historical resources" applies to any such resources listed in or determined to be eligible for listing in the California Register of Historical Resources, included in a local register of historical resources, or determined to be historically significant by the lead agency (Title 14 CCR §15064.5(a)(1)-(3)). Regarding the proper criteria for

the evaluation of historical significance, CEQA guidelines mandate that "generally a resource shall be considered by the lead agency to be 'historically significant' if the resource meets the criteria for listing on the California Register of Historical Resources" (Title 14 CCR §15064.5(a)(3)). A resource may be listed in the California Register if it meets any of the following criteria:

(1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
(2) Is associated with the lives of persons important in our past.
(3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
(4) Has yielded, or may be likely to yield, information important in prehistory or history. (PRC §5024.1(c))

In summary of the research results outlined above, two built-environment features within or adjacent to the project boundaries, namely the existing access road to the well site and the segment of Cajon Boulevard that the access road intersects at the northern end, trace their origins to the historic period. However, both of these features have been significantly altered during more recent times, and neither of them retains sufficient historic integrity in relation to the historic period to be considered a potential "historical resource" in their own right.

The existence of the access road along its current alignment dates at least to the early 1950s, and parts of it may have been in use in the late 1930s. Since then, however, the road has been mechanically graded, perhaps repeatedly, and partially paved with asphalt. It is notable that the course of the access road may partially overlap that of the pre-1900 main road though Cajon Canyon (Fig. 7), the direct successor to John Brown's Toll Road, which in itself represented an important chapter in the history of the Cajon Pass area. However, in light of the location of the project area within the active wash of Cajon Creek, it is unlikely that any physical remnants of the primitive wagon road nearby would have survived the periodic flooding in the canyon. The catastrophic flood of March 1938, for example, is known to have cause significant damage to the Atchison, Topeka and Santa Fe Railway, the Union Pacific Railroad, and U.S. Route 66 at much higher elevations (Panhorst 1938).

The segment of Cajon Boulevard located closest to the project location was once a part of U.S. Route 66, albeit a relatively late component built in the 1950s, and is thus logically an extension of Site 36-002910, which as a whole has been determined eligible for listing in the National Register of Historic Places (OHP 2000:140). As such, the site is automatically eligible for the California Register of Historical Resources and qualifies as a "historical resource" under CEQA provisions. However, at this location Cajon Boulevard represents only the now-reconfigured southbound lanes of Route 66, with the older northbound lanes and the former median abandoned on the opposite side from the project area. The current appearance and characteristics of Cajon Boulevard resulted from alterations, upgrading, and maintenance in modern times, or after the period of significance for Route 66 (i.e., early to mid-20th century), and do not contribute to the significance of Site 36-002910.

Furthermore, the portion of the project near the extension of Site 36-002910 entails only improvement to the existing access road that intersects a small portion of Cajon Boulevard and has little potential to alter the existing condition, characteristics, or appearance of what remains of Route

66 as a whole. Given the limited scale of the proposed construction activities in relation to Site 36-002910, this study concludes that the project will not cause a substantial adverse change in the significance of the site, either directly or indirectly.

CONCLUSION AND RECOMMENDATIONS

In conclusion, throughout the course of the present study, no "historical resources," as defined by CEQA and associated regulations, were identified within the project boundaries. Outside but adjacent to the project area, the segment of Cajon Boulevard nearby is considered an extension of Site 36-002910 (U.S. Route 66), which meets the definition of a "historical resource," but the proposed project has no potential to cause a substantial adverse change in the significance of the site. Based on these findings, CRM TECH presents the following recommendations to the City of San Bernardino Municipal Water Department:

- The proposed project will have *No Impact* on any known "historical resources," including archaeological resources
- No further cultural resources investigation will be necessary for the project unless construction plans undergo such changes as to include areas not covered by this study.
- If any buried cultural materials are encountered during earth-moving operations associated with the project, all work within 50 feet of the discovery should be halted or diverted until a qualified archaeologist can evaluate the nature and significance of the finds.

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APPENDIX 1:
PERSONNEL QUALIFICATIONS

PRINCIPAL INVESTIGATOR/HISTORIAN
Bai "Tom" Tang, M.A.

Education

1988-1993	Graduate Program in Public History/Historic Preservation, UC Riverside.
1987	M.A., American History, Yale University, New Haven, Connecticut.
1982	B.A., History, Northwestern University, Xi'an, China.
2000	"Introduction to Section 106 Review," presented by the Advisory Council on Historic Preservation and the University of Nevada, Reno.
1994	"Assessing the Significance of Historic Archaeological Sites," presented by the Historic Preservation Program, University of Nevada, Reno.

Professional Experience

2002-	Principal Investigator, CRM TECH, Riverside/Colton, California.
1993-2002	Project Historian/Architectural Historian, CRM TECH, Riverside, California.
1993-1997	Project Historian, Greenwood and Associates, Pacific Palisades, California.
1991-1993	Project Historian, Archaeological Research Unit, UC Riverside.
1990	Intern Researcher, California State Office of Historic Preservation, Sacramento.
1990-1992	Teaching Assistant, History of Modern World, UC Riverside.
1988-1993	Research Assistant, American Social History, UC Riverside.
1985-1988	Research Assistant, Modern Chinese History, Yale University.
1985-1986	Teaching Assistant, Modern Chinese History, Yale University.
1982-1985	Lecturer, History, Xi'an Foreign Languages Institute, Xi'an, China.

Cultural Resources Management Reports

Preliminary Analyses and Recommendations Regarding California's Cultural Resources Inventory System (With Special Reference to Condition 14 of NPS 1990 Program Review Report). California State Office of Historic Preservation working paper, Sacramento, September 1990.

Numerous cultural resources management reports with the Archaeological Research Unit, Greenwood and Associates, and CRM TECH, since October 1991.

PRINCIPAL INVESTIGATOR/ARCHAEOLOGIST
Michael Hogan, Ph.D., RPA*

Education

1991	Ph.D., Anthropology, University of California, Riverside.
1981	B.S., Anthropology, University of California, Riverside; with honors.
1980-1981	Education Abroad Program, Lima, Peru.
2002	Section 106—National Historic Preservation Act: Federal Law at the Local Level. UCLA Extension Course #888.
2002	"Recognizing Historic Artifacts," workshop presented by Richard Norwood, Historical Archaeologist.
2002	"Wending Your Way through the Regulatory Maze," symposium presented by the Association of Environmental Professionals.
1992	"Southern California Ceramics Workshop," presented by Jerry Schaefer.
1992	"Historic Artifact Workshop," presented by Anne Duffield-Stoll.

Professional Experience

2002-	Principal Investigator, CRM TECH, Riverside/Colton, California.
1999-2002	Project Archaeologist/Field Director, CRM TECH, Riverside.
1996-1998	Project Director and Ethnographer, Statistical Research, Inc., Redlands.
1992-1998	Assistant Research Anthropologist, University of California, Riverside
1992-1995	Project Director, Archaeological Research Unit, U. C. Riverside.
1993-1994	Adjunct Professor, Riverside Community College, Mt. San Jacinto College, U.C. Riverside, Chapman University, and San Bernardino Valley College.
1991-1992	Crew Chief, Archaeological Research Unit, U. C. Riverside.
1984-1998	Archaeological Technician, Field Director, and Project Director for various southern California cultural resources management firms.

Research Interests

Cultural Resource Management, Southern Californian Archaeology, Settlement and Exchange Patterns, Specialization and Stratification, Culture Change, Native American Culture, Cultural Diversity.

Cultural Resources Management Reports

Author and co-author of, contributor to, and principal investigator for numerous cultural resources management study reports since 1986.

Memberships

* Register of Professional Archaeologists; Society for American Archaeology; Society for California Archaeology; Pacific Coast Archaeological Society; Coachella Valley Archaeological Society.

PROJECT HISTORIAN/REPORT WRITER
Terri Jacquemain, M.A.

Education

2004	M.A., Public History and Historic Resource Management, University of California, Riverside.
2002	B.S., Anthropology, University of California, Riverside.
2001	Archaeological Field School, University of California, Riverside.
1991	A.A., Riverside Community College, Norco Campus.

Professional Experience

2003-	Historian/Architectural Historian/Report Writer, CRM TECH, Riverside/Colton, California.
2002-2003	Teaching Assistant, Religious Studies Department, University of California, Riverside.
2002	Interim Public Information Officer, Cabazon Band of Mission Indians.
2000	Administrative Assistant, Native American Student Programs, University of California, Riverside.
1997-2000	Reporter, *Inland Valley Daily Bulletin*, Ontario, California.
1991-1997	Reporter, *The Press-Enterprise*, Riverside, California.

Membership

California Preservation Foundation.

PROJECT ARCHAEOLOGIST/NATIVE AMERICAN LIAISON
Nina Gallardo, B.A.

Education

2004	B.A., Anthropology/Law and Society, University of California, Riverside.

Professional Experience

2004-	Project Archaeologist, CRM TECH, Riverside/Colton, California.

Cultural Resources Management Reports

Co-author of and contributor to numerous cultural resources management reports since 2004.

PROJECT ARCHAEOLOGIST/FIELD DIRECTOR
Daniel Ballester, M.S.

Education

2013	M.S., Geographic Information System (GIS), University of Redlands, California.
1998	B.A., Anthropology, California State University, San Bernardino.
1997	Archaeological Field School, University of Las Vegas and University of California, Riverside.
1994	University of Puerto Rico, Rio Piedras, Puerto Rico.

Professional Experience

2011-2012	GIS Specialist for Caltrans District 8 Project, Garcia and Associates, San Anselmo, California.
2009-2010	Field Crew Chief, Garcia and Associates, San Anselmo, California.
2009-2010	Field Crew, ECorp, Redlands.
2002-	Field Director/GIS Specialist, CRM TECH, Riverside/Colton, California.
1999-2002	Project Archaeologist, CRM TECH, Riverside, California.
1998-1999	Field Crew, K.E.A. Environmental, San Diego, California.
1998	Field Crew, A.S.M. Affiliates, Encinitas, California.
1998	Field Crew, Archaeological Research Unit, University of California, Riverside.

PROJECT ARCHAEOLOGIST
Ben Kerridge, M.A.

Education

2014	Geoarchaeological Field School, Institute for Field Research, Kephallenia, Greece.
2010	M.A., Anthropology, California State University, Fullerton.
2009	Project Management Training, Project Management Institute/CH2M HILL, Santa Ana, California.
2004	B.A., Anthropology, California State University, Fullerton.

Professional Experience

2015-	Project Archaeologist/Report Writer, CRM TECH, Colton, California.
2015	Teaching Assistant, Institute for Field Research, Kephallenia, Greece.
2009-2014	Publications Delivery Manager, CH2M HILL, Santa Ana, California.
2010-	Naturalist, Newport Bay Conservancy, Newport Beach, California.
2006-2009	Technical Publishing Specialist, CH2M HILL, Santa Ana, California.

Memberships

Society for California Archaeology; Pacific Coast Archaeological Society.

APPENDIX 2

CORRESPONDENCE WITH NATIVE AMERICAN REPRESENTATIVES

SACRED LANDS FILE & NATIVE AMERICAN CONTACTS LIST REQUEST

NATIVE AMERICAN HERITAGE COMMISSION
915 Capitol Mall, RM 364
Sacramento, CA 95814
(916) 653-4082
(916) 657-5390 (fax)
nahc@pacbell.net

Project: Proposed Vincent Well Flood Protection and Stream Stabilization Improvements Project (CRM TECH No. 3577)

County: San Bernardino

USGS Quadrangle Name: Cajon and Devore, Calif.

Township 2 North **Range** 5 West SB **BM; Section(s)**: 19

Company/Firm/Agency: CRM TECH

Contact Person: Nina Gallardo

Street Address: 1016 E. Cooley Drive, Suite A/B

City: Colton, CA **Zip:** 92324

Phone: (909) 824-6400 **Fax:** (909) 824-6405

Email: ngallardo@crmtech.us

Project Description: The primary component of the project is to make improvement to an existing well. The project area consists of the approximately eight-acre well site, a staging/laydown area, and approximately 0.45 linear mile of access road, located within Cajon Wash and near Keenbrook, San Bernardino County, California.

January 17, 2020

NATIVE AMERICAN HERITAGE COMMISSION

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

January 24, 2020

Nina Gallardo
CRM TECH

Via Email to: ngallardo@crmtech.us

Re: Proposed Vincent Well Flood Protection and Stream Stabilization Improvements Project, San Bernardino County

Dear Ms. Gallardo:

A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were positive. Please contact the Gabrieleno Band of Mission Indians – Kizh Nation on the attached list for more information. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated; if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call or email to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify me. With your assistance, we can assure that our lists contain current information.

If you have any questions or need additional information, please contact me at my email address: Andrew.Green@nahc.ca.gov.

Sincerely,

Andrew Green

Andrew Green
Staff Services Analyst

Attachment

Native American Heritage Commission
Native American Contact List
San Bernardino County
1/24/2020

Gabrieleno Band of Mission Indians - Kizh Nation
Andrew Salas, Chairperson
P.O. Box 393 — Gabrieleno
Covina, CA, 91723
Phone: (626) 926 - 4131
admin@gabrielenoindians.org

Gabrieleno/Tongva San Gabriel Band of Mission Indians
Anthony Morales, Chairperson
P.O. Box 693 — Gabrieleno
San Gabriel, CA, 91778
Phone: (626) 483 - 3564
Fax: (626) 286-1262
GTTribalcouncil@aol.com

Gabrielino /Tongva Nation
Sandonne Goad, Chairperson
106 1/2 Judge John Aiso St., #231 — Gabrielino
Los Angeles, CA, 90012
Phone: (951) 807 - 0479
sgoad@gabrielino-tongva.com

Gabrielino Tongva Indians of California Tribal Council
Robert Dorame, Chairperson
P.O. Box 490 — Gabrielino
Bellflower, CA, 90707
Phone: (562) 761 - 6417
Fax: (562) 761-6417
gtongva@gmail.com

Gabrielino-Tongva Tribe
Charles Alvarez,
23454 Vanowen Street — Gabrielino
West Hills, CA, 91307
Phone: (310) 403 - 6048
roadkingcharles@aol.com

Morongo Band of Mission Indians
Robert Martin, Chairperson
12700 Pumarra Rroad — Cahuilla, Serrano
Banning, CA, 92220
Phone: (951) 849 - 8807
Fax: (951) 922-8146
dtorres@morongo-nsn.gov

Morongo Band of Mission Indians
Denisa Torres, Cultural Resources Manager
12700 Pumarra Rroad — Cahuilla, Serrano
Banning, CA, 92220
Phone: (951) 849 - 8807
Fax: (951) 922-8146
dtorres@morongo-nsn.gov

San Fernando Band of Mission Indians
Donna Yocum, Chairperson
P.O. Box 221838 — Kitanemuk, Vanyume, Tataviam
Newhall, CA, 91322
Phone: (503) 539 - 0933
Fax: (503) 574-3308
ddyocum@comcast.net

San Manuel Band of Mission Indians
Lee Clauss, Director of Cultural Resources
26569 Community Center Drive — Serrano
Highland, CA, 92346
Phone: (909) 864 - 8933
Fax: (909) 864-3370
lclauss@sanmanuel-nsn.gov

Serrano Nation of Mission Indians
Wayne Walker, Co-Chairperson
P. O. Box 343 — Serrano
Patton, CA, 92369
Phone: (253) 370 - 0167
serranonation1@gmail.com

Serrano Nation of Mission Indians
Mark Cochrane, Co-Chairperson
P. O. Box 343 — Serrano
Patton, CA, 92369
Phone: (909) 528 - 9032
serranonation1@gmail.com

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed Proposed Vincent Well Flood Protection and Stream Stabilization Improvements Project, San Bernardino County.

January 27, 2020

Andrew Salas, Chairperson
Gabrieleño Band of Mission Indians–Kizh Nation
P. O. Box 393
Covina, CA 91723

RE: Proposed Vincent Well Flood Protection and Stream Stabilization Improvements Project
Eight Acres and 0.45 Linear Mile of Access Road near the City of San Bernardino
San Bernardino County, California
CRM TECH Contract #3577

Dear Mr. Salas:

I am writing to bring your attention to an ongoing CEQA-compliance study for the proposed project referenced above. The project entails improvements to the existing Vincent well site within the Cajon Wash and other improvements to stabilize the stream flow and provide flood protection. The project area for these improvements encompasses approximately eight acres of land and 0.45 linear mile of access road located within the wash near the Keenbrook area, San Bernardino County, California. The accompanying map, based on USGS Cajon and Devore, Calif., 7.5' quadrangles, depicts the location of the project area in Section 19, T2N R5W, SBBM.

In a letter dated January 24, 2020, the Native American Heritage Commission (NAHC) reports that the record search result for the project was positive for tribal cultural resources and recommends contacting the Gabrieleno Band of Mission Indians—Kizh Nation for further information (see attached). The NAHC also recommends contacting other local Native American tribes on the list provided. As part of the cultural resources study for this project, I am writing to request your input on potential tribal cultural resources in or near the project area.

Please respond at your earliest convenience if you have any specific knowledge of sacred/religious sites or other sites of Native American traditional cultural value in or near the project area, or any other information to consider during the cultural resources investigations. Any information or concerns may be forwarded to CRM TECH by telephone, e-mail, facsimile, or standard mail. Requests for documentation or information we cannot provide will be forwarded to our client and/or the lead agency, namely the City of San Bernardino.

We would also like to clarify that, as the cultural resources consultant for the project, CRM TECH is not involved in the AB 52-compliance process or in government-to-government consultations. The purpose of this letter is to seek any information that you may have to help us determine if there are additional cultural resources in or near the project area that we should be aware of and to help us assess the sensitivity of the project area. Thank you for your time and effort in addressing this important matter.

Respectfully,

Nina Gallardo
Project Archaeologist/Native American liaison
CRM TECH
Email: ngallardo@crmtech.us

Encl.: NAHC response letter and project location map

From: Administration Gabrieleno <admin@gabrielenoindians.org>
Sent: Tuesday, February 11, 2020 12:55 PM
To: Nina Gallardo
Subject: Vincent Well Flood protection and stream stabilization improvements project

Good afternoon Nina,

Thank you for our letter dated January 27, 2020. Our Tribal government would like to consult with the lead agency regarding the above project.

Thank you

Sincerely,

Brandy Salas

Admin Specialist
Gabrieleno Band of Mission Indians - Kizh Nation
PO Box 393
Covina, CA 91723
Office: 844-390-0787
website: www.gabrielenoindians.org

Appendix E – Design Technical Memo

GENTERRA
CONSULTANTS, INC.
ENGINEERING & GEOTECHNICAL SERVICES

TECHNICAL MEMORANDUM
FIELD OBSERVATIONS AND RECOMMENDATIONS
PROPOSED FLOOD PROTECTION AND STREAM STABILIZATION IMPROVEMENTS
VINCENT WELL, SAN BERNARDINO COUNTY, CALIFORNIA

TO: Mr. Michael J. Gentile, P.E., QSD
CASC Engineering and Consulting, Inc.

FROM: Joseph J. Kulikowski, P.E., G.E. and Soma Balachandran, PhD., P.E., G.E.
GENTERRA Consultants, Inc.

SUBJECT: Field Observations and Recommendations
Proposed Flood Protection and Stream Stabilization Improvements
Vincent Well
San Bernardino County, California
GENTERRA Project No. 420-CASC-SBC

DATE: June 21, 2018

GENTERRA Consultants, Inc. (GENTERRA) is pleased to submit this brief technical memorandum presenting a summary of documents reviewed, the results of a visual assessment of site conditions, and recommendations for design of protection and grading work for the Flood Protection Design that is being carried out by CASC Engineering and Consulting, Inc., under the contract with the City of San Bernardino Municipal Water Department (SBMWD). This brief technical memorandum is part of the scope of work authorized in GENTERRA's agreement with CASC to provide geotechnical engineering support services associated with the proposed flood protection and stream stabilization improvements to the existing Vincent Well in San Bernardino County, California. The location of the existing Vincent Well is shown on Figure 1 – Vincent Well Location Map.

1. Introduction

The SBMWD wants to provide flood protection and stream stabilization improvements for SBMWD's Vincent Well and other wells in the areas having potential soil erosion problems as identified by this Project. Protection is also required for the Vincent Well water main and power poles.

SBMWD's Vincent Well is located in the Cajon Wash between Kenwood Avenue and Mathews Ranch Road in San Bernardino County, California. During a 2017 unusually heavy rainfall, the Vincent Well building's foundation was undermined by a flash flood, threatening the structural integrity of the well. Temporary stabilization consisted of placing grouted riprap in the eroded area. In order to prevent the Vincent Well's foundation from being undermined again, SBMWD is considering long-term protection measures for the well, the water main, and power poles.

This technical memorandum summarizes documents reviewed, the results of a visual assessment of site conditions, and provides recommendations for protection and gives considerations for construction.

2. Results of Document Review

The following documents and information were reviewed:

- URS Corporation (2013). *Final Hydraulics Report for Cajon Creek in Devore, CA, I-15/I-215 Interchange Improvement (Devore) Design-Build Project;*
- Gonzales, Portia (2010). *Cajon Creek, Devore Heights, CA: Hydrology and Hydraulics Study Using Geographical Information System, A Case Study; and,*
- Site photographs and maps

Information obtained in the review of these documents and the visual site assessment are being used to develop recommendations for protecting the well.

The location of the I-15/I-215 improvement project, described in the 2013 URS Corporation Report, is approximately two miles downstream of the Vincent Well. The geotechnical and hydraulics information in that report are considered applicable to the Vincent Well site due to the relative proximity and the fact that the similar soil types and close distance from the project site.

Grain size distribution analyses performed on seven near-surface samples at the I-15/I-215 site identified the soils as poorly graded sand (SP) and poorly graded sand with gravel (SP). The site photographs also show cobbles and boulders on the surface. The scour analyses at this site assume that the soil profile consists of predominantly of SP soils to the depth of scour potential and also assume that the grain size distribution of the soils is similar to that determined for the near-surface soils.

The hydraulics study in the URS Corporation Report identifies the peak flow rates for the 100-year and 100-year bulked flow as 20,500 cubic feet per second (cfs) and 30,750 cfs, respectively. Both flows were used to evaluate scour potential using guidelines in the Federal Highway Administration *Hydraulic Engineering Circular No. 20 (HEC-20), Stream Stability of Highway Structures (April 2012)*.

For highway bridge analyses, scour is the sum of the following three components:

- Long-term aggradation and degradation of the channel bed;
- General scour due to contraction scour and other general scour; and,
- Local scour at the piers (at the Vincent Well in this case) and abutments.

Long-term scour at the I-15/I-215 site was 8.2 feet in 37 years for an average of 0.2 feet per year. This time period ended in 2013. A flash flood occurred in 2017, and scour was as much as 8 feet deep in the vicinity of the Vincent Well. The estimated long-term scour, including the 2017 event, is 16.2 feet in 41 years for an average of 0.4 feet per year. For the Vincent Well, the projected time period for well protection is 50 years. Based on an average of 0.4 feet per year, the estimated long-term scour is 20 feet.

General scour primarily results from increased velocity at the channel cross section due to contraction. At the I-15/I-215 site the contraction was determined to be negligible because it is minimal in comparison to the width of the cross section. Since less contraction would occur at the

well than at the bridge, general scour is also considered to be minimal at the well. Any increase in velocity resulting from this contraction, particularly during the 100-year event, would be negligible.

Local scour is the result of flow around the piers or, in this case, the Vincent Well. At the I-15/I-215 site, using Equation 7.1 in HEC-18, this was calculated to range between 12 feet and 14.1 feet. A more complex analysis was conducted for one of the bents resulting in an estimated scour depth of as much as 24.4 feet based on the bulked 100-year flow rate. The complex analysis does not appear applicable to the Vincent Well site based on geometry and existing conditions. Therefore, local scour at the well is not expected to exceed 15 feet.

For conservatism, a cutoff depth extending below the lowest projected scour depth should be considered. For the well site, an estimated 5-foot-deep cutoff is recommended to provide a factor of safety. Based on the above estimates, scour protection at the Vincent Well should extend to a depth of 40 feet (20 feet + 15 feet + 5 feet) below the slab level of the building that contains the Vincent Well. The depth of the well screen is unknown. It is assumed that the well screen is considerably deeper than the projected scour depth.

Grouted riprap was placed in the eroded area at the well after the 2017 rain event. In considering alternatives for permanent protection, the grouted riprap was taken into account. Using this existing protection is considered feasible; however, the depth is not sufficient to provide the protection required. The portion of grouted riprap shown on Figure 3-3 can be keep in place. However, more materials may be needed. The option shown on Figure 3-2 needs less rock gabion and a portion of riprap will be kept in place, but geogrid reinforcement is required for construction. Both options will provide good performance. Cost estimates from the construction contractor would enable comparison to see which one is more cost-effective.

3. Field Observations

The field observations of the Vincent Well site and its immediate surrounding that are of interest to GENTERRA and CASC for the subject project were performed by Soma Balachandran, Ph.D., P.E., G.E. of GENTERRA, and Mike Gentile, P.E., Christopher Sidor, E.I.T, and Kimberly Boydstun of CASC on May 23, 2018.

Based on the visual assessment of the site conditions at the time of the site visit, the surface of the project area is covered with alluvial materials consisting of poorly graded sand, poorly graded sand with gravel, poorly graded gravel, well-graded sand, well-graded sand with gravel, poorly graded gravel, well-graded gravel, cobbles, and boulders. Also, very thin layers of silt were observed on the surface of the river channel. A portion of the east side slope of the west channel near the Vincent Well was covered with grouted riprap, but it was partially undermined due to recent flow in the channel.

No standing water was observed on the ground surface during the time of the site visit on May 23, 2018. It is our opinion that groundwater may have an impact on the construction of the remedial measures that are needed to provide adequate erosion protection since the project site was identified to have high liquefaction susceptibility by the County of San Bernardino.

No soil samples were collected for laboratory testing since site-specific geotechnical investigation work is beyond the authorized scope of work for this project.

4. Recommendations

4.1 General

Based on the results of our evaluations of existing conditions around the existing Vincent Well, some remedial work is necessary to provide needed erosion protection during the 100-year flood event. Upon completion of the remedial work that is recommended in this technical memorandum, the existing Vincent Well will have adequate erosion protection during a 100-year flood event.

Based on our visual evaluation of site conditions, very difficult excavation conditions should be anticipated during the construction of the remedial work proposed in this technical memorandum. Based on our experience, the construction contractor should anticipate cobbles and large boulders within the required excavation for the project as well as during the site preparation. Groundwater may be present within the limits of excavation or a few feet within the bottom of the proposed excavation, and therefore an appropriate dewatering plan should be submitted for GENTERRA's review and approval. Since the project site is located within a creek, the moisture content of the subsurface materials can vary substantially (very dry to very wet) during the construction period and therefore significant delay should be anticipated in processing the subsurface materials to make it as a suitable fill material. Also, the exposed temporary excavation slope should be properly protected to prevent surficial shallow failure of the loose and/or soft subsurface materials.

Since no site-specific geotechnical exploration was performed to develop recommendations, potential construction contractors are advised to visit the project site and its surrounding area to evaluate the level of difficulties during site preparation, grading, excavation and construction of the project. Significant variations in subsurface materials and groundwater conditions should be anticipated because segments of the San Andreas Fault are running very close to the project site. Also, GENTERRA encourages potential construction contractors to explore the project site using test pits and other exploratory methods with appropriate permissions and permits to develop appropriate means and methods to accomplish the remedial work construction in a timely and efficient manner.

4.2 Recommendations for Design of Armoring

Several alternatives were considered for protecting the Vincent Well against future scour. These alternatives included:

- A reinforced concrete slab on an excavated slope; the excavation would be backfilled;
- Rock protection placed on an excavated slope; the rock would be underlain by bedding material and filter fabric; the rock would not be grouted; the excavation would be backfilled. (See Figure 3-1);
- Grouted rock protection placed on an excavated slope which is similar to ungrouted rock protection except that the rock is grouted; the grouting would allow for a lesser rock layer thickness and for the use of smaller rock;

- Gabion baskets stacked in a retaining wall shape and placed in an excavated area around the well; Geogrid would be installed in the excavated area between the gabion baskets and the bottom of the excavated slope; the remainder of the excavation would be backfilled. (See Figure 3-2);
- Gabion blanket placed on an excavated slope similar to rock protection (See Figure 3-3); the gabion blanket thickness would be about half the thickness of ungrouted rock protection; and,
- A steel sheet pile enclosure around the well.

The steel sheet pile enclosure was not given further consideration because the presence of cobbles and boulders would make installation problematic. The reinforced concrete slab is a rigid option that would be susceptible to cracking and joint separation due to settlement or loading during a major flood event and seismic event. Since a non-rigid option is preferred, the reinforced concrete slab is not being given further consideration. Grouted rock protection is also a more rigid alternative than the ungrouted option and so was not given further consideration.

The three non-rigid alternatives are one loose rock protection (riprap) option and the two gabion options. Regarding the three alternatives, the preferred alternative is the gabion blanket on the excavated slope as shown on Figure 3-3. The gabion blanket should extend to a depth of 40 feet below existing grade around the Vincent Well Building. This scour protection is considered adequate for a 50-year period that would include a 100-year flood event.

Based on historical scour at the well site, protection should completely encircle the well site as shown on Figure 2, including the existing power pole. Flow can occur around the well on both the east and west sides. The increase in loading on the wall of the vertical well will be less with the sloping gabion blanket than with the rock fill or gabion retaining wall option.

The water line that crosses the east channel will be impacted during the design scour event. If the existing water line is located above the anticipated scour level, damage to the water line that is beyond the protected area should be anticipated. Any additional power poles beyond the protected area may be impacted by the 100-year flood event.

4.3 Grading

It is anticipated that the existing grouted riprap will remain in place. The slope for the gabion blanket will be excavated to a 2:1 (Horizontal:Vertical) slope. At the interface of the existing grouted riprap and gabion blanket, at the top of the slope, the grouted riprap may require shaping to form a smooth transition between the gabions and riprap. Anchors should be installed to tie the gabion baskets to the riprap and the interface should be grouted. The opposite slope can be excavated to a 1½:1 (Horizontal:Vertical) slope. Please see the section, "Excavation and Temporary Slopes" for further details and requirements.

The gabion blanket should be installed on a filter bedding layer or geotextile to prevent the migration of fines through the gabion stone fill. After the gabion blanket is installed, the excavated area should be backfilled with excavated materials. Cobbles larger than four inches in size should not be used in the immediate fill (fill within five feet of the completed surface of the gabion

baskets) to be placed against the gabion baskets to prevent damages to gabion baskets. Compaction requirements should be determined based on the results of compaction tests. Please see the section, "Compaction" for further details and requirements.

Regular maintenance after each major flood event will enhance the performance of the proposed design. Therefore, any permit to be obtained for this project should include the maintenance activities during the design life of the project.

All required fill should be uniformly well compacted, and it should be observed and tested during placement. The existing soils, except any expansive soils, are suitable for use as compacted fill, but some modification/blending may be required to have enough binding materials.

Good drainage of surface water around the well structure should be provided by providing adequate slopes to all graded surfaces around the Vincent Well. Proper drainage will enhance the performance of the proposed remedial repair.

Please note that heavy construction equipment should not be operated so as to encroach within 15 feet of existing structures and utilities to prevent damage to existing features.

The remainder of this section provides recommendations for the following grading items:

- Site preparation
- Excavations and Temporary Slopes
- Compaction
- Backfill
- Material for fill

4.3.1 Site Preparation

After the site is cleared and any existing loose fill soils are excavated as recommended, the exposed soils should carefully be observed for the removal of all unsuitable deposits such as disturbed soils, soft soils, and any debris. Next, the exposed soils should be scarified to a minimum depth of six inches, brought to within two percent below or two percent above the optimum moisture content for both sandy and clayey soils and compacted with heavy compaction equipment. At least the upper six inches of the exposed soils should be compacted to at least 90 percent of the maximum dry density obtainable by ASTM Designation D1557 for clayey soils and 95 percent of the maximum dry density obtainable by ASTM Designation D1557 for sandy soils. This compaction requirement may not be achievable if the exposed subgrade is too wet due to ponding of water or due to high groundwater table. In this case, we recommend proper dewatering to prevent standing water and placing a layer of gravel material (typically 6-inch- to 12-inch-thick) to stabilize the exposed subgrade before placing any fill materials or geotextile layer or geogrid that is needed to construct the gabions.

4.3.2 Excavations and Temporary Slopes

Where excavations deeper than about five feet are required, the sides of the excavations should be sloped back at a slope of 1½:1 (Horizontal:Vertical) or shored for safety. If shoring is needed, the

construction contractor must confirm that it is safe and stable. Please see Section 4.4 below in this Memorandum.

If the temporary construction embankments are to be maintained during the rainy season, we suggest that berms be constructed along the tops of the slopes where necessary as diversion structures to prevent runoff water from entering the excavation and eroding the slope faces.

The actual depth of excavation should be based on recommendations and observations made during grading. Therefore, some variations in the depth and lateral extent of over-excavation recommended in this technical memorandum should be anticipated.

The excavations should be observed by personnel of GENTERRA so that any necessary modifications based on variations in the soil conditions encountered may be made. All applicable safety requirements and regulations, including OSHA regulations, should be met.

Where sloped embankments are used, the tops of the slopes should be barricaded to prevent vehicles and storage loads within five feet of the tops of the slopes. A greater setback may be necessary when considering heavy vehicles, such as concrete trucks and cranes; GENTERRA should be advised of such heavy vehicle loadings so that specific setback requirements may be established

Heavy-duty earth moving should be able to excavate the earth materials at the site.

4.3.3 Compaction

Any required fill should be placed in loose horizontal lifts not more than eight-inches-thick and compacted. The fill should be compacted to at least 95 percent for sandy soils and 90 percent for clayey soils of the maximum density obtainable per ASTM D1557. The moisture content of the on-site sandy soils and clayey soils at the time of compaction should vary no more than two percent below or two percent above optimum moisture content.

4.3.4 Backfill

All required backfill should be placed in loose horizontal lifts not more than eight-inches-thick and compacted mechanically in layers; flooding should not be permitted. Proper compaction of backfill will be necessary to minimize settlement of the backfill and to reduce settlement of overlying slabs and paving. Backfill should be compacted to at least 95 percent for sandy soils and 90 percent for clayey soils of the maximum dry density obtainable per ASTM D1557. The on-site soils, except expansive soils, may be used in compacted backfill.

Some settlement of the backfill should be expected, and any utilities supported therein should be designed to accept differential settlement.

4.3.5 Material for Fill

The on-site soils, other than any expansive soils, free of any debris or organic matter, may be used in required fills. Cobbles larger than four inches in diameter should not be used in the fill. Any

required import material should consist of relatively non-expansive soils with an Expansion Index of less than 20. The imported materials should contain sufficient fines (binder material; at least 12 percent passing No. 200 sieve) so as to be relatively impermeable (but, fines content cannot be more than 35 percent passing No. 200 sieve) and result in a stable subgrade when compacted. All proposed import materials should be approved by GENTERRA prior to placing at the site.

4.4 Geotechnical Observation and Testing

The reworking of the upper soils in the excavated slope and the compaction of all required fill should be observed and tested during placement by a representative of GENTERRA. This representative should be authorized to perform at least the following duties:

- Observe the clearing and grubbing operations for proper removal of all unsuitable materials;
- Observe the exposed subgrade in areas to receive fill and in areas where excavation has resulted in the desired finished subgrade;
- Evaluate the suitability of on-site and import soils for fill placement; collect and submit soil samples for required or recommended laboratory testing where necessary;
- Observe the fill and backfill for uniformity during placement;
- Test backfill for field density and compaction to determine the percentage of compaction achieved during backfill placement;
- Observe the placement of geotextile or geogrid layer under the gabions basket; and,
- Observe the construction of gabion blanket where needed.

The local and/or federal review agencies having jurisdiction over the project should be notified prior to commencement of grading so that the necessary permits can be obtained and arrangements can be made for required inspection(s). The Contractor should be familiar with the inspection requirements of the reviewing agencies.

Earthwork should be performed in accordance with Project Specifications to be prepared by the project Civil Engineers in accordance with SBMWD's guidelines for Project Specifications. This specification should include geotechnical recommendations given in this technical memorandum. Appropriate measures should be taken to prevent damage to Vincent Well, adjacent structures and utilities. Any design and construction of temporary sloping, sheeting, or shoring should be made the Contractor's responsibility. It should be noted that it is the responsibility of the Contractor to oversee the safety of the workers in the field during construction. The Contractor shall conform to all applicable occupational and health standards, rules, regulations, and orders established by the State of California. In addition, other State, County, or City regulations may supersede the recommendations presented in this section. If a trench shoring design and safety plan is required, GENTERRA should be given the opportunity to review the plan to confirm that recommendations presented by GENTERRA have been applied to the design.

4.5 Limitations and Basis for Recommendations

Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or

similar localities. No other warranty, express or implied, is made as to the professional advice included in this technical memorandum. This technical memorandum has been prepared for CASC and is to be used solely for design of armoring for the existing Vincent Well in Devore in San Bernardino County, California, and may not contain sufficient information for use by other parties.

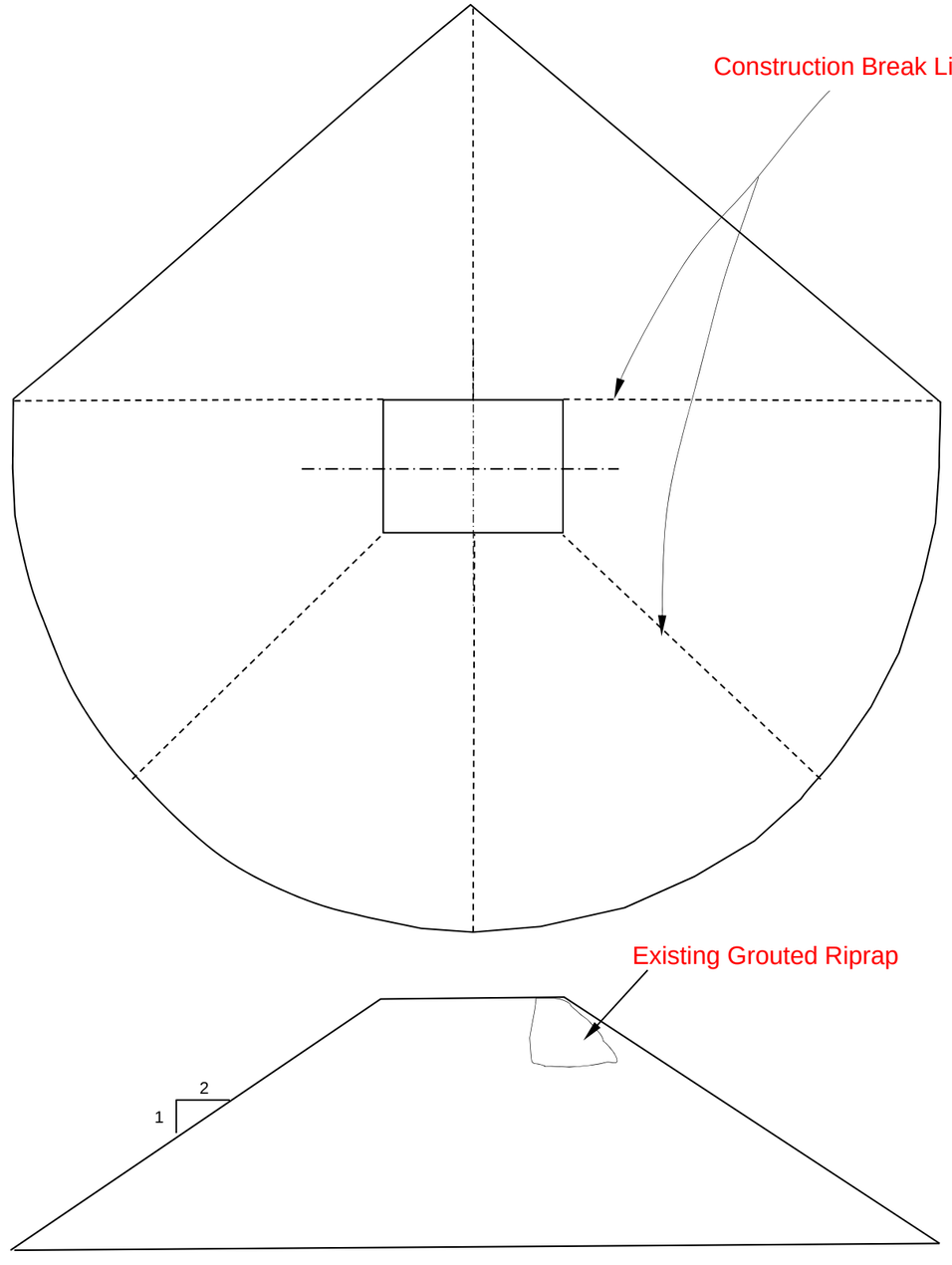
The recommendations provided in this technical memorandum are based upon our understanding of the described project information and our interpretation of available published information and field observations done by GENTERRA. We have made our recommendations based upon experience with similar site conditions under similar loading conditions. The recommendations apply to the specific project discussed in this technical memorandum; therefore, any change in the configuration of the existing Vincent Well or the site grades should be provided to us so that we can review our conclusions and recommendations and make any necessary modifications.

The recommendations provided in this technical memorandum are based upon the assumption that the necessary geotechnical observations and testing during construction of remedial measures will be performed by GENTERRA. The field observation services are considered a continuation of the geotechnical evaluation and essential to verify that the actual soil conditions are as expected. This also provides for the procedure whereby the SBMWD may be advised of unexpected or changed conditions that would require modifications of our original recommendations. In addition, the presence of our firm at the site provides the SBMWD with an independent professional opinion regarding the geotechnical construction procedures. If another firm is retained for the geotechnical observation services, our professional responsibility and liability would be limited to the extent that we would not be the geotechnical engineer of record.

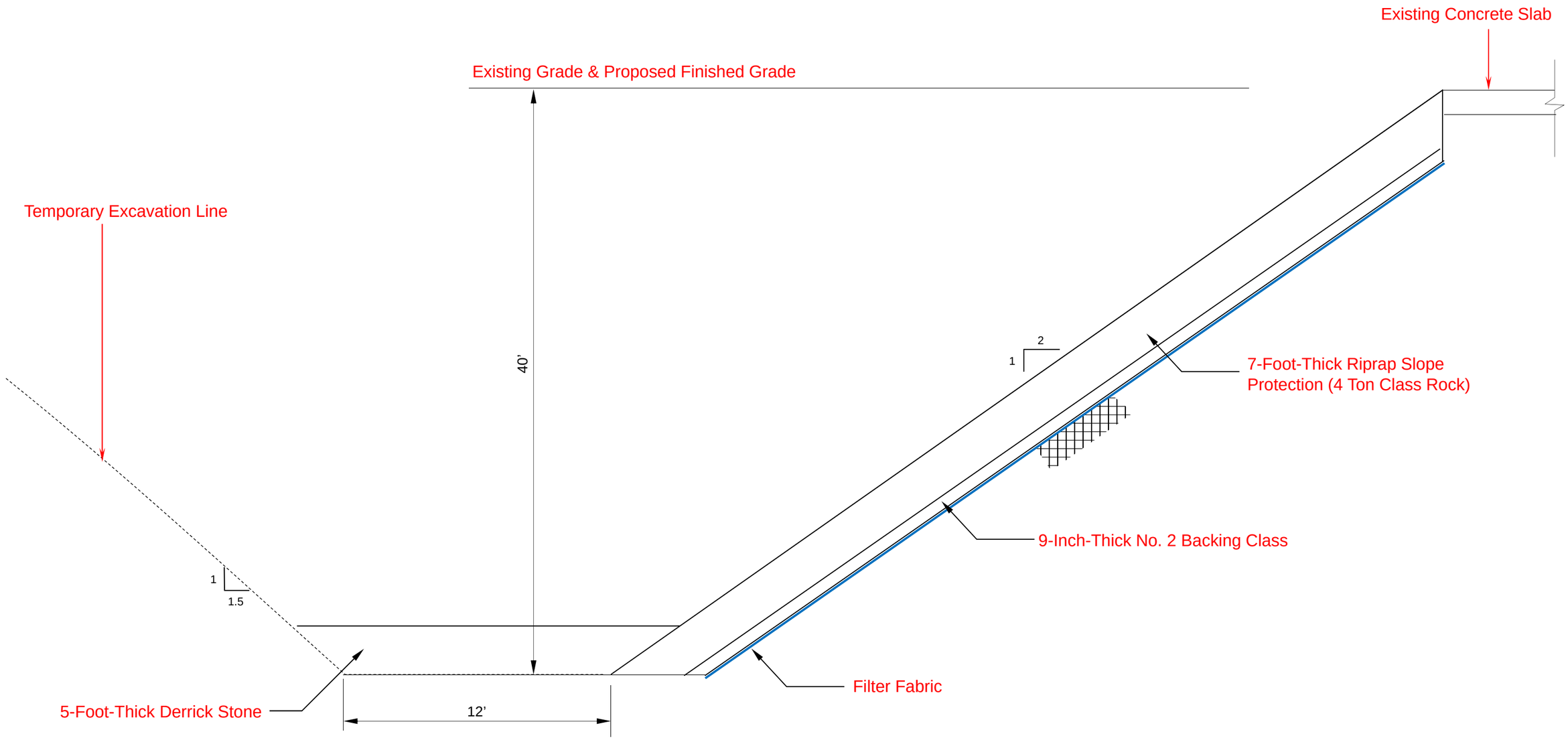
REFERENCE: Google Earth 2018 Website

GENTERRA CONSULTANTS, INC. ENGINEERING & GEOTECHNICAL SERVICES	THE CITY OF SAN BERNARDINO MUNICIPAL WATER DEPARTMENT 444 RIALTO AVENUE, SUITE D SAN BERNARDINO, CALIFORNIA 92401	VINCENT WELL FLOOD PROTECTION & STREAM STABILIZATION IMPROVEMENT SAN BERNARDINO COUNTY, CALIFORNIA	PROJECT NO.	DATE	FIGURE 1
			420-CASC-SBC	JUNE 21, 2018	VINCENT WELL LOCATION MAP

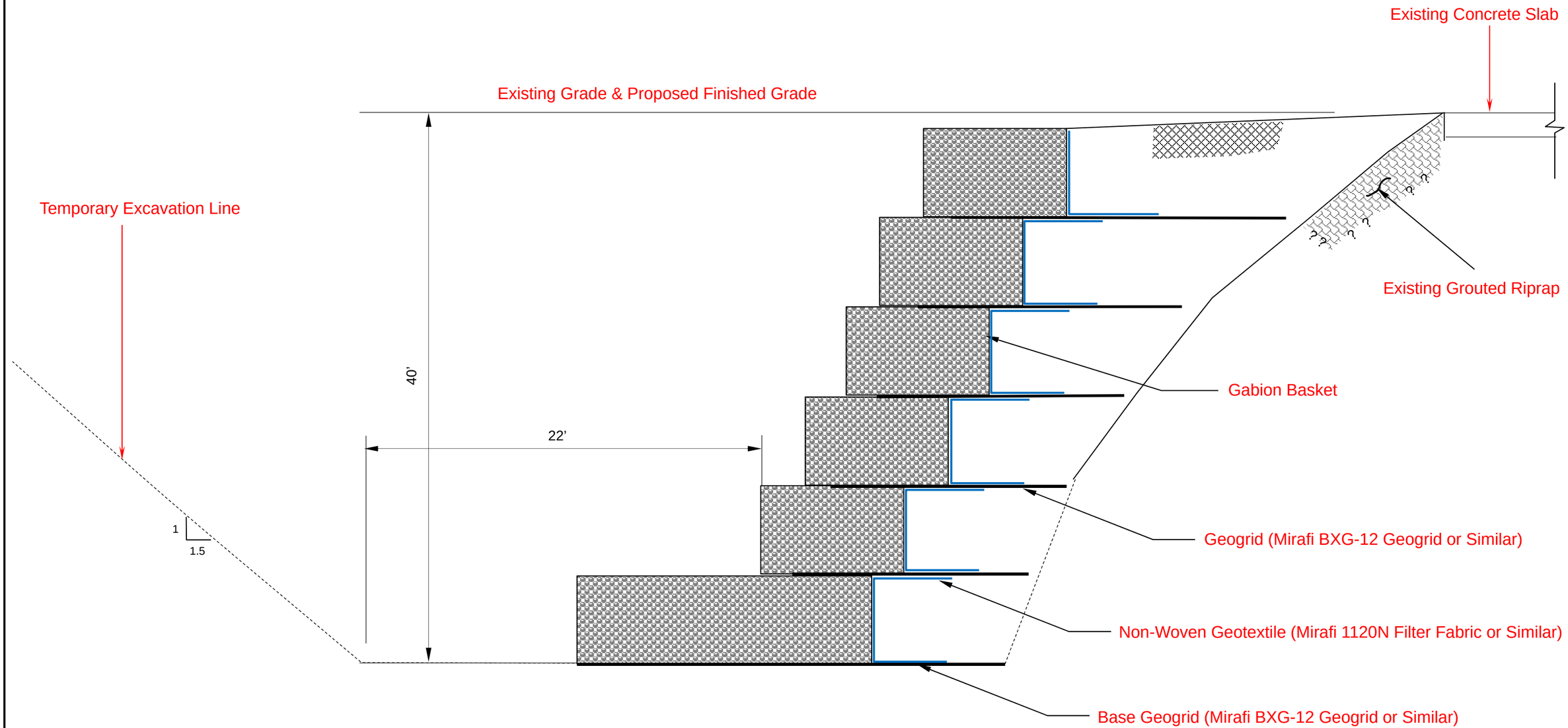
Proposed Finished Grade



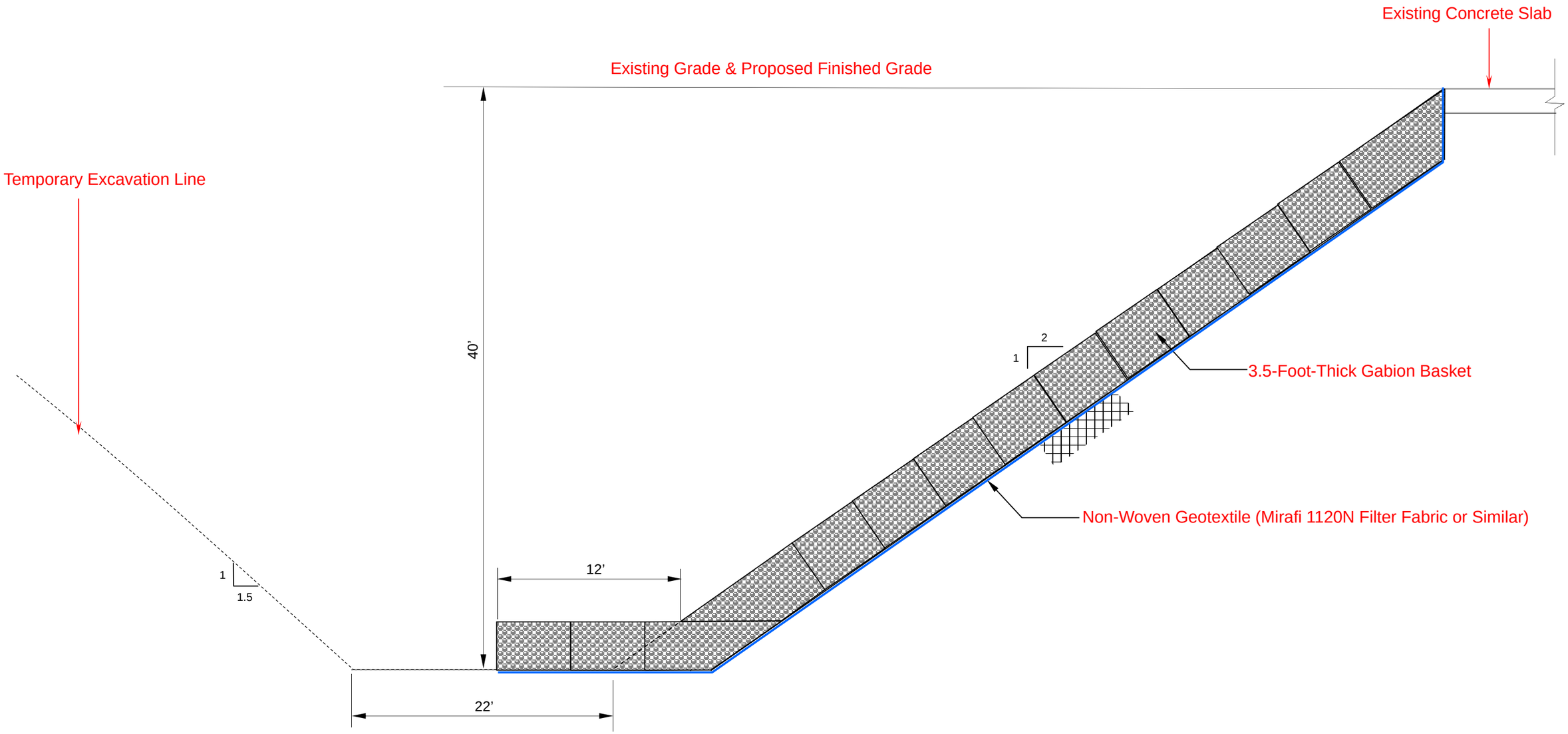
GENTERRA CONSULTANTS, INC. ENGINEERING & GEOTECHNICAL SERVICES	THE CITY OF SAN BERNARDINO MUNICIPAL WATER DEPARTMENT 444 RIALTO AVENUE, SUITE D SAN BERNARDINO, CALIFORNIA 92401	VINCENT WELL FLOOD PROTECTION & STREAM STABILIZATION IMPROVEMENT SAN BERNARDINO COUNTY, CALIFORNIA	PROJECT NO.	DATE	FIGURE 2
			420-CASC-SBC	JUNE 21, 2018	CONCEPTUAL DESIGN-OPTION 1 PLAN VIEW



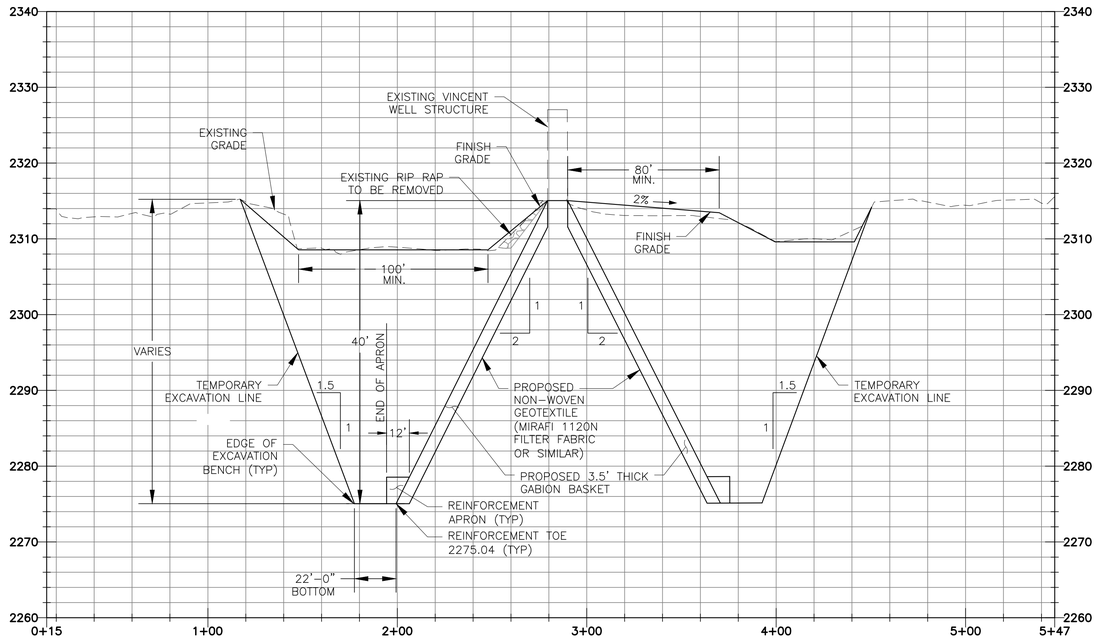
GENTERRA CONSULTANTS, INC. ENGINEERING & GEOTECHNICAL SERVICES	THE CITY OF SAN BERNARDINO MUNICIPAL WATER DEPARTMENT 444 RIALTO AVENUE, SUITE D SAN BERNARDINO, CALIFORNIA 92401	VINCENT WELL FLOOD PROTECTION & STREAM STABILIZATION IMPROVEMENT SAN BERNARDINO COUNTY, CALIFORNIA	PROJECT NO.	DATE	FIGURE 3-1
			420-CASC-SBC	JUNE 21, 2018	CONCEPTUAL DESIGN-OPTION 1 TYPICAL CROSS-SECTION



GENTERRA CONSULTANTS, INC. ENGINEERING & GEOTECHNICAL SERVICES	THE CITY OF SAN BERNARDINO MUNICIPAL WATER DEPARTMENT 444 RIALTO AVENUE, SUITE D SAN BERNARDINO, CALIFORNIA 92401	VINCENT WELL FLOOD PROTECTION & STREAM STABILIZATION IMPROVEMENT SAN BERNARDINO COUNTY, CALIFORNIA	PROJECT NO.	DATE	FIGURE 3-2
			420-CASC-SBC	JUNE 21, 2018	CONCEPTUAL DESIGN-OPTION 2 TYPICAL CROSS-SECTION

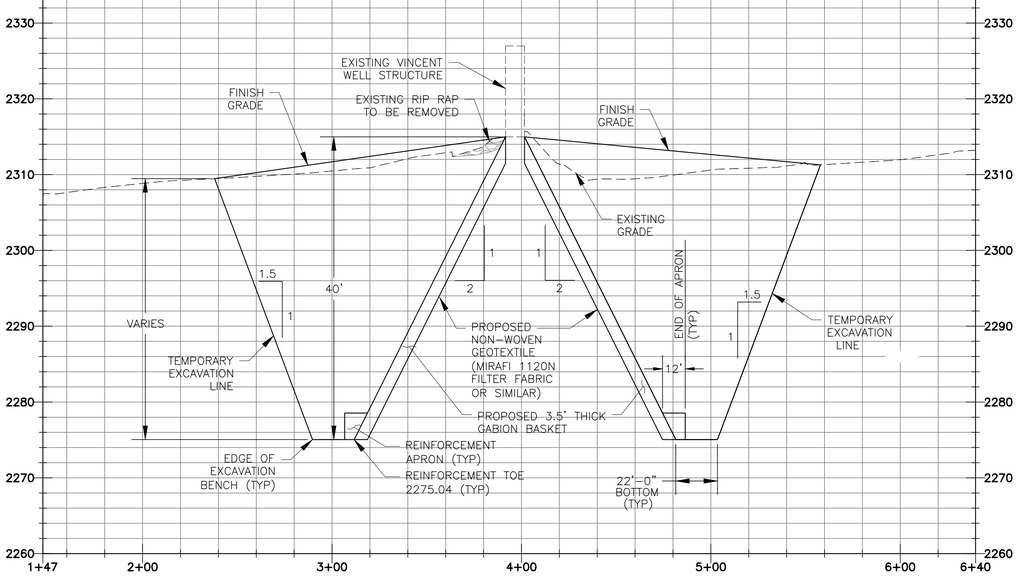


GENTERRA CONSULTANTS, INC. ENGINEERING & GEOTECHNICAL SERVICES	THE CITY OF SAN BERNARDINO MUNICIPAL WATER DEPARTMENT 444 RIALTO AVENUE, SUITE D SAN BERNARDINO, CALIFORNIA 92401	VINCENT WELL FLOOD PROTECTION & STREAM STABILIZATION IMPROVEMENT SAN BERNARDINO COUNTY, CALIFORNIA	PROJECT NO.	DATE	FIGURE 3-3
			420-CASC-SBC	JUNE 21, 2018	CONCEPTUAL DESIGN-OPTION 3 TYPICAL CROSS-SECTION



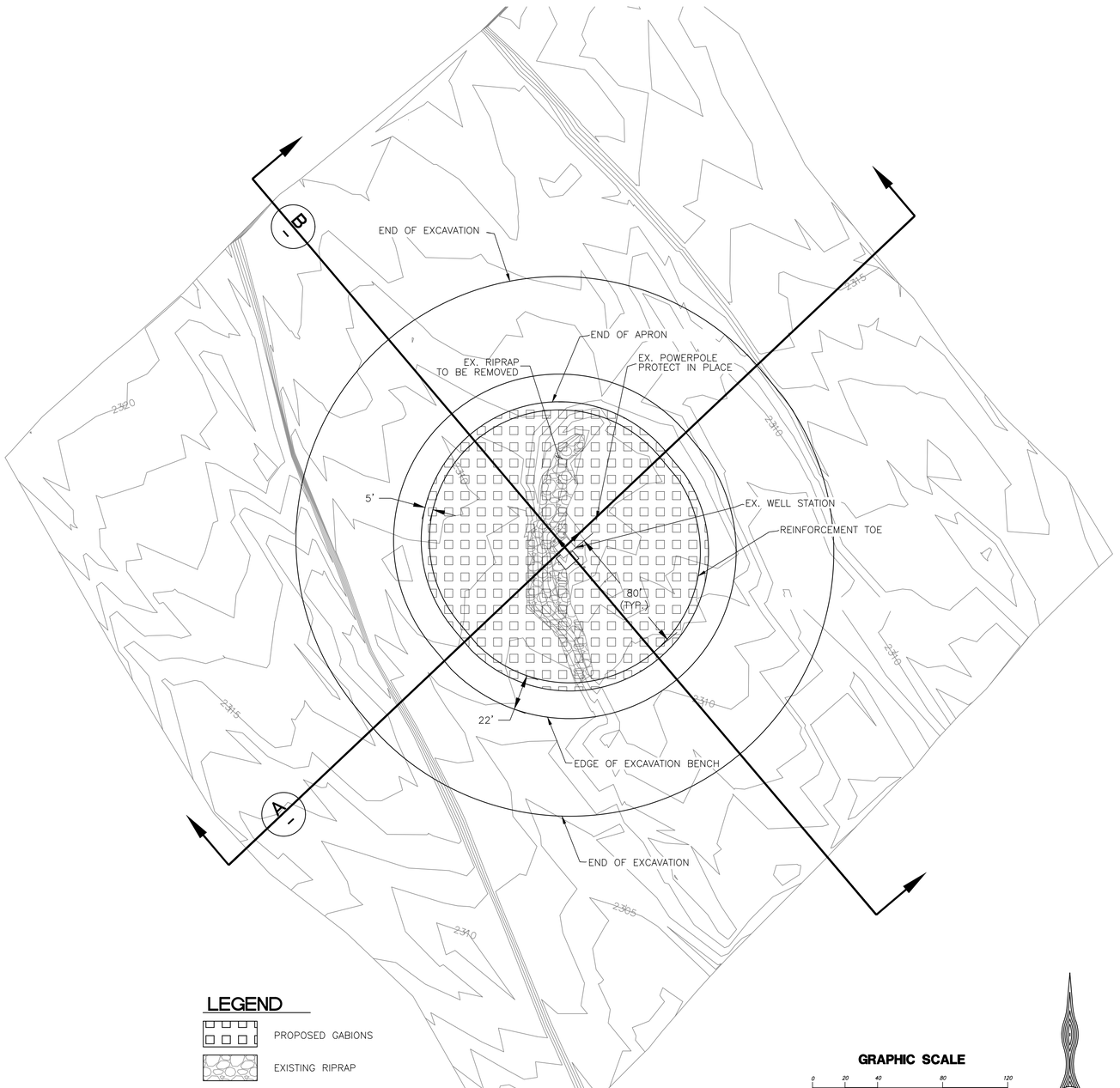
A — SECTION

SCALE: 1"=40' HORIZONTAL, 1"=10' VERTICAL



B — SECTION

SCALE: 1"=40' HORIZONTAL, 1"=10' VERTICAL



LEGEND

PROPOSED GABIONS

EXISTING RIPRAP

PLAN

GRAPHIC SCALE

0 20 40 80 120

(IN FEET)
1 inch = 40 ft.

N

UNDERGROUND SERVICE ALERT

CALL: TOLL FREE 811

TWO WORKING DAYS BEFORE YOU DIG

DECLARATION OF RESPONSIBLE CHARGE: ENGINEER OF WORK:

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER DESIGN OF THIS PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE SAN BERNARDINO MUNICIPAL WATER DEPARTMENT IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

SIGNATURE _____ DATE _____

INSERT ENGINEER'S STAMP HERE

ENGINEER'S SEAL

CASC Engineering and Consulting

1475 EAST COOLEY DRIVE, COLTON, CA 92324
PH. (909) 783-0101

APPROVED BY: _____ DATE: _____

REGISTERED CIVIL ENGINEER No. XXXXX

MARK	REVISIONS	APPROVED	DATE	APPROVED	DATE

DESIGNED BY: XX DRAWN BY: XX CHECKED BY: XX

DESIGN ENGINEER SBMWD ENGINEER

BENCHMARK:

ELEV.= XXXX.XX FT.

CITY OF SAN BERNARDINO
MUNICIPAL WATER DEPARTMENT

VINCENT WELL STABILIZATION PROJECT
CONCEPTUAL PLAN EXHIBIT

DRAWING SCALES:
HORIZ: 1"=40' VERT: N/A

C.O. NO.:
1682

DWG G1

SHEET 1 OF 1

C-1682-1-G-G1.DWG

Estimate of Probable Cost - Conceptual Plan Stage 6/22/2018

Vincent Well Stabilization Project

Preferred Alternative (Figure 3-3)

Bid Item	Bid Item Description	Quantity	Unit	Unit Cost	Item Cost
1	Excavation	75,275	CY	$ 5.00	$ 376,375.00
2	Non-Woven Geotextile (Mirafi 1120N Filter Fabric or Approved Equal)	3,845	SY	$ 5.00	$ 19,225.00
3	Gabion Slope Protection (3.5' Thick)	4,485	CY	$ 250.00	$ 1,121,250.00
4	Backfill	70,000	CY	$ 5.00	$ 350,000.00
5	Export	5,275	CY	$ 10.00	$ 52,750.00
	Subtotal				$ 1,919,600.00
	Dewatering				$ 125,000.00
	Contingency (Permits,Mobilization, Temporary Construction)			35%	$ 671,860.00
	Total Estimate of Probable Cost				**$ 2,716,460.00**

Appendix F – Response to Comments (reserved)