Appendix I
Aquatic Resources Delineation Report

Final

Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
NV FLAP 500(1)
Clark County, Nevada

Federal Highway Administration
Central Federal Lands Highway Division
12300 West Dakota Avenue
Lakewood, Colorado 80228

Regulatory Office:
U.S. Army Corps of Engineers
Los Angeles Office
915 Wilshire Blvd.
Los Angeles, CA 90017

Project Location:
Eastern Extent: 36.15819° / -115.359953°
Western Extent: 36.132634° / -115.423704°

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Summary

On behalf of the Federal Highway Administration, Central Federal Lands Highway Division (FHWA-CFLHD), Jacobs Engineering Group Inc. (Jacobs) completed a delineation of aquatic resources for the Red Rock Canyon Trail and Intersections Improvements (Project) in Clark County, Nevada. The Project is entirely within the Red Rock Canyon National Conservation Area (RRCNCA) and begins near the intersection of State Route 159 (SR 159) and Sky Vista Drive within the Summerlin development in western Las Vegas, Nevada, terminating approximately 3.85 miles southwest at Scenic Loop Drive. The proposed Project includes a 5.5-mile-long multi-use trail, several parking lots, and improvements to deceleration lanes along SR 159 and Calico Basin Road.

The purpose of the delineation report is to describe aquatic resources (i.e., wetlands, other waters) in the study area that are potential waters of the United States (WoUS) and to support project planning, design, and future permitting under the Clean Water Act. The report was prepared following the *Minimum Standards for Acceptance of Aquatic Resources Delineation Reports* and *Updated Map and Drawing Standards for the South Pacific Division Regulatory Program*, prepared by the U.S. Army Corps of Engineers (USACE)–Sacramento District (2016a and 2016b). The boundaries of potential WoUS described and mapped in the report should be considered preliminary until verified by USACE.

The field delineation identified a total of 64 ephemeral channels (5.648 acres/34,881 linear feet) which are likely non-jurisdictional. No wetlands were identified or delineated in the study area. The delineation was conducted in accordance with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), the ordinary high water mark (OHWM) Regulatory Guidance Letter No. 05-05 (USACE 2005), the *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* (Lichvar and McColley 2008), and the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Curtis and Lichvar 2010).

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Acronyms and Abbreviations

Acronym	Definition
°F	Fahrenheit
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
FHWA-CFLHD	Federal Highway Administration – Central Federal Lands Highway Division
GIS	geographic information system
GPS	global position system
Jacobs	Jacobs Engineering Group Inc.
NHD	National Hydrography Dataset
NRPW	non-relatively permanent water
NWI	National Wetlands Inventory
OHWM	ordinary high water mark
Project	Wild Rivers Back Country Byway Loop Road Project
RPW	relatively permanent water
RRCNCA	Red Rock Canyon National Conservation Area
SR	State Route
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
WoUS	Waters of the United States

1. Introduction

The Federal Highway Administration Central Federal Lands Highway Division (FHWA-CFLHD), in cooperation with the U.S. Bureau of Land Management (BLM), is proposing the Red Rock Canyon Trail and Intersections Improvements (Project) in Clark County, Nevada. The Project is entirely within the Red Rock Canyon National Conservation Area (RRCNCA) and begins near the intersection of State Route 159 (SR 159) and Sky Vista Drive within the Summerlin development in western Las Vegas, Nevada, terminating approximately 3.85 miles southwest at Scenic Loop Drive (Appendix A, Figure 1).

The proposed Project includes a multi-use trail, several parking lots, and improvements to deceleration lanes along SR 159 and Calico Basin Road. The 5.5-mile-long multi-use trail would connect the Summerlin development to the RRCNCA entrance and fee station. This trail would have a paved width of 12 feet, with 1-foot-wide gravel shoulders on each side. Two alignment alternatives are being considered for the eastern 1.5 miles of the trail; the western 4 miles of trail alignment is shared between the two alternatives. Parking improvements include a new 9,300 square foot parking lot on the southern side of SR 159 near the Summerlin development, a new 10,000 square foot parking lot on the northern side of SR 159 approximately 0.75 mile east of the Calico Basin Road/SR 159 intersection, and a new 18,600 square foot parking lot at the northwest corner of the Calico Basin Road/SR 159 intersection. An existing 5,400 square foot gravel parking area along Calico Basin Road would be formalized and paved. SR 159 would be widened to the north by approximately 12 feet to accommodate lengthened deceleration lanes, including a 530-foot lane providing access to the proposed parking lot east of the Calico Basin Road/SR 159 intersection. The deceleration lane at Calico Basin Road would be lengthened from 120 feet to 505 feet and the paved shoulder width increased from 1 to 6 feet. The deceleration lane at the entrance station intersection would be lengthened from 300 feet to 605 feet and the shoulder widened from 1 to 6 feet.

This report was prepared using guidance from the *Minimum Standards for Acceptance of Aquatic Resources Delineation Reports* and *Updated Map and Drawing Standards for the South Pacific Division Regulatory Program*, prepared by the U.S. Army Corps of Engineers (USACE)–Sacramento District (2016a and 2016b). The boundaries of potential waters of the United States (WoUS) described and mapped in this report should be considered preliminary until verified by USACE.

2. Study Area Description

The study area for the aquatic resource delineation begins near the intersection of SR 159 and Sky Vista Drive within the Summerlin development in western Las Vegas, Nevada, and terminates approximately 3.85 miles southwest at Scenic Loop Drive (Appendix A, Figure 1). The Project can be reached by driving west along SR 159 from Interstate 15 for approximately 11.15 miles. As the road bears to the southwest, travel an additional 0.18 mile to the intersection of SR 159 and Sky Vista Drive. The Project starts here (36.15819° / -115.359953°) and proceeds toward the southwest, where the preliminary alignment ends at Scenic Loop Drive (36.132634° / -115.423704°). The legal description includes Sections 3, 4, 5, 7, and 8 Township 21S Range 59E (T21S, R59E).

Elevations within the study area average 3,450 feet above sea level, reaching a low elevation of 3,220 feet at Red Rock Wash near the Project start and a high elevation of 3,680 feet at Scenic Loop Drive. The study area generally follows Red Rock Wash before veering northeast towards Calico Basin, before returning alongside SR 159. Soils in the study area are predominantly loam, ranging from gravelly fine sandy to very and extremely gravelly.

The study area is approximately 189.74 acres and encompasses the preliminary trail alignments, proposed parking areas, and deceleration lanes.

2.1 Land Uses

Land use within the study area is limited to recreational use on BLM lands. The study area is located within the RRCNCA and offers recreational biking, camping/picnicking, and hiking on designated trails.

2.2 Climate

Based on long-term data collected at Red Rock Spring Mountain Ranch State Park Station, approximately 4.74 miles southwest of the western extent of the study area, precipitation levels peak in February (Table 1). The average December low temperature is 29.5 degrees Fahrenheit (°F), and the average high July temperature is 96.7°F (WRCC 2020). The total average annual precipitation is 11.64 inches.

Table 1. Long-Term Climate Data, Red Rock Spring Mountain Ranch State Park Station, Nevada (266691) 1977 to 2016

Data Measured	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Average Maximum Temperature (°F)	53.0	56.8	63.7	71.0	80.3	91.2	96.7	94.8	87.7	76.1	62.1	53.4	73.9
Average Minimum Temperature (°F)	29.7	32.9	38.4	44.3	52.9	63.6	70.7	68.5	59.3	47.3	35.9	29.5	47.8
Average Total Precipitation (inches)	1.78	2.21	1.88	0.59	0.24	0.10	0.99	1.09	0.56	0.52	0.75	0.92	11.64

Source: WRCC 2020

2.3 Hydrology

The study area is located within the Las Vegas Wash (15010015) hydrologic unit (USGS 2020a). The dominant hydrologic features in the study area are several unnamed ephemeral channels flowing generally northwest to southeast into the Red Rock Wash, which flows southwest to northeast. Red Rock Wash terminates in a detention basin at the northeast end of the study area.

The Project is covered by two Flood Insurance Rate Maps: 32003C2125E and 32003C2150E. These maps identify most of the study area as Zone X, while those areas associated with Red Rock Wash are Zone A floodplain. The Federal Emergency Management Agency defines Zone A as "areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies" or 100-year event with a determined Base Flood Elevation (2020). Areas identified as Zone X have minimal flood hazard and are "higher than the elevation of the 0.2-percent-annual-chance flood event" or 500-year flood.

National Wetlands Inventory (NWI) and National Hydrography Dataset (NHD) maps were reviewed to determine locations of mapped aquatic resources within the study area (USFWS 2020; USGS 2020b). Several channels, including Red Rock Wash, were identified within the study area (Appendix A, Figure 2).

2.4 Vegetation

The study area is classified as the Creosote Bush-Dominated Basin Level IV ecoregion, as classified by Ecoregions of Nevada (Bryce et al. 2003). This ecoregion is characterized by valleys containing stream terraces; floodplains; alluvial fans; isolated buttes, mesas, and hills; and eroded washes. Perennial or ephemeral, low- to medium-gradient warm streams and rivers are found throughout. Reliable surface water is scarce; surface waters present throughout this region are generally alkaline and contain high concentrations of calcium carbonate. Flash flooding can follow thunderstorms. This ecoregion is found between about 1,800- and 4,500-foot elevation above mean sea level. Vegetation consists mostly of creosote bush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), cacti (Cactaceae), yucca (*Yucca* spp.), ephedra (*Ephedra* spp.), big galleta (*Hilaria rigida*), and Indian ricegrass (*Achnatherum hymenoides*).

Vegetation in and around the study area consists of Joshua tree (*Yucca brevifolia*) and Mojave yucca (*Y. schidigera*) woodland, creosote bush-white bursage scrub, and desert willow (*Chilopsis linearis*). A list of each plant species identified during this delineation and its wetland indicator status is presented in Appendix B.

3. Regulatory Setting

The Clean Water Act was enacted to restore and maintain the chemical, physical, and biological integrity of the nation's waters through the elimination of discharges of pollutants. In support of this goal, the Clean Water Act established permit programs to control discharges into WoUS and provided the U.S. Environmental Protection Agency (EPA) and U.S. Army with regulatory authority to issue permits. Section 404 established a program to regulate the discharge of dredged or fill material into WoUS and requires the issuance of a permit for any activities resulting in such discharge, unless an exemption applies. Section 401 requires any applicant for a federal license or permit that involves discharges into a navigable water (e.g., Section 404 permit) to also obtain a water quality certification demonstrating that the activity complies with the Clean Water Act. The USACE issues Section 404 permits, and the Nevada Division of Environmental Protection issues Section 401 certifications.

For purposes of issuing permits, the EPA and USACE have established a definition of WoUS and verify jurisdiction of aquatic resources that meet that definition. The EPA and USACE are responsible for making all final jurisdictional determinations. The current definition of WoUS is provided in the Navigable Waters Protection Rule, which became effective June 22, 2020 (Code of Federal Regulations [CFR] Title 33 part 328, Vol. 85, No. 77).

Non-tidal WoUS are defined as "waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce" and include tributaries to those waters (33 CFR 328.3). WoUS include lakes, rivers, streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, and natural ponds. According to 33 CFR 328.4(c), the following are the limits of federal jurisdiction in non-tidal waters:

- In the absence of adjacent wetlands, the jurisdiction extends to the ordinary high water mark (OHWM).
- When adjacent wetlands are present, the jurisdiction extends beyond the OHWM to the limit of the adjacent wetlands.
- When the WoUS consists only of wetlands, the jurisdiction extends to the limit of the wetland.

Federal regulations define the OHWM as "that line on the shore established by the fluctuations of water and 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, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" (33 CFR 328.3).

Wetlands are defined for regulatory purposes as "those areas that are inundated or saturated by surface or groundwater 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" (40 CFR 230.3 and 33 CFR 328.3). Wetlands are important ecological resources that perform many functions including groundwater recharge, flood flow attenuation and conveyance, erosion control, and water quality improvement. They also provide habitat for many plants and animals, including sensitive species.

4. Methods

4.1 Pre-field Investigation

General information on climate, vegetation, soils, hydrology, and existing wetlands were reviewed before the field survey. Data sources included U.S. Geological Survey (USGS) topographic maps, NWI (USFWS 2020), NHD (USGS 2020b), U.S. Department of Agriculture Natural Resources Conservation Service Web Soil Survey (2019), and satellite imagery (Google Earth Pro 2020). A soil resource report for the study area is presented in Appendix C.

4.2 Field Survey

Jacobs Engineering Group Inc. (Jacobs) biologist Rachel Newton conducted the aquatic resources delineation from May 5 to 9, 2020. The field survey was limited to the 189.74-acre study area, which includes all proposed areas of Project disturbance. The survey methodology followed the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), the OHWM Regulatory Guidance Letter No. 05-05 (USACE 2005), the *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* (Lichvar and McColley 2008), and the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Curtis and Lichvar 2010). Wetland indicator statuses for plants were taken from *The National Wetland Plant List, version 3.4* (USACE 2018).

Where aquatic resources were identified, feature boundaries were mapped using a handheld global position system (GPS) unit with submeter accuracy. Data were collected in North American Datum of 1983 Nevada State Plane Zone East in U.S. survey feet. Geographic information system (GIS) data were post-processed using ArcGIS 10.4. The field sampling procedures and methods used to delineate and map aquatic resources followed protocol as detailed in the references cited above.

5. Results

The field delineation identified a total of approximately 5.648 acres (34,881 linear feet) associated with 64 likely non-jurisdictional ephemeral drainages in the study area. Based on channel morphology, these channels have been categorized as single (SC), branched (BC), or braided (BRC). Table 2 presents an overview of the types and amounts of potential WoUS in the study area. These results are shown in Appendix A, Figure 3. Representative photographs are presented in Appendix D. Representative OHWM data sheets for each channel are found in Appendix E, as are datasheets for larger washes within the study area. No wetlands were identified in the study area.

Table 2. Aquatic Resources Investigated within the Red Rock Canyon Trail and Intersections Project Aquatic Resources Study Area

Feature ID	Figure / Photos	Latitude / Longitude	Approximate Project Stationing	OHWM Indicators [1]	Cowardin Classification [2]	Channel Type with Study Area [3]	Average Width of OHWM (feet)	Acreage within Study Area (linear feet)	RPW / NRPW	Connectivity to RPW	Potentially Jurisdictional
ES-1 (Red Rock Wash)	3A, 3B, 3F / 1A - 1I	36.156693 / -115.362021	102+30 to 104+20 LT; 102+60 to 109+25 RT; 102+00 to 118+40 ALT LT	CV, S/CB/B, SS	R6	BRC	22	1.475 (4,369)	NRPW	No	No
ES-2A	3B / 2A	36.154104 / -115.364422	116+10 to 116+60 LT	CV, S/CB/B, SS	R6	SC	4	0.002 (32)	NRPW	No	No
ES-2B	3B / 2B, 2C	36.15461 / -115.3639	112+00 to 115+60 RT	CV, S/CB/B, SS	R6	SC	3	0.015 (345)	NRPW	No	No
ES-3 (Red Rock Wash)	3C / 3A, 3B	36.151932 / -115.36914	131+80 to 133+35 RT	CV, S/CB/B, SS	R6	BC	14.5	0.045 (46)	NRPW	No	No
ES-4	3D, 3E / 4A, 4B	36.149937 / -115.372436	142+80 to 147+20 RT	CV, S/CB/B, SS	R6	BC	8	0.063 (401)	NRPW	No	No
ES-5 (Red Rock Wash)	3E, 3I / 5A - 5C	36.149934 / -115.376849	157+35 to 159+10 LT; 157+20 to 157+70 RT; 157+90 to 158+10 RT; 158+40 to 159+20 RT	CV, S/CB/B	R6	BRC	25	0.346 (631)	NRPW	No	No
ES-6	3F, 3G / 7	36.155406 / -115.369067	126+80 to 127+20 ALT LT	CV, S/CB/B	R6	SC	4.5	0.005 (60)	NRPW	No	No
ES-7	3F, 3G / 8	36.155425 / -115.369211	127+10 to 127+60 ALT LT	CV, S/CB/B	R6	SC	6	0.009 (71)	NRPW	No	No
ES-8	3G / 9	36.155359 / -115.369704	128+60 to 129+45 ALT LT	CV, S/CB/B	R6	BRC	5	0.010 (88)	NRPW	No	No
ES-9	3G / 10A, 10B	36.15534 / -115.369805	129+00 to 130+40 ALT LT	CV, S/CB/B, SS	R6	BRC	6	0.022 (121)	NRPW	No	No
ES-10	3G / 11A, 11B	36.155307 / -115.370021	129+80 to 130+90 ALT LT; 130+75 to 131+60 ALT RT	CV, S/CB/B, SS	R6	SC	8	0.048 (264)	NRPW	No	No
ES-11	3G / 12A, 12B	36.155269 / -115.370743	132+40 to 132+60 ALT LT; 132+60 to 132+65 ALT RT	CV, S/CB/B, SS	R6	SC	4	0.009 (118)	NRPW	No	No
ES-12	3G / 13A, 13B	36.155143 / -115.370875	132+75 to 132+90 ALT LT; 132+80 to 132+90 ALT RT	CV, S/CB/B	R6	BRC	4	0.012 (117)	NRPW	No	No
ES-13	3G / 14A, 14B	36.15509 / -115.371077	133+60 to 133+80 ALT LT; 133+30 to 3+50 ALT RT	CV, S/CB/B, SS	R6	BRC	7.5	0.040 (232)	NRPW	No	No
ES-14	3G / 15A, 15B	36.154916 / -115.371709	135+60 to 135+80 ALT LT; 135+70 to 136+40 ALT RT	CS, CV, S/CB/B, SS	R6	BRC	5	0.028 (259)	NRPW	No	No
ES-15	3G / 17A - 17C	36.154859 / -115.371921	136+00 to 137+75 ALT LT; 136+60 to 138+40 ALT RT	CS, CV, S/CB/B, SS	R6	BRC	6	0.105 (1,040)	NRPW	No	No
ES-16	3G / 19A, 19B	36.154639 / -115.372362	138+20 to 139+90 ALT LT; 138+90 to 139+50 ALT RT	CV, S/CB/B	R6	SC	1	0.005 (241)	NRPW	No	No
ES-17	3H / 20A, 20B	36.154049 / -115.373107	141+30 to 142+10 ALT LT; 142+10 to 142+65 ALT RT	CV, S/CB/B	R6	SC	1	0.006 (275)	NRPW	No	No
ES-18	3H / 21	36.153597 / -115.373734	143+60 to 144+00 ALT LT	CV, S/CB/B	R6	BC	1	0.003 (138)	NRPW	No	No
ES-19	3H / 22A, 22B	36.15338 / -115.374044	144+90 to 145+00 ALT LT; 144+90 to 145+20 ALT RT	CV, S/CB/B	R6	BRC	5	0.022 (197)	NRPW	No	No
ES-20	3H / 23A, 23B	36.153117 / -115.374363	146+20 ALT	CV, S/CB/B	R6	BC	3	0.009 (154)	NRPW	No	No
ES-21	3H / 24	36.15303 / -115.375128	148+15 to 148+20 ALT LT; 148+00 to 148+20 ALT RT	CV, S/CB/B	R6	SC	4	0.011 (143)	NRPW	No	No

Feature ID	Figure / Photos	Latitude / Longitude	Approximate Project Stationing	OHWM Indicators [1]	Cowardin Classification [2]	Channel Type with Study Area [3]	Average Width of OHWM (feet)	Acreage within Study Area (linear feet)	RPW / NRPW	Connectivity to RPW	Potentially Jurisdictional
ES-22	3H / 26A, 26B	36.152421 / -115.375276	149+00 to 150+00 ALT LT; 148+60 to 149+70 ALT RT	CS, CV, S/CB/B, SS	R6	BRC	6	0.068 (537)	NRPW	No	No
ES-23	3H / 27A, 27B	36.152308 / -115.375563	150+60 to 151+80 ALT LT; 150+90 ALT RT	CS, CV, S/CB/B, SS	R6	BRC	5	0.036 (453)	NRPW	No	No
ES-24	3I / 28A - 28C	36.152007 / -115.376324	152+90 to 153+60 ALT LT; 153+20 to 154+00 ALT RT	CS, CV, S/CB/B, SS	R6	BRC	12	0.103 (343)	NRPW	No	No
ES-25	3I / 29	36.151682 / -115.37625	153+90to 154+00 ALT LT	CS, CV, S/CB/B	R6	SC	1	0.001 (38)	NRPW	No	No
ES-26	3I / 30	36.151629 / -115.376304	154+15 to 154+45 ALT	CS, CV, S/CB/B	R6	BC	1	0.006 (278)	NRPW	No	No
ES-27	3I / 31A, 31B	36.151367 / -115.376994	156+10 to 156+30 ALT LT; 156+20 to 156+30 ALT RT	CV, S/CB/B, SS	R6	BRC	5	0.025 (215)	NRPW	No	No
ES-28	3I / 32A - 32C	36.151152 / -115.377655	157+60 to 158+20 ALT LT; 158+10 to 158+80 ALT RT	CS, CV, S/CB/B	R6	BRC	4.5	0.054 (497)	NRPW	No	No
ES-29	3I / 33A, 33B	36.150395 / -115.378494	161+40 to 162+20 ALT LT; 161+40 to 163+00 ALT RT / 164+15 to 164+70 LT; 164+15 to 165+60 RT	CS, CV, S/CB/B	R6	BC	15	0.019 (457)	NRPW	No	No
ES-30	3I / 34	36.150404 / -115.378921	162+40 to 163+00 ALT LT / 165+00 to 165+60 LT	CS, CV, S/CB/B	R6	SC	1.5	0.003 (91)	NRPW	No	No
ES-31	3I / 35A, 35B	36.150525 / -115.379609	164+0 to 164+80 ALT LT; 164+80 to 165+20 ALT RT / 167+00 to 167+40 LT; 167+60 to 168+00 RT	CS, CV, S/CB/B, SS	R6	SC	6.5	0.030 (237)	NRPW	No	No
ES-32	3J / 36A - 36E	36.150732 / -115.381772	168+70 to 174+80 LT; 170+60 to 171+60 RT; 172+80 to 177+20 RT	CS, CV, S/CB/B	R6	BRC	8.5	0.346 (2,287)	NRPW	No	No
ES-33	3J / 37	36.150867 / -115.381988	174+60 to 175+85 LT	CV, S/CB/B	R6	SC	3.5	0.015 (167)	NRPW	No	No
ES-34	3J / 38A - 38C	36.151718 / -115.383093	175+30 to 177+10 LT; 176+60 to 179+00 RT	CS, CV, S/CB/B	R6	BC	6	0.088 (705)	NRPW	No	No
ES-35	3J, 3K / 39A - 39C	36.152692 / -115.385868	180+40 to 186+80 LT; 186+60 to 187+80 RT	CS, CV, S/CB/B	R6	BRC	7.5	0.222 (1,105)	NRPW	No	No
ES-36	3K / 40A - 40D	36.15416 / -115.389053	188+40 to 191+10 LT; 191+80 to 192+60 LT; 190+90 to 198+60 RT	CS, CV, S/CB/B	R6	BC	7.5	0.205 (1,038)	NRPW	No	No
ES-37	3L / 41A - 41C	36.154088 / -115.390127	199+75 to 202+60 LT; 202+50 to 203+00 RT	CS, CV, S/CB/B	R6	BRC	3	0.053 (574)	NRPW	No	No
ES-38	3L / 42A, 42B	36.154134 / -115.390603	203+20 to 203+65 LT; 203+60 to 203+80 RT	CS, CV, S/CB/B	R6	SC	4	0.013 (135)	NRPW	No	No
ES-39	3L / 43	36.154319 / -115.390992	204+35 to 204+55 LT	CV, S/CB/B	R6	SC	1	0.003 (121)	NRPW	No	No
ES-40	3L / 44A, 44B	36.154219 / -115.391711	205+60 to 205+90 LT; 205+75 to 206+30 RT	CS, CV, S/CB/B	R6	BC	17.5	0.088 (214)	NRPW	No	No

Feature ID	Figure / Photos	Latitude / Longitude	Approximate Project Stationing	OHWM Indicators [1]	Cowardin Classification [2]	Channel Type with Study Area [3]	Average Width of OHWM (feet)	Acreage within Study Area (linear feet)	RPW / NRPW	Connectivity to RPW	Potentially Jurisdictional
ES-41	3L / 45A, 45B	36.15387 / -115.391798	206+90 to 207+15 LT; 207+15 to 207+45 RT	CS, CV, S/CB/B	R6	BC	3.5	0.021 (259)	NRPW	No	No
ES-42	3L / 46A, 46B	36.153431 / -115.392177	209+00 to 209+75 LT; 209+60 to 210+00 RT	CV, S/CB/B	R6	BRC	3.5	0.024 (285)	NRPW	No	No
ES-43A	3L / 47A	36.153171 / -115.392736	210+00 to 212+20 LT	CS, CV, S/CB/B	R6	BC	5	0.015 (140)	NRPW	No	No
ES-43B	3L / 47B	36.15289 / -115.3933	212+40 to 213+80 LT	CS, CV, S/CB/B	R6	SC	5	0.017 (150)	NRPW	No	No
ES-43C	3M / 47C, 47D	36.15236 / -115.3943	214+80 to 218+90 LT	CV, S/CB/B	R6	SC	5	0.047 (457)	NRPW	No	No
ES-44	3L / 48	36.153171 / -115.392736	211+00 to 211+40 LT; 211+40 to 211+60 RT	CV, S/CB/B	R6	BRC	4	0.133 (804)	NRPW	No	No
ES-45	3M / 49	36.152694 / -115.393851	214+90 to 215+60 LT; 215+60 to 216+30 RT	CV, S/CB/B	R6	BRC	4.5	0.028 (263)	NRPW	No	No
ES-46	3M / 50	36.151001 / -115.395474	221+55 to 223+90 LT	CS, CV, S/CB/B	R6	SC	4.5	0.021 (246)	NRPW	No	No
ES-47	3M / 51A, 51B	36.15094 / -115.395855	224+10 to 224+80 LT; 223+80 to 224+20 RT	CS, CV, S/CB/B	R6	BRC	4.5	0.038 (324)	NRPW	No	No
ES-48	3O / 52A - 52C	36.148244 / -115.400434	241+80 to 242+60 LT; 241+80 to 242+40 RT	CS, CV, S/CB/B, SS	R6	BRC	10	0.133 (880)	NRPW	No	No
ES-49	3O / 53	36.147866 / -115.400407	243+40 to 244+00 LT; 244+00 to 244+15 RT	CS, CV, S/CB/B	R6	SC	1	0.003 (125)	NRPW	No	No
ES-50	3O, 3P / 54	36.147329 / -115.40025	245+35 LT	CS, CV, S/CB/B	R6	SC	2	0.003 (100)	NRPW	No	No
ES-51	3O, 3P / 55	36.147125 / -115.400225	246+40 t0 247+22 LT; 247+00 to 247+10 RT	CS, CV, S/CB/B	R6	BC	2	0.010 (201)	NRPW	No	No
ES-52	3P / 56	36.145763 / -115.402542	256+10 to 256+75 LT; 256+75 RT	CS, CV, S/CB/B	R6	SC	4	0.024 (220)	NRPW	No	No
ES-53	3Q / 57A, 57B	36.146303 / -115.40405	261+10 to 262+00 LT; 261+10 RT	CS, CV, S/CB/B	R6	SC	5	0.016 (136)	NRPW	No	No
ES-54A	3Q / 58A	36.14594 / -115.4044	262+20 to 263+00 LT	CS, CV, S/CB/B, SS	R6	SC	5	0.005 (100)	NRPW	No	No
ES-54B	3Q / 58B - 58E	36.145917 / -115.404837	263+60 to 264+20 RT	CS, CV, S/CB/B, SS	R6	BC	3.5	0.113 (1,189)	NRPW	No	No
ES-55A	3Q / 59A - 59C	36.14589 / -115.404	258+60 to 263+20 LT	CS, CV, S/CB/B, SS	R6	BC	23	0.169 (860)	NRPW	No	No
ES-55B	3Q / 59D	36.14573 / -115.4041	259+80 to 263+20 LT	CS, CV, S/CB/B, SS	R6	BRC	12	0.080 (307)	NRPW	No	No
ES-55C	3Q / 59E, 59F	36.145689 / -115.404573	263+70 to 264+40	CS, CV, S/CB/B, SS	R6	BRC	50	0.174 (260)	NRPW	No	No
ES-55D	3Q / 59G	36.14531 / -115.4036	265+80 to 269+80 LT	CS, CV, S/CB/B, SS	R6	BRC	9	0.087 (502)	NRPW	No	No
ES-56A	3Q / 60A, 60B	36.144842 / -115.404222	268+30 to 269+45 LT; 267+00 to 269+10 RT	CS, CV, S/CB/B, SS	R6	BRC	15	0.136 (456)	NRPW	No	No
ES-56B	3Q / 60C - 60E	36.14489 / -115.4029	269+40 to 271+80 LT	CS, CV, S/CB/B, SS	R6	BC	10	0.088 (407)	NRPW	No	No
ES-57	3R / 61A - 61C	36.14358 / -115.401813	275+40 to 276+20 LT; 275+00 to 275+40 RT	CS, CV, S/CB/B	R6	BC	6	0.034 (313)	NRPW	No	No
ES-58A	3R / 62A	36.14259 / -115.4001	280+20 LT	CS, CV, S/CB/B	R6	SC	5	0.002 (25)	NRPW	No	No

Feature ID	Figure / Photos	Latitude / Longitude	Approximate Project Stationing	OHWM Indicators [1]	Cowardin Classification [2]	Channel Type with Study Area [3]	Average Width of OHWM (feet)	Acreage within Study Area (linear feet)	RPW / NRPW	Connectivity to RPW	Potentially Jurisdictional
ES-58B	3R, 3T - 3V / 62B - 62H	36.144842 / -115.404222	280+40 to 283+20 LT; 286+00 to 294+30 LT; 299+90 to 300+40 LT; 283+20 to 286+30 RT; 294+30 to 299+90 RT	CS, CV, S/CB/B, SS	R6	BRC	6.5	0.294 (3,278)	NRPW	No	No
ES-59	3W / 64A, 64B	36.14047 / -115.403706	312+85	CV, S/CB/B	R6	BC	1.5	0.008 (255)	NRPW	No	No
ES-60	3W / 65	36.135572 / -115.410826	317+80 to 318+10 LT; 318+10 to 320+10 RT	CS, CV, S/CB/B	R6	SC	1	0.010 (313)	NRPW	No	No
ES-61	3X / 66A, 66B	36.133906 / -115.413583	326+00 to 327+80 LT; 327+80 to 330+30 RT	CV, S/CB/B	R6	SC	1	0.012 (458)	NRPW	No	No
ES-62A	3X / 67A, 67B	36.133611 / -115.41538	333+20 to 336+40 LT	CS, CV, S/CB/B	R6	SC	7	0.036 (310)	NRPW	No	No
ES-62B	3Y / 67C, 67D	36.133096 / -115.416759	338+70 to 339+60 LT	CS, CV, S/CB/B	R6	BRC	9	0.020 (205)	NRPW	No	No
ES-62C	3Y / 67E - 67H	36.132997 / -115.418826	340+10 to 345+10 LT; 344+75 to 345+90 RT	CS, CV, S/CB/B	R6	BRC	7	0.140 (1,367)	NRPW	No	No
ES-63	3X, 3Y / 68A - 68C	36.133592 / -115.416547	335+60 to 337+80 LT; 337+80 to 338+20 RT	CS, CV, S/CB/B	R6	BRC	3	0.025 (382)	NRPW	No	No
ES-64	3Y, 3Z / 69A, 69B	36.13204 / -115.421665	352+60 to 354+40 LT; 354+25 to 355+40 RT	CS, CV, S/CB/B	R6	BRC	1	0.014 (470)	NRPW	No	No

[1] CS = change in soil characteristics; CV = change in vegetation; S/CB/B = shelving/cut bank/benching; SS = sediment sorting

[2] R6 = A wetland, spring, stream, river, pond or lake that only exists for a short period

[3] BC = branched channel; BRC = braided channel; SC = simple channel

NRPW = non-relatively permanent water
RPW = relatively permanent water

6. References

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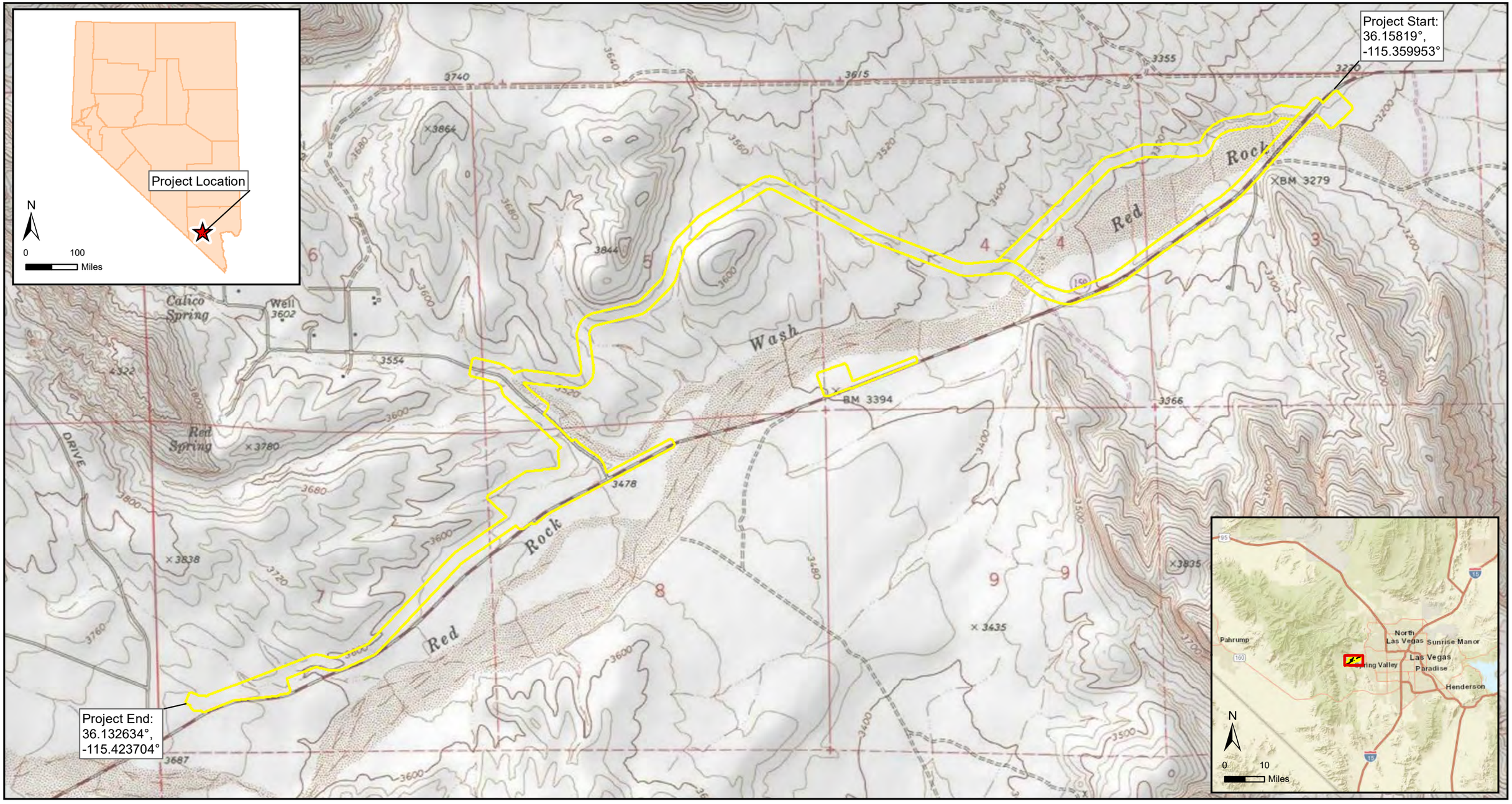
Appendix A
Figures



Legend

Aquatic Resources Study Area (189.74 acres)

Made in accordance with the
Updated Map and Drawing Standards for the
South Pacific Division Regulatory Program,
as amended on February 10, 2016.
Figure created by Jill Rosenberger, revised 8/7/2020.

0 750 1,500 Feet
1 in = 1,500 ft

Image Source: ESRI USA Topographic Map
NAD_1983_2011_StatePlane_Nevada_Central_FIPS_2702_Ft_US
WKID: 6519 Authority: EPSG
Projection: Transverse_Mercator
False_Easting: 1640416.666666667
False_Northing: 19685000.0
Central_Meridian: -116.6666666666667
Scale_Factor: 0.9999
Latitude_Of_Origin: 34.75
Linear Unit: Foot_US (0.3048006096012192)
USGS Topographic Quadrangles:
La Madre Mountain, 1974 / Blue Diamond NE, 1984

Figure 1
Regional Vicinity Map
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV

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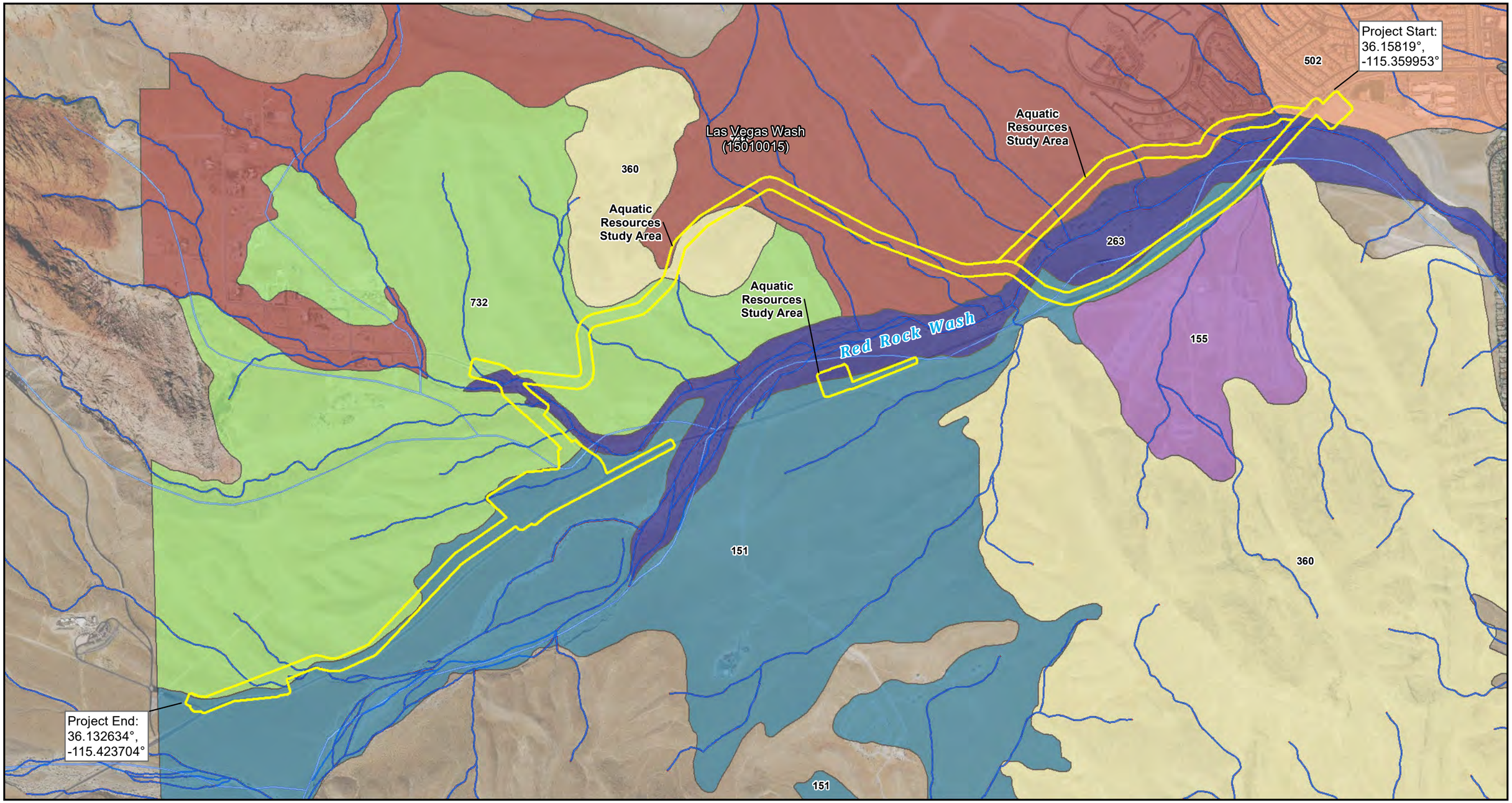

Legend

- Aquatic Resources Study Area (189.74 acres)
- NHD Streams
- NHD Waterbodies

NWI Wetlands

- Freshwater Pond
- Riverine

Soil Type

- 502 - Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes
- 155 - Cave gravelly fine sandy loam, 4 to 15 percent slopes
- 263 - Jean complex, 2 to 4 percent slopes
- 732 - Purob extremely gravelly loam, 8 to 30 percent slopes
- 731 - Purob-Irongold association
- 360 - Rock outcrop-St. Thomas complex, 15 to 30 percent slopes
- 151 - Vace-Jean association

IMAGE SOURCE: NAIP, USA Imagery
Source : USFWS, National Wetlands Mapper, 2018;
USGS National Hydrography Dataset, 2018
Made in accordance with the Updated Map
and Drawing Standards for the South Pacific Division
Regulatory Program, as amended on February 10, 2016.
Figure created by Jill Rosenberger, revised 7/29/2020

0 750 1,500 Feet

1 in = 1,500 ft

N

Figure 2
N RCS Soils, National Wetlands Inventory and National Hydrography Dataset
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV

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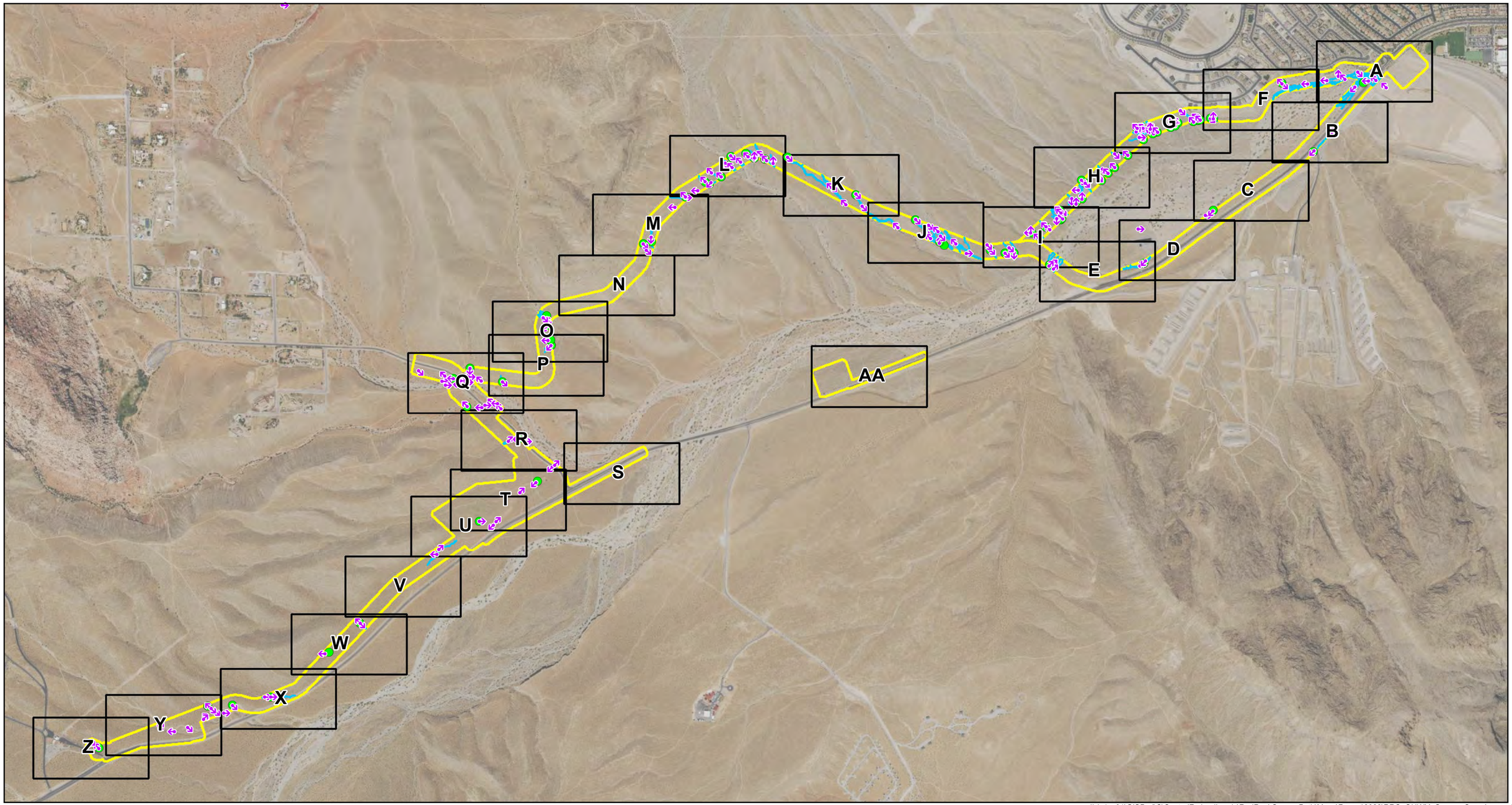

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Legend

- Aquatic Resources Study Area (189.74 acres)
- Sample Point
- Photo Point

Delineated Features

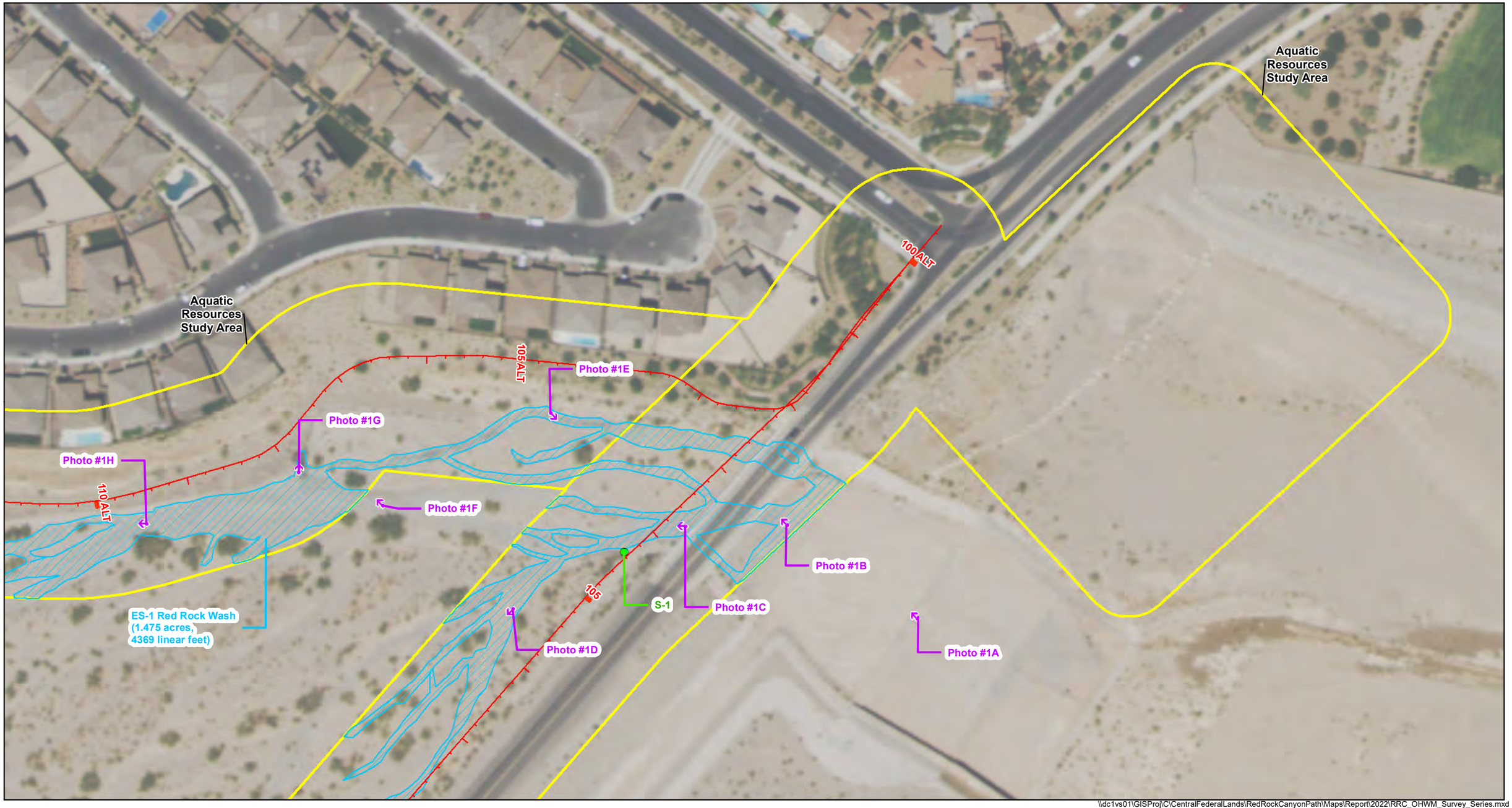
- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09/2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 650 1,300 Feet N

1 in = 1,300 ft

Figure 3 Overview
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV



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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft

N

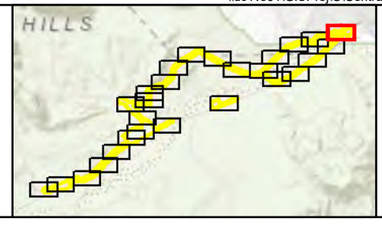

Figure 3A
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV

No delineated features on this page.

Aquatic Resources Study Area

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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020. Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft

N

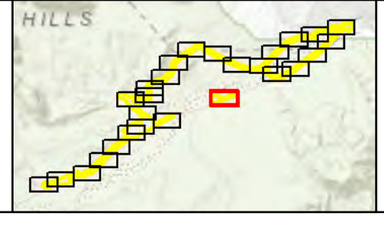
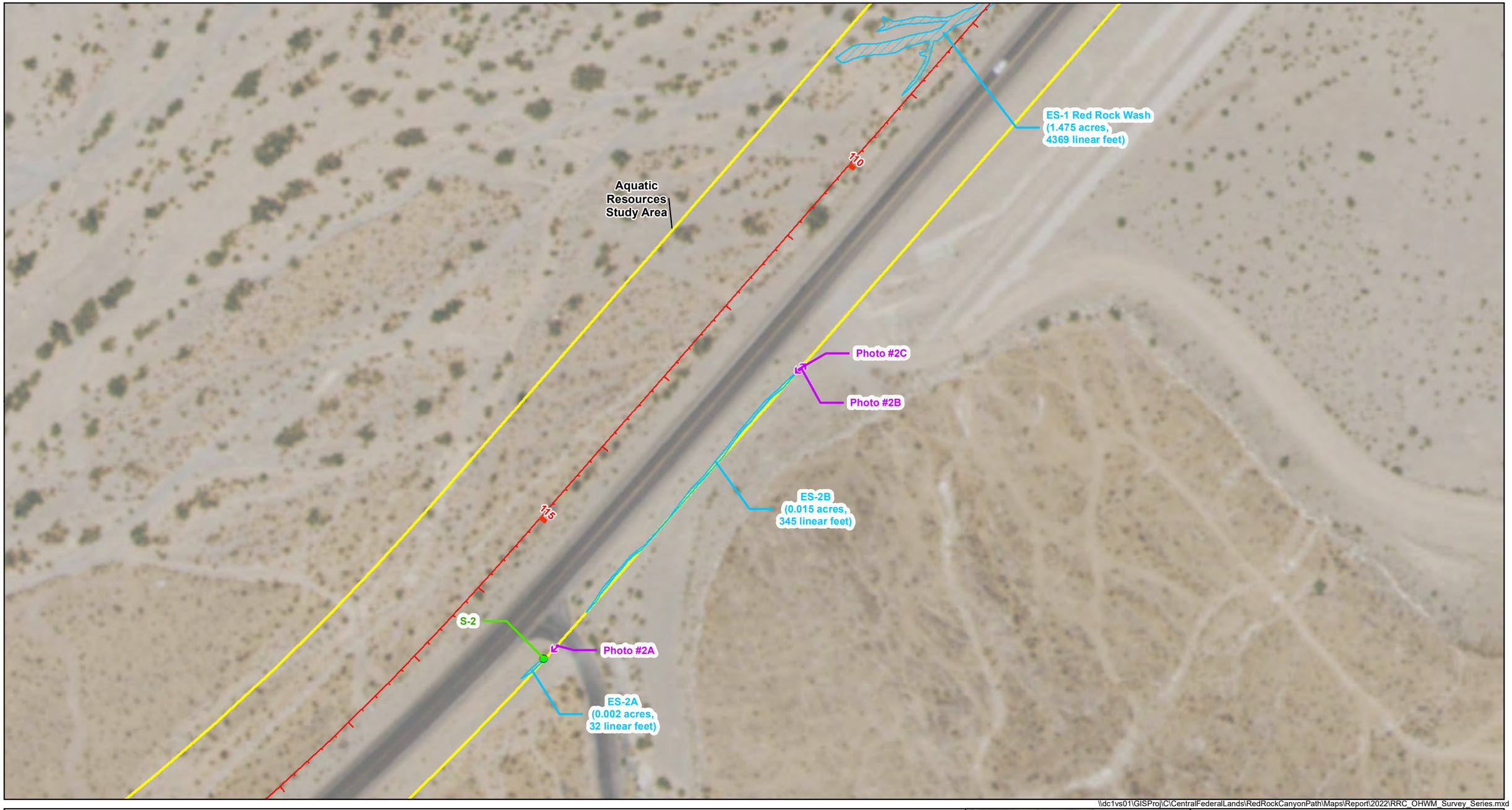


Figure 3AA
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV



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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet N

1 in = 100 ft

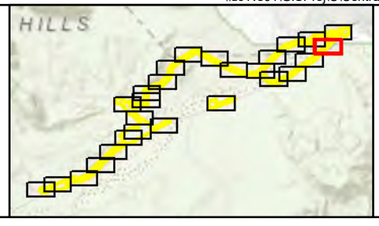

Figure 3B
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV

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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft
N

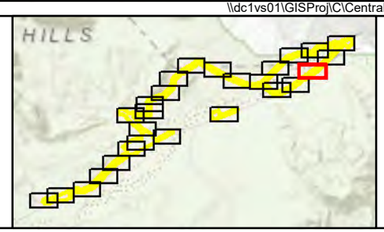

Figure 3C
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV

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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

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1 in = 100 ft

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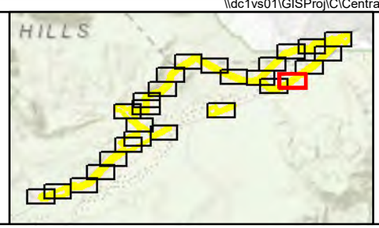

Figure 3D
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV

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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

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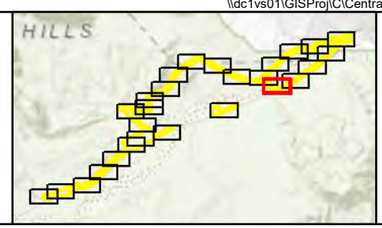
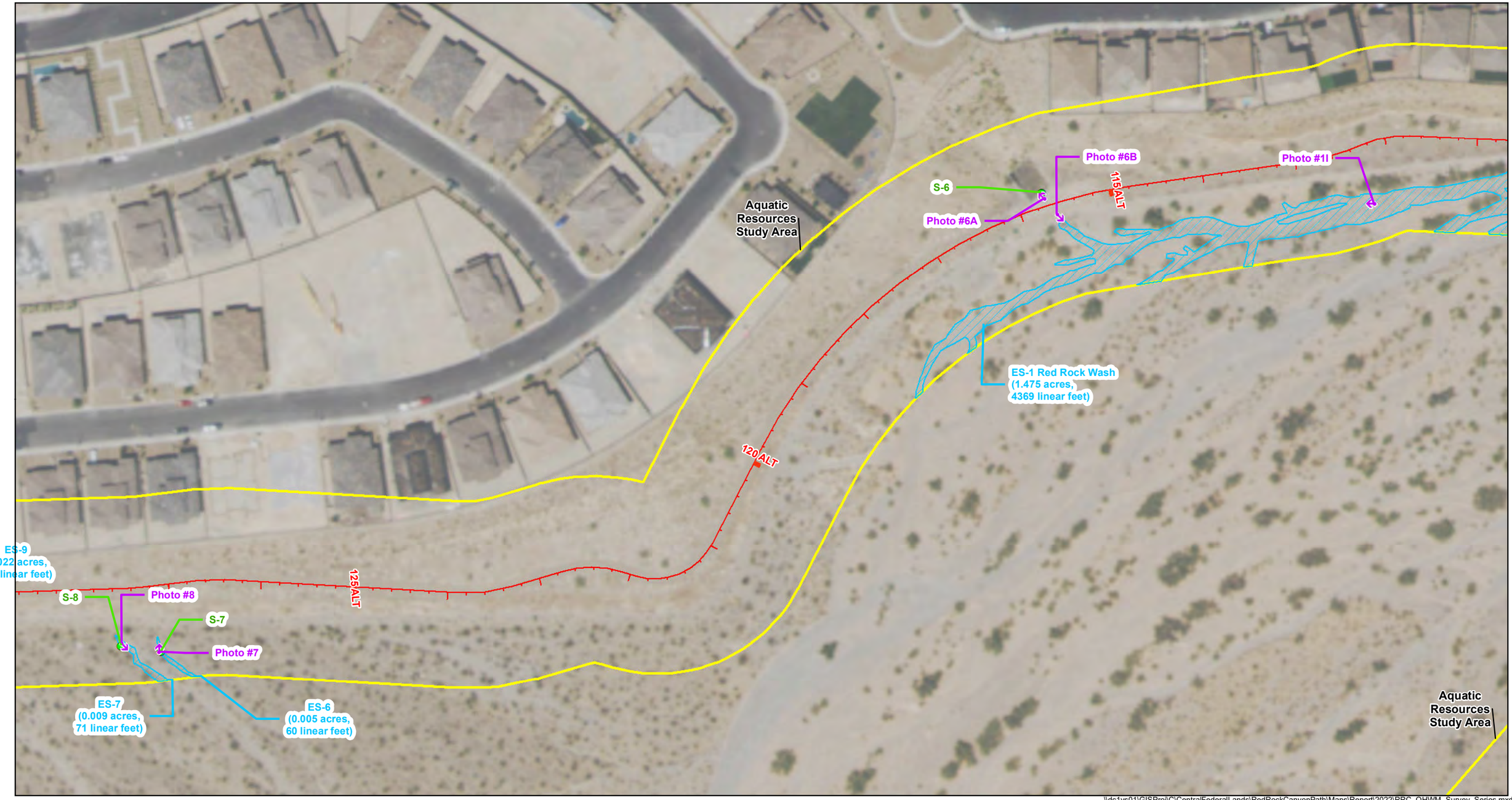


Figure 3E
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV



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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft
N

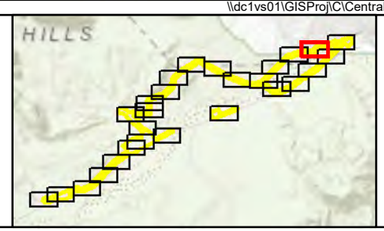
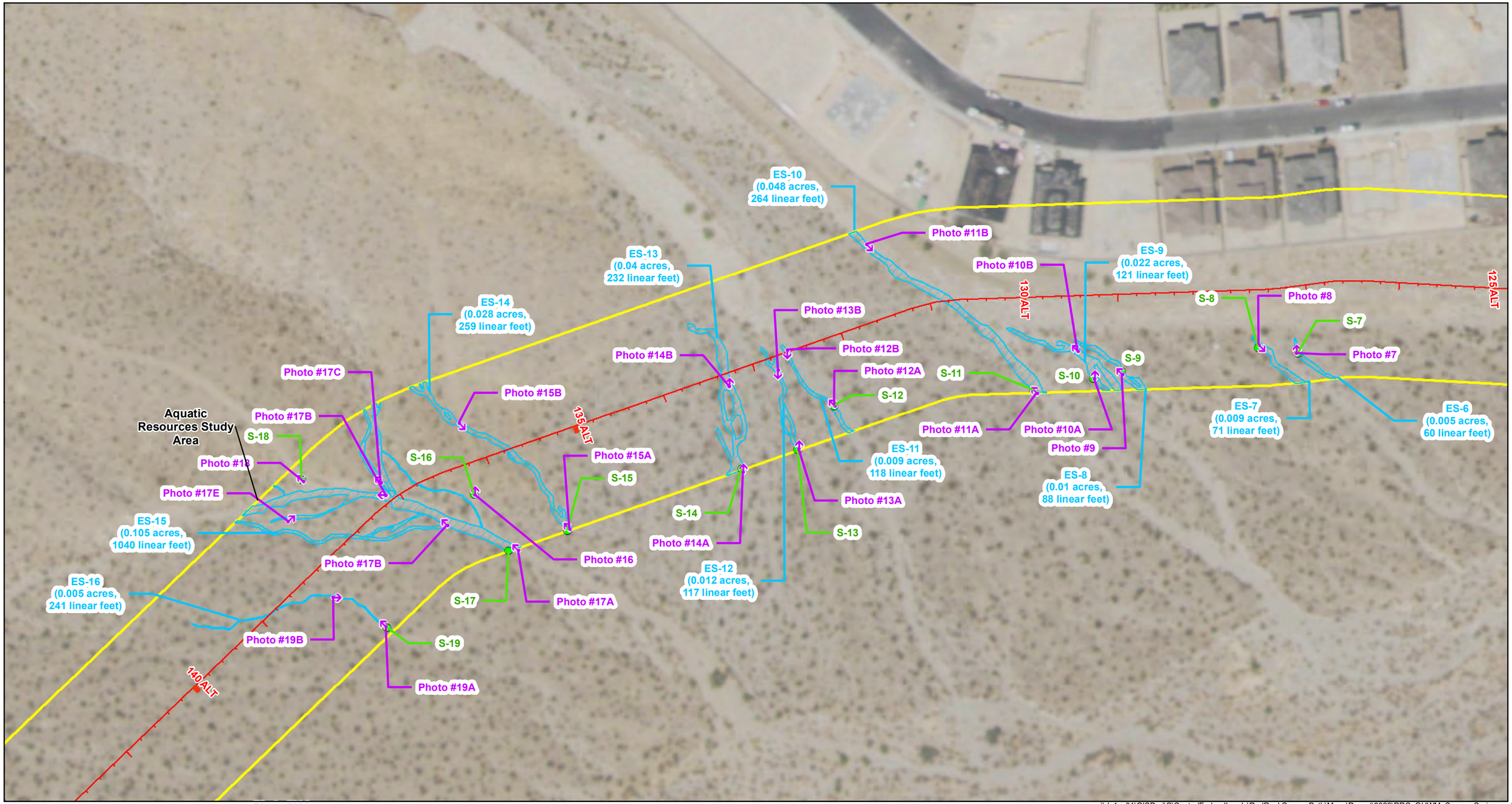


Figure 3F
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV



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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft
N

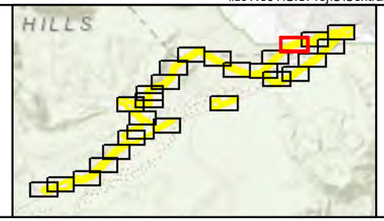

Figure 3G
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV

Photo #20B
Photo #20A
ES-17
(0.006 acres,
275 linear feet)
S-20
Aquatic
Resources
Study Area
ES-19
(0.022 acres,
197 linear feet)
S-21
ES-20
(0.009 acres,
154 linear feet)
Photo #22B
145ALT
Photo #21
ES-18
(0.003 acres,
138 linear feet)
Photo #23B
S-25
S-22
Photo #25
Photo #22A
S-24
S-23
Photo #24
Photo #23A
ES-22
(0.068 acres,
537 linear feet)
ES-21
(0.011 acres,
143 linear feet)
Photo #26B
ES-23
(0.036 acres,
453 linear feet)
150ALT
S-26
Photo #27B
S-27
Photo #26A
Photo #27A
Photo #28C

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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft
N

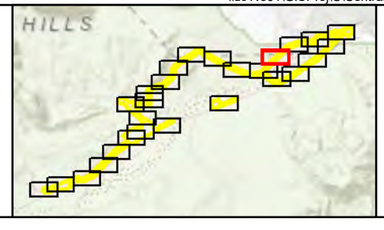
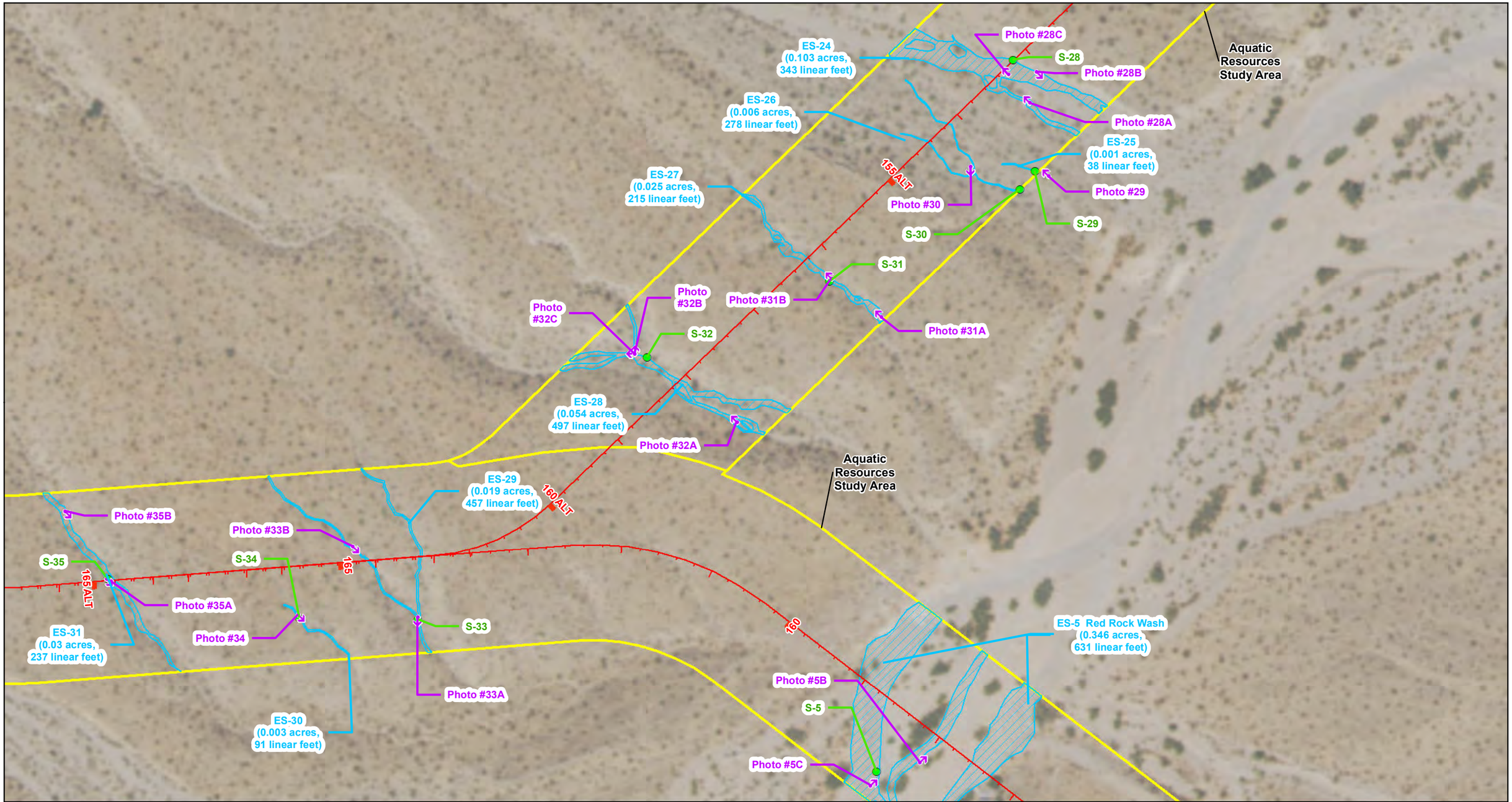


Figure 3H
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV



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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
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0 50 100 Feet
1 in = 100 ft
N

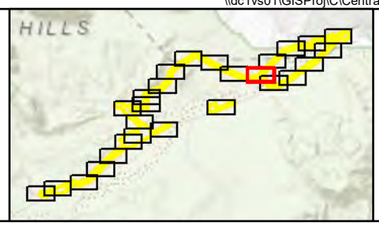
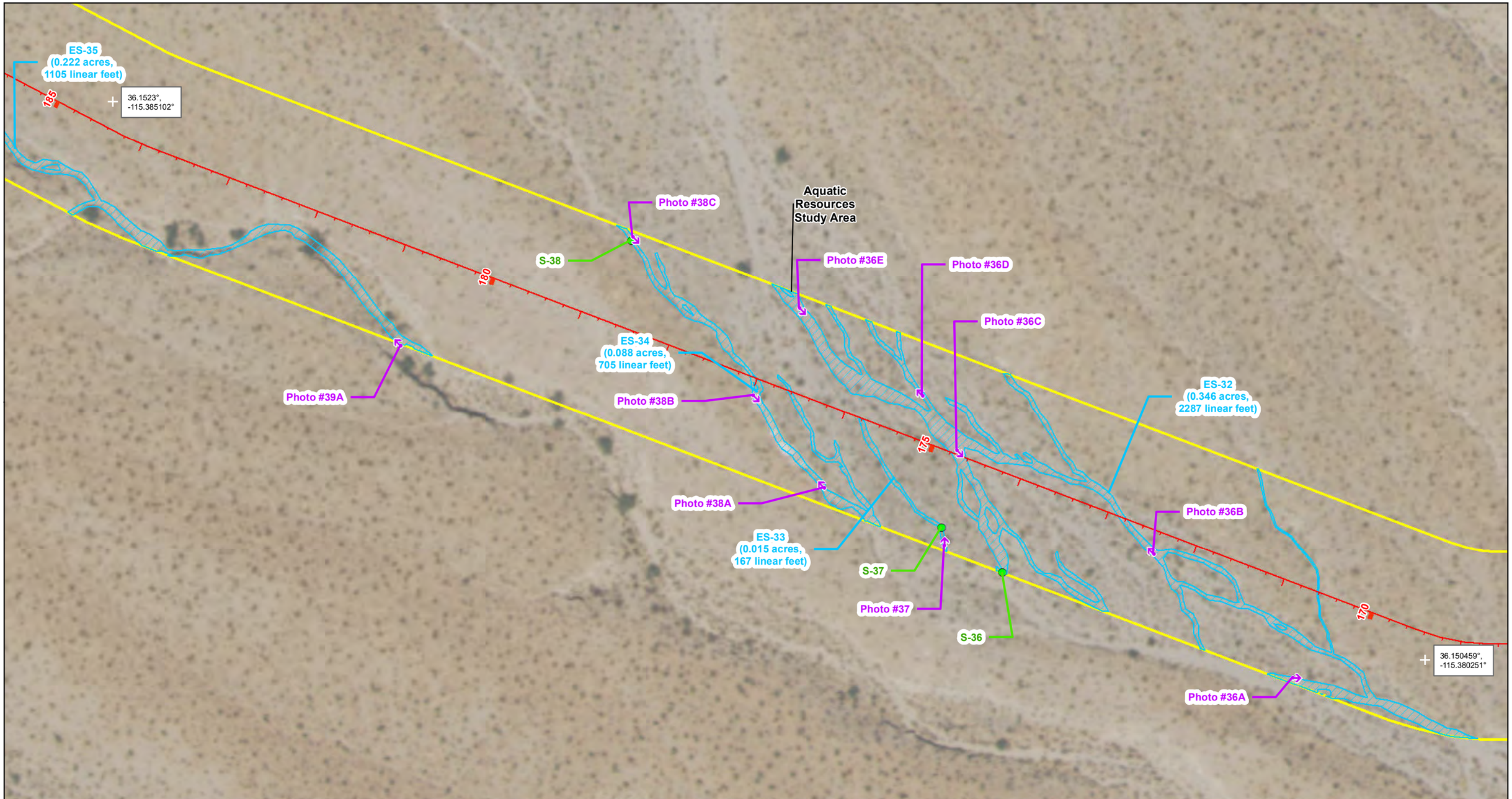


Figure 3I
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV



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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

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Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet N
1 in = 100 ft

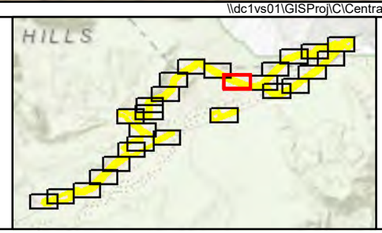
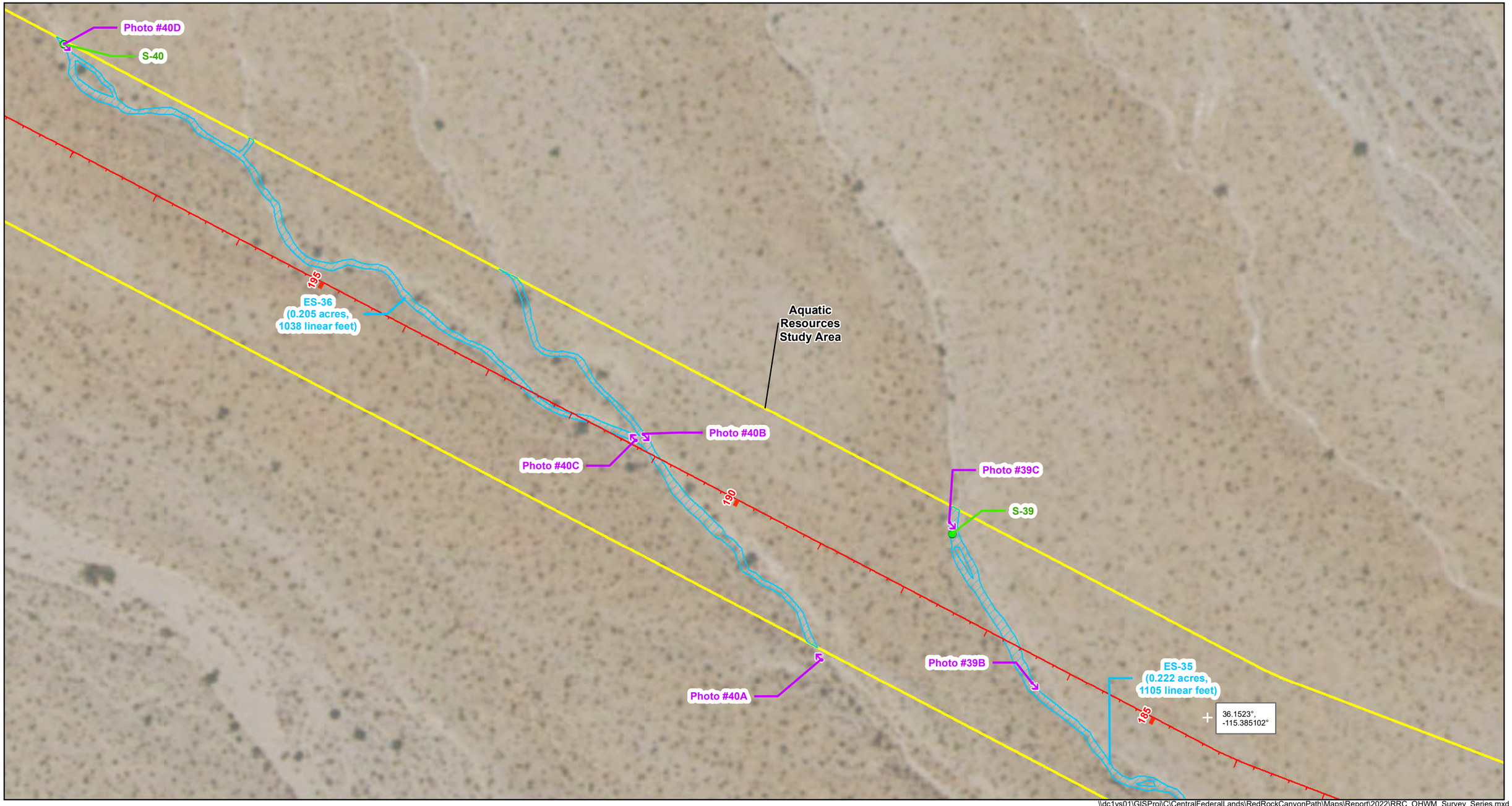


Figure 3J
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV



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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
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0 50 100 Feet
1 in = 100 ft

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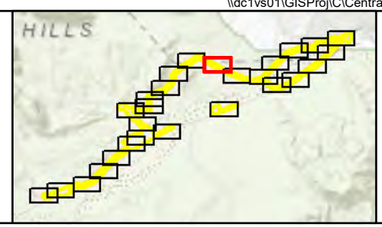
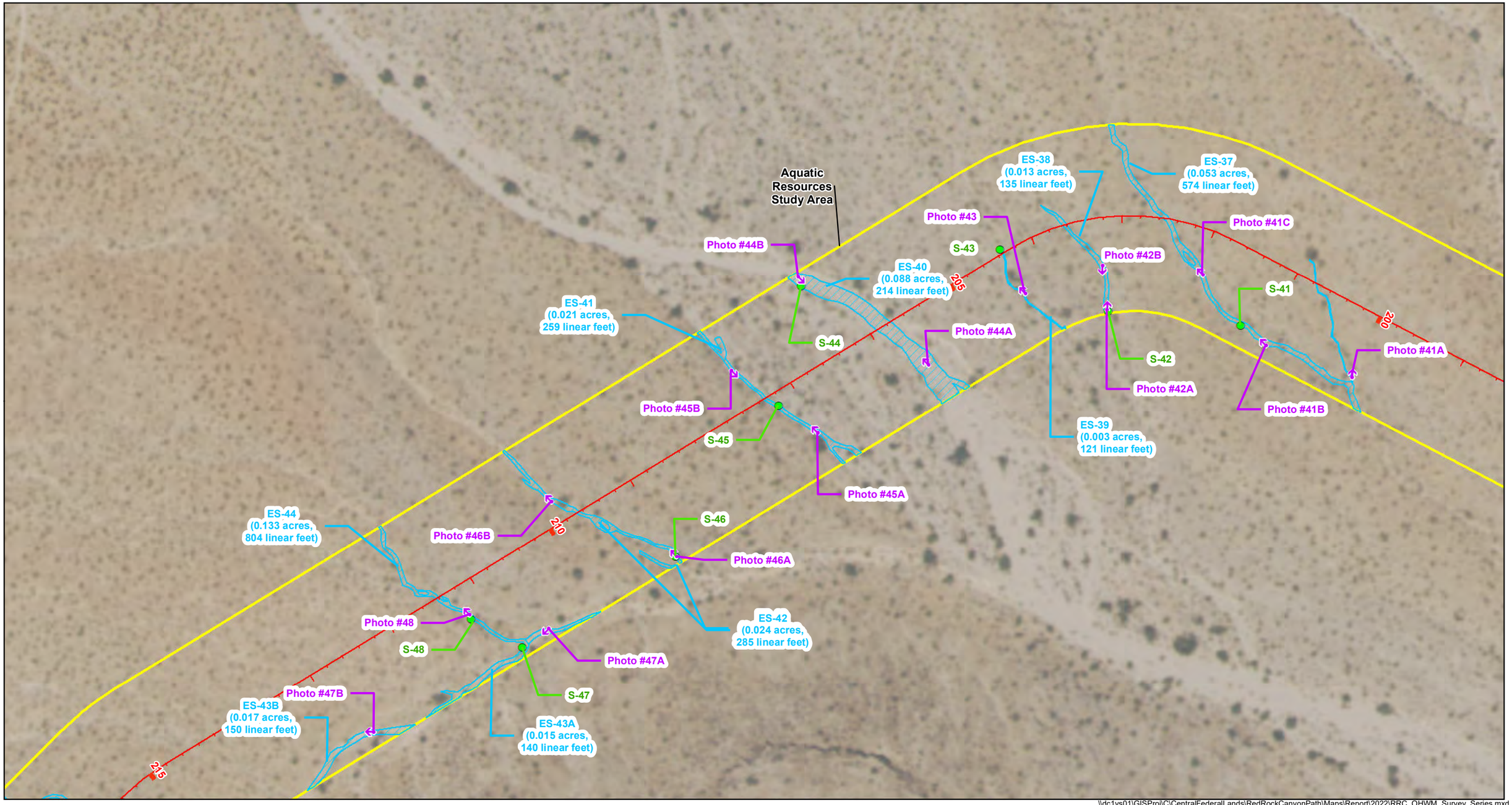


Figure 3K
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV



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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
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Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft
N

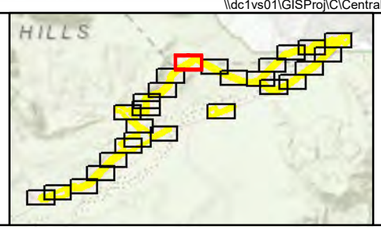
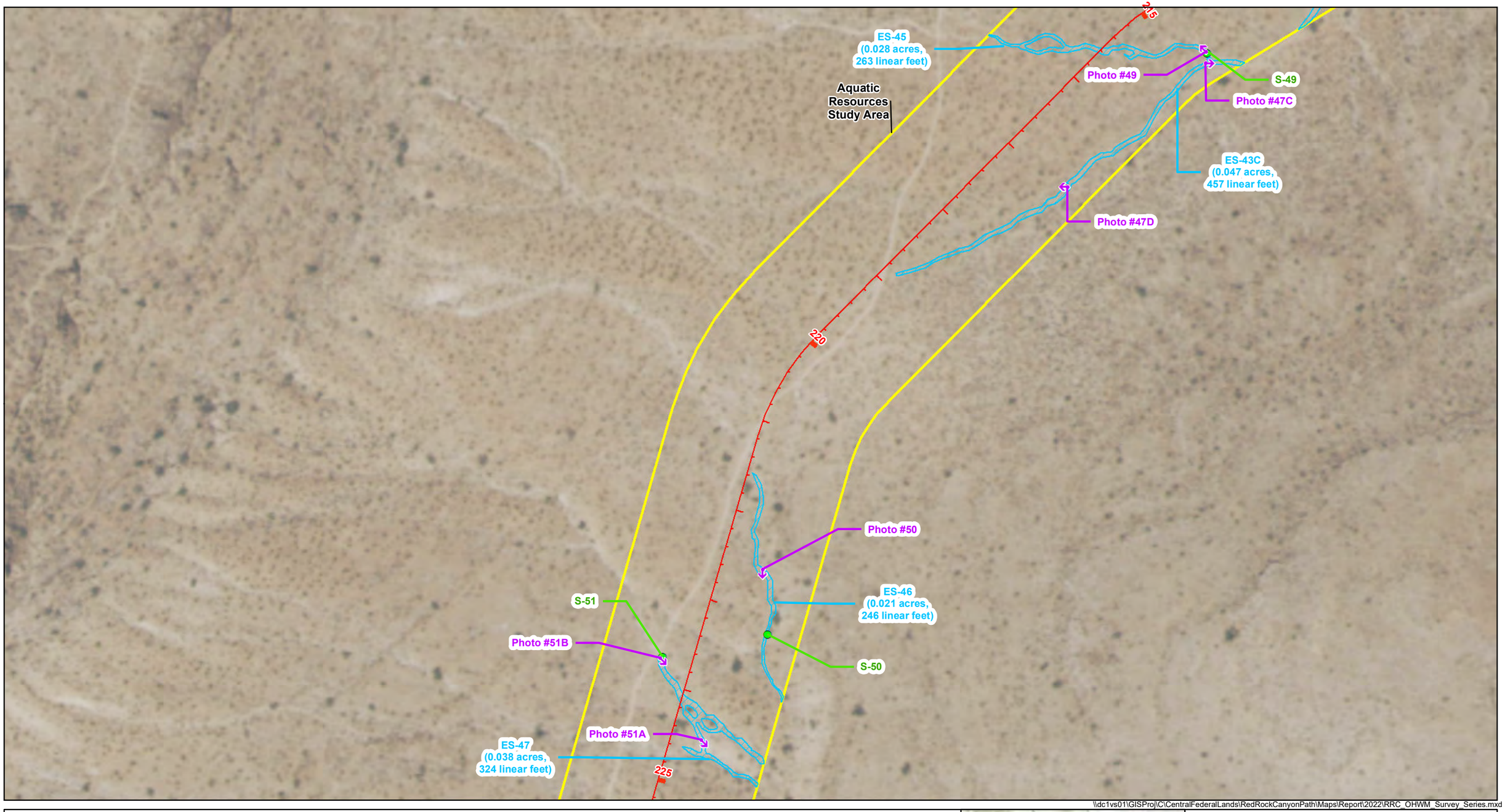


Figure 3L
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV



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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft
N

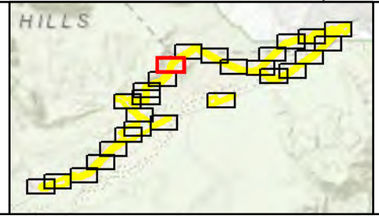

Figure 3M
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV

No delineated features on this page.

Aquatic Resources Study Area

230

235

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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
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Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft

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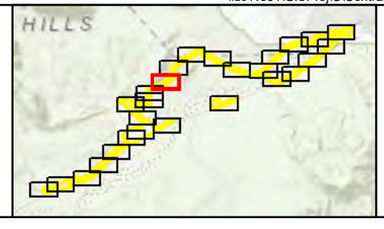
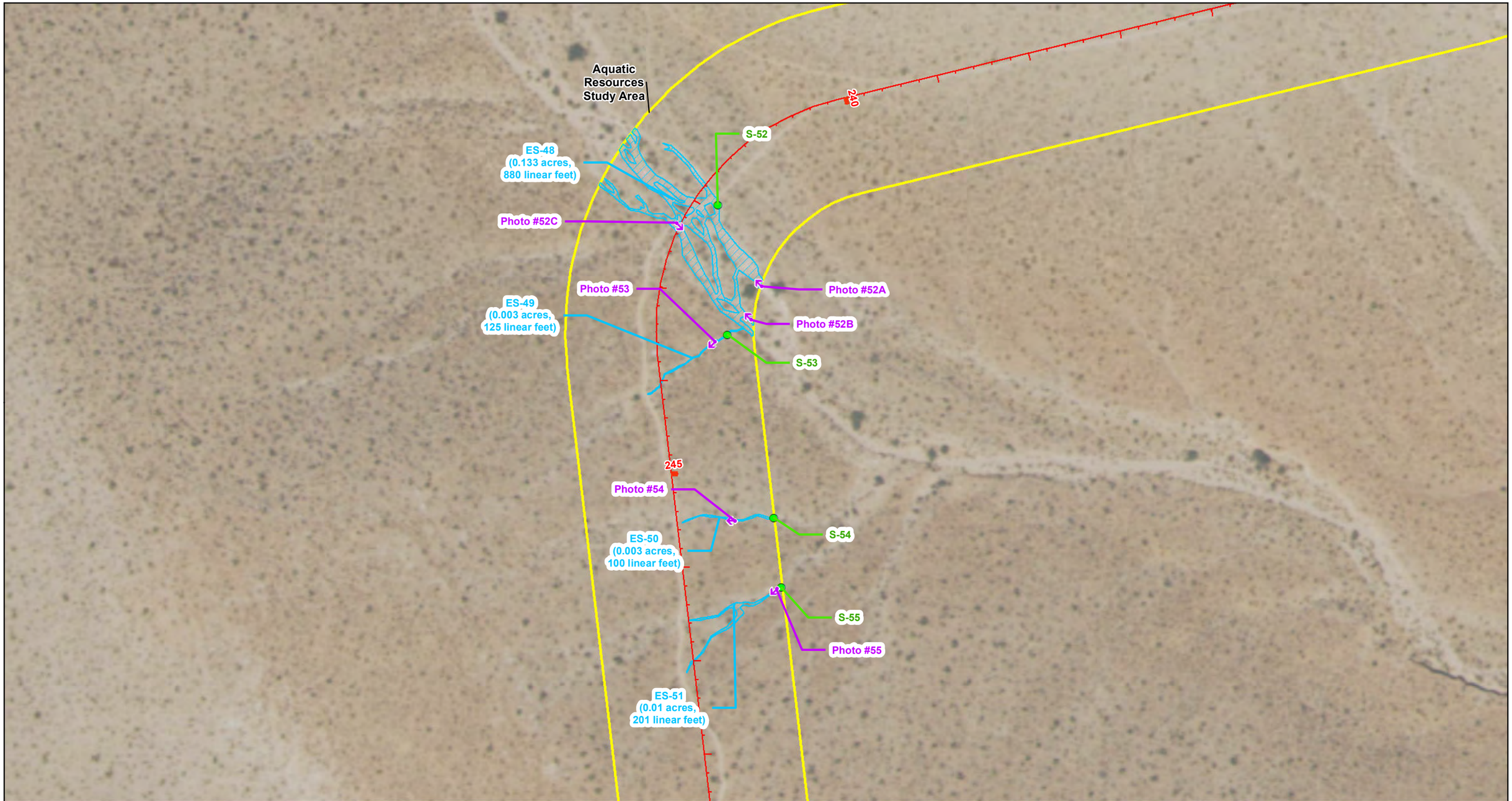


Figure 3N
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV



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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft
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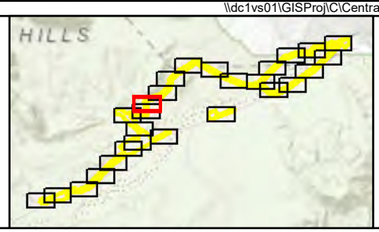
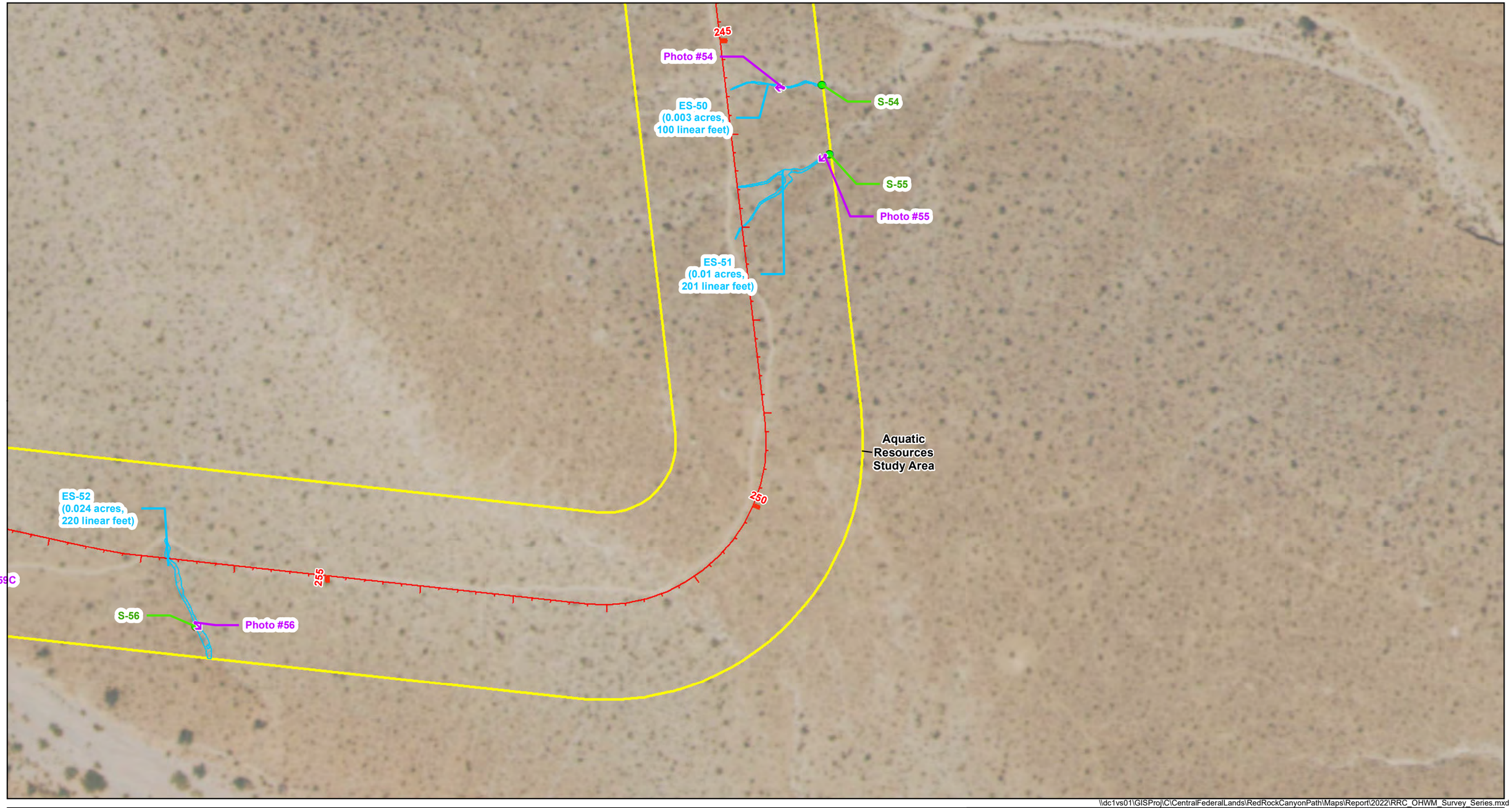


Figure 3O
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV



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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
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0 50 100 Feet
1 in = 100 ft
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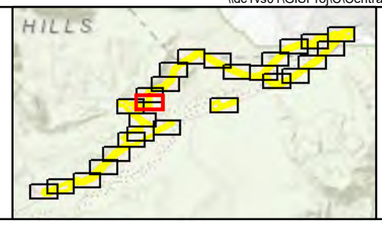
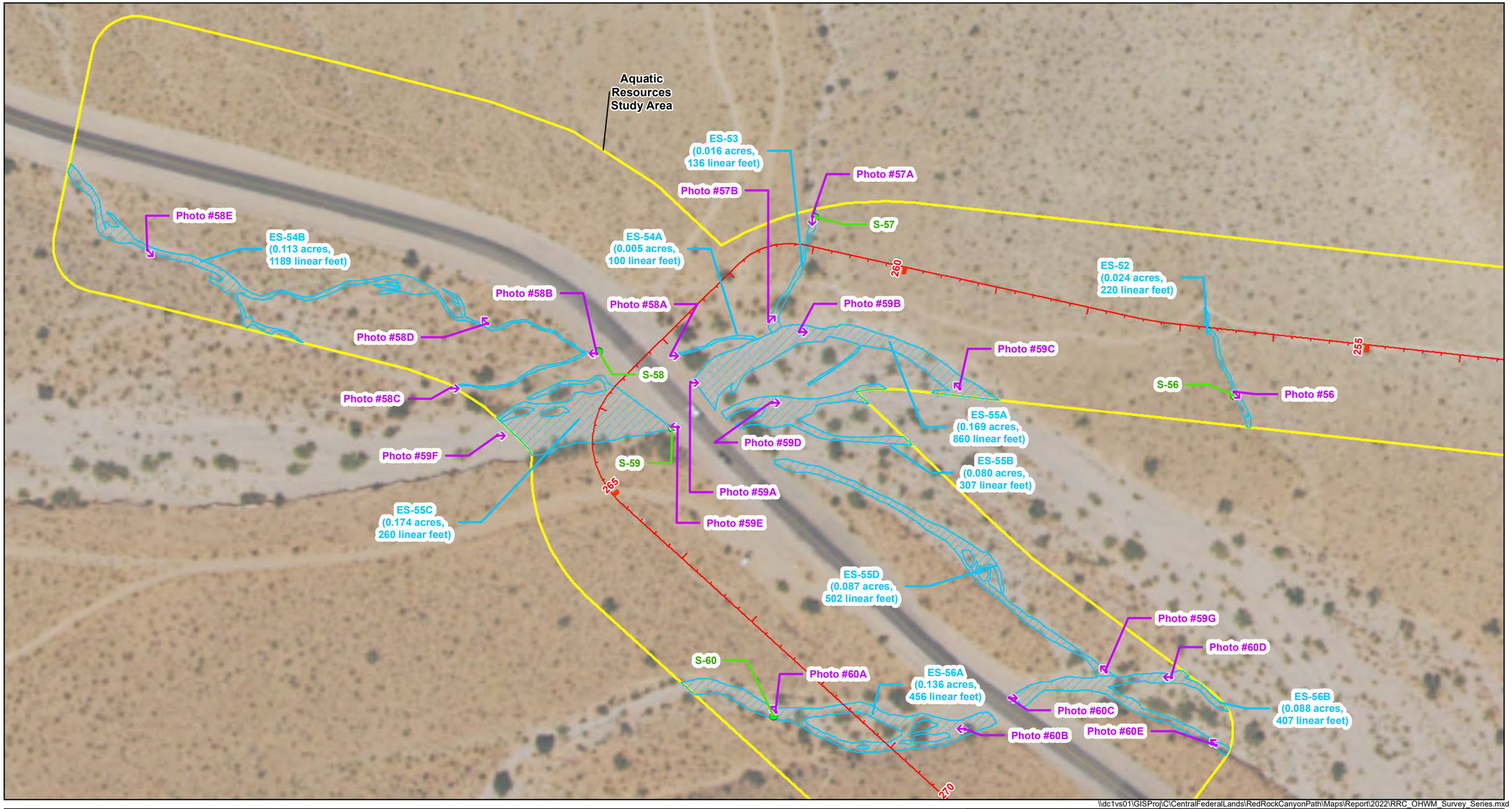


Figure 3P
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV



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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft

N

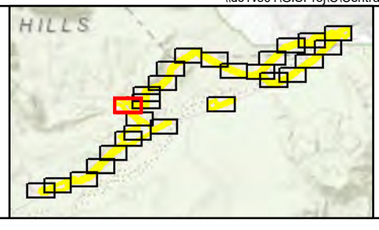
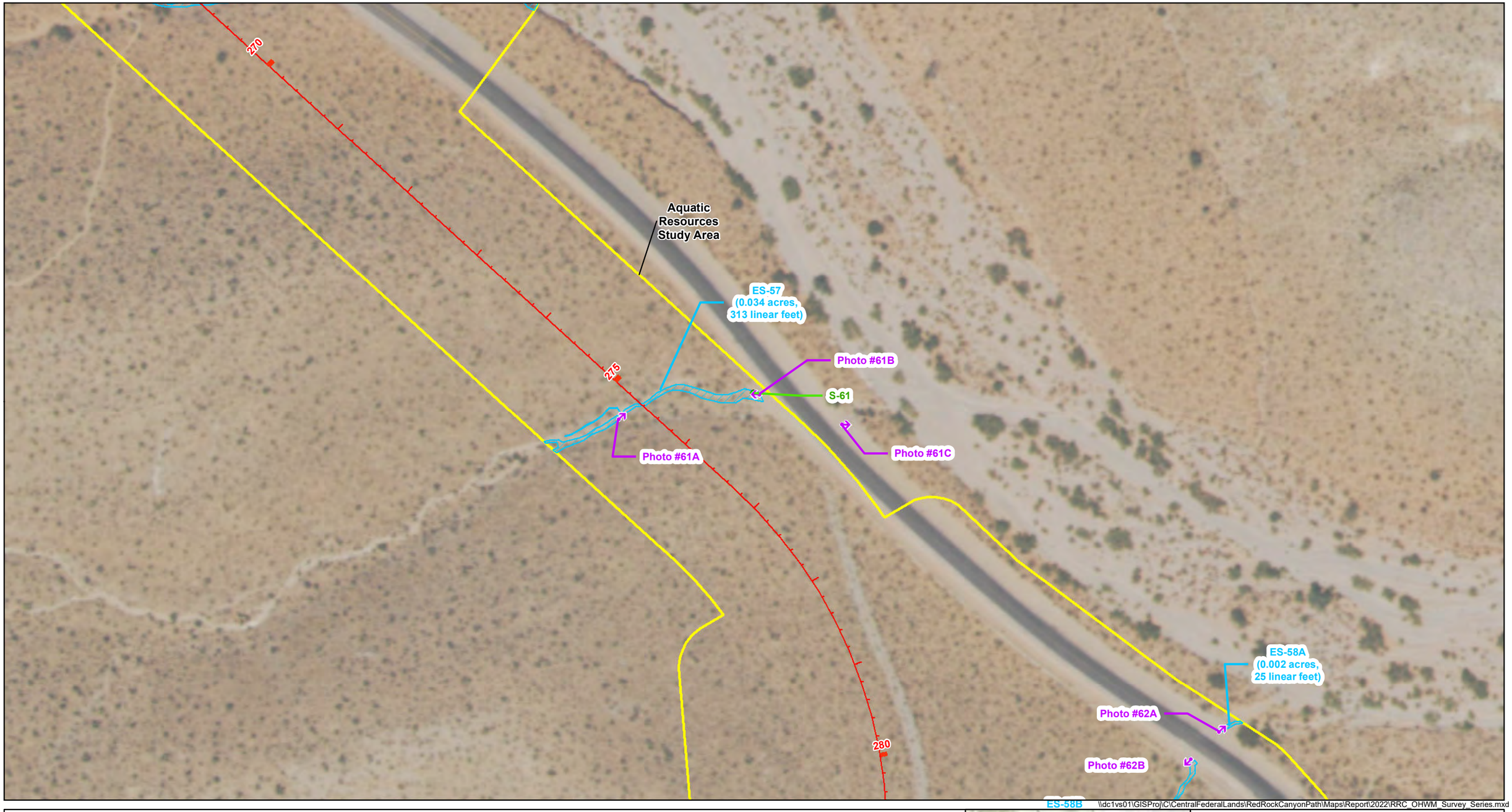


Figure 3Q
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV



Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
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0 50 100 Feet
1 in = 100 ft

N

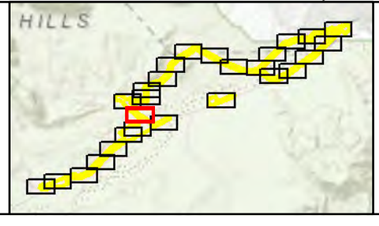

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Figure 3R
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV

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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
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0 50 100 Feet
1 in = 100 ft
N

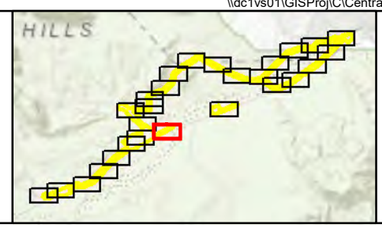

Figure 3S
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV

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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft
N

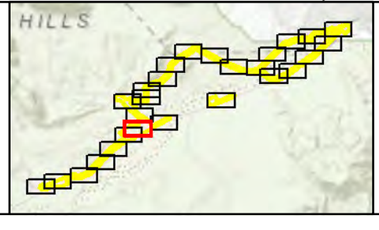
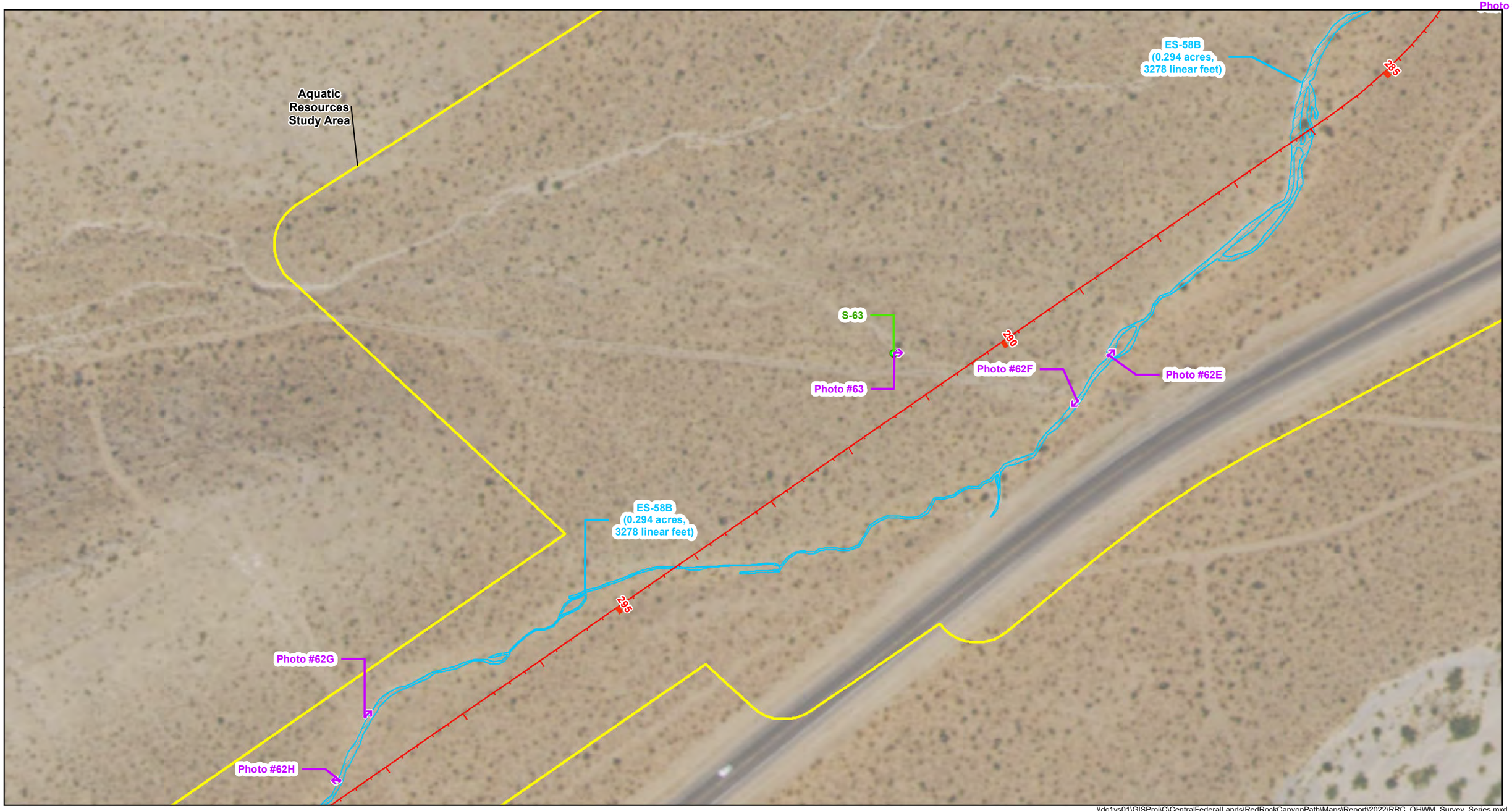


Figure 3T
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV



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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet N
1 in = 100 ft

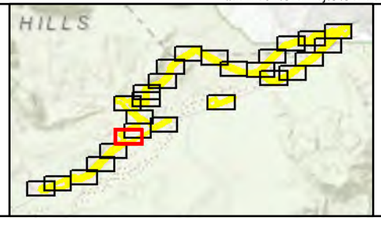

Figure 3U
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV

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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
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Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft
N

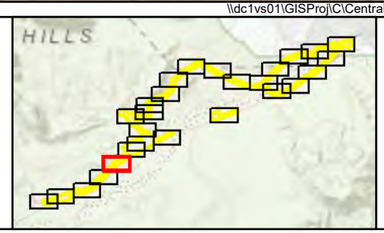

Figure 3V
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV

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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
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Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft
N

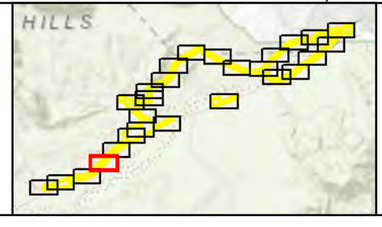

Figure 3W
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV

ES-63
(0.025 acres,
382 linear feet)

S-67

335

Photo #67A

ES-62A
(0.036 acres,
310 linear feet)

Photo #67B

Photo #66B

S-66

330

Photo #66A

ES-61
(0.012 acres,
458 linear feet)

325

Aquatic
Resources
Study Area

\\dc1vs01\GISProj\C\CentralFederalLands\RedRockCanyonPath\Maps\Report\2022\RRC_OHWM_Survey_Series.mxd

Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
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Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft

N

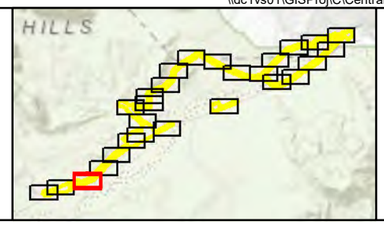
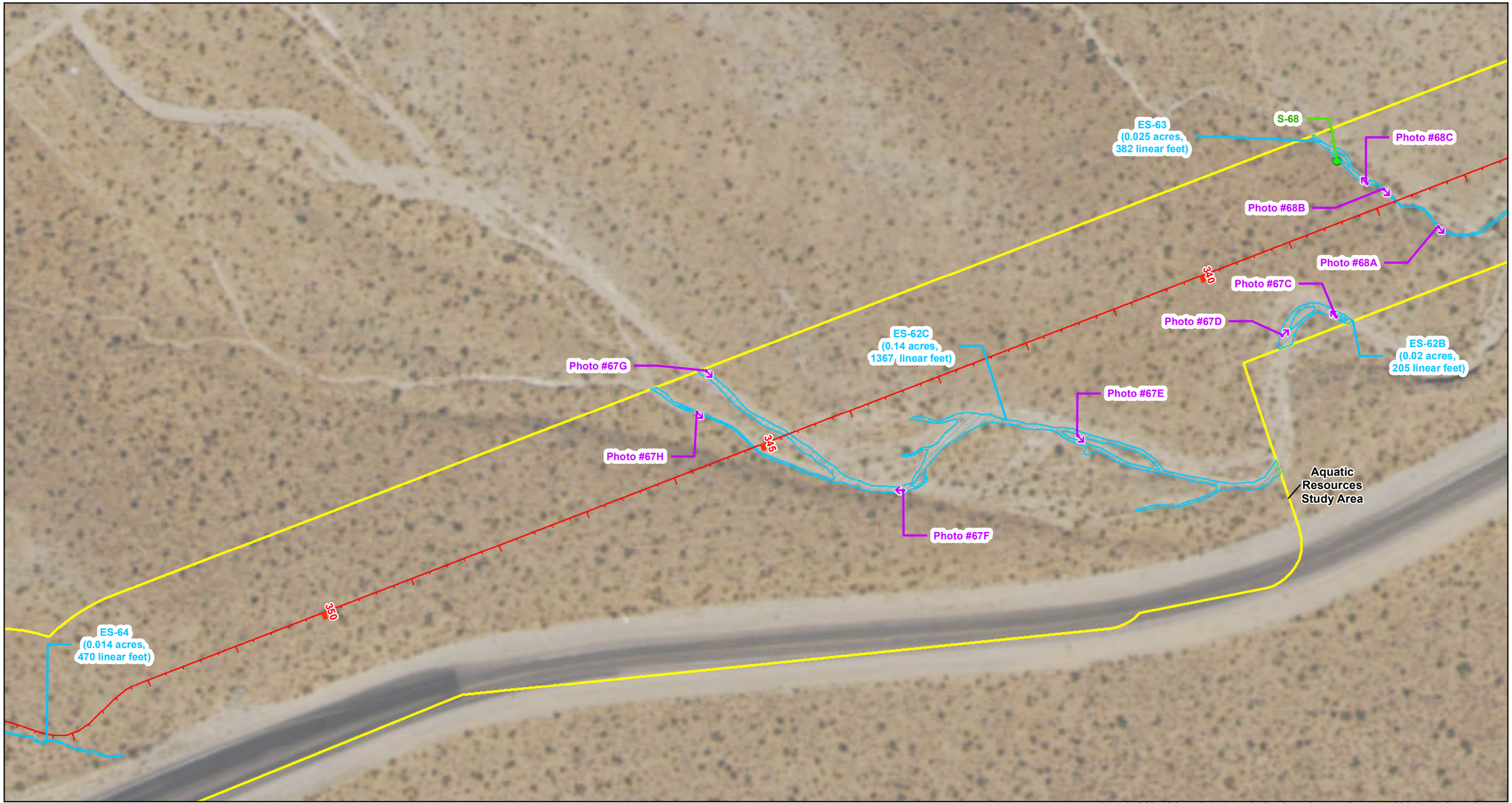


Figure 3X
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV



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Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft

N

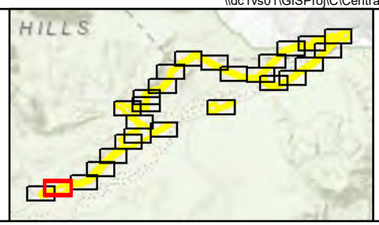


Figure 3Y
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV

Photo #67

Photo #69B

Aquatic Resources Study Area

S-69

ES-64 (0.014 acres, 470 linear feet)

Photo #69A

350

355

\\dc1vs01\GISProj\C\CentralFederalLands\RedRockCanyonPath\Maps\Report\2022\RRC_OHWM_Survey_Series.mxd

Legend

- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point

Delineated Features

- Channel

Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09-2020.
Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022

0 50 100 Feet
1 in = 100 ft
N

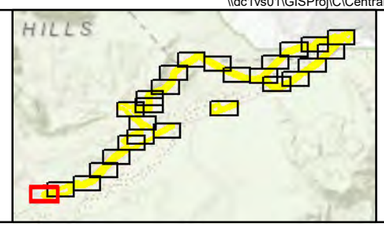


Figure 3Z
Potential Wetlands and Waters of the US
Aquatic Resources Delineation Report
Red Rock Canyon Trail and Intersections Improvements Project
Central Federal Lands Highway Division
NV FLAP 500(1)
Clark County, NV

Appendix B
Plant List from Mapped Aquatic Resources

Table 1. Plant List from Mapped Aquatic Resources

Plant Type	Scientific Name	Common Name	Status [1,2]
Forbs	*Encelia virginensis*	Virgin River brittlebush	NI
Graminoids	*Alopecurus pratensis*	Field meadow-foxtail	FACW
Graminoids	*Bromus madritensis* ssp. *rubens*	Red brome	UPL
Graminoids	*Bromus tectorum*	Cheatgrass	NI
Graminoids	*Polypogon monspeliensis*	Annual rabbit's-foot grass	FACW
Graminoids	*Typha angustifolia*	Narrow-leaf cattail	OBL
Shrubs and Trees	*Ambrosia dumosa*	White bursage	NI
Shrubs and Trees	*Baccharis sarothroides*	Rosinbush	FACU
Shrubs and Trees	*Chilopsis linearis*	Desert willow	FAC
Shrubs and Trees	*Gutierrezia microcephala*	Threadleaf snakeweed	NI
Shrubs and Trees	*Hymenoclea salsola*	Cheesebussh	NI
Shrubs and Trees	*Larrea tridentata*	Creosote bush	NI
Shrubs and Trees	*Salvia dorrii*	Purple sage	NI

[1] Status follows *National Wetland Plant List, version 3.4* (USACE 2018).

[2] Indicator Status:
FAC = Occurs in wetlands and non-wetlands
FACU = Usually occurs in non-wetlands but may occur in wetlands
FACW = Usually occurs in wetlands but may occur in non-wetlands
NI = No indicator listed
OBL = Almost always occurs in wetlands
UPL = Almost always occurs in uplands

Appendix C
Soil Resource Report

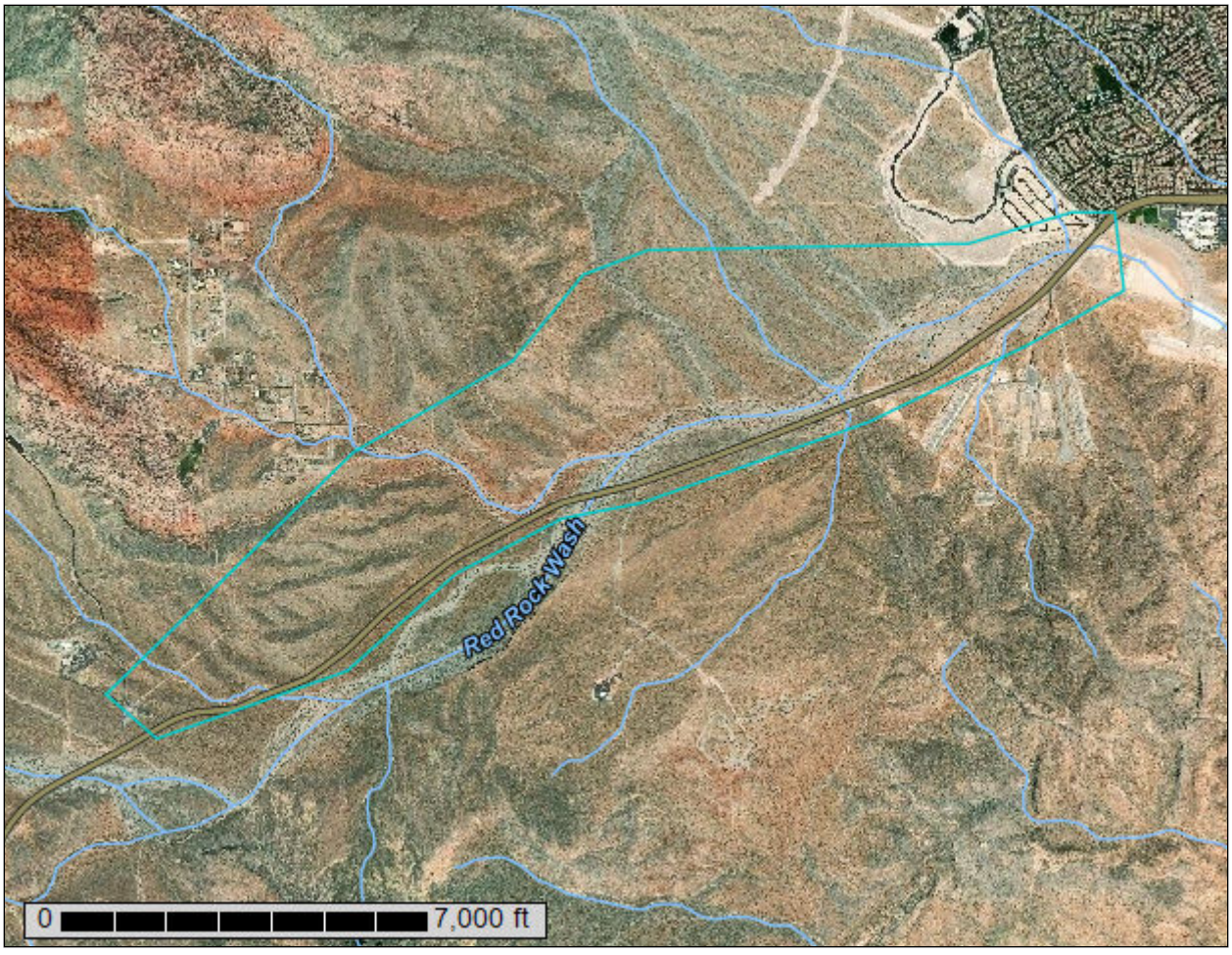
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Clark County Area, Nevada; and Las Vegas Valley Area, Nevada, Part of Clark County



September 27, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

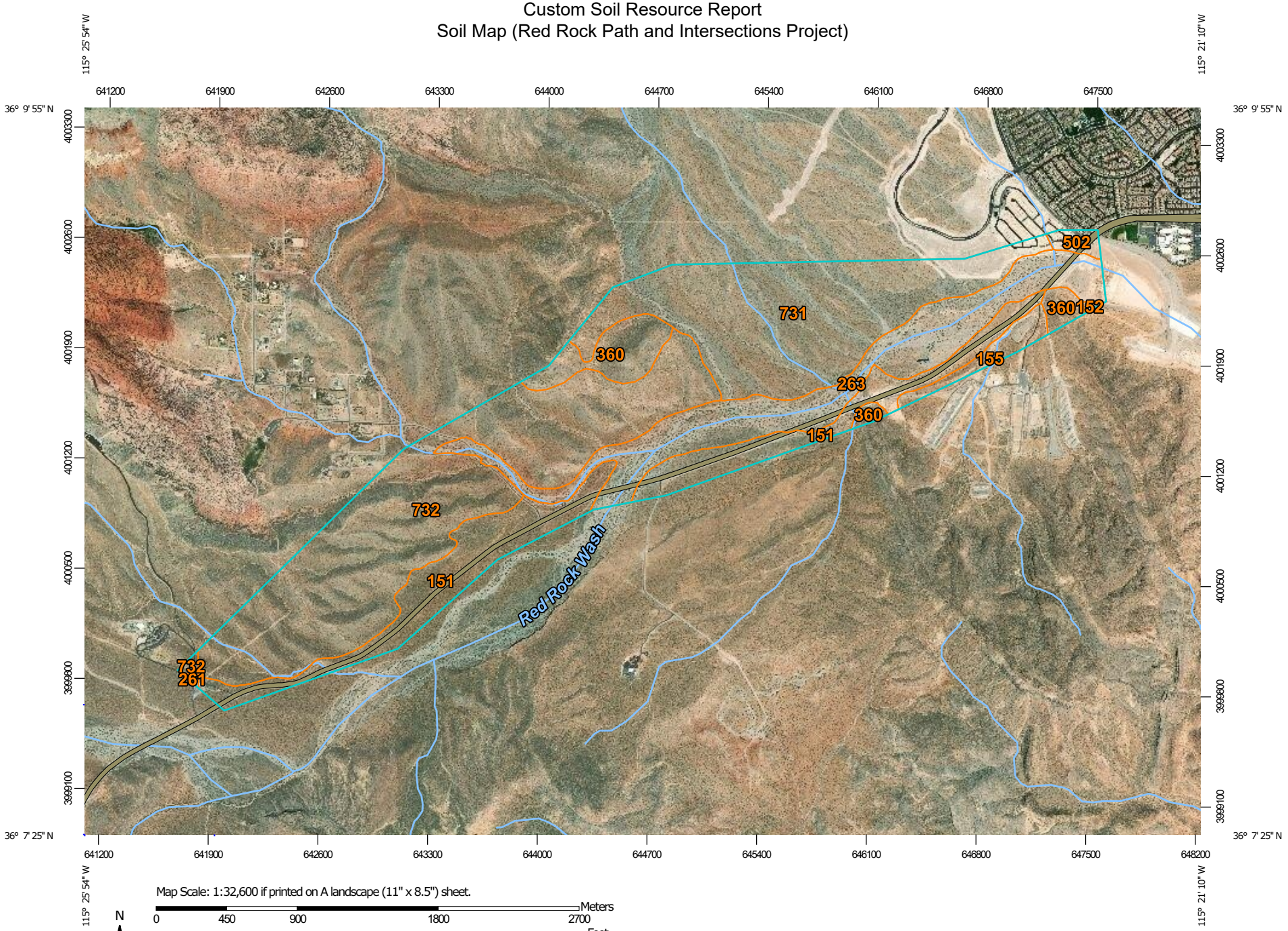
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


115° 25' 54" W
115° 21' 10" W
641200
641900
642600
643300
644000
644700
645400
646100
646800
647500
36° 9' 55" N
36° 7' 25" N
4003300
4002600
4001900
4001200
4000500
3999800
3999100
502
731
360152
360
155
263
360
151
732
151
Red Rock Wash
732
261
648200
Map Scale: 1:32,600 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 450 900 1800 2700
Feet
0 1500 3000 6000 9000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clark County Area, Nevada
Survey Area Data: Version 14, Sep 16, 2019

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County
Survey Area Data: Version 14, Sep 16, 2019

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 6, 2016—Sep 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend (Red Rock Path and Intersections Project)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
261	Vace-Jean association	1.0	0.1%
732	Purob extremely gravelly loam, 8 to 30 percent slopes	2.9	0.2%
Subtotals for Soil Survey Area		**3.9**	**0.3%**
Totals for Area of Interest		**1,449.7**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
151	Vace-Jean association	227.9	15.7%
152	Cave gravelly fine sandy loam, 0 to 4 percent slopes	1.2	0.1%
155	Cave gravelly fine sandy loam, 4 to 15 percent slopes	27.9	1.9%
263	Jean complex, 2 to 4 percent slopes	240.6	16.6%
360	Rock outcrop-St. Thomas complex, 15 to 30 percent slopes	71.8	5.0%
502	Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes	11.3	0.8%
731	Purob-Irongold association	349.4	24.1%
732	Purob extremely gravelly loam, 8 to 30 percent slopes	515.8	35.6%
Subtotals for Soil Survey Area		**1,445.8**	**99.7%**
Totals for Area of Interest		**1,449.7**	**100.0%**

Map Unit Descriptions (Red Rock Path and Intersections Project)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some

observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The

pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Clark County Area, Nevada

261—Vace-Jean association

Map Unit Setting

National map unit symbol: 1qq1q
Elevation: 2,000 to 6,660 feet
Mean annual precipitation: 4 to 9 inches
Mean annual air temperature: 51 to 69 degrees F
Frost-free period: 130 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Vace and similar soils: 50 percent
Jean and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vace

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous loess and mixed alluvium

Typical profile

H1 - 0 to 2 inches: gravelly fine sandy loam
H2 - 2 to 8 inches: loam
H3 - 8 to 60 inches: cemented material

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 4 to 14 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Arid Active Alluvial Fans (R030XB005NV)
Other vegetative classification: Limy 5-7 p.z. (030XB005NV_3)
Hydric soil rating: No

Description of Jean

Setting

Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from limestone, sandstone and quartzite

Typical profile

H1 - 0 to 1 inches: gravelly loamy fine sand
H2 - 1 to 18 inches: loamy fine sand
H3 - 18 to 60 inches: stratified extremely gravelly sand to very gravelly loamy fine sand

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 3.7 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: LIMY SAND 5-7 P.Z. (R030XB037NV)
Other vegetative classification: LIMY SAND 5-7" P.Z. (030XB037NV_2)
Hydric soil rating: No

Minor Components

Jean

Percent of map unit: 6 percent
Landform: Channels
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: VALLEY WASH (R030XB028NV)
Hydric soil rating: No

Irongold

Percent of map unit: 4 percent
Landform: Fan remnants
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: SHALLOW GRAVELLY LOAM 5-7 P.Z. cool thermic fan portions corr (R030XB029NV)

Other vegetative classification: Shallow Gravelly Loam 5-7 p.z. (030XB029NV_2)
Hydric soil rating: No

Riverwash

Percent of map unit: 4 percent
Landform: Drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Purob

Percent of map unit: 1 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: SHALLOW GRAVELLY LOAM 7-9 P.Z. Mountain portions correlated t (R030XC007NV)
Other vegetative classification: Shallow Gravelly Loam 8-10 p.z. (029XY077NV_1)
Hydric soil rating: No

732—Purob extremely gravelly loam, 8 to 30 percent slopes

Map Unit Setting

National map unit symbol: hqzc
Elevation: 3,770 to 7,080 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 51 to 57 degrees F
Frost-free period: 130 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Purob and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Purob

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from limestone

Typical profile

H1 - 0 to 3 inches: extremely gravelly loam
H2 - 3 to 8 inches: very gravelly loam
H3 - 8 to 19 inches: very gravelly loam
H4 - 19 to 60 inches: cemented material

Properties and qualities

Slope: 8 to 30 percent
Percent of area covered with surface fragments: 1.0 percent
Depth to restrictive feature: 14 to 20 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 80 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: SHALLOW GRAVELLY LOAM 7-9 P.Z. Mountain portions correlated t (R030XC007NV)
Hydric soil rating: No

Minor Components

Typic petrocalcids, thermic

Percent of map unit: 6 percent
Landform: Fan remnants
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: SHALLOW GRAVELLY LOAM 5-7 P.Z. cool thermic fan portions corr (R030XB029NV)
Hydric soil rating: No

Typic petrocalcids, mesic

Percent of map unit: 5 percent
Landform: Fan remnants
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Aridic calcixerolls

Percent of map unit: 2 percent
Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: GRAVELLY INSET FAN 7-9 P.Z. (R030XC011NV)
Hydric soil rating: No

Rock outcrop

Percent of map unit: 1 percent
Landform: Ridges

Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Typic torriorthents

Percent of map unit: 1 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: UPLAND WASH (R030XB051NV)
Hydric soil rating: No

Las Vegas Valley Area, Nevada, Part of Clark County

151—Vace-Jean association

Map Unit Setting

National map unit symbol: hr9t
Elevation: 2,000 to 6,660 feet
Mean annual precipitation: 4 to 9 inches
Mean annual air temperature: 51 to 69 degrees F
Frost-free period: 130 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Vace and similar soils: 50 percent
Jean and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vace

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous loess and mixed alluvium

Typical profile

H1 - 0 to 2 inches: gravelly fine sandy loam
H2 - 2 to 8 inches: loam
H3 - 8 to 60 inches: cemented material

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 4 to 14 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Arid Active Alluvial Fans (R030XB005NV)
Other vegetative classification: Limy 5-7 p.z. (030XB005NV_3)
Hydric soil rating: No

Description of Jean

Setting

Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from limestone, sandstone and quartzite

Typical profile

H1 - 0 to 1 inches: gravelly loamy fine sand
H2 - 1 to 18 inches: loamy fine sand
H3 - 18 to 60 inches: stratified extremely gravelly sand to very gravelly loamy fine sand

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 3.7 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: LIMY SAND 5-7 P.Z. (R030XB037NV)
Other vegetative classification: LIMY SAND 5-7" P.Z. (030XB037NV_2)
Hydric soil rating: No

Minor Components

Jean

Percent of map unit: 6 percent
Landform: Channels
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: VALLEY WASH (R030XB028NV)
Hydric soil rating: No

Riverwash

Percent of map unit: 4 percent
Landform: Drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Irongold

Percent of map unit: 4 percent

Landform: Fan remnants
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: SHALLOW GRAVELLY LOAM 5-7 P.Z. cool thermic fan portions corr (R030XB029NV)
Other vegetative classification: Shallow Gravelly Loam 5-7 p.z. (030XB029NV_2)
Hydric soil rating: No

Purob

Percent of map unit: 1 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: SHALLOW GRAVELLY LOAM 7-9 P.Z. Mountain portions correlated t (R030XC007NV)
Other vegetative classification: Shallow Gravelly Loam 8-10 p.z. (029XY077NV_1)
Hydric soil rating: No

152—Cave gravelly fine sandy loam, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: hr9v
Elevation: 2,000 to 4,800 feet
Mean annual precipitation: 4 to 12 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Cave and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cave

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 12 inches: gravelly fine sandy loam
H2 - 12 to 36 inches: indurated
H3 - 36 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: 4 to 20 inches to petrocalcic

Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

155—Cave gravelly fine sandy loam, 4 to 15 percent slopes

Map Unit Setting

National map unit symbol: hr9w
Elevation: 2,000 to 4,800 feet
Mean annual precipitation: 4 to 12 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Cave and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cave

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 15 inches: gravelly fine sandy loam
H2 - 15 to 60 inches: indurated

Properties and qualities

Slope: 4 to 15 percent
Depth to restrictive feature: 4 to 20 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

263—Jean complex, 2 to 4 percent slopes

Map Unit Setting

National map unit symbol: hrbj
Elevation: 2,000 to 3,600 feet
Mean annual precipitation: 4 to 8 inches
Mean annual air temperature: 61 to 68 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Jean and similar soils: 55 percent
Jean and similar soils: 40 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Jean

Setting

Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from limestone, sandstone and quartzite

Typical profile

H1 - 0 to 1 inches: gravelly loamy fine sand
H2 - 1 to 11 inches: loamy fine sand
H3 - 11 to 60 inches: stratified extremely gravelly sand to very gravelly loamy fine sand

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Other vegetative classification: LIMY SAND 5-7" P.Z. (030XB037NV_2)
Hydric soil rating: No

Description of Jean

Setting

Landform: Inset fans, channels
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Alluvium derived from limestone, sandstone and quartzite

Typical profile

H1 - 0 to 1 inches: very gravelly loamy fine sand
H2 - 1 to 11 inches: loamy fine sand
H3 - 11 to 60 inches: stratified extremely gravelly sand to very gravelly loamy fine sand

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Ecological site: VALLEY WASH (R030XB028NV)
Hydric soil rating: No

Minor Components

Goodsprings

Percent of map unit: 5 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

360—Rock outcrop-St. Thomas complex, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: hrby
Elevation: 1,600 to 3,000 feet
Mean annual precipitation: 4 to 9 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 170 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 50 percent
St. thomas and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex

Description of St. Thomas

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Colluvium derived from limestone and dolomite over residuum weathered from limestone and dolomite

Typical profile

H1 - 0 to 7 inches: extremely cobbly fine sandy loam
H2 - 7 to 17 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Percent of area covered with surface fragments: 2.0 percent

Depth to restrictive feature: 4 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Very low (about 0.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Other vegetative classification: LIMY HILL 3-5" P.Z. (030XB017NV_3)
Hydric soil rating: No

Minor Components

Weiser

Percent of map unit: 10 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

Bracken

Percent of map unit: 5 percent
Landform: Pediments
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: GYSIC LOAM 3-8 P.Z. (030XB026NV_2)
Hydric soil rating: No

502—Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hrcf
Elevation: 1,700 to 4,800 feet
Mean annual precipitation: 4 to 12 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 180 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Canutio and similar soils: 55 percent
Cave and similar soils: 40 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canutio

Setting

Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 9 inches: gravelly fine sandy loam
H2 - 9 to 60 inches: stratified extremely gravelly loamy coarse sand to gravelly loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: A
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

Description of Cave

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 16 inches: gravelly fine sandy loam
H2 - 16 to 30 inches: indurated
H3 - 30 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 4 to 20 inches to petrocalcic
Natural drainage class: Well drained

Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

Minor Components

Arizo

Percent of map unit: 5 percent
Landform: Channels
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: VALLEY WASH (R030XB028NV)
Hydric soil rating: No

731—Purob-Irongold association

Map Unit Setting

National map unit symbol: 1tf74
Elevation: 3,410 to 6,660 feet
Mean annual precipitation: 5 to 10 inches
Mean annual air temperature: 51 to 63 degrees F
Frost-free period: 130 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Purob and similar soils: 60 percent
Irongold and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Purob

Setting

Landform: Fan remnants

Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from limestone

Typical profile

H1 - 0 to 3 inches: extremely gravelly loam
H2 - 3 to 8 inches: very gravelly loam
H3 - 8 to 19 inches: very gravelly loam
H4 - 19 to 60 inches: cemented material

Properties and qualities

Slope: 2 to 8 percent
Percent of area covered with surface fragments: 1.0 percent
Depth to restrictive feature: 14 to 20 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 80 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: SHALLOW GRAVELLY LOAM 7-9 P.Z. Mountain portions correlated t (R030XC007NV)
Hydric soil rating: No

Description of Irongold

Setting

Landform: Fan remnants
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: And/or alluvium derived from limestone

Typical profile

H1 - 0 to 1 inches: extremely gravelly loam
H2 - 1 to 7 inches: gravelly loam
H3 - 7 to 11 inches: very gravelly loam
H4 - 11 to 34 inches: cemented material
H5 - 34 to 60 inches: extremely gravelly loamy coarse sand

Properties and qualities

Slope: 2 to 8 percent
Percent of area covered with surface fragments: 1.0 percent
Depth to restrictive feature: 10 to 14 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 70 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: SHALLOW GRAVELLY LOAM 5-7 P.Z. cool thermic fan portions corr (R030XB029NV)
Hydric soil rating: No

Minor Components

Typic torriorthents

Percent of map unit: 5 percent
Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: SHALLOW GRAVELLY LOAM 7-9 P.Z. Mountain portions correlated t (R030XC007NV)
Hydric soil rating: No

Purob

Percent of map unit: 3 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: SHALLOW GRAVELLY LOAM 7-9 P.Z. Mountain portions correlated t (R030XC007NV)
Hydric soil rating: No

Arizo

Percent of map unit: 3 percent
Landform: Drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: UPLAND WASH (R030XB051NV)
Hydric soil rating: No

Typic haplocalcids

Percent of map unit: 2 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: SHALLOW LIMESTONE SLOPE 5-7 P.Z. (R030XA006NV)
Hydric soil rating: No

Xeric haplocambids

Percent of map unit: 1 percent

Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: GRAVELLY CALCAREOUS INSET FAN 9-11 P.Z. (R030XC012NV)
Hydric soil rating: No

Aridic calcixerolls

Percent of map unit: 1 percent
Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: GRAVELLY INSET FAN 7-9 P.Z. (R030XC011NV)
Hydric soil rating: No

732—Purob extremely gravelly loam, 8 to 30 percent slopes

Map Unit Setting

National map unit symbol: 1tf75
Elevation: 3,770 to 7,080 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 51 to 57 degrees F
Frost-free period: 130 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Purob and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Purob

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from limestone

Typical profile

H1 - 0 to 3 inches: extremely gravelly loam
H2 - 3 to 8 inches: very gravelly loam
H3 - 8 to 19 inches: very gravelly loam
H4 - 19 to 60 inches: cemented material

Properties and qualities

Slope: 8 to 30 percent
Percent of area covered with surface fragments: 1.0 percent
Depth to restrictive feature: 14 to 20 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 80 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: SHALLOW GRAVELLY LOAM 7-9 P.Z. Mountain portions correlated t (R030XC007NV)
Hydric soil rating: No

Minor Components

Typic petrocalcids, thermic

Percent of map unit: 6 percent
Landform: Fan remnants
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: SHALLOW GRAVELLY LOAM 5-7 P.Z. cool thermic fan portions corr (R030XB029NV)
Hydric soil rating: No

Typic petrocalcids, mesic

Percent of map unit: 5 percent
Landform: Fan remnants
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Aridic calcixerolls

Percent of map unit: 2 percent
Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: GRAVELLY INSET FAN 7-9 P.Z. (R030XC011NV)
Hydric soil rating: No

Rock outcrop

Percent of map unit: 1 percent
Landform: Ridges
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Typic torriorthents

Percent of map unit: 1 percent
Landform: Alluvial fans

Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: UPLAND WASH (R030XB051NV)
Hydric soil rating: No

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Appendix D
Representative Photographs

Photo 1A: View to the northwest of **Sample Point 1** at approximate location station (STA) 102+87 LT. Photo shows detention basin at the eastern end of ephemeral channel **ES-1** Red Rock Wash.

Photo 1B: View to the northwest of **Sample Point 1** at approximate STA 103+00 LT. Photo shows ephemeral channel **ES-1** Red Rock Wash flowing northwest to southeast under State Route (SR) 159 towards the detention basin.

Photo 1C: View to the west of **Sample Point 1** at approximate STA 103+75 LT. Photo shows ephemeral channel **ES-1** Red Rock Wash flowing west to east towards SR 159.

Photo 1D: View to southwest of **Sample Point 1** at approximate STA 105+60 RT. Photo shows ephemeral channel **ES-1** Red Rock Wash flowing southwest to northeast towards SR 159.

Photo 1E: View to the southeast of **Sample Point 1** at approximate STA 104+70 ALT LT. Photo shows ephemeral channel **ES-1** Red Rock Wash flowing northwest to southeast towards SR 159.

Photo 1F: View to the northwest of **Sample Point 1** at approximate STA 107+60 ALT LT. Photo shows ephemeral channel **ES-1** Red Rock Wash flowing northwest to southeast towards SR 159.

Photo 1G: View to the north of **Sample Point 1** at approximate STA 108+00 ALT LT. Photo shows a culvert flowing northeast to southwest from the Summerlin development into ephemeral channel **ES-1** Red Rock Wash.

Photo 1H: View to the west of **Sample Point 1** at approximate STA 109+60 ALT LT. Photo shows ephemeral channel **ES-1** Red Rock Wash flowing west to east towards SR 159.

Photo 1I: View to the west of **Sample Point 1** at approximate STA 112+40 ALT LT. Photo shows ephemeral channel **ES-1** Red Rock Wash flowing west to east towards SR 159.

Photo 2A: View to the southwest of **Sample Point 2** at approximate STA 115+95 LT. Photo shows ephemeral channel **ES-2A** flowing southwest to northeast on the south side of SR 159.

Photo 2B: View to the southwest of **Sample Point 2** at approximate STA 112+00 LT. Photo shows ephemeral channel **ES-2B** flowing southwest to northeast on the south side of SR 159.

Photo 2C: View to the northeast of **Sample Point 2** at approximate STA 112+00 LT. Photo shows buried culvert stopping flow of ephemeral channel **ES-2B** towards the detention basin at the eastern end of the study area.

Photo 3A: View to the southwest of **Sample Point 3** at approximate STA 132+00 RT. Photo shows ephemeral channel **ES-3** Red Rock Wash flowing southwest to northeast towards ES-1.

Photo 3B: View to the east of **Sample Point 3** at approximate STA 133+10 RT. Photo shows ephemeral channel **ES-3** Red Rock Wash flowing southwest to northeast towards ES-1.

Photo 4A: View to the southwest of **Sample Point 4** at approximate STA 143+70 RT. Photo shows ephemeral channel **ES-4** flowing southwest to northeast towards Red Rock Wash.

Photo 4B: View to the northeast of **Sample Point 4** at approximate STA 144+75 RT. Photo shows ephemeral channel **ES-4** flowing southwest to northeast towards Red Rock Wash.

Photo 5A: View to the northeast of **Sample Point 5** at approximate STA 157+55 LT. Photo shows ephemeral channel **ES-5** Red Rock Wash flowing southwest to northeast towards SR 159.

Photo 5B: View to the northeast of **Sample Point 5** at approximate STA 158+00 LT. Photo shows ephemeral channel **ES-5** Red Rock Wash flowing southwest to northeast towards SR 159.

Photo 5C: View to the northeast of **Sample Point 5** at approximate STA 158+30 LT. Photo shows ephemeral channel **ES-5** Red Rock Wash flowing southwest to northeast towards SR 159.

Photo 6A: View to the northwest of **Sample Point 6** at approximate STA 115+77 ALT RT. Photo shows culvert conveying flow from the Summerlin development towards ES-1 Red Rock Wash. Area lacks hydric soil indicators and is not a wetland.

Photo 6B: View to the southeast of **Sample Point 6** at approximate STA 115+68 ALT LT. Photo shows outflow from culvert flowing southeast into ES-1 Red Rock Wash.

Photo 7: View to the north of **Sample Point 7** at approximate STA 127+20 ALT LT. Photo shows ephemeral channel **ES-6** flowing north to southeast towards Red Rock Wash.

Photo 8: View to the southeast of **Sample Point 8** at approximate STA 127+60 ALT LT. Photo shows ephemeral channel **ES-7** flowing northwest to southeast towards Red Rock Wash.

Photo 9: View to the northwest of **Sample Point 9** at approximate STA 129+00 ALT LT. Photo shows ephemeral channel **ES-8** flowing northwest to southeast towards Red Rock Wash.

Photo 10A: View to the north of **Sample Point 10** at approximate STA 129+35 ALT LT. Photo shows ephemeral channel **ES-9** flowing northwest to southeast towards Red Rock Wash.

Photo 10B: View facing northwest of **Sample Point 10** at approximate STA 129+50 ALT LT. Photo shows ephemeral channel **ES-9** flowing northwest to southeast towards Red Rock Wash.

Photo 11A: View to the northwest of **Sample Point 11** at approximate STA 129+95 ALT LT. Photo shows ephemeral channel **ES-10** flowing northwest to southeast towards Red Rock Wash.

Photo 11B: View facing southeast of **Sample Point 11** at approximate STA 131+40 ALT RT. Photo shows ephemeral channel **ES-10** flowing northwest to southeast towards Red Rock Wash.

Photo 12A: View to the northwest of **Sample Point 12** at approximate STA 132+40 ALT LT. Photo shows ephemeral channel **ES-11** flowing northwest to southeast towards Red Rock Wash.

Photo 12B: View facing south of **Sample Point 12** at approximate STA 123+62 ALT RT. Photos shows ephemeral channel **ES-11** flowing northwest to southeast towards Red Rock Wash.

Photo 13A: View to the north of **Sample Point 13** at approximate STA 132+80 ALT LT. Photo shows ephemeral channel **ES-12** flowing north to south towards Red Rock Wash.

Photo 13B: View to the south of **Sample Point 13** at approximate STA 132+80 ALT LT. Photos shows ephemeral channel **ES-12** flowing north to south towards Red Rock Wash.

Photo 14A: View to the north of **Sample Point 14** at approximate STA 133+40 ALT LT. Photo shows ephemeral channel **ES-13** flowing north to south towards Red Rock Wash.

Photo 14B: View to the north of **Sample Point 14** at approximate STA 133+35 ALT LT. Photo shows ephemeral channel **ES-13** flowing north to south towards Red Rock Wash.

Photo 15A: View to the northwest of **Sample Point 15** at approximate STA 135+40 ALT LT. Photo shows ephemeral channel **ES-14** flowing northwest to southeast towards Red Rock Wash.

Photo 15B: View to the southeast of **Sample Point 15** at approximate STA 136+20 ALT RT. Photo shows ephemeral channel **ES-14** flowing northwest to southeast towards Red Rock Wash.

Photo 16: View to the north of **Sample Point 16** at approximate STA 136+25 ALT LT. Photo shows area appearing as potential channel on aerial imagery but lacking channel features.

Photo 17A: View to the northwest of **Sample Point 17** at approximate STA 136+05 ALT LT. Photo shows ephemeral channel **ES-15** flowing northwest to southeast towards Red Rock Wash.

Photo 17B: View to the west of **Sample Point 17** at approximate STA 137+15 ALT RT. Photo shows ephemeral channel **ES-15** flowing west to southeast towards Red Rock Wash.

Photo 17C: View to the northwest of **Sample Point 17** at approximate STA 137+10 ALT RT. Photo shows ephemeral channel **ES-15** flowing northwest to southeast towards Red Rock Wash.

Photo 18: View to the northwest of **Sample Point 18** at approximate STA 137+60 ALT RT. Photo shows area appearing as potential channel on aerial imagery but lacking channel features.

Photo 19A: View to the northwest of **Sample Point 19A** at approximate STA 138+00 ALT LT. Photo shows ephemeral channel **ES-16** flowing northwest to southeast towards Red Rock Wash.

Photo 19B: View to the east of **Sample Point 19** at approximate STA 138+30 ALT LT. Photo shows ephemeral channel **ES-16** flowing west to east, then southeast towards Red Rock Wash.

Photo 20A: View facing northwest of **Sample Point 20** at approximate STA 141+20 ALT LT. Photo shows ephemeral channel **ES-17** flowing northwest to southeast towards Red Rock Wash.

Photo 20B: View to the southeast of **Sample Point 20** at approximate STA 142+30 ALT RT. Photo shows ephemeral channel **ES-17** flowing northwest to southeast towards Red Rock Wash.

Photo 21: View facing northwest of **Sample Point 21** at approximate STA 143+70 ALT LT. Photo shows ephemeral channel **ES-18** flowing northwest to southeast towards Red Rock Wash.

Photo 22A: View to the northwest of **Sample Point 22** at approximate STA 144+90 ALT LT. Photo shows ephemeral channel **ES-19** flowing northwest to southeast towards Red Rock Wash.

Photo 22B: View to the southeast of **Sample Point 22** at approximate STA 145+00 ALT RT. Photo shows ephemeral channel **ES-19** flowing northwest to southeast towards Red Rock Wash.

Photo 23A: View to the northwest of **Sample Point 23A** at approximate STA 146+20 ALT LT. Photo shows ephemeral channel **ES-20** flowing northwest to southeast towards Red Rock Wash.

Photo 23B: View to the southeast of **Sample Point 23** at approximate STA 146+20 ALT LT. Photo shows ephemeral channel **ES-20** flowing northwest to southeast towards Red Rock Wash.

Photo 24: View to the southeast of **Sample Point 24** at approximate STA 148+05 ALT RT. Photo shows ephemeral channel **ES-21** flowing northwest to southeast towards Red Rock Wash.

Photo 25: View to the southeast of **Sample Point 25** at approximate STA 148+20 ALT RT. Photo shows area appearing as potential channel on aerial imagery but lacking channel features. Area is used as a road.

Photo 26A: View to the north of **Sample Point 26** at approximate STA 149+90 ALT LT. Photo shows ephemeral channel **ES-22** flowing north to south towards Red Rock Wash.

Photo 26B: View to the west of **Sample Point 26** at approximate STA 149+45 ALT RT. Photo shows ephemeral channel **ES-22** flowing north to south towards Red Rock Wash.

Photo 27A: View to the north of **Sample Point 27** at approximate STA 151+00 ALT LT. Photo shows ephemeral channel **ES-23** flowing northwest to southeast towards Red Rock Wash.

Photo 27B: View facing south of **Sample Point 27** at approximate STA 150+90 ALT RT. Photo shows ephemeral channel **ES-23** flowing northwest to southeast towards Red Rock Wash.

Photo 28A: View to the northwest of **Sample Point 28** at approximate STA 153+45 ALT LT. Photo shows ephemeral channel **ES-24** flowing northwest to southeast towards Red Rock Wash.

Photo 28B: View to the southeast of **Sample Point 28** at approximate STA 153+15 ALT LT. Photo shows ephemeral channel **ES-24** flowing northwest to southeast towards Red Rock Wash.

Photo 28C: View to the northwest of **Sample Point 28** at approximate STA 153+35 ALT LT. Photo shows ephemeral channel **ES-24** flowing northwest to southeast towards Red Rock Wash.

Photo 29: View to the northwest of of **Sample Point 29** at approximate STA 153+80 ALT LT. Photo shows ephemeral channel **ES-25** flowing northwest to southeast towards Red Rock Wash.

Photo 30: View to the south of **Sample Point 30** at approximate STA 154+30 ALT LT. Photo shows ephemeral channel **ES-26** flowing northwest to southeast towards Red Rock Wash.

Photo 31A: View to the northwest of **Sample Point 31** at approximate STA 156+15 ALT LT. Photo shows ephemeral channel **ES-27** flowing northwest to southeast towards Red Rock Wash.

Photo 31B: View to the northwest of **Sample Point 31** at approximate STA 156+20 ALT LT. Photo shows ephemeral channel **ES-27** flowing northwest to southeast towards Red Rock Wash.

Photo 32A: View to the northwest of **Sample Point 32** at approximate STA 158+00 ALT LT. Photo shows ephemeral channel **ES-28** flowing northwest to southeast towards Red Rock Wash.

Photo 32B: View to the north of **Sample Point 32** at approximate STA 158+20 ALT RT. Photo shows ephemeral channel **ES-28** flowing northwest to southeast towards Red Rock Wash.

Photo 32C: View to the west of **Sample Point 32** at approximate STA 158+20 ALT RT. Photo shows ephemeral channel **ES-28** flowing northwest to southeast towards Red Rock Wash.

Photo 33A: View to the south of **Sample Point 33** at approximate STA 164+20 LT (161+60 ALT LT). Photo shows ephemeral channel **ES-29** flowing northwest to southeast towards Red Rock Wash.

Photo 33B: View to the southeast of **Sample Point 33** at approximate STA 164+80 RT (161+80 ALT RT). Photo shows ephemeral channel **ES-29** flowing northwest to southeast towards Red Rock Wash.

Photo 34: View to the southeast of **Sample Point 34** at approximate STA 165+60 LT (162+80 ALT LT). Photo shows ephemeral channel **ES-30** flowing northwest to southeast towards Red Rock Wash.

Photo 35A: View to the southeast of **Sample Point 35** at approximate STA 167+50 RT (164+80 ALT LT). Photo shows ephemeral channel **ES-31** flowing northwest to southeast towards Red Rock Wash.

Photo 35B: View to the southeast of **Sample Point 35** at approximate STA 167+90 RT (STA 165+20 ALT RT). Photo shows ephemeral channel **ES-31** flowing northwest to southeast towards Red Rock Wash.

Photo 36A: View to the east of **Sample Location 36** at approximate STA 170+60 LT. Photo shows ephemeral channel **ES-32** flowing northwest to southeast towards Red Rock Wash.

Photo 36B: View to the northwest of **Sample Point 36** at approximate STA 172+20 LT. Photo shows ephemeral channel **ES-32** flowing northwest to southeast towards Red Rock Wash.

Photo 36C: View to the southeast of **Sample Point 36** at approximate STA 174+70 RT. Photo shows ephemeral channel **ES-32** flowing northwest to southeast towards Red Rock Wash.

Photo 36D: View to the northwest of **Sample Point 36** at approximate STA 175+30 RT. Photo shows ephemeral channel **ES-32** flowing northwest to southeast towards Red Rock Wash.

Photo 36E: View to the southeast of **Sample Point 36** at approximate STA 176+80 RT. Photo shows ephemeral channel **ES-32** flowing northwest to southeast towards Red Rock Wash.

Photo 37: View to the north of **Sample Point 37** at approximate STA 174+60 LT. Photo shows ephemeral channel **ES-33** flowing northwest to southeast towards Red Rock Wash.

Photo 38A: View to the northwest of **Sample Point 38** at approximate STA 176+00 LT. Photo shows ephemeral channel **ES-34** flowing northwest to southeast towards Red Rock Wash.

Photo 38B: View to the southeast at **Sample Point 38** at approximate STA 177+00 LT. Photo shows ephemeral channel **ES-34** flowing northwest to southeast towards Red Rock Wash.

Photo 38C: View to the southeast of **Sample Point 38** at approximate STA 178+75 RT. Photo shows ephemeral channel **ES-34** flowing northwest to southeast towards Red Rock Wash.

Photo 39A: View to the northwest of **Sample Point 39** at approximate STA 180+75 LT. Photo shows ephemeral channel **ES-35** flowing northwest to southeast towards Red Rock Wash.

Photo 39B: View to the southeast of **Sample Point 39** at approximate STA 186+35 LT. Photo shows ephemeral channel **ES-35** flowing northwest to southeast towards Red Rock Wash.

Photo 39C: View to the southeast of **Sample Point 39** at approximate STA 187+90 RT. Photo shows ephemeral channel **ES-35** flowing northwest to southeast towards Red Rock Wash.

Photo 40A: View to the northwest of **Sample Point 40** at approximate STA 188+50 LT. Photo shows ephemeral channel **ES-36** flowing northwest to southeast towards Red Rock Wash.

Photo 40B: View to the southeast of **Sample Point 40** at approximate STA 191+20 RT. Photo shows ephemeral channel **ES-36** flowing northwest to southeast towards Red Rock Wash.

Photo 40C: View to the northwest of **Sample Point 40** at approximate STA 191+30 RT. Photo shows ephemeral channel **ES-36** flowing northwest to southeast towards Red Rock Wash.

Photo 40D: View to the southeast of **Sample Point 40** at approximate STA 198+60 RT. Photo shows ephemeral channel **ES-36** flowing northwest to southeast towards Red Rock Wash.

Photo 41A: View to the north of **Sample Point 41** at approximate STA 200+00 LT. Photo shows ephemeral channel **ES-37** flowing north to south towards Red Rock Wash.

Photo 41B: View to the northwest of **Sample Point 41** at approximate STA 201+00 LT. Photo shows ephemeral channel **ES-37** flowing northwest to southeast towards Red Rock Wash.

Photo 41C: View to the northwest of **Sample Point 41** at approximate STA 202+00 LT. Photo shows ephemeral channel **ES-37** flowing northwest to southeast towards Red Rock Wash.

Photo 42A: View to the north of **Sample Point 42** at approximate STA 203+35 LT. Photo shows ephemeral channel **ES-38** flowing north to south towards Red Rock Wash.

Photo 42B: View to the south of **Sample Point 42** at approximate STA 203+30 LT. Photo shows ephemeral channel **ES-38** flowing north to south towards Red Rock Wash.

Photo 43: View to the northwest of **Sample Point 43** at approximate STA 204+40 LT. Photo shows ephemeral channel **ES-39** flowing northwest to southeast towards Red Rock Wash.

Photo 44A: View to the northwest of **Sample Point 44** at approximate STA 205+75 LT. Photo shows ephemeral channel **ES-40** flowing northwest to southeast towards Red Rock Wash.

Photo 44B: View to the southeast of **Sample Point 44** at approximate STA 206+25 RT. Photo shows ephemeral channel **ES-40** flowing northwest to southeast towards Red Rock Wash.

Photo 45A: View to the northwest of **Sample Point 45** at approximate STA 207+05 LT. Photo shows ephemeral channel **ES-41** flowing northwest to southeast towards Red Rock Wash.

Photo 45B: View to the southeast of **Sample Point 45** at approximate STA 207+40 RT. Photo shows ephemeral channel **ES-41** flowing northwest to southeast towards Red Rock Wash.

Photo 46A: View to the northwest **of Sample Point 46** at approximate STA 209+05 LT. Photo shows ephemeral channel **ES-42** flowing northwest to southeast towards Red Rock Wash.

Photo 46B: View to the northwest of **Sample Point 46** at approximate STA 209+80 RT. Photo shows ephemeral channel **ES- 42** flowing northwest to southeast towards Red Rock Wash.

Photo 47A: View to the southwest of **Sample Point 47** at approximate STA 210+60 LT. Photo shows ephemeral channel **ES-43A** flowing southwest to northeast towards Red Rock Wash.

Photo 47B: View to the west of **Sample Point 47** at approximate STA 212+75 LT. Photo shows ephemeral channel **ES-43B** flowing southwest to northeast towards Red Rock Wash.

Photo 47C: View to the east of **Sample Point 47** at approximate STA 214+80 LT. Photo shows ephemeral channel **ES-43C** flowing southwest to northeast towards Red Rock Wash.

Photo 47D: View to the west of **Sample Point 47** at approximate STA 216+95 LT. Photo shows ephemeral channel **ES-43C** flowing southwest to northeast towards Red Rock Wash.

Photo 48: View to the northwest of **Sample Point 48** at approximate STA 211+25 LT. Photo shows ephemeral channel **ES-44** flowing northwest to southeast towards ES-43A.

Photo 49: View to the northwest of **Sample Point 49** at approximate STA 214+90 LT. Photo shows ephemeral channel **ES-45** flowing west to east towards ES-43A.

Photo 50: View to the south of **Sample Point 50** at approximate STA 226+60 LT. Photo shows ephemeral channel **ES-46** flowing north to south towards Red Rock Wash.

Photo 51A: View to the southeast of **Sample Point 51** at approximate STA 224+45 LT. Photo shows ephemeral channel **ES-47** flowing northwest to southeast towards Red Rock Wash.

Photo 51B: View to the southeast of **Sample Point 51** at approximate STA 223+70 RT. Photo shows ephemeral channel **ES-47** flowing northwest to southeast towards Red Rock Wash.

Photo 52A: View to the northwest **of Sample Point 52** at approximate STA 242+40 LT. Photo shows ephemeral channel **ES-48** flowing northwest to southeast towards Red Rock Wash.

Photo 52B: View to the northwest of **Sample Point 52** at approximate STA 242+80 LT. Photo shows ephemeral channel **ES-48** flowing northwest to southeast towards Red Rock Wash.

Photo 52C: View to the southeast of **Sample Point 52** at approximate STA 242+35 RT. Photo shows ephemeral channel **ES-48** flowing northwest to southeast towards Red Rock Wash.

Photo 53: View to the southwest of **Sample Point 53** at approximate STA 243+65 LT. Photo shows ephemeral channel **ES-49** flowing southwest to northeast towards ES-48.

Photo 54: View to the west of **Sample Point 54** at approximate STA 245+50 LT. Photo shows ephemeral channel **ES-50** flowing west to east towards ES-48.

Photo 55: View to the southwest of **Sample Point 55** at approximate STA 246+35 LT. Photo shows ephemeral channel **ES-51** flowing southwest to northeast towards ES-48.

Photo 56: View to the southeast of **Sample Point 56** at approximate STA 256+40 LT. Photo shows ephemeral stream **ES-52** flowing northwest to southeast towards ES-55.

Photo 57A: View to the south of **Sample Point 57** at approximate STA 261+10 RT. Photo shows ephemeral channel **ES-53** flowing northeast to southwest towards ES-55.

Photo 57B: View to the northeast of **Sample Point 57** at approximate STA 262+00 LT. Photo shows ephemeral channel **ES-53** flowing northeast to southwest towards ES-55.

Photo 58A: View to the east of **Sample Point 58** at approximate STA 623+10 LT. Photo shows ephemeral channel **ES-54A** flowing west to east towards ES-55A.

Photo 58B: View to the west of **Sample Point 58** at approximate STA 263+60 RT. Photo shows ephemeral channel **ES-54B** flowing west to east towards ES-55A.

Photo 58C: View to the east of **Sample Point 58** at approximate STA 264+10 RT. Photo shows ephemeral channel **ES-54B** flowing west to east towards ES-55A.

Photo 58D: View to the northwest of **Sample Point 58** at approximate STA 263+90 RT. Photo shows ephemeral channel **ES-54B** flowing northwest to southeast towards ES-55A.

Photo 58E: View to the southeast of **Sample Point 58** at approximate STA 263+90 RT. Photo shows ephemeral channel **ES-54B** flowing northwest to southeast towards ES-55A.

Photo 59A: View to the east of **Sample Point 59** at approximate STA 263+15 LT. Photo shows ephemeral channel **ES-55A** flowing west to east towards Red Rock Wash.

Photo 59B: View to the east of **Sample Point 59** at approximate STA 261+00 LT. Photo shows ephemeral channel **ES-55A** flowing northwest to southeast towards Red Rock Wash.

Photo 59C: View to the northwest of **Sample Point 59** at approximate STA 259+20 LT. Photo shows ephemeral stream **ES-55A** flowing northwest to southeast towards Red Rock Wash.

Photo 59D: View to the east of **Sample Point 59** at approximate STA 262+80 LT. Photo shows ephemeral stream **ES-55B** flowing west to east towards Red Rock Wash.

Photo 59E: View to the west of **Sample Point 59** at approximate STA 264+80 LT. Photo shows ephemeral channel **ES-55C** flowing west to east towards ES-55B and ES-55D.

Photo 59F: View to the east of **Sample Point 59** at approximate STA 264+30 RT. Photo shows ephemeral channel **ES- 55C** flowing west to east ES-55B and ES-55D.

Photo 59G: View to the northwest of **Sample Point 59** at approximate STA 270+00 LT. Photo shows ephemeral stream **ES-55D** flowing northwest to southeast towards ES-56B.

Photo 60A: View to the northwest of **Sample Point 60** at approximate STA 267+80 RT. Photo shows ephemeral channel **ES-56A** flowing west to east towards Red Rock Wash.

Photo 60B: View to the west of **Sample Point 60** at approximate STA 269+40 LT. Photo shows ephemeral channel **ES-56A** flowing west to east towards Red Rock Wash.

Photo 60C: View to the east of **Sample Point 60** at approximate STA 269+40 LT. Photo shows ephemeral channel **ES-56B** flowing west to east towards Red Rock Wash.

Photo 60D: View to the west of **Sample Point 60** at approximate STA 270+50 LT. Photo shows ephemeral channel **ES-56B** flowing west to east towards Red Rock Wash.

Photo 60E: View to the northwest of **Sample Point 60** at approximate STA 271+50 LT. Photo shows ephemeral stream **ES-56B** flowing northwest to southeast towards Red Rock Wash.

Photo 61A: View to the northeast of **Sample Point 61** at approximate STA 275+30 RT. Photo shows ephemeral channel **ES-57** flowing west to east towards Red Rock Wash.

Photo 61B: View to the west of **Sample Point 61** at approximate STA 276+10 LT. Photo shows ephemeral channel **ES-57** flowing west to east towards Red Rock Wash.

Photo 61C: View to the east of **Sample Point 61** at approximate STA 276+90 LT. Photo shows ephemeral channel **ES-57** flowing west to east towards Red Rock Wash outside the study area.

Photo 62A: View to the northeast of **Sample Point 62** at approximate STA 280+10 LT. Photo shows ephemeral channel **ES-58A** flowing west to east towards Red Rock Wash.

Photo 62B: View to the southwest of **Sample Point 62** at approximate STA 280+20 LT. Photo shows ephemeral channel **ES-58B** flowing west to east towards Red Rock Wash.

Photo 62C: View to the southwest of **Sample Point 62** at approximate STA 281+95 LT. Photo shows ephemeral channel **ES-58B** flowing southwest to northeast towards Red Rock Wash.

Photo 62D: View to the northeast of **Sample Point 62** at approximate STA 284+00 RT. Photo shows ephemeral stream **ES-58B** flowing southwest to northeast towards Red Rock Wash.

Photo 62E: View to the northeast of **Sample Point 62** at approximate STA 289+10 LT. Photo shows ephemeral stream **ES-58B** flowing southwest to northeast towards Red Rock Wash.

Photo 62F: View to the southwest of **Sample Point 62** at approximate STA 289+80 LT. Photo shows ephemeral stream **ES-58B** flowing southwest to northeast towards Red Rock Wash.

Photo 62G: View to the northeast of **Sample Point 62** at approximate STA 297+90 RT. Photo shows ephemeral channel **ES-58B** flowing southwest to northeast towards Red Rock Wash.

Photo 62H: View to the west of **Sample Point 62** at approximate STA 298+50 RT. Photo shows ephemeral channel **ES-58B** flowing southwest to northeast towards Red Rock Wash.

Photo 63: View to the east of **Sample Point 63** at approximate STA 291+05 RT. Photo shows relictual channel severed by road.

Photo 64A: View to the northwest of **Sample Point 64** at approximate STA 312+78 RT. Photo shows ephemeral channel **ES-59** flowing northwest to southeast towards SR 159.

Photo 64B: View to the southeast of **Sample Point 64** at approximate STA 312+78 LT. Photo shows ephemeral channel **ES-59** flowing northwest to southeast towards SR 159.

Photo 65: View to the west of **Sample Point 65** at approximate STA 319+20 RT. Photo shows ephemeral channel **ES-60** flowing west to southeast towards SR 159.

Photo 66A: View to the east of **Sample Point 66** at approximate STA 329+15 RT. Photo shows ephemeral channel **ES-61** flowing west to east towards SR 159.

Photo 66B: View to the east of **Sample Point 66** at approximate STA 329+90 RT. Photo shows ephemeral channel **ES-61** flowing west to east towards SR 159.

Photo 67A: View to the southeast of **Sample Point 67** at approximate STA 334+90 LT. Photo shows ephemeral channel **ES-62A** flowing northwest to southeast before crossing through culverts towards Red Rock Wash.

Photo 67B: View to the northeast of **Sample Point 67** at approximate STA 336+60 LT. Photo shows ephemeral channel **ES-62A** flowing southwest to northeast, then southeast towards Red Rock Wash.

Photo 67C: View to the northwest of **Sample Point 67** at approximate STA 338+90 LT. Photo shows ephemeral channel **ES-62B** flowing northwest to southeast towards ES-62A.

Photo 67D: View to the northeast of **Sample Point 67** at approximate STA 339+50 LT. Photo shows ephemeral channel **ES-62B** flowing southwest to northeast towards ES-62A.

Photo 67E: View to the southeast of **Sample Point 67** at approximate STA 341+90 LT. Photo shows ephemeral channel **ES-62C** flowing northwest to southeast towards ES-62B.

Photo 67F: View to the west of **Sample Point 67** at approximate STA 343+80 LT. Photo shows ephemeral channel **ES-62C** flowing west to northeast towards ES-62B.

Photo 67G: View to the southeast of **Sample Point 67** at approximate STA 345+20 RT. Photo shows ephemeral channel **ES-62C** flowing northwest to southeast towards ES-62B.

Photo 67H: View to the southeast of **Sample Point 67** at approximate STA 345+55 RT. Photo shows ephemeral channel **ES-62C** flowing northwest to southeast towards ES-62B.

Photo 68A: View to the southeast of **Sample Point 68** at approximate STA 337+50 LT. Photo shows ephemeral channel **ES-63** flowing southeast to east towards ES-62A.

Photo 68B: View to the southeast of **Sample Point 68** at approximate STA 337+90 RT. Photo shows ephemeral channel **ES-63** flowing northwest to southeast towards ES-62A. ES-63 is crossed by a social trail in this section but flow does not appear to be interrupted.

Photo 68C: View to the northwest of **Sample Point 68** at approximate STA 338+00 RT. Photo shows ephemeral channel **ES-63** flowing northwest to southeast towards ES-62A.

Photo 69A: View to the northwest at **Sample Point 69** at approximate STA 354+60 RT. Photo shows ephemeral channel **ES-64** northwest to southeast towards SR 159.

Photo 69B: View to the southeast of **Sample Point 69** at approximate STA 355+60 RT. Photo shows ephemeral channel **ES-64** flowing northwest to southeast towards SR 159.

Appendix E
USACE Wetland and Ordinary High Water Mark Datasheets

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Red Rock Canyon Trails Intersections Improvements **Date:** 5/5-5/9/20 **Time:**
Project Number: NVFLAP 500(1) **Town:** Las Vegas **State:** NV
Stream: SIMPLE CHANNEL **Photo begin file#:** **Photo end file#:**
Investigator(s): RACHEL NEWTON

Y [X] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [X] Is the site significantly disturbed?

Location Details:

Projection: **Datum:**
Coordinates:

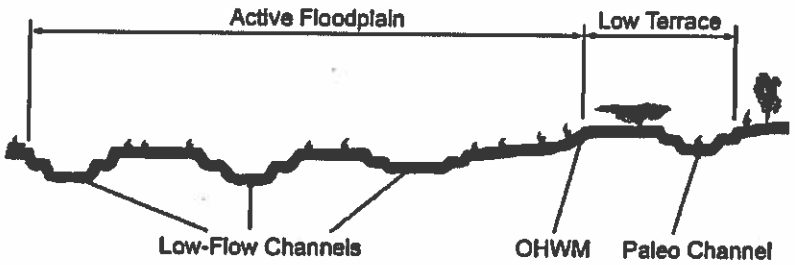
Potential anthropogenic influences on the channel system:
Within the study area, channels are unimpeded by culverts. Occasional use as / crossed by social trails.

Brief site description: Representative low to moderate gradient simple channel, bed of consolidated but erodible material or loose alluvium. Ephemeral streams ES-2A, ES-2B, ES-6, ES-7, ES-10, ES-11, ES-16, ES-17, ES-25, ES-30, ES-31, ES-33, ES-38, ES-39, ES-43B, ES-43C, ES-46, ES-49, ES-50, ES-52, ES-53, ES-54A, ES-58A, ES-60, ES-61, ES-62A

Checklist of resources (if available):

- [X] Aerial photography
  Dates: 5/13/2019
- [X] Topographic maps
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [X] Global positioning system (GPS)
- [ ] Other studies
- [ ] Stream gage data
  Gage number:
  Period of record:
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
  - [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - [ ] Mapping on aerial photograph
   - [ ] Digitized on computer
   - [X] GPS
   - [ ] Other:

Project ID: RRC **Cross section ID:** SIMPLE **Date:** **Time:**

Cross section drawing: Some slopes are more abrupt: 80° ~80°

OHWM

GPS point: _____

Indicators:

- [x] Change in average sediment texture
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: _____
- [ ] Other: _____

Comments:
OHWM width varies with each channel (see Table 2 in HRDR).

Floodplain unit: [x] Low-Flow Channel [ ] Active Floodplain [ ] Low Terrace

GPS point: _____

Characteristics of the floodplain unit:
Average sediment texture: silt / sand / gravels / cobbles
Total veg cover: 0 % Tree: ____ % Shrub: ____ % Herb: ____ %
Community successional stage:

- [x] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [x] Ripples
- [ ] Drift and/or debris
- [x] Presence of bed and bank
- [x] Benches
- [ ] Soil development
- [x] Surface relief
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

Comments:
Low-flow channels devoid of vegetation

Project ID: RRC **Cross section ID:** SIMPLE **Date:** **Time:**

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:
Average sediment texture: silt/gravels/cobbles
Total veg cover: _____ % Tree: _____ % Shrub: _____ % Herb: _____ %
Community successional stage:
- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☒ Late (herbaceous, shrubs, mature trees)

Indicators:
- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☒ Presence of bed and bank
- ☒ Benches
- ☒ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:
Vegetative cover variable, but is consistent with surrounding areas. ~25% cover by invasive grasses Bromus rubens & B. tectorum. Forbs and shrubs include various cactus and yucca, along with white bursage, creosote bush.

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:
Average sediment texture: _____
Total veg cover: _____ % Tree: _____ % Shrub: _____ % Herb: _____ %
Community successional stage:
- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:
- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Red Rock Canyon Trail & Intersections Improve. **Date:** 5/5-5/9/20 **Time:**
Project Number: NV FLAP 5006) **Town:** Las Vegas **State:** NV
Stream: BRANCHED **Photo begin file#:** **Photo end file#:**
Investigator(s): K. Newton

Y ☒ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☒ Is the site significantly disturbed?

Location Details:

Projection: **Datum:**
Coordinates:

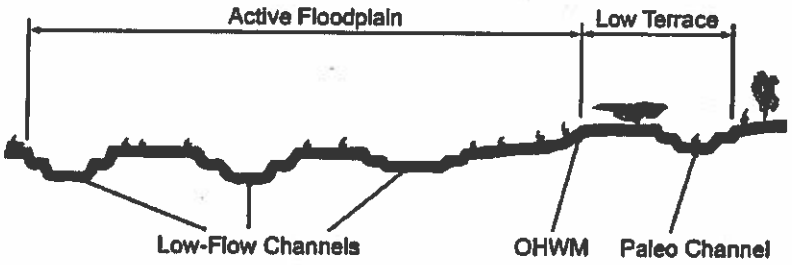
Potential anthropogenic influences on the channel system:
Within the study area, channels are unimpeded by culverts. Occasional use as / crossed by social trail

Brief site description:
Representative low to moderate gradient, branched channel, bed of consolidated but erodible material or loose alluvium. Ephemeral streams ES-3 ES-4, ES-18, ES-20, ES-26, ES-29, ES-34, ES-36, ES-41, ES-43A, ES-51, ES-54B, ES-57, ES-59

Checklist of resources (if available):

- ☒ Aerial photography
  Dates: 5/13/19
- ☒ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☐ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☒ Global positioning system (GPS)
- ☐ Other studies
- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☒ GPS
   - ☐ Other:

Project ID: RRC **Cross section ID:** BRANCHED **Date:** **Time:**

Cross section drawing:

Depth of OHWM varies by channel. Slopes also vary between 45-90°.

OHWM

GPS point: _____

Indicators:

- [X] Change in average sediment texture
- [X] Change in vegetation species
- [X] Change in vegetation cover
- [X] Break in bank slope
- [ ] Other: _____
- [ ] Other: _____

Comments:

OHWM width varies with each channel (See Table 2 in ARDR).

Floodplain unit: [X] Low-Flow Channel [ ] Active Floodplain [ ] Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: silt/sand/gravels/cobbles

Total veg cover: 0 % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- [X] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [X] Ripples
- [ ] Drift and/or debris
- [X] Presence of bed and bank
- [X] Benches
- [ ] Soil development
- [X] Surface relief
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

Comments:

Low-flow channels devoid of vegetation

Project ID: RRC **Cross section ID:** BRANCHED **Date:** **Time:**

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:
Average sediment texture: silt | gravels | cobbles
Total veg cover: _____ % Tree: 0 % Shrub: _____ % Herb: _____ %
Community successional stage:
- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☒ Late (herbaceous, shrubs, mature trees)

Indicators:
- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☒ Presence of bed and bank
- ☒ Benches
- ☒ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:
Vegetative cover is variable but is consistent with surrounding areas. ~25% cover by invasive grasses Bromus rubens and B. tectorum. Forbs and shrubs include various cactus, yucca, along with white bursage, creosote bush.

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:
Average sediment texture: _____
Total veg cover: _____ % Tree: _____ % Shrub: _____ % Herb: _____ %
Community successional stage:
- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:
- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Red Rock Canyon Trails Intersections Improvements **Date:** 5/5-5/9/20 **Time:**
Project Number: NV FLAP 500(1) **Town:** Las Vegas **State:** NV
Stream: BRAIDED **Photo begin file#:** **Photo end file#:**
Investigator(s): RACHEL NEWTON

Y [X] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [X] Is the site significantly disturbed?

Location Details:

Projection: **Datum:**
Coordinates:

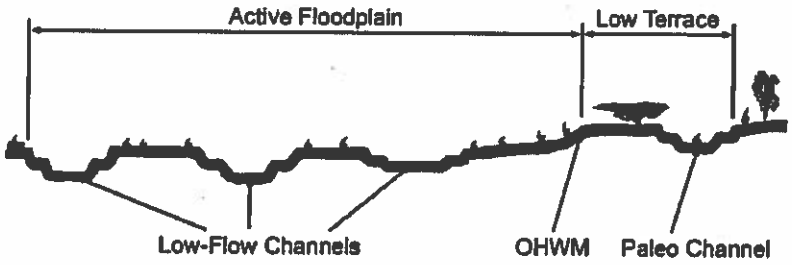
Potential anthropogenic influences on the channel system:
Within the study area, channels are unimpeded by culverts. Occasional use as/crossed by social trail.

Brief site description: Representative low to moderate gradient, braided channel, bed of consolidated but erodible material or loose alluvium Ephemeral streams ES-8, ES-9, ES-12, ES-13 ES-14, ES-15, ES-19, ES-22, ES-23, ES-24, ES-27, ES-28, ES-32, ES-35, ES-37, ES-42, ES-44, ES-45, ES-47, ES-58B, ES-62B, ES-62C, ES-63, ES-64

Checklist of resources (if available):

- [X] Aerial photography
  Dates: 5/13/2019
- [X] Topographic maps
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [X] Global positioning system (GPS)
- [ ] Other studies
- [ ] Stream gage data
  Gage number:
  Period of record:
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
  - [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - [ ] Mapping on aerial photograph
   - [ ] Digitized on computer
   - [X] GPS
   - [ ] Other:

Project ID: RRC **Cross section ID:** BRAIDED **Date:** **Time:**

Cross section drawing:

Depth of OHWM varies by channel. Slopes vary between 30-90°.
Some portions of the braids are not as incised as others.

OHWM

GPS point: _____

Indicators:

- ☒ Change in average sediment texture
- ☒ Change in vegetation species
- ☒ Change in vegetation cover
- ☒ Break in bank slope
- ☐ Other: _____
- ☐ Other: _____

Comments:

OHWM width varies with each channel (see Table 2 in ARDIR).

Floodplain unit:

☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: silt | sand | gravel | cobbles

Total veg cover: 0 % Tree: ____% Shrub: ____% Herb: ____%

Community successional stage:

- ☒ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☑ Ripples
- ☐ Drift and/or debris
- ☒ Presence of bed and bank
- ☒ Benches
- ☐ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Low-flow channels devoid of vegetation.

Project ID: RRC **Cross section ID:** BRAIDED **Date:** **Time:**

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:
Average sediment texture: silt/gravels/cobbles
Total veg cover: _____ % Tree: _____ % Shrub: _____ % Herb: _____ %
Community successional stage:
- ☐ NA
- ☒ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:
- ☐ Mudcracks
- ☐ Ripples
- ☒ Drift and/or debris
- ☐ Presence of bed and bank
- ☒ Benches
- ☐ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:
Vegetative cover is variable, although generally low. Vegetation present is typically bent over or has roots exposed.

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:
Average sediment texture: silt/gravels/cobbles
Total veg cover: _____ % Tree: _____ % Shrub: _____ % Herb: _____ %
Community successional stage:
- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☒ Late (herbaceous, shrubs, mature trees)

Indicators:
- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☒ Presence of bed and bank
- ☒ Benches
- ☒ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:
Vegetative cover is variable but is consistent with surrounding area. ~25% cover by invasive grasses Bromus rubens and B. tectorum. Forbs + shrubs include various cactus and yucca, along with white bursage + creosote bush

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Red Rock Canyon Trail + Intersections Improvements **Date:** 5/5/20; 5/9/20 **Time:**
Project Number: NV FLAP 500(1) **Town:** Las Vegas **State:** NV
Stream: ES-1 Red Rock Wash **Photo begin file#:** **Photo end file#:**
Investigator(s): RACHEL NEWTON

Y [X] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [X] Is the site significantly disturbed?

Location Details: 102+30 to 104+20 LT
102+60 to 109+25 RT 102+00 to 118+40 ALT

Projection: WGS 84 **Datum:**
Coordinates: 36.156693 / -115.362021

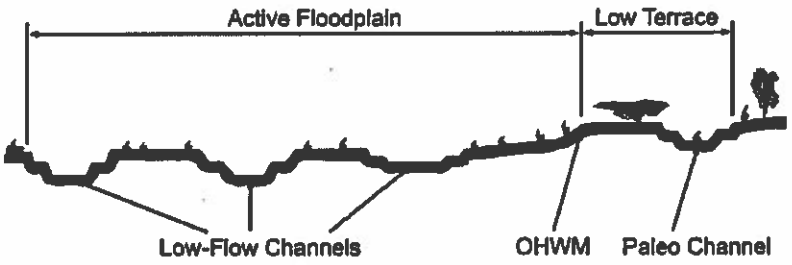
Potential anthropogenic influences on the channel system:
Red Rock Wash flows southwest to northeast along SR 159 before flowing underneath the bridge into the detention basin (outside the study area). Trail system parallels the channel as it passes near the Summerlin development.

Brief site description:
Red Rock Wash is the dominant hydrologic feature in the study area. The channel is complex, with multiple branches and braiding. Flows SW to NE before turning S

Checklist of resources (if available):

- [X] Aerial photography
  Dates: 5/13/2019
- [X] Topographic maps
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [X] Global positioning system (GPS)
- [ ] Other studies
- [ ] Stream gage data
  Gage number:
  Period of record:
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
  - [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

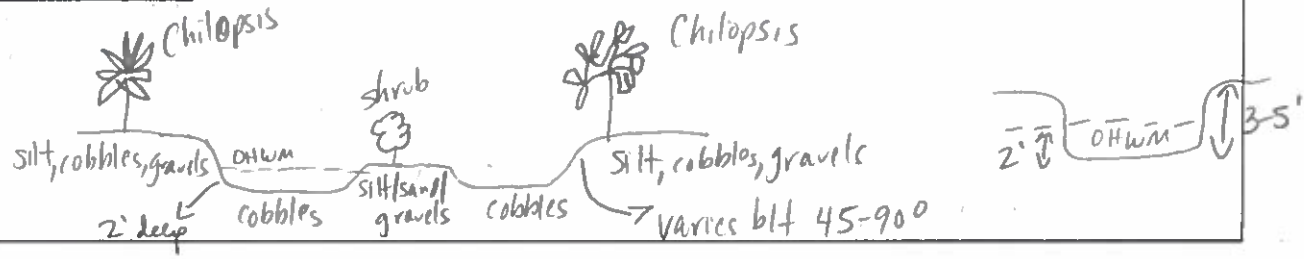


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - [ ] Mapping on aerial photograph
   - [ ] Digitized on computer
   - [X] GPS
   - [ ] Other:

Project ID: RRC **Cross section ID:** ES-1 Red Rock Wash **Date:** May 5, 9 2020 **Time:**

Cross section drawing:



OHWM

GPS point: 36.156693°/-115.362021°

Indicators:

- [ ] Change in average sediment texture
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: _____
- [ ] Other: _____

Comments:

Width varies throughout the ES-1 system. Some branches ~8' wide, while main branch is ~60' wide.

Floodplain unit:

- [x] Low-Flow Channel
- [ ] Active Floodplain
- [ ] Low Terrace

GPS point: 36.156722°/-115.362131

Characteristics of the floodplain unit:

Average sediment texture: cobble, silt

Total veg cover: 0 % Tree: ____% Shrub: ____% Herb: ____%

Community successional stage:

- [ ] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [x] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [x] Drift and/or debris
- [x] Presence of bed and bank
- [x] Benches
- [ ] Soil development
- [x] Surface relief
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

Comments:

Substrate varies by location within the system. Smaller branches contain more silt, but larger/main branch bed composed almost entirely of cobble.

Project ID: RRC **Cross section ID:** ES-1 Red Rock Wash **Date:** **Time:**

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: 36.156598° / -115.362267°

Characteristics of the floodplain unit:

Average sediment texture: Silt/Sand

Total veg cover: 40 % Tree: 20 % Shrub: 20 % Herb: tr %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☒ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☒ Benches
- ☒ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Chilopsis linearis, Baccharis sarothroides, trace Bromus rubens, B. tectorum

---

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: _____ % Tree: _____ % Shrub: _____ % Herb: _____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Red Rock Canyon Trail Intersections Improvements **Date:** 5/5/20 **Time:**
Project Number: NV FLAP 500(1) **Town:** Las Vegas **State:** NV
Stream: ES-5 Red Rock Wash **Photo begin file#:** **Photo end file#:**
Investigator(s): RACHEL NEWTON

Y [X] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [X] Is the site significantly disturbed?

Location Details: 157+35 to 159+10 LT, 157+20 to 157+70 RT, 157+90 to 158+10 RT, 158+40 to 159+20 RT

Projection: WGS84 **Datum:**
Coordinates: 36.149934°/-115.376849

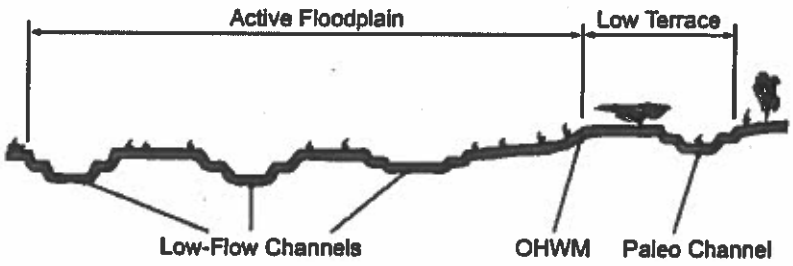
Potential anthropogenic influences on the channel system:
In this section of the study area, Red Rock Wash is crossed by a social trail that does not impede flow. Trail is marked by rock cairns. This cross-section is ~0.1 mile from SR159.

Brief site description:
Red Rock Wash is the dominant hydrologic feature in the study area. Large braided channel w/ cobbles and some boulders. Flows SW to NE this section.

Checklist of resources (if available):

- [X] Aerial photography
  Dates: 5/13/2019
- [X] Topographic maps
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [X] Global positioning system (GPS)
- [ ] Other studies
- [ ] Stream gage data
  Gage number:
  Period of record:
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
  - [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

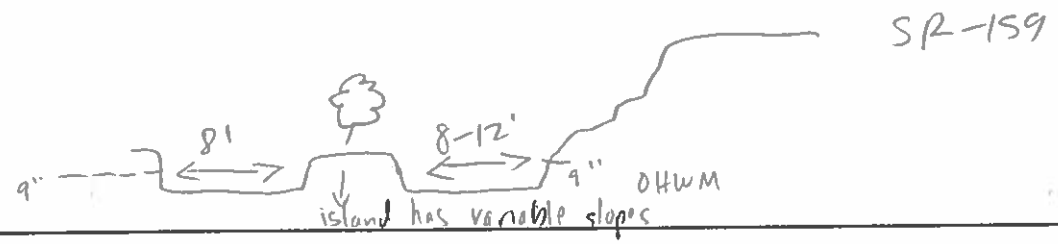


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - [ ] Mapping on aerial photograph
   - [X] GPS
   - [ ] Digitized on computer
   - [ ] Other:

Project ID: RRC **Cross section ID:** ES-5 Red Rock High **Date:** 5/5/20 **Time:**

Cross section drawing:



OHWM

GPS point: 36.149934°/-115.376849

Indicators:

- [ ] Change in average sediment texture
- [X] Change in vegetation species
- [X] Change in vegetation cover
- [X] Break in bank slope
- [ ] Other: _____
- [ ] Other: _____

Comments:

Approx. 9" deep in this section

Floodplain unit: [X] Low-Flow Channel [ ] Active Floodplain [ ] Low Terrace

GPS point: 36.150048°/-115.376870°

Characteristics of the floodplain unit:

Average sediment texture: cobbles/gravels

Total veg cover: 0 % Tree: ____% Shrub: ____% Herb: ____%

Community successional stage:

- [X] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [X] Drift and/or debris
- [X] Presence of bed and bank
- [X] Benches
- [ ] Soil development
- [X] Surface relief
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

Comments:

Flow lines evident. Sediment sorting

Project ID: RC **Cross section ID:** ES-5 Red Rock Wash **Date:** 5/5/2020 **Time:**

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: 36.149816° / -115.376873

Characteristics of the floodplain unit:

Average sediment texture: silt/gravels/cobbles

Total veg cover: 20 % Tree: 100 % Shrub: ____ % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☒ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☒ Presence of bed and bank
- ☒ Benches
- ☒ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Chrysopsis linearis

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Red Rock Canyon Trail and Intersections Improv City/County: Las Vegas/Clark Sampling Date: 5/9/20

Applicant/Owner: Central Federal Lands Highway Division State: NV Sampling Point: S-6

Investigator(s): Rachel Newton Section, Township, Range: S03 T21S R59E

Landform (hillslope, terrace, etc.): detention basin Local relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR): D - Western Range and Irrigated Re Lat: 36.156723 Long: -115.365849 Datum: WGS 84

Soil Map Unit Name: Purob-Irongold association NWI classification: UPL

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 x 5 ft.)			
1. Typha angustifolia	45	Y	OBL
2. Polypogon monspeliensis	20	Y	FACW
3. Alopecurus pratensis	10	N	FACW
4.			
5.			
6.			
7.			
8.			
	75 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust 15

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 45	x 1 = 45
FACW species 30	x 2 = 60
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: 75 (A)	105 (B)

Prevalence Index = B/A = 1.4

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Biotic crust is an algal mat.

SOIL

Sampling Point: S-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 1/2	2.5 Y 6/4	100					Sa	
1/2 - 2	2.5 Y 3/2	100					Sa	
2 - 4	2.5 Y 6/4	100					Sa	
4								shovel refusal
								concrete detention basin

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

Sand present is likely the result of multiple storm-related depositional events.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ✓ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

algal mat

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Red Rock Canyon Trail Intersections Improvements **Date:** 5/9/2020 **Time:**
Project Number: NV FLAP 500(1) **Town:** LAS VEGAS **State:** NV
Stream: ES-21 **Photo begin file#:** **Photo end file#:**
Investigator(s): RACHEL NEWTON

Y [X] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [X] Is the site significantly disturbed?

Location Details: 148+15 to 148+20 ALT LT, 148+00 to 148+20 ALT RT

Projection: WGS84 **Datum:**
Coordinates: 36.15303° / -115.375128

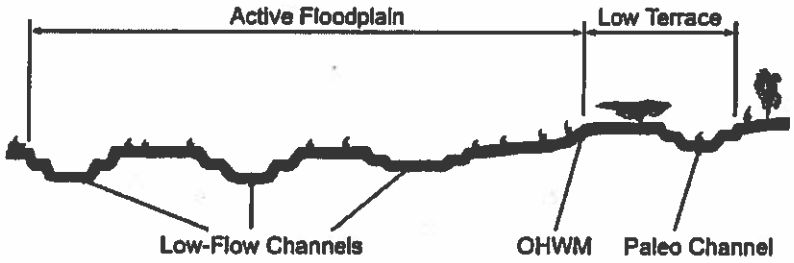
Potential anthropogenic influences on the channel system:
Area next to this channel used as a road.

Brief site description:
Ephemeral channel flowing NW to SE towards Red Rock Wash

Checklist of resources (if available):

- [X] Aerial photography
  Dates: 5/13/2019
- [X] Topographic maps
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [X] Global positioning system (GPS)
- [ ] Other studies
- [ ] Stream gage data
  Gage number:
  Period of record:
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
  - [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

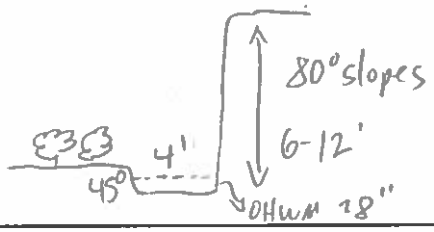


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - [ ] Mapping on aerial photograph
   - [X] GPS
   - [ ] Digitized on computer
   - [ ] Other:

Project ID: RRC **Cross section ID:** ES-21 **Date:** 5/9/2020 **Time:**

Cross section drawing:



OHWM

GPS point: 36.15303° / -115.375128

Indicators:

- [ ] Change in average sediment texture
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: _____
- [ ] Other: _____

Comments: Impressed line on bank

Floodplain unit:

- [x] Low-Flow Channel
- [ ] Active Floodplain
- [ ] Low Terrace

GPS point: 36.152882° / -115.375020°

Characteristics of the floodplain unit:

Average sediment texture: cobble

Total veg cover: 0 % Tree: ____% Shrub: ____% Herb: ____%

Community successional stage:

- [x] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [ ] Drift and/or debris
- [x] Presence of bed and bank
- [x] Benches
- [ ] Soil development
- [x] Surface relief
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

Comments:

Project ID: RRC **Cross section ID:** ES-21 **Date:** 5/9/2020 **Time:**

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: 36.152739° / -115.374959°

Characteristics of the floodplain unit:

Average sediment texture: gravels/cobbles

Total veg cover: 25 % Tree: ____ % Shrub: 20 % Herb: 5 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☒ Presence of bed and bank
- ☒ Benches
- ☐ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Baccharis sarothroides, Bromus tectorum, B. rubens

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Red Rock Canyon Trail & Intersections Improvements **Date:** 5/6/2020 **Time:**
Project Number: NV FLAP 500(1) **Town:** Las Vegas **State:** NV
Stream: ES-40 **Photo begin file#:** **Photo end file#:**
Investigator(s): Rachel Newton

Y [X] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [X] Is the site significantly disturbed?

Location Details: 205+60 to 205+90 LT, 205+75 to 206+30 RT

Projection: WGS84 **Datum:**
Coordinates: 36.154214° / -115.391711

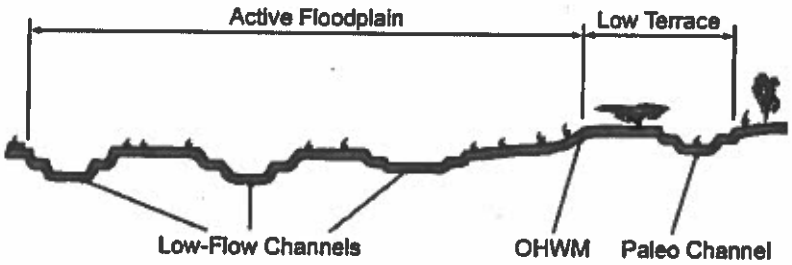
Potential anthropogenic influences on the channel system:
None in the study area

Brief site description:
Ephemeral channel flowing NW to SE towards Red Rock Wash.

Checklist of resources (if available):

- [X] Aerial photography
  Dates: 5/13/2019
- [X] Topographic maps
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [X] Global positioning system (GPS)
- [ ] Other studies
- [ ] Stream gage data
  Gage number:
  Period of record:
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
  - [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

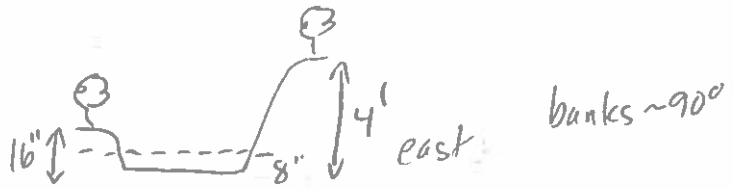


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - [ ] Mapping on aerial photograph
   - [ ] Digitized on computer
   - [X] GPS
   - [ ] Other:

Project ID: RRC **Cross section ID:** ES-40 **Date:** 5/6/2020 **Time:**

Cross section drawing:



OHWM

GPS point: 36.154219° / -115.391711°

Indicators:

- [ ] Change in average sediment texture
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: _____
- [ ] Other: _____

Comments:

Floodplain unit: [x] Low-Flow Channel [ ] Active Floodplain [ ] Low Terrace

GPS point: 36.154100° / -115.391439°

Characteristics of the floodplain unit:

Average sediment texture: cobble

Total veg cover: 0 % Tree: ____% Shrub: ____% Herb: ____%

Community successional stage:

- [x] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [ ] Drift and/or debris
- [x] Presence of bed and bank
- [ ] Benches
- [ ] Soil development
- [x] Surface relief
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

Comments:

Project ID: RLC **Cross section ID:** ES-40 **Date:** 5/6/2020 **Time:**

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: 36.154078° / -115.391489°

Characteristics of the floodplain unit:

Average sediment texture: silt/sand/gravel

Total veg cover: 40 % Tree: ____ % Shrub: 25 % Herb: 15 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☒ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☒ Presence of bed and bank
- ☒ Benches
- ☒ Soil development
- ☒ Surface relief
- ☐ Other: ____
- ☐ Other: ____
- ☐ Other: ____

Comments:

Salvia dorrii, various cactus, Ambrosia dumosa

Gutierrezia microcephala

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: ____

Characteristics of the floodplain unit:

Average sediment texture: ____

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: ____
- ☐ Other: ____
- ☐ Other: ____

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Red Rock Canyon Trail & Intersections Improvements
Project Number: NV FLAP 500(1)
Stream: ES-48
Investigator(s): RACHEL NEWTON

Date:
Time:
Town: LAS VEGAS
State: NV
Photo begin file#:
Photo end file#:

Y [X] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [X] Is the site significantly disturbed?

Location Details: 241+80 to 242+60 LT
241+80 to 242+40 RT

Projection: WGS84 **Datum:**
Coordinates: 36.148244°/-115.400434

Potential anthropogenic influences on the channel system:
A social trail crosses the middle of the channel but doesn't intercept flow

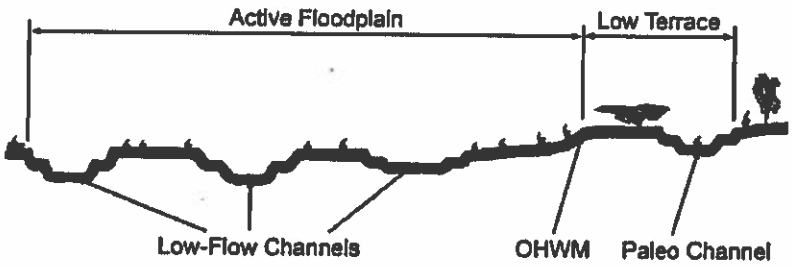
Brief site description:
Braided channel flowing NW to SE towards Red Rock Wash

Checklist of resources (if available):

- [X] Aerial photography
  Dates: 5/13/2019
- [X] Topographic maps
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [X] Global positioning system (GPS)
- [ ] Other studies

- [ ] Stream gage data
  Gage number:
  Period of record:
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
  - [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - [ ] Mapping on aerial photograph
   - [ ] Digitized on computer
   - [X] GPS
   - [ ] Other:

Project ID: RRC **Cross section ID:** ES-48 **Date:** 5/8/2020 **Time:**

Cross section drawing:

OHWM

GPS point: 36.148244° / -115.400434

Indicators:

- [ ] Change in average sediment texture
- [X] Change in vegetation species
- [X] Change in vegetation cover
- [X] Break in bank slope
- [ ] Other: _____
- [ ] Other: _____

Comments:

Width varies, averages ~10'

Floodplain unit: [X] Low-Flow Channel [ ] Active Floodplain [ ] Low Terrace

GPS point: 36.148216° / -115.400490°

Characteristics of the floodplain unit:

Average sediment texture: sand/silt/some bedrock

Total veg cover: 0 % Tree: ____% Shrub: ____% Herb: ____%

Community successional stage:

- [X] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [ ] Drift and/or debris
- [ ] Presence of bed and bank
- [ ] Benches
- [ ] Soil development
- [ ] Surface relief
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

Comments:

Project ID: RRC **Cross section ID:** ES-48 **Date:** 5/8/2020 **Time:**

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: 36.148216° / -115.400545°

Characteristics of the floodplain unit:

Average sediment texture: silt | sand

Total veg cover: 50 % Tree: ____ % Shrub: 35 % Herb: 15 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Bromus rubens, B. tectorum, Encelia virginensis
Larrea tridentata, Ambrosia dumosa, Hymenoclea salsola

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Red Rock Canyon Trail & Intersections Improvements **Date:** 5/7/2020 **Time:**
Project Number: NFLAP500(1) **Town:** Las Vegas **State:** NV
Stream: ES-55 **Photo begin file#:** **Photo end file#:**
Investigator(s): Rachel Newton

Y ☒ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☒ Is the site significantly disturbed?

Location Details: 258+60 to 263+20 LT, 259+80 to 263+20 LT, 263+70 to 264+40, 265+80 to 269+80 LT

Projection: WGS84 **Datum:**
Coordinates: 36.14589 / -115.4040

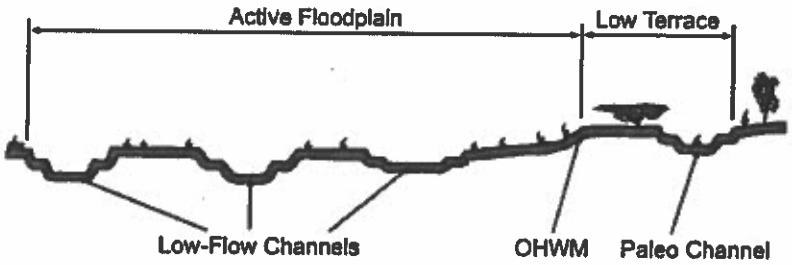
Potential anthropogenic influences on the channel system:
Channel crosses over Calico Basin Road. Some evidence of plowing after large storm/flow events.

Brief site description:
Wide braided/branched channel flowing west to east across Calico Basin Rd, then turning SE towards Red Rock Wash.

Checklist of resources (if available):

- ☒ Aerial photography
  Dates: 5/13/2019
- ☒ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☐ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☒ Global positioning system (GPS)
- ☐ Other studies
- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



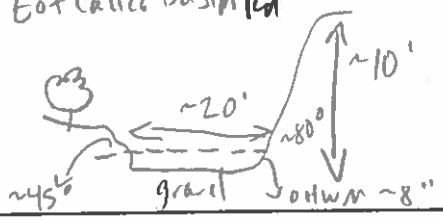
Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☒ GPS
   - ☐ Other:

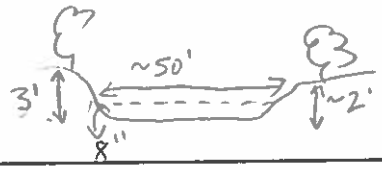
Project ID: RRC **Cross section ID:** ES-55 **Date:** 5/7/2020 **Time:**

Cross section drawing:

E of Calico Basin Rd



W of Calico Basin Rd



OHWM

GPS point: 36.145689 / -115.404573

Indicators:

- ☐ Change in average sediment texture
- ☒ Change in vegetation species
- ☒ Change in vegetation cover
- ☒ Break in bank slope
- ☐ Other: _____
- ☐ Other: _____

Comments:

impressed line in the bank

Width varies, but decreases on eastern side of road.

Floodplain unit: ☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: 36.145682° / -115.404852°

Characteristics of the floodplain unit:

Average sediment texture: cobbles/gravels

Total veg cover: 0 % Tree: ____% Shrub: ____% Herb: ____%

Community successional stage:

- ☒ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☒ Ripples
- ☐ Drift and/or debris
- ☒ Presence of bed and bank
- ☒ Benches
- ☐ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Project ID: RLC **Cross section ID:** ES-55 **Date:** 5/7/2020 **Time:**

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: 36.145867° / -115.404114°

Characteristics of the floodplain unit:

Average sediment texture: silt/cobbles/gravels

Total veg cover: 30 % Tree: 15 % Shrub: 15 % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☒ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☒ Drift and/or debris
- ☐ Presence of bed and bank
- ☒ Benches
- ☒ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Chilopsis linearis

Baccharis sarothroides

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Red Rock Canyon Trail & Intersections Improvements **Date:** 5/7/2020 **Time:**
Project Number: NV FLAP 500(1) **Town:** Las Vegas **State:** NV
Stream: ES-56 **Photo begin file#:** **Photo end file#:**
Investigator(s): RACHEL NEWTON

Y [X] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [X] Is the site significantly disturbed?

Location Details: 268+30 to 269+45 LT
267+00 to 269+10 RT

Projection: WGS 84 **Datum:**
Coordinates: 36.144842° / -115.404222

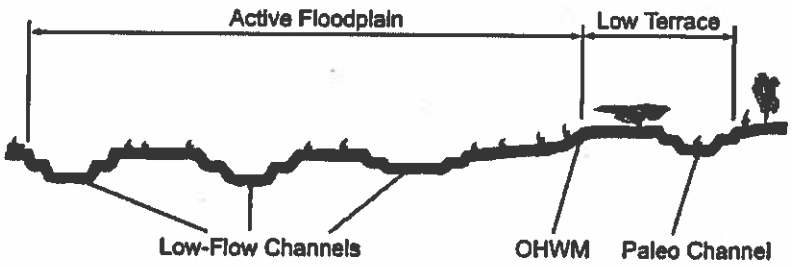
Potential anthropogenic influences on the channel system:
Channel crosses Calico Basin Road but flow does not appear to be impeded
A fence blocks debris flow on the western side

Brief site description:
Ephemeral braided/branched channel flowing west to east across Calico Basin Road before joining ES-55 and on to Red Rock Wash.

Checklist of resources (if available):

- [X] Aerial photography
  Dates: 5/13/2019
- [X] Topographic maps
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [X] Global positioning system (GPS)
- [ ] Other studies
- [ ] Stream gage data
  Gage number:
  Period of record:
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
  - [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

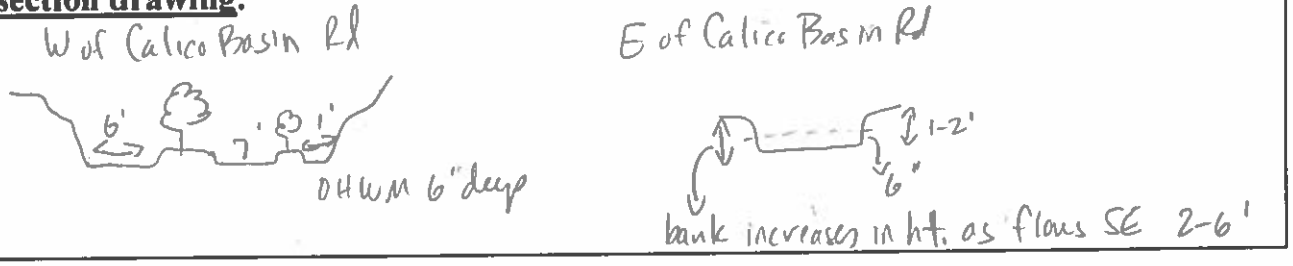


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - [ ] Mapping on aerial photograph
   - [X] GPS
   - [ ] Digitized on computer
   - [ ] Other:

Project ID: RRC **Cross section ID:** ES-56 **Date:** 5/7/2020 **Time:**

Cross section drawing:



OHWM

GPS point: 36.144749° / -115.403997°

Indicators:

- ☐ Change in average sediment texture
- ☒ Change in vegetation species
- ☒ Change in vegetation cover
- ☒ Break in bank slope
- ☐ Other: _____
- ☐ Other: _____

Comments:

Floodplain unit:

☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: 36.144773° / -115.404030°

Characteristics of the floodplain unit:

Average sediment texture: cobbles / gravels

Total veg cover: 0 % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- ☒ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☒ Drift and/or debris
- ☒ Presence of bed and bank
- ☒ Benches
- ☐ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Debris caught on fence.

Project ID: RRC **Cross section ID:** ES-56 **Date:** 5/7/2020 **Time:**

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: 36.144810° / -115.403975°

Characteristics of the floodplain unit:

Average sediment texture: silt | sand

Total veg cover: 50 % Tree: 30 % Shrub: 20 % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☒ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☒ Drift and/or debris
- ☒ Presence of bed and bank
- ☒ Benches
- ☒ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Chilopsis linearis
Baccharis sarothroides

Some debris caught on edges of islands.

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments: