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°

Prepared by:
Rachel Newton

Jacobs

September 2020
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

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

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

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>
<thead>
<tr>
<th>Feature ID</th>
<th>Figure / Photos</th>
<th>Latitude / Longitude</th>
<th>Approximate Project Stationing</th>
<th>OHWM Indicators [1]</th>
<th>Cowardin Classification [2]</th>
<th>Channel Type with Study Area [3]</th>
<th>Average Width of OHWM (feet)</th>
<th>Acreage within Study Area (linear feet)</th>
<th>RPW / NRPW</th>
<th>Connectivity to RPW</th>
<th>Potentially Jurisdictional</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES-1 (Red Rock Wash)</td>
<td>3A, 3B, 3F / 1A - 1I</td>
<td>36.156693 / -115.362021</td>
<td>102+30 to 104+20 LT; 102+60 to 109+25 RT; 102+00 to 118+40 ALT LT</td>
<td>CV, S/CB/R, SS</td>
<td>R6</td>
<td>BRC</td>
<td>22</td>
<td>1.475 (4,369)</td>
<td>NRPW</td>
<td>No</td>
<td>No</td>
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<tr>
<td>ES-2A</td>
<td>3B / 2A</td>
<td>36.154104 / -115.364422</td>
<td>116+10 to 116+60 LT</td>
<td>CV, S/CB/R, SS</td>
<td>R6</td>
<td>SC</td>
<td>4</td>
<td>0.002 (32)</td>
<td>NRPW</td>
<td>No</td>
<td>No</td>
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<tr>
<td>ES-2B</td>
<td>3B / 2B, 2C</td>
<td>36.154617 / -115.3639</td>
<td>112+00 to 115+60 RT</td>
<td>CV, S/CB/R, SS</td>
<td>R6</td>
<td>SC</td>
<td>3</td>
<td>0.015 (345)</td>
<td>NRPW</td>
<td>No</td>
<td>No</td>
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<tr>
<td>ES-3 (Red Rock Wash)</td>
<td>3C / 3A, 3B</td>
<td>36.151932 / -115.36914</td>
<td>131+80 to 133+35 RT</td>
<td>CV, S/CB/R, SS</td>
<td>R6</td>
<td>BC</td>
<td>14.5</td>
<td>0.045 (46)</td>
<td>NRPW</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>ES-4</td>
<td>3D, 3E / 4A, 4B</td>
<td>36.149937 / -115.372436</td>
<td>142+80 to 147+20 RT</td>
<td>CV, S/CB/R, SS</td>
<td>R6</td>
<td>BC</td>
<td>8</td>
<td>0.063 (401)</td>
<td>NRPW</td>
<td>No</td>
<td>No</td>
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<td>ES-5 (Red Rock Wash)</td>
<td>3E, 3I / 5A - 5C</td>
<td>36.149934 / -115.36849</td>
<td>157+35 to 159+10 LT; 157+20 to 157+70 RT; 157+90 to 158+10 RT; 158+40 to 159+20 RT</td>
<td>CV, S/CB/B</td>
<td>R6</td>
<td>BRC</td>
<td>25</td>
<td>0.346 (631)</td>
<td>NRPW</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>ES-6</td>
<td>3F, 3G / 7</td>
<td>36.155406 / -115.369067</td>
<td>126+60 to 127+20 ALT LT</td>
<td>CV, S/CB/B</td>
<td>R6</td>
<td>SC</td>
<td>4.5</td>
<td>0.005 (60)</td>
<td>NRPW</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>ES-7</td>
<td>3F, 3G / 8</td>
<td>36.155425 / -115.369211</td>
<td>127+10 to 127+60 ALT LT</td>
<td>CV, S/CB/B</td>
<td>R6</td>
<td>SC</td>
<td>6</td>
<td>0.009 (71)</td>
<td>NRPW</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>ES-8</td>
<td>3G / 9</td>
<td>36.155359 / -115.369704</td>
<td>128+60 to 129+45 ALT LT</td>
<td>CV, S/CB/B</td>
<td>R6</td>
<td>BRC</td>
<td>5</td>
<td>0.010 (88)</td>
<td>NRPW</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>ES-9</td>
<td>3G / 10A, 10B</td>
<td>36.15534 / -115.369805</td>
<td>129+00 to 130+40 ALT LT</td>
<td>CV, S/CB/R, SS</td>
<td>R6</td>
<td>BRC</td>
<td>6</td>
<td>0.022 (121)</td>
<td>NRPW</td>
<td>No</td>
<td>No</td>
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<tr>
<td>ES-10</td>
<td>3G / 11A, 11B</td>
<td>36.155307 / -115.370021</td>
<td>129+80 to 130+90 ALT LT; 130+75 to 131+60 ALT LT</td>
<td>CV, S/CB/R, SS</td>
<td>R6</td>
<td>SC</td>
<td>8</td>
<td>0.048 (264)</td>
<td>NRPW</td>
<td>No</td>
<td>No</td>
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<tr>
<td>ES-11</td>
<td>3G / 12A, 12B</td>
<td>36.155269 / -115.370743</td>
<td>132+20 to 132+60 ALT LT; 132+60 to 132+65 ALT LT</td>
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<td>SC</td>
<td>4</td>
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<td>No</td>
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<tr>
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<td>132+75 to 132+90 ALT LT; 132+80 to 132+90 ALT LT</td>
<td>CV, S/CB/B</td>
<td>R6</td>
<td>BRC</td>
<td>4</td>
<td>0.012 (117)</td>
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<td>No</td>
</tr>
<tr>
<td>ES-13</td>
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<td>CV, S/CB/R, SS</td>
<td>R6</td>
<td>BRC</td>
<td>7.5</td>
<td>0.040 (232)</td>
<td>NRPW</td>
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<td>No</td>
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<td>ES-14</td>
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<td>36.154916 / -115.371709</td>
<td>135+60 to 135+80 ALT LT; 135+70 to 136+40 ALT LT</td>
<td>CS, CV, S/CB/R, SS</td>
<td>R6</td>
<td>BRC</td>
<td>5</td>
<td>0.028 (259)</td>
<td>NRPW</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>ES-15</td>
<td>3G / 17A - 17C</td>
<td>36.154859 / -115.371921</td>
<td>136+00 to 137+75 ALT LT; 136+60 to 138+40 ALT LT</td>
<td>CS, CV, S/CB/R, SS</td>
<td>R6</td>
<td>BRC</td>
<td>6</td>
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<td>3G / 19A, 19B</td>
<td>36.154639 / -115.372362</td>
<td>138+20 to 139+90 ALT LT; 138+90 to 139+50 ALT LT</td>
<td>CV, S/CB/B</td>
<td>R6</td>
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<td>3H / 20A, 20B</td>
<td>36.154049 / -115.373107</td>
<td>141+30 to 142+10 ALT LT; 142+10 to 142+65 ALT LT</td>
<td>CV, S/CB/B</td>
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<td>3H / 22A, 22B</td>
<td>36.15338 / -115.374044</td>
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<td>CV, S/CB/B</td>
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<td>BRC</td>
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<td>3H / 23A, 23B</td>
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<td>36.15303 / -115.375128</td>
<td>148+15 to 148+20 ALT LT; 148+00 to 148+20 ALT LT</td>
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<td>OHWM Indicators (1)</td>
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<td>Channel Type with Study Area (3)</td>
<td>Average Width of OHWM (feet)</td>
<td>Acreage within Study Area (linear feet)</td>
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<td>Connectivity to RPW</td>
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<td>36.152308 / -115.375563</td>
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<td>154+15 to 154+45 ALT</td>
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<td>3I / 31A, 31B</td>
<td>36.151367 / -115.376994</td>
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<td>CV, S/CB/B, SS</td>
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<td>BRC</td>
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<td>3I / 32A - 32C</td>
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<td>BRC</td>
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<td>3I / 33A, 33B</td>
<td>36.150395 / -115.378494</td>
<td>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</td>
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<td>36.150525 / -115.379609</td>
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<td>3J / 36A - 36E</td>
<td>36.150732 / -115.381772</td>
<td>168+70 to 174+80 LT; 170+60 to 177+10 RT; 172+80 to 177+20 RT</td>
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<td>3J / 37</td>
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<td>SC</td>
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<td>0.015 (167)</td>
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<td>ES-34</td>
<td>3J / 38A - 38C</td>
<td>36.151718 / -115.383093</td>
<td>175+30 to 177+10 LT; 176+60 to 179+00 RT</td>
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<td>R6</td>
<td>BC</td>
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<td>3J, 3K / 39A - 39C</td>
<td>36.152692 / -115.385868</td>
<td>180+40 to 186+80 LT; 186+60 to 187+80 RT</td>
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<td>BRC</td>
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<td>188+40 to 191+10 LT; 191+80 to 192+60 LT; 190+90 to 198+60 RT</td>
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<td>R6</td>
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<td>0.205 (1,038)</td>
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<td>3L / 42A, 42B</td>
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<td>3L / 43</td>
<td>36.154319 / -115.390992</td>
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<td>36.154219 / -115.391711</td>
<td>205+60 to 205+90 LT; 205+75 to 206+30 RT</td>
<td>CS, CV, S/CB/B</td>
<td>R6</td>
<td>BC</td>
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<td>Acreage within Study Area (linear feet)</td>
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<td>Connectivity to RPW</td>
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<td>3L / 45A, 45B</td>
<td>36.15387 / -115.391798</td>
<td>206+90 to 207+15 LT; 207+15 to 207+45 RT</td>
<td>CS, CV, S/CB/B</td>
<td>R6 BC</td>
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<td>0.021 (259)</td>
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<td>ES-42</td>
<td>3L / 46A, 46B</td>
<td>36.153431 / -115.392177</td>
<td>209+00 to 209+75 LT; 209+60 to 210+00 RT</td>
<td>CV, S/CB/B</td>
<td>R6 BRC</td>
<td>3.5</td>
<td>0.024 (285)</td>
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<td>3L / 47A</td>
<td>36.153171 / -115.392736</td>
<td>210+00 to 212+20 LT</td>
<td>CS, CV, S/CB/B</td>
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<td>3L / 47B</td>
<td>36.15289 / -115.3933</td>
<td>212+40 to 213+80 LT</td>
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<td>ES-44C</td>
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<td>3L / 48</td>
<td>36.153171 / -115.392736</td>
<td>211+00 to 211+40 LT; 211+40 to 211+60 RT</td>
<td>CV, S/CB/B</td>
<td>R6 BRC</td>
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<td>3M / 49</td>
<td>36.152694 / -115.393851</td>
<td>214+90 to 215+60 LT; 215+60 to 216+30 RT</td>
<td>CV, S/CB/B</td>
<td>R6 BRC</td>
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<td>36.145763 / -115.400254</td>
<td>256+10 to 256+75 LT; 256+30 to 256+75 RT</td>
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<td>3Q / 57A, 57B</td>
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<td>3Q / 58B - 58E</td>
<td>36.145917 / -115.404837</td>
<td>263+60 to 264+20 RT</td>
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<td>36.14589 / -115.40404</td>
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<td>36.145689 / -115.40573</td>
<td>263+70 to 264+40</td>
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<td>36.14531 / -115.4036</td>
<td>265+80 to 269+80 LT</td>
<td>CS, CV, S/CB/B, SS</td>
<td>R6 BRC</td>
<td>9</td>
<td>0.087 (502)</td>
<td>NRPW No</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ES-56A</td>
<td>3Q / 60A, 60B</td>
<td>36.144842 / -115.404222</td>
<td>268+30 to 269+45 LT; 267+00 to 269+10 RT</td>
<td>CS, CV, S/CB/B, SS</td>
<td>R6 BRC</td>
<td>15</td>
<td>0.136 (456)</td>
<td>NRPW No</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ES-56B</td>
<td>3Q / 60C - 60E</td>
<td>36.144897 / -115.4029</td>
<td>269+40 to 271+80 LT</td>
<td>CS, CV, S/CB/B, SS</td>
<td>R6 BC</td>
<td>10</td>
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<tr>
<td>ES-57</td>
<td>3R / 61A - 61C</td>
<td>36.14358 / -115.401813</td>
<td>275+80 to 276+20 LT; 275+00 to 275+40 RT</td>
<td>CS, CV, S/CB/B</td>
<td>R6 BC</td>
<td>6</td>
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<td>NRPW No</td>
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<td></td>
</tr>
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<td>Figure / Photos</td>
<td>Latitude / Longitude</td>
<td>Approximate Project Stationing</td>
<td>OHWM Indicators (1)</td>
<td>Cowardin Classification (2)</td>
<td>Channel Type (3)</td>
<td>Average Width of OHWM (feet)</td>
<td>Acreage within Study Area (linear feet)</td>
<td>RPW / NRPW</td>
<td>Connectivity to RPW</td>
<td>Potentially Jurisdictional</td>
</tr>
<tr>
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<tr>
<td>ES-58B</td>
<td>3R, 3T - 3V / 62B - 62H</td>
<td>36.144842 / -115.404222</td>
<td>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</td>
<td>CS, CV, S/CB/B, SS</td>
<td>R6</td>
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<td>ES-59</td>
<td>3W / 64A, 64B</td>
<td>36.14047 / -115.403706</td>
<td>312+85</td>
<td>CV, S/CB/B</td>
<td>R6</td>
<td>BC</td>
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<td>0.008 (255)</td>
<td>NRPW</td>
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<tr>
<td>ES-60</td>
<td>3W / 65</td>
<td>36.135572 / -115.410826</td>
<td>317+80 to 318+10 LT; 318+10 to 320+10 RT</td>
<td>CS, CV, S/CB/B</td>
<td>R6</td>
<td>SC</td>
<td>1</td>
<td>0.010 (313)</td>
<td>NRPW</td>
<td>No</td>
<td>No</td>
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<tr>
<td>ES-61</td>
<td>3X / 66A, 66B</td>
<td>36.133906 / -115.413583</td>
<td>326+00 to 327+80 LT; 327+80 to 330+30 RT</td>
<td>CV, S/CB/B</td>
<td>R6</td>
<td>BC</td>
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<td>NRPW</td>
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<tr>
<td>ES-62A</td>
<td>3X / 67A, 67B</td>
<td>36.133611 / -115.415338</td>
<td>333+20 to 336+40 LT</td>
<td>CS, CV, S/CB/B</td>
<td>R6</td>
<td>SC</td>
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<td>ES-62B</td>
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<td>36.133096 / -115.416759</td>
<td>338+70 to 339+60 LT</td>
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<td>R6</td>
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<td>ES-62C</td>
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<td>340+10 to 345+10 LT; 344+75 to 345+90 RT</td>
<td>CS, CV, S/CB/B</td>
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<td>BRC</td>
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<td>No</td>
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<td>ES-63</td>
<td>3X, 3Y / 68A - 68C</td>
<td>36.133592 / -115.416547</td>
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<td>CS, CV, S/CB/B</td>
<td>R6</td>
<td>BRC</td>
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<td>ES-64</td>
<td>3Y, 3Z / 69A, 69B</td>
<td>36.13204 / -115.421665</td>
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<td>CS, CV, S/CB/B</td>
<td>R6</td>
<td>BRC</td>
<td>1</td>
<td>0.014 (470)</td>
<td>NRPW</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

(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


Appendix A
Figures
Project Start: 36.15819°, -115.35995°

Project End: 36.132634°, -115.423704°
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

Legend
Aquatic Resources Study Area (189.74 acres)
Sample Point
Photo Point
Delineated Features
Channel
Aquatic Resources Study Area

ES-1 Red Rock Wash
(1.475 acres, 4369 linear feet)

Legend
- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point
- Delineated Features
- Channel

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

Figure 3A
Aerial Imagery: NAIP
Delamination completed by Rachel Newton
(AAC023 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 02/22/2022
No delineated features on this page.
Aquatic Resources Study Area

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

Aerial Imagery: NAIP

Delination 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
Aquatic Resources Study Area

Legend
- Aquatic Resources Study Area (189.74 acres)

Stationing
- Sample Point
- Photo Point

Delineated Features
- Channel

ES-17
(0.006 acres,
279 linear feet)

ES-18
(0.003 acres,
138 linear feet)

ES-19
(0.022 acres,
197 linear feet)

ES-20
(0.009 acres,
154 linear feet)

ES-21
(0.011 acres,
143 linear feet)

ES-22
(0.068 acres,
537 linear feet)

ES-23
(0.036 acres,
453 linear feet)

ES-24
(0.003 acres,
138 linear feet)

ES-25
(0.006 acres,
453 linear feet)

ES-26
(0.009 acres,
154 linear feet)

ES-27
(0.003 acres,
138 linear feet)

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
Aquatic Resources Study Area

Legend
- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point
- Delineated Features
- Channel

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

Figure 3M
Aerial Imagery: NAIP
Delineation completed by Rachel Newton/JACOBS 05/05/2020 - 05/09/2020
Based on Wetland Hierarchy, U.S. Fish and Wildlife Service Wetlands Source: National Wetland Mapper, 2018; Waters – 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.
Prepared by Jill Rosenberger/Jacobs on 2/22/2022
No delineated features on this page.
Aquatic Resources Study Area

- ES-45 (0.01 acres, 313 linear feet)
- ES-59 (0.008 acres, 255 linear feet)

Legend
- Aquatic Resources Study Area (189.74 acres)
- Stationing
- Sample Point
- Photo Point
- Delineated Features
- Channel

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 50011
Clark County, NV

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
Appendix B
Plant List from Mapped Aquatic Resources
### Table 1. Plant List from Mapped Aquatic Resources

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

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

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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.
Custom Soil Resource Report
Soil Map (Red Rock Path and Intersections Project)
MAP LEGEND

<table>
<thead>
<tr>
<th>Area of Interest (AOI)</th>
<th>Soils</th>
<th>Special Point Features</th>
<th>Water Features</th>
<th>Transportation</th>
<th>Background</th>
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<td>□ Blowout</td>
<td>□ Streams and Canals</td>
<td>□ Rails</td>
<td>□ Aerial Photography</td>
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<td>□ Lava Flow</td>
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<td>□ Marsh or swamp</td>
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<td>□ Mine or Quarry</td>
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<td>□ Miscellaneous Water</td>
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<td>□ Perennial Water</td>
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<td>□ Rock Outcrop</td>
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<td>□ Saline Spot</td>
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<td>□ Severely Eroded Spot</td>
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<td>□ Slide or Slip</td>
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<td>□ Sodic Spot</td>
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</tbody>
</table>

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.
<table>
<thead>
<tr>
<th>MAP LEGEND</th>
<th>MAP INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.</td>
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</table>
Map Unit Legend (Red Rock Path and Intersections Project)

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

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

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 map unit.

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 corr (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

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**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 map unit.

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 mhmhos/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 mhmhos/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 mmmhos/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
References


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 1: 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 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: Ripe Rock Canyon Trail Interfaces Improvements
Project Number: NVPAP 5040(5)
Stream: Simple Channel
Investigator(s): Rachel Newton

Date: 5/13/20
Time:
Town: Las Vegas
State: NV
Photo begin file#: Photo end file#:

Location Details:
Projection:
Datum:
Coordinates:

Y X / N □ Do normal circumstances exist on the site?
Y □ / N X Is the site significantly disturbed?

Potential anthropogenic influences on the channel system:
Within the study area, channels are unimpeded by culverts. Occasional use as a cross road for social trails.


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)
☐ 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
☐ Other studies

Hydrogeomorphic Floodplain Units

Active Floodplain
Low Terrace
Low-Flow Channels
OHWM
Paleo Channel

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 Y GPS
   □ Digitized on computer □ Other:
Cross section drawing: Some slopes are more abrupt. 80° - 80°

45-60° depth of OHWM varies with each channel.

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 ARDR).

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

GPS point: ________________

Characteristics of the floodplain unit:
Average sediment texture: ☑ Silt
☑ Sand
☐ Gravel
☐ Cobble
Total veg cover: 0 % Tree: ___ % Shrub: ___ % Herb: ___ %
Community successional stage:
☑ NA
☐ Early (herbaceous & seedlings)
☐ 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.
### Floodplain unit:
- [ ] Low-Flow Channel
- [ ] Active Floodplain
- [x] Low Terrace

### Project ID: RRC  Cross section ID: Simple

### Date: ____________________  Time: ____________________

#### GPS point: ____________________

### Characteristics of the floodplain unit:
- Average sediment texture: [ [x] Gravels, [ ] Cobble ]
- Total veg cover: _____ %  Tree: _____ %  Shrub: _____ %  Herb: _____ %

#### Community successional stage:
- [ ] NA
- [ ] Early (herbaceous & seedlings)
- [x] Late (herbaceous, shrubs, mature trees)
- [ ] Mid (herbaceous, shrubs, saplings)

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

#### Comments:
Vegetative cover variable, but is consistent with surrounding areas. 25% cover by invasive grasses, Bromus rubens & P. tectorum. Forbs and shrubs include various Cactus and yucca, along with white burrage, 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

#### Comments:
### Arid West Ephemeral and Intermittent Streams OHWM Datasheet

**Project:** Red Rock Canyon Trail Intersections Impact  
**Project Number:** NV FLAP 5004  
**Stream:** BRANCH  
**Investigator(s):** R. Munton

**Date:** 5/15/20  
**Time:**  
**Town:** Las Vegas  
**State:** NV  
**Photo begin file#:**  
**Photo end file#:**

<table>
<thead>
<tr>
<th>Y/N Do normal circumstances exist on the site?</th>
<th>Location Details:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y/N Is the site significantly disturbed?</td>
<td>Projection:</td>
</tr>
</tbody>
</table>

**Potential anthropogenic influences on the channel system:**
Within the study area, channels are unimpeded by culverts. Occasional use as a 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-26, Es-29, Es-34, Es-36, Es-41, Es-41A, Es-51, Es-51B, Es-57, Es-59.

**Checklist of resources (if available):**
- [x] Aerial photography  
  - Dates: 5/15/19  
- [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

![Diagram of floodplain units](attachment:image.png)

**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:
Cross section drawing:

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

OHWM

GPS point:

Indicators:

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

Comments:

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

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

GPS point:

Characteristics of the floodplain unit:

- Average sediment texture: Silt/sand/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:

Low-flow channels devoid of vegetation
**Project ID:** RRC  
**Cross section ID:** BRANCHED  
**Date:**  
**Time:**

<table>
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<tr>
<th>Floodplain unit:</th>
<th>Low-Flow Channel</th>
<th>Active Floodplain</th>
<th>Low Terrace</th>
</tr>
</thead>
</table>

**GPS point:**

**Characteristics of the floodplain unit:**

- **Average sediment texture:** silts, gravels, cobbles
- **Total veg cover:** __%  
  - Tree: __%  
  - Shrub: __%  
  - Herb: __%

**Community successional stage:**

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

**Indicators:**

- [ ] Mudcracks
- [ ] Ripples
- [ ] Drift and/or debris
- [X] Presence of bed and bank
- [X] Benches
- [X] Soil development
- [X] Surface relief
- [ ] 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, aguacita, 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)
- [X] Late (herbaceous, shrubs, mature trees)

**Indicators:**

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

**Comments:**
Arid West Ephemeral and Intermittent Streams OHWM Datasheet

<table>
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<th>Project: Red Rock Canyon Trail Intersection Improvements</th>
<th>Date: 5/5-5/19 2020</th>
</tr>
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<td>Project Number: NV FLAP 500(1)</td>
<td>Time:</td>
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<tr>
<td>Stream: BRAIDED</td>
<td>Town: Las Vegas</td>
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<tr>
<td>Investigator(s): Rachel Newton</td>
<td>State: NV</td>
</tr>
<tr>
<td>Y ☑/N ☐ Do normal circumstances exist on the site?</td>
<td>Photo begin file#:</td>
</tr>
<tr>
<td>Y ☐/N ☑ Is the site significantly disturbed?</td>
<td>Photo end file#:</td>
</tr>
</tbody>
</table>

Location Details:
Projection: Datum:
Coordinates:

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


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:
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 HDR2). 

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

GPS point: ____________

Characteristics of the floodplain unit:

- Average sediment texture: ____________
  - Silt
  - Sand
  - Gravel
  - Cobble

- 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:

Low-flow channels devoid of vegetation.
### Project ID: REC  Cross section ID: BRAIDED  Date:  Time:

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

**GPS point:** __________________________

**Characteristics of the floodplain unit:**
- Average sediment texture: [Salt|Gravel|Cobble]
- Total veg cover: ____ %  Tree: ____ %  Shrub: ____ %  Herb: ____ %

**Community successional stage:**
- [ ] NA
- [x] 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:**
Vegetative cover is variable, although generally low. Vegetation present is typically bent-over or has roots exposed.

---

### Project ID: REC  Cross section ID: BRAIDED  Date:  Time:

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

**GPS point:** __________________________

**Characteristics of the floodplain unit:**
- Average sediment texture: [Salt|Gravel|Cobble]
- Total veg cover: ____ %  Tree: ____ %  Shrub: ____ %  Herb: ____ %

**Community successional stage:**
- [ ] NA
- [ ] Early (herbaceous & seedlings)
- [x] 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
- [x] Soil development
- [x] Surface relief
- [ ] Other: __________________________
- [ ] Other: __________________________
- [ ] Other: __________________________

**Comments:**
Vegetative cover is variable but is consistent with surrounding areas. A 25% cover by invasive grasses Bromus rubens and B. tectorum. Forbs & shrubs include various cactus and yucca, along with white buttercup & creosole bush.
Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Red Rock Canyon Trail Intersection
Project Number: 06-FLAP 5000(1)
Stream: ES-1 Red Rock Wash
Investigator(s): Rachel Newton

Date: 5/5/20, 5/19/20
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: 102°47'00" to 104°18'00"
102°40'00" to 104°18'00"
102°40'00" to 104°20'00"

Projection: WGS 84
Datum:
Coordinates: 36.156643/ -115.302071

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 STONE before turning

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

Active Floodplain
Low Terrace
Low-Flow Channels
OHWM
Paleo Channel

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
   ☐ GPS
   ☐ Digitized on computer
   ☐ Other:
OHWM

GPS point: 36.156693°/ -115.302021°

Indicators:
- □ Change in average sediment texture
- □ Change in vegetation species
- □ Change in vegetation cover
- □ Break in bank slope
- □ Other: ____________________________

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

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

GPS point: 36.156722°/ -115.302131

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)
□ Later (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:
Substrate varies by location within the system. Smaller branches contain miresilt, but larger/main branch bed composed almost entirely of cobble.
**Project ID:** RRC  
**Cross section ID:** ES-I  
**Date:**  
**Time:**

<table>
<thead>
<tr>
<th>Floodplain unit:</th>
<th>Low-Flow Channel</th>
<th>Active Floodplain</th>
<th>Low Terrace</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GPS point:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Characteristics of the floodplain unit:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average sediment texture:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total veg cover:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tree:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shrub:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herb:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community successional stage:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early (herbaceous &amp; seedlings)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid (herbaceous, shrubs, saplings)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late (herbaceous, shrubs, mature trees)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicators:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mudcracks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ripples</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drift and/or debris</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of bed and bank</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benches</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface relief</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Other:</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td><em>Chilopsis linearis, Baccharis serothroides, trace Bromus rubens, B tectorum</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**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 d Int'sections Improvements  
Project Number: NV FLAP 500(1)  
Stream: ES-5 Red Rock Wash  
Investigator(s): Rachel Newton  
Date: 5/9/20  
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?  

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 rockcarns. 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 with cobbles and some boulders. Flow SW to NE this section.

Checklist of resources (if available):  
☐ Aerial photography  
Dates: 5/10/2019  
☐ Topographic maps  
☐ Geologic maps  
☐ Vegetation maps  
☐ Soils maps  
☐ Rainfall/precipitation maps  
☐ Existing delineation(s) for site  
☐ Global positioning system (GPS)  
☐ 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  
☐ Other studies

Hydrogeomorphic Floodplain Units

Active Floodplain  
Low Terrace  
Low-Flow Channels  
OHWM  
Paleo Channel

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1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
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   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  
   ☑ GPS  
   ☐ Digitized on computer  
   ☐ Other:
Cross section drawing:

**OHWM**

GPS point: 76.149934°/-115.376849

Indicators:
- [x] Change in average sediment texture
- [x] Change in vegetation species
- [ ] 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: 76.130048°/-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
- [ ] Benches
- [ ] Soil development
- [x] Surface relief
- [ ] Other: 
- [ ] Other: 
- [ ] Other: 

Comments:
Flow lines evident. Sediment-sorting
Project ID: "rkC"
Cross section ID: ES-5
Date: 5/5/2020
Time:

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

GPS point: 36.149816°/ -115.396873

Characteristics of the floodplain unit:
- Average sediment texture: Silt/gravel/cobble
- Total veg cover: 20%
- Tree: 18%
- 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:
Chilopsis linearis

---

Project ID: "rkC"
Cross section ID: ES-5
Date: 5/5/2020
Time:

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 Improvement  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 Region 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.

<table>
<thead>
<tr>
<th>Hydrophytic Vegetation Present?</th>
<th>Yes ☑  No ☐</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydric Soil Present?</td>
<td>Yes ☑  No ☐</td>
</tr>
<tr>
<td>Wetland Hydrology Present?</td>
<td>Yes ☑  No ☐</td>
</tr>
<tr>
<td>Is the Sampled Area within a Wetland?</td>
<td>Yes ☑  No ☐</td>
</tr>
</tbody>
</table>

Remarks:

VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Tree Stratum (Plot size: ____________)</th>
<th>Absolute % Cover</th>
<th>Dominant Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum (Plot size: ____________)</th>
<th>% Cover</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum (Plot size: 5 x 5 ft.)</th>
<th>% Cover</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Typha angustifolia</td>
<td>45</td>
<td>OBL</td>
</tr>
<tr>
<td>2. Polygogon monspeliensis</td>
<td>20</td>
<td>FACW</td>
</tr>
<tr>
<td>3. Alopecurus pratensis</td>
<td>10</td>
<td>FAC</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine Stratum (Plot size: ____________)</th>
<th>% Cover</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>% Bare Ground in Herb Stratum</th>
<th>% Cover of Biotic Crust</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>15</td>
</tr>
</tbody>
</table>

Remarks:

Biotic crust is an algal mat.
**SOIL**

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

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Matrix</th>
<th>Redox Features</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 1/2</td>
<td>2.5 Y 6/4</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2 - 2</td>
<td>2.5 Y 3/2</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 - 4</td>
<td>2.5 Y 6/4</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>shovel refusal</td>
<td>100</td>
<td></td>
<td>concrete detention basin</td>
</tr>
</tbody>
</table>

| Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.) |
|-----------------|-----------------|-----------------|--------|
| Histosol (A1)   | Sandy Redox (S5)| 1 cm Muck (A9) (LRR C) |
| Histic Epipedon (A2) | Stripped Matrix (S6) | 2 cm Muck (A10) (LRR B) |
| Black Histic (A3) | Loamy Mucky Mineral (F1) | Reduced Vertic (F18) |
| Hydrogen Sulfide (A4) | Loamy Gleyed Matrix (F2) | Red Parent Material (TF2) |
| Stratified Layers (A5) (LRR C) | Depleted Matrix (F3) | Other (Explain in Remarks) |
| 1 cm Muck (A9) (LRR D) | Redox Dark Surface (F6) | 3Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic. |
| Depleted Below Dark Surface (A11) | Depleted Dark Surface (F7) | |
| Thick Dark Surface (A12) | Redox Depressions (F8) | |
| Sandy Mucky Mineral (S1) | Vernal Pools (F9) | |
| Sandy Gleyed Matrix (S4) | | |

Restrictive Layer (if present):

<table>
<thead>
<tr>
<th>Type:</th>
<th>Depth (inches):</th>
<th>Hydric Soil Present?</th>
<th>Yes ✔ No ✓</th>
</tr>
</thead>
</table>

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)

<table>
<thead>
<tr>
<th>Surface Water (A1)</th>
<th>Salt Crust (B11)</th>
<th>Water Marks (B1) (Riverine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
<td>Sediment Deposits (B2) (Riverine)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
<td>Drift Deposits (B3) (Riverine)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
<td>Drainage Patterns (B10)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
<td>Dry-Season Water Table (C2)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
<td>Crayfish Burrows (C8)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
<td>Saturation Visible on Aerial Imagery (C9)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Thin Muck Surface (C7)</td>
<td>Shallow Aquitard (D3)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>Other (Explain in Remarks)</td>
<td>✓ FAC-Neutral Test (D5)</td>
</tr>
</tbody>
</table>

Secondary Indicators (2 or more required)

Field Observations:

<table>
<thead>
<tr>
<th>Surface Water Present?</th>
<th>Yes ✔ No ✓ Depth (inches):</th>
<th>Wetland Hydrology Present?</th>
<th>Yes ✔ No ✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Table Present?</td>
<td>Yes ✔ No ✓ Depth (inches):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturation Present?</td>
<td>Yes ✔ No ✓ Depth (inches):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

( includes capillary fringe)

Remarks:

algal mat
Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Red Rock Canyon Trail, Intersections
Project Number: NV/FLHP 500(C) Improvements
Stream: ES-21
Investigator(s): Rachel Newcomb

Date: 5/19/2020
Time: 
Town: Las Vegas
State: NV
Photo begin file#: 
Photo end file#: 

Y [ ] N [ ] Do normal circumstances exist on the site?
Y [ ] N [X] Is the site significantly disturbed?

Location Details:
148°15'40"ALN LT, 148°15'40" ALN LT
Projection: WGS 84
Datum: 
Coordinates: 36.135303° N, 115.375128° W

Potential anthropogenic influences on the channel system:
Area next to this channel used to be 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
[ ] 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

Active Floodplain
Low Terrace
Low-Flow Channels
OHWM
Paleo Channel

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: RC  Cross section ID: E5-21  Date: 5/9/2020  Time:

Cross section drawing:

80' slopes
6-12'

OHWM

GPS point: 76.15707° / -115.375128°

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

Comments: Impressed line on bank

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

GPS point: 76.152882° / -115.375020°

Characteristics of the floodplain unit:
- Average sediment texture:____________________
- Total veg cover: _____  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: RRE  Cross section ID: ES-21  Date: 5/9/2020  Time: 

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

GPS point:  30.152739°, -115.374959°

Characteristics of the floodplain unit:
Average sediment texture:  gravel/sediments
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:

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:

Comments:  

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

| Project: Red Rock Canyon Trail Intersection | Date: 3/6/2020 | Time: |
| Project Number: NV FLAP 5oo (1) | Town: Las Vegas | State: NV |
| Stream: ES-40 | Photo begin file#: | Photo end file#: |
| Investigator(s): Rachel Newton | Location Details: | |
| | 20S+600+02.205+90LT, 20S+754+306+30.R.T | |
| Y ❑ / N ❑ Do normal circumstances exist on the site? | Projection: WGS 84 | Datum: |
| Y ❑ / N ❑ Is the site significantly disturbed? | Coordinates: 36.15+2.96 / -115.34+7.11 | |

Potential anthropogenic influences on the channel system:

None in the study area

Brief site description:

Ephemeral channel flowing NW to SE toward 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

Active Floodplain

Low Terrace

Low-Flow Channels

OHWM

Paleo Channel

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: PEC  
Cross section ID: ES-40  
Date: 5/6/2020  
Time:

Cross section drawing:

[Diagram showing cross section with various measurements and notes]

OHWM

GPS point: 36.154719° / -115.391711°

Indicators:
- □ Change in average sediment texture  
- □ Change in vegetation species  
- □ Change in vegetation cover  
- □ Break in bank slope  
- □ Other: ____________________________

Comments:

Floodplain unit:  
- □ 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: ___%  
- 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: ____________________________

Comments:
### Project ID: RLC  Cross section ID: ES-40  Date: 5/16/2020  Time:

<table>
<thead>
<tr>
<th>Floodplain unit:</th>
<th>Low-Flow Channel</th>
<th>Active Floodplain</th>
<th>Low Terrace</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS point:</td>
<td>36.154078° / -115.391489°</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Characteristics of the floodplain unit:
Average sediment texture: sand
Total veg cover: 40%  Tree: 25%  Shrub: 25%  Herb: 15%

Community successional stage:
- Mid (herbaceous, shrubs, saplings)
- Late (herbaceous, shrubs, mature trees)

Indicators:
- Mudcracks
- Ripples
- Drift and/or debris
- Presence of bed and bank

Comments:
- *Salvia dorisii, various cacti, Artemisia dumosa, Gastroceras microcephala*

---

### Project ID: RLC  Cross section ID: ES-40  Date: 5/16/2020  Time:

<table>
<thead>
<tr>
<th>Floodplain unit:</th>
<th>Low-Flow Channel</th>
<th>Active Floodplain</th>
<th>Low Terrace</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS point:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Characteristics of the floodplain unit:
Average sediment texture: ____________
Total veg cover: ___%  Tree: ___%  Shrub: ___%  Herb: ___%

Community successional stage:
- NA
- Early (herbaceous & seedlings)

Indicators:
- Mudcracks
- Ripples
- Drift and/or debris
- Presence of bed and bank

Comments:
- Soil development
- Surface relief
- Other: ________________
- Other: ________________
- Other: ________________

---

### Project ID: RLC  Cross section ID: ES-40  Date: 5/16/2020  Time:

<table>
<thead>
<tr>
<th>Floodplain unit:</th>
<th>Low-Flow Channel</th>
<th>Active Floodplain</th>
<th>Low Terrace</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS point:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Characteristics of the floodplain unit:
Average sediment texture: ____________
Total veg cover: ___%  Tree: ___%  Shrub: ___%  Herb: ___%

Community successional stage:
- Mid (herbaceous, shrubs, saplings)
- Late (herbaceous, shrubs, mature trees)

Indicators:
- Mudcracks
- Ripples
- Drift and/or debris
- Presence of bed and bank

Comments:
- Soil development
- Surface relief
- Other: ________________
- Other: ________________
- Other: ________________
Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Red Rock Canyon Trail Interactions
Project Number: NV FLAP 500C1 Improvements
Stream: ES-48
Investigator(s): Rachel Nelson

Date: Time:
Town: Las Vegas State: NV
Photo begin file#: Photo end file#

Y/N □ Do normal circumstances exist on the site?
Y □ /N X Is the site significantly disturbed?

Location Details: 24°1-80 to 24°2-60 LT
    24°1-80 to 24°2-40 LT
Projection: WGS 84 Datum:
Coordinates: 36.1-148 24°/ -115.4-000-13 LT

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):

☐ 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)
☐ 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
☐ Other studies

Hydrogeomorphic Floodplain Units

Active Floodplain
Low Terrace
Low-Flow Channels
OHWM
Paleo Channel

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 ☒ GPS
    ☐ Digitized on computer ☐ Other:
**OHWM**

**GPS point:** 26°14'24.4" / -115°40'43.4"

**Indicators:**
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [ ] Change in average sediment texture
- [ ] Other:

**Comments:** Width varies, averages ~10'

---

**Floodplain unit:** [x] Low-Flow Channel

**GPS point:** 36°14'21.6" / -115°40'04.90"

**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:

**Comments:**
Project ID: PRC  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:  sand
Total veg cover: 50%  Tree: 35%  Shrub: 15%  Herb: 50%
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, Batocarum, Encelia vungensis
Lerrea tridentata, Ambrosia dumosa, Hymenoclea salsola

---

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

GPS point: ____________________

Characteristics of the floodplain unit:
Average sediment texture:  sand
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
Project Number: NIFAP50861
Stream: ES-55
Investigators: Rachel Newton

Date: 5/7/2020
Time:
Town: Las Vegas
State: NV
Photo begin file:
Photo end file:

Location Details:
258°-160° N 115°-40° W
260°-160° N 115°-40° W

Projection: WGS84
Datum:
Coordinates: 36.14389 / -115.4040

Potential anthropogenic influences on the channel system:
Channel crosses over Calico Basin Rd. 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: 5/15/2019
□ 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

Active Floodplain
Low Terrace
Low-Flow Channels
OHWM
Paleo Channel

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:
**Cross section drawing:**

- End of Caliza Basin Rd
- W of Caliza Basin Rd

**OHWM**

- GPS point: 36.145687 / -115.404573
- Indicators:
  - [X] Change in vegetation species
  - [X] Change in vegetation cover
  - [ ] Break in bank slope
  - [ ] Other: ________________

- Comments:
  - Impressed line in the bank
  - Width varies, but decreases on eastern side of road

**Floodplain unit:**

- [X] Low-Flow Channel
- [ ] Active Floodplain
- [ ] Low Terrace
- GPS point: 36.145682 / -115.404852

**Characteristics of the floodplain unit:**

- Average sediment texture: gravel
- Total veg cover: 0%

- 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
  - [ ] Surface relief
  - [ ] Other: ________________
  - [ ] Other: ________________

- Comments:
Floodplain unit: □ Low-Flow Channel □ Active Floodplain □ Low Terrace

GPS point: 36.115867° / -115.404110°

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 □ Soil development
□ Presence of bed and bank □ Other: __________________________
□ Benches □ 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 □ Other: __________________________
□ Presence of bed and bank □ Other: __________________________
□ Benches □ Other: __________________________
□ Other: __________________________

Comments:
Arid West Ephemeral and Intermittent Streams OHWM Datasheet

| Project: Red Rock Canyon Trail intersections Improvements | Date: 11/7/2020 | Time: |
| Project Number: NV FLAP 5406 | Town: Las Vegas | State: NV |
| Stream: ES-56 | Photo begin file#: | Photo end file#: |
| Investigator(s): Rachel Newton | Location Details: 208°30'6.26945"L 267'00'6.26904"W | Datum: |
| | Projection: WGS84 | Coordinates: 36°14'42.0"N 115°48'23.2"W |

Y / N Do normal circumstances exist on the site? Y / N Is the site significantly disturbed?

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

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: RKC  Cross section ID: ES-56  Date: 5/7/2020  Time: 

Cross section drawing:

W of Calico Basin Rd

E of Calico Basin Rd

OHWM

GPS point: 36.144749° / -115.403997°

Indicators:

- Change in average sediment texture
- Break in bank slope
- Change in vegetation species
- Other: __________________________
- Change in vegetation cover
- Other: __________________________

Comments:

Floodplain unit: Low-Flow Channel

GPS point: 36.144773° / -115.404030°

Characteristics of the floodplain unit:

Average sediment texture: 30% cobble 70% gravel

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:

Debris caught on fence.
### Floodplain unit:

- **Low-Flow Channel**
- **Active Floodplain**
- **Low Terrace**

### GPS point:

36.14810°, -115.403975°

### Characteristics of the floodplain unit:

- **Average sediment texture:** Silt
- **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*

*Boccharis sarothroides*

Some debris caught on edges of islands.

---

### Floodplain unit:

- **Low-Flow Channel**
- **Active Floodplain**
- **Low Terrace**

### GPS point:

_____________________

### Characteristics of the floodplain unit:

- **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: