C.4 404(b)(1)Analysis

THOUSAND PALMS FLOOD CONTROL PROJECT:
Draft Section 404(b)(1) Alternatives Analysis

Prepared for:

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1.0 Introduction

The Coachella Valley Water District (CVWD) proposes to construct and operate the Thousand Palms Flood Control Project (proposed Project), formerly known as the Whitewater River Basin Flood Control Project. The proposed Project consists of a series of flood control improvements designed to provide the maximum flood protection for developed and planned development areas in Thousand Palms and the vicinity to meet the Federal Emergency Management Agency (FEMA) 0.01 chance, or 100-year, flood event. The need for flood control has increased substantially in recent years due to continued growth and development in the Coachella Valley. The proposed Project is also designed to support continued aeolian (wind-driven) transport of sand to the Coachella Valley Preserve (or Preserve), where it forms habitat for the sensitive Coachella Valley fringe-toed lizard (CVFTL) (*Uma inornata*) (State-listed as endangered and federally listed as threatened). The proposed Project is linear in nature and is generally located on the northern and eastern margins of the community of Thousand Palms. Components of the proposed Project include levees, channels, culverts, and a sediment basin. The levees and channels would be comprised of compacted native soil with a layer of soil cement to protect the structures from erosion.

The U.S. Army Corps of Engineers (Corps) previously partnered with CVWD on this Project via the Corp's Civil Works Program; however, the Corp's involvement under this program terminated over 10 years ago. The current proposed action is a modified version of that Project. The Corps is now evaluating an application by CVWD for a Section 404 Clean Water Act permit that would allow CVWD to place dredged or fill material within waters of the United States (waters of the U.S.) as part of constructing this Project. This 404(b)(1) analysis is a required component of the permit review process and assesses alternatives from a Clean Water Act perspective in support of the Corps' permitting decision.

This Section 404(b)(1) Analysis considers the impacts to the aquatic environment resulting from construction and implementation of CVWD's preferred alternative as well as other alternatives that were considered during the alternatives formulation process and evaluated in the Draft Environmental Impact Report/Environmental Impact Statement (Draft EIR/EIS) for the proposed Project (CVWD/USACE 2020).

1.1 Project Background

In 2000, CVWD and Corps Planning prepared a Feasibility Report and Final EIS/EIR for the Whitewater River Basin Flood Control Project, with Corps Planning functioning as the Federal Lead Agency under NEPA and CVWD functioning as the CEQA Lead Agency. Corps Planning is no longer involved in the Project, and Corps Regulatory is currently functioning as the NEPA Lead Agency. The 2000 Final EIS/EIR determined that Alternative 6 was the Preferred Alternative based on the proposed action of providing sufficient flood control and environmental protection, avoiding disruption to aeolian (wind-driven) sand transport through the wind corridor, and could be designed to provide recreational opportunities in the form of equestrian and hiking trails along levee rights-of-way. Alternative 6 consisted of four earthen levees (no channels or detention basins) protected with soil cement west of Del Webb and included the purchase of 550 acres of floodway. However, due to funding restrictions the action was never implemented or constructed.

In 2011, Corps Planning initiated a revised project description to address development built in the Project area. Specifically, since finalization of the 2000 EIS/EIR, residential, institution, and recreational development has substantially expanded throughout the Project area (increasing the need for flood control).

The 2011 analysis was referred to as a Preliminary Draft Supplemental Environmental Assessment (SEA) and Mitigated Negative Declaration (MND). As a supplemental analysis, the Preliminary Draft SEA/MND tiered-

off the Final EIS/EIR, and characterized potential impacts of the Project, or "Proposed Action," in terms of how they would differ from impacts of Alternative 6, as characterized in the 2000 Final EIS/EIR. Each environmental issue area section in the Preliminary Draft SEA/MND discussed how impacts of the Proposed Action and alternatives would be the same or different from those discussed in the 2000 Final EIS/EIR and identified any new impacts that would be introduced as well as any previously identified impacts that would be avoided.

Due to federal funding restrictions, the design of the Project never progressed far enough to publish or finalize the 2011 SEA/MND, which remained in the "Preliminary Draft" phase. Therefore, the 2011 SEA/MND was considered an internal planning document and was not used to make any decision on the Project. Meanwhile, CVWD decided it was necessary to move forward with the design and construction of the Project to address the persisting flood hazard issues in the Thousand Palms area.

In early 2012, Corps Planning signed over authority of design of the Project to the CVWD, which is functioning as the CEQA Lead Agency for this EIR/EIS. Corps Regulatory now serves as the NEPA Lead Agency in preparation of this EIR/EIS, which will be used to support the Corps' decision-making process for the Section 404 Clean Water Act permit.

1.2 Section 404(b)(1) Regulatory Background

The goal of the Clean Water Act (CWA) Section 404(b)(1) Guidelines (Guidelines) developed by the U.S. Environmental Protection Agency (USEPA) is "to restore and maintain the chemical, physical, and biological integrity of waters of the United States through the control of discharges of dredged of fill material" [40 CFR (Code of Federal Regulations) § 230.1(a). The regulations set forth in 40 CFR Section 230 are the substantive criteria issued by the USEPA, used in evaluating discharges of dredged or fill material into waters of the U.S. The Guidelines provide regulations outlining measures to avoid, minimize, and compensate for impacts. The Guidelines impose four restrictions which must be satisfied in order to make a finding that a proposed discharge of dredged or fill material complies with the Guidelines [40 CFR § 230.10]. The Guidelines generally state that no discharge of dredged or fill material shall be permitted if:

1) *There is a practicable alternative to the proposed discharge which would have less adverse impacts on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.*
2) *The discharge would:*
    a. *Cause or contribute, after consideration of disposal site dilution and dispersion, to violations of any applicable State water quality standard.*
    b. *Violate any applicable toxic effluent standard or prohibition under Section 307 of the CWA.*
    c. *Jeopardize the continued existence of species listed as endangered or threatened under the Endangered Species Act of 1973, as amended, or result in the likelihood of the destruction or adverse modification of a habitat which is determined by the Secretary of the Interior or Commerce, as appropriate, to be a critical habitat under the Endangered Species Act of 1973, as amended; or*
    d. *Violate any requirement imposed by the Secretary of Commerce to protect any marine sanctuary designated under Title III of the Marine Protection, Research, and Sanctuaries Act of 1972.*

3) *The discharge would cause or contribute to significant degradation of waters of the US. Findings of significant degradation related to the proposed discharge shall be based upon appropriate factual determinations, evaluations, and tests required by the subparts B and G, after consideration of subparts C through F, with special emphasis on the persistence and permanence of the effects outlined in the subparts.*
4) *And, unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem.*

Under 40 CFR Section 230, an alternative is practicable "if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the overall project purpose".

If the proposed Project would involve a discharge into a special aquatic site, such as a wetland, the Guidelines distinguish between those projects that are water dependent and those that are not. A water dependent project is one that requires access or proximity to, or siting within, a special aquatic site to achieve its basic purpose, such as a marina. A non-water dependent project does not exhibit the same requirements, such as a housing development or wind farm.

The Guidelines establish two presumptions for non-water dependent projects that propose a discharge or a fill into a special aquatic site. First, it is presumed that there are practicable alternatives to non-water projects, "unless clearly demonstrated otherwise" [40 CFR § 230.10(a)(3)]. Second, "where a discharge is proposed for a special aquatic site, all practicable alternatives to the proposed discharge which do not involve a discharge into a special aquatic site are presumed to have less adverse impacts on the aquatic ecosystem, unless clearly demonstrated otherwise" [40 CFR § 230.10(a)(3)]. The intent of the Guidelines is that Applicants should design proposed projects to meet the overall project purpose while avoiding and minimizing impacts to the aquatic environment.

The Corps must evaluate alternatives that are practicable and reasonable. The Guidelines state "a permit cannot be issued if a practicable alternative exists that would have less adverse impact on the aquatic ecosystem (known as the Least Environmentally Damaging Practicable Alternative [LEDPA]), provided that the LEDPA does not have other significant adverse environmental consequences to other natural ecosystem components [40 CFR 230.10(a)].

In addition to requiring the identification of the LEDPA, the Guidelines mandate that no discharge of dredged or fill material shall be permitted if it causes or contributes to violations of any applicable State water quality standard [40 CFR § 230.10(b)(1)], violates any applicable toxic effluent standard or prohibition [40 CFR § 230.10(b)(2)], jeopardizes the continued existence of any endangered or threatened species (or destroys or adversely modifies critical habitat) [40 CFR § 230.10(b)(3)], or causes or contributes to significant degradation of waters of the U.S. [40 CFR § 230.10(c)].

1.3 Basic and Overall Project Purpose

1.3.1 Basic Project Purpose and Water Dependency Determination

The basic project purpose comprises the fundamental, essential, or irreducible purpose of the project, and is used by the Corps to determine if the project is water dependent. If a project is not water dependent, practicable alternatives that do not involve a discharge of fill into special aquatic sites are presumed to be available, unless clearly demonstrated otherwise. The basic project purpose for the proposed Project is "flood protection", which is not water dependent. The discharge of fill material is not proposed to occur in any special aquatic sites in the proposed Project area. Therefore, the presumption

that practicable alternative sites or designs that do not affect special aquatic sites are available does not apply to this assessment.

1.3.2 Overall Project Purpose

The overall project purpose serves as the basis for the 404(b)(1) alternatives analysis and is determined by further refining the basic project purpose in a manner that more specifically describes the applicant's goals for the Project and which allows a reasonable range of alternatives to be analyzed. The overall purpose for the proposed Project is to provide flood hazard protection to the maximum number of developed and planned development areas located within the FEMA-designated flood hazard zone in the Thousand Palms area while avoiding and minimizing adverse effects to wildlife and habitat and enhancing aeolian sand transport within the Coachella Valley Preserve.

1.4 Proposed Project Location

The Project is in the Thousand Palms area of the Coachella Valley in Riverside County, California. The unincorporated community of Thousand Palms is about ten miles east of the City of Palm Springs and immediately north of the City of Palm Desert (see Figure 1-1). Portions of the Coachella Valley are urbanized, with most development along the southern edge of the valley from the City of Palm Springs in the northwest to the Cities of Indio, Coachella, and La Quinta in the southeast. The only incorporated city on the north side of the Coachella Valley is the City of Desert Hot Springs, located north of Palm Springs (USACE, 2000).

The Coachella Valley is defined by the San Jacinto and Santa Rosa Mountains to the southwest and the Little San Bernardino Mountains to the north and northeast. The Coachella Valley slopes gradually from the San Gorgonio Pass toward the Salton Sea for approximately 40 miles. The Whitewater River is the main drainage course in the Coachella Valley, originating on the southern slopes of the San Bernardino Mountains and flowing in a southeasterly direction through the valley to the Salton Sea (USACE, 2000). The Coachella Valley is within the Colorado Desert (a subdivision of the larger Sonoran Desert) and the climate is hot and dry. Annual rainfall averages four inches but varies by location and from year to year. Common habitat types in the Coachella Valley include, but are not limited to, creosote bush scrub, desert saltbush scrub, desert wash, sand dunes and sand fields (CVAG, 2007).

Regional elevations range from about 30 feet above mean sea level (AMSL) near Indio to 1,614 feet AMSL at Edom Hill near the northwestern end of the Indio Hills. Elevations within the proposed Project area range from approximately 100 to 400 feet AMSL. Two segments of the San Andreas Fault are in the area. These include the Mission Creek Fault along the north edge of the Indio Hills and the Banning Fault along the south edge of the Indio Hills (USACE, 2000).

The Coachella Valley is influenced by infrequent seasonal heavy rains, and prevalent northwest winds (SLA, 1997). During rain events, sand and sediment is carried by flowing water (fluvial transport) from the surrounding hills and mountains and deposited in the Coachella Valley. The sand that has been introduced through fluvial deposition is often carried by the wind (aeolian transport) and deposited toward the southeast, throughout the valley. Sand that has been subject to aeolian transport is often referred to as blowsand, which is generally very fine sand that creates a loose and destabilized surface (SLA, 1996). The combined effect of the fluvial and aeolian transport of sand creates a series of sand formations that form dynamic and continuously altering environments. These sand formations include hummocks (mounds), dunes, and sandy plains. Many plant and wildlife species in the Coachella Valley are uniquely adapted to this type of habitat.

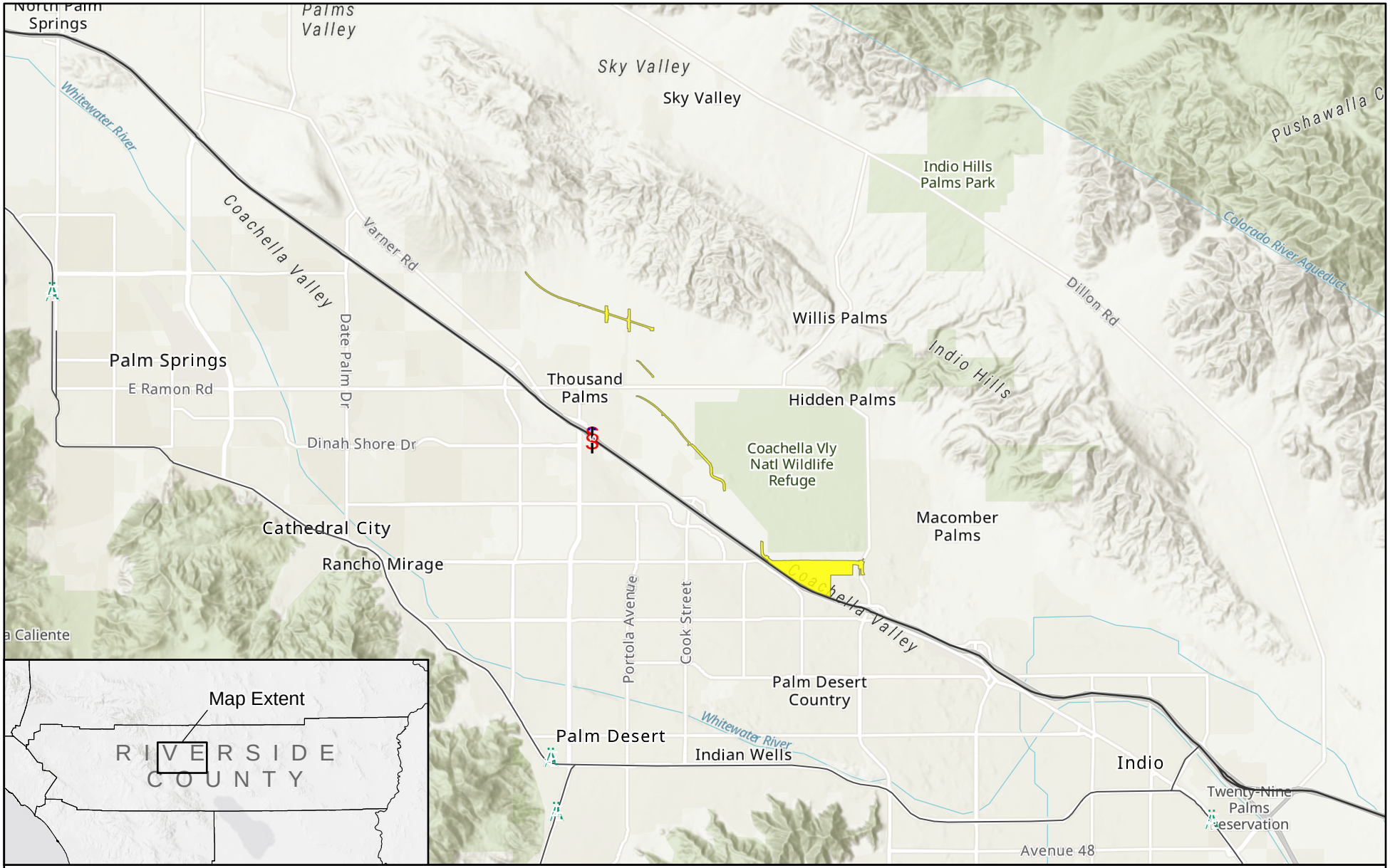


Figure 1-1

Proposed Project Vicinity

There are four main sand transport systems in the Coachella Valley that maintain blowsand habitat. These include the Thousand Palms, Whitewater Floodplain, Willow Hole, and Snow Creek systems. Each system is composed of sand source areas, fluvial transport zones, fluvial deposition/aeolian erosion areas, wind transport corridors, and aeolian sand deposition areas. The proposed Project area is located within the Thousand Palms system. Sand erodes from canyons and hillsides and is deposited onto alluvial plains. Strong winds blow through the Coachella Valley from the west and pick up the sand particles. Shrubs, structures, and topographic features slow the winds near the ground surface and the sand particles drop out and accumulate into dunes and hummocks.

Sand dunes increase and decrease over time, depending on the amount of sand being deposited and eroded by the wind. If upwind sources of sand are reduced or eliminated, wind deposition of sand will be insufficient to replace sand lost by wind erosion and dunes and hummocks will become depleted. This results in degradation or loss of suitable habitat for the CVFTL and other sand-dependent species. Maintenance of blowsand processes is therefore essential to sustaining habitat for these species.

The proposed Project area also lies within the area covered by the Coachella Valley Multiple Species Habitat Conservation Plan/Natural Community Conservation Plan (CVMSHCP/NCCP) and partly within the Thousand Palms Conservation Area as identified in the CVMSHCP/NCCP.

2.0 Formulation of Project Alternatives

This section describes the alternatives formulation process that was used to develop an array of alternatives for screening from a Clean Water Act permitting perspective under the 404(b)(1) guidelines. The alternatives screened for the 404(B)(1) analysis generally parallel the screening that has been done previously by the Corps and CVWD as part of the overall project development history. The alternatives described below are screened under the 404(b)(1) guidelines in later sections of this analysis.

2.1 Alternatives Formulation Background

Flooding and related problems in the Whitewater River Basin, including Coachella Valley, have been intermittently studied by the Corps Planning Division (Los Angeles District) since the Flood Control Act of 1937 authorized a survey for flood control in the entire area of the Whitewater River. A reconnaissance phase for the proposed Project was completed in 1992. During that phase, the Corps investigated flood-related problems along the entire reach of the Whitewater River and determined that a federal interest existed relating to the provision of flood protection in the Thousand Palms area.

The Corps certified the Reconnaissance Report in October of 1993, giving the Los Angeles District authority to move into the feasibility phase. The purpose of the feasibility phase was to describe and evaluate alternative plans for flood protection in the Project area and to select a preferred alternative.

In 2000, CVWD and the Corps prepared a Feasibility Report and Final EIS/EIR for the Whitewater River Basin Flood Control Project. The Feasibility Study and the subsequent concurring report from the Corps' Chief of Engineers determined that Alternative 6 was the Preferred Alternative based on the proposed flood control and environmental protection elements provided, including avoiding disruption to aeolian (wind-driven) sand transport through the wind corridor. Alternative 6 consisted of four earthen levees (no channels or detention basins) protected with soil cement along some of the levees and included the purchase of 550 acres of floodway. However, due to funding restrictions the action was never implemented or constructed.

In anticipation of the Project's eventual implementation, the Corps maintained coordination efforts with local land developers and regulatory agencies to ensure consistency of the Project with other projects in the area. Specifically, the Corps proceeded in coordination with Xavier College Preparatory High School, a portion of which would be traversed by Reach 3, and with the Berger Foundation regarding the Classic Club Golf Course, into which Reach 3 would direct stormwater flows.

In 2011, the Corps developed a revised project description to address development built in the Project area. Specifically, since finalization of the 2000 EIS/EIR, residential, institution, and recreational development has substantially expanded throughout the Project area, increasing the need for flood control.

The 2011 analysis was evaluated in a Preliminary Draft Supplemental Environmental Assessment (SEA) and Mitigated Negative Declaration (MND). As a supplemental analysis, the Preliminary Draft SEA/MND tiered-off the Final EIS/EIR, and characterized potential impacts of the Project, or Proposed Action, in terms of how they would differ from impacts of Alternative 6, as characterized in the 2000 Final EIS/EIR. Each environmental issue area section in the Preliminary Draft SEA/MND discussed how impacts of the Proposed Action and alternatives would be the same or different from those discussed in the 2000 Final EIS/EIR and identified any new impacts that would be introduced as well as any previously identified impacts that would be avoided.

Due to federal funding restrictions, the design of the Project never progressed far enough to publish or finalize the 2011 SEA/MND, which remained in the "Preliminary Draft" phase. Therefore, the 2011 SEA/MND was considered an internal planning document and was not used to make any decision on the Project. Meanwhile, CVWD decided it was necessary to move forward with the design and construction of the Project to address the persisting flood hazard issues in the Thousand Palms area without the Corps' active involvement in the project development process. The Corps' involvement shifted from a planning, design, and construction role for the Project to a regulatory role under the Clean Water Act.

The alternatives resulting from previous planning efforts to be screened under the 404(b)(1) guidelines include the following and are further described below.

Alternatives Evaluated in the 2021 EIR/EIS:

- Alternative 1 (Preferred Project)
- Alternative 2: Removal of Reach 2 Alignment
- Alternative 3: Modified Reach 3 Alignment-Option A
- Alternative 3: Modified Reach 3 Alignment-Option B
- No-Action Alternative

Previous Alternatives Considered:

- Previously Approved Project (1999 Feasibility Study)
- Complete Channelization Alternative
- I-10 Channel Alternative
- Detention Basins Alternative
- Reach 1 South of Utility Corridor Alternative
- Continuous Reach 1 Alternative
- Straight Reach 3 Alternative
- Reach 3 With Debris Basin
- Reach 3 Paralleling Classic Club Golf Course
- Reach 3 West of Xavier High School Alternative
- Reach 1 Culverts Alternative
- Non-Structural Alternative
- Off-site alternatives

2.2 Description of Alternatives Screened

The following describes the range of alternatives that were evaluated within this 404(b)(1) alternatives analysis. Each of the alternatives considered by CVWD are described below. In addition, information is provided for the initial high-level screening of the alternatives to determine whether there are any substantial issues associated with the alternative in question that warrant withdrawing the alternative from further screening. Table 2.1-1 provides an initial screening of the various alternatives that have been considered for analysis in this document. Alternatives were evaluated and considered based on several factors related to the purpose and need, practicability, available technology, and others. If the alternatives did not meet the screening criteria they were eliminated from further analysis.

Table 2.1-1. Alternative Screening Criteria

Alternative	Passes Initial Screening	Meets Project Purpose	Practicable-Logistics	Practicable-Available Technology	Practicable-Cost	Evaluate for LEDPA
Alternative Evaluated in the EIR/EIS						
Alternative 1 (Preferred Project)	Y	Y	Y	Y	Y	Y
Alternative 2: Removal of Reach 2 Alignment	N	N	Y	Y	Y	Y
Alternative 3: Modified Reach 3 Alignment – Option A	N	N	Y	Y	Y	N
Alternative 3: Modified Reach 3 Alignment – Option B	N	N	Y	Y	Y	N
No-Action Alternative	N	N	N	N	N	N
Other Alternatives						
Previously Approved Project (1999 Feasibility Study)	N	N	N	Y	N	N
Complete Channelization Alternative	N	N	N	Y	N	N
I-10 Channel Alternative	N	N	N	Y	N	N
Detention Basins Alternative	N	N	N	Y	Y	N
Reach 1 South of Utility Corridor Alternative	N	N	N	Y	N	N
Continuous Reach 1 Alternative	N	N	N	Y	N	N
Straight Reach 3 Alternative	N	N	N	Y	N	N
Reach 3 With Debris Basin	N	N	N	Y	N	N
Reach 3 Paralleling Classic Club Golf Course	N	N	N	Y	N	N
Reach 3 West of Xavier High School Alternative	N	N	N	Y	N	N
Reach 1 Culverts Alternative	N	N	N	N	N	N
Non-Structural Alternative	N	N	N	N	N	N
Off-site alternatives	N	N	N	N	N	N

2.2.1 Alternative 1 (Preferred Project)

Alternative 1 is comprised of four individual reaches that would tie into existing flood control features including the floodway at the Classic Club Golf Course and the existing channel in the Del Webb/Sun City residential development located on the east side of Washington Street (see Figure 2-1). Implementation of Alternative 1 would protect the most undeveloped and developed areas on the alluvial fan downstream of proposed Project features. Areas located above Reach 1 would remain subject to flooding from Long Canyon and Morongo Wash, including various industrial facilities (CalPortland cement plant, Desert Recycling Center), residences along the northernmost areas of Desert Moon drive and Via Las Palmas, and open undeveloped lands, including the Coachella Valley Preserve.

Alternative 1 includes levees, channels, culverts, and a sediment basin (at the end of Reach 1). Soils generated by the implementation of Alternative 1 would either be used to construct the levees or disposed of offsite. All levees would have an underground "toe" (levee toe) extending to a depth of approximately 15 feet. The top, upstream/northern sides and the toe of the levees would be covered with soil cement, while the southern/downstream side would be comprised of earthen materials (soil). Soil cement is a compacted high-density mix of pulverized native rocks and soils bonded with cement and water that is highly resistant to erosion while maintaining an earthen color. The channels would also be fully lined with soil cement to protect the structures during large flow events.

- **Reach 1.** Reach 1 (see Figure 2-2) is comprised of an approximately 12,700-foot long (2.4 miles) levee (Levee 1). Water and sediment from the Indio Hills would flow naturally toward Reach 1 and be diverted to the 550-acre floodway located at the terminus of Reach 1 (described below). The height of Levee 1 would vary from 5 feet to 14 feet depending on topography and ground slope and be designed to accommodate a 100-year flood event. A minimum 12-foot access (patrol) road would be constructed on the top of the levee and an unpaved access road would be located on the downstream (west side) of the levee to support operations and maintenance (O&M) activities. Levee 1 would range from 75 to 100 feet in width and initiate approximately 0.1 mile to the east of the intersection of 28th Avenue and Rio del Sol Road, on the south side of 28th Avenue, and extend in an east-southeasterly direction. The levee would generally run parallel and north of an existing Southern California Edison (SCE) utility corridor. Levee 1 would cross Sierra del Sol, Desert Moon Drive, and Via Las Palmas. Culverts and road crossings of the levee would be constructed at Desert Moon Drive and Via Las Palmas.

  The proposed alignment of Reach 1 would cross 37 non-residential properties and 7 residential properties. These properties would need to be obtained by the CVWD in order for this reach to be constructed. The limits of land acquisition depend on the percent of the parcel crossed by the final Project alignment and the temporary construction access needs. If the existing use of any parcel impacted by the proposed Project cannot be maintained, the entire parcel may be acquired.

  Sediment Basin. A sediment basin would be installed at the downstream end of Reach 1 in order to trap sediment, slow the velocity of stormwater flow across the Coachella Valley Preserve, and avoid adverse effects associated with erosion or channel migration (see Figure 2-2). The sediment basin would be approximately 2.1 acres in size and would consist of an excavated basin with riprap protection on the upstream side. The sediment basin would also induce deposition of fluvially-transported sediment on the wind corridor for natural transport onto the Preserve. Storm water directed by Reach 1 would flow through the sediment basin, overland in a southeast direction towards Reaches 2 and 3, described below.

  Road Crossing. Roads would be constructed over the Reach 1 levee at Via Las Palmas and at Desert Moon Drive to maintain access between the communities north and south of Levee 1. The road crossings would generally match the width of the existing roadways and be consistent with Riverside

County standards. The design speed is 35 miles per hour (mph) at Via Las Palmas and 25 mph at Desert Moon Drive. The road crossings are designed to have the smallest permanent footprint to minimize impacts to sand migration.

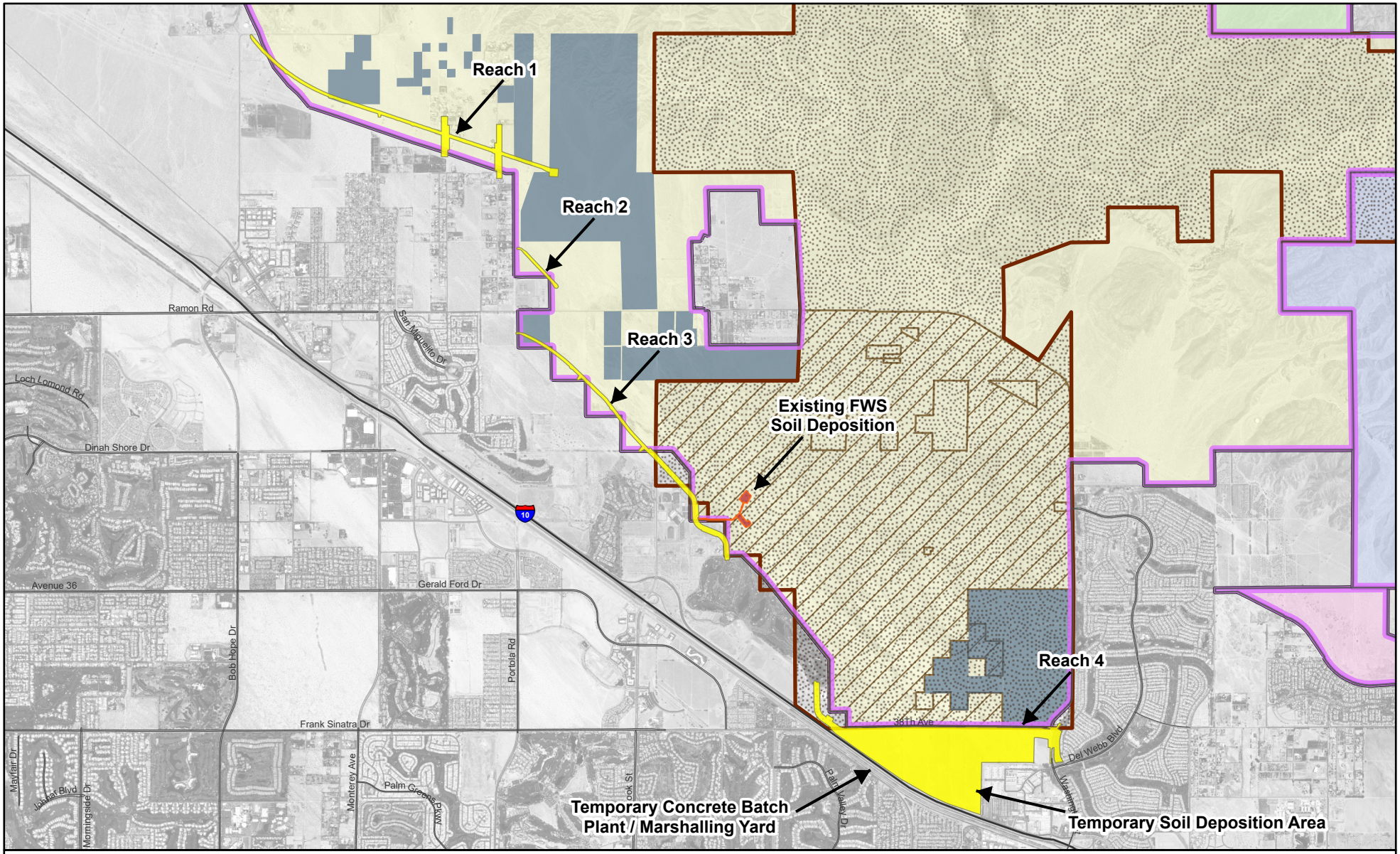


Figure 2-1

Preferred Project (Alternative 1) Alignment

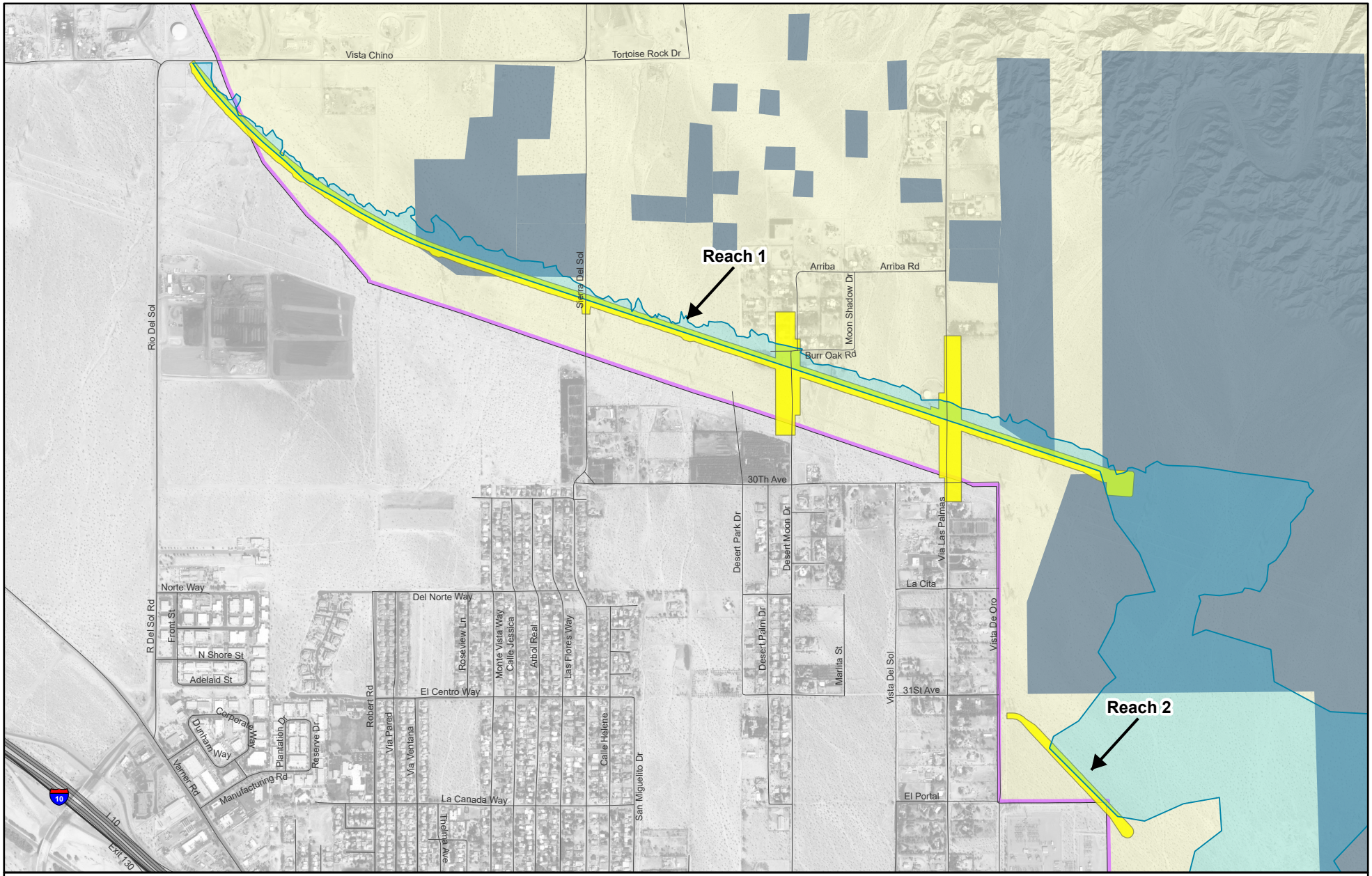


Figure 2-2

Alternative 1:
Reach 1 and 2 Alignment

Reservoir 4602. Reservoir 4602 is an existing above ground water tank owned and operated by CVWD. The reservoir is located west of Via Las Palmas and north of the proposed Reach 1 alignment. The reservoir is protected by a small berm with established vegetation and would be protected and maintained in-place during construction of the proposed Project. Additional flood protection may be provided in the future to ensure the integrity of the structure after the construction of Reach 1.

- **Reach 2.** Reach 2 (see Figure 2-2) is comprised of an approximately 1,700-foot long (0.32 mile) levee (Levee 2) with a height of approximately 5 feet. The levee would range from 12 to 135 feet in width and is positioned in the mid-alluvial fan just northeast of SCE's Mirage Substation to protect the substation and to facilitate the diversion of water in a southeasterly direction. A minimum 12-foot access (patrol) road would be constructed on the top of the levee and an unpaved access road would be located on the downstream (west side) of the levee to support O&M activities. Levee 2 is aligned in the direction of the prevailing wind to avoid interference with aeolian transport in this area. Reach 2 would capture large storm events from Reach 1 and direct flow towards Reach 3.

  The proposed alignment of Reach 2 would cross 3 non-residential properties. These properties would need to be obtained by the CVWD in order for this reach to be constructed. As noted above, the limits of land acquisition depend on the percent of the parcel crossed by the final Project alignment and the temporary construction access needs. If the existing use of any parcel impacted by the proposed Project cannot be maintained, the entire parcel may be acquired.

- **Reach 3.** Reach 3 (see Figure 2-3) is comprised of an approximately 6,500-foot long (1.2 miles) levee (Levee 3) and a 5,300-foot long (1.0 mile) incised trapezoidal channel lined with soil cement (Reach 3 Channel). A minimum 12-foot wide access road would be located on top of the levee and an unpaved access road would occur on the downstream (west side) of the levee. Levee 3 would vary from approximately 5 feet to 14 feet in height depending upon the topography and ground slope in order to accommodate the volume and velocity of water associated with the 100-year flood event. Levee 3 would range from 12 to 200 feet in width and initiate 1,000 feet south of East Ramon Road and approximately 2,000 feet southwest of the downstream end of Levee 2. Reach 3 would cross natural lands, private lands owned by Xavier College Preparatory High School, portions of the Coachella Valley Preserve/Coachella Valley National Wildlife Refuge (or Refuge), and the Pegasus Riding Academy. As noted above, the limits of land acquisition depend on the percent of the parcel crossed by the final Project alignment and the temporary construction access needs. If the existing use of any parcel impacted by the proposed Project cannot be maintained, the entire parcel may be acquired. Although not constructed, new residential developments have been proposed south of Reach 3; however, the proposed Project alignment is not expected to interfere with these developments should they occur.

  An existing earthen berm located approximately one-half mile north of Xavier High School would also be crossed by Reach 3. This berm would be crossed where the reach transitions from a levee to a channel configuration. At the terminus of Reach 3 the channel would divert flows into an existing storm water conveyance system located on the Classic Club Golf Course before connecting to Reach 4.

  The transition of Reach 3 to a channel configuration is intended to minimize land use conflicts with athletic fields located at Xavier College Preparatory High School and to minimize the disruption to aeolian sand transport patterns. The channel configuration would curve around the athletic fields, whereas a levee would need to maintain a straighter alignment through the high school property to maintain storm conveyance.

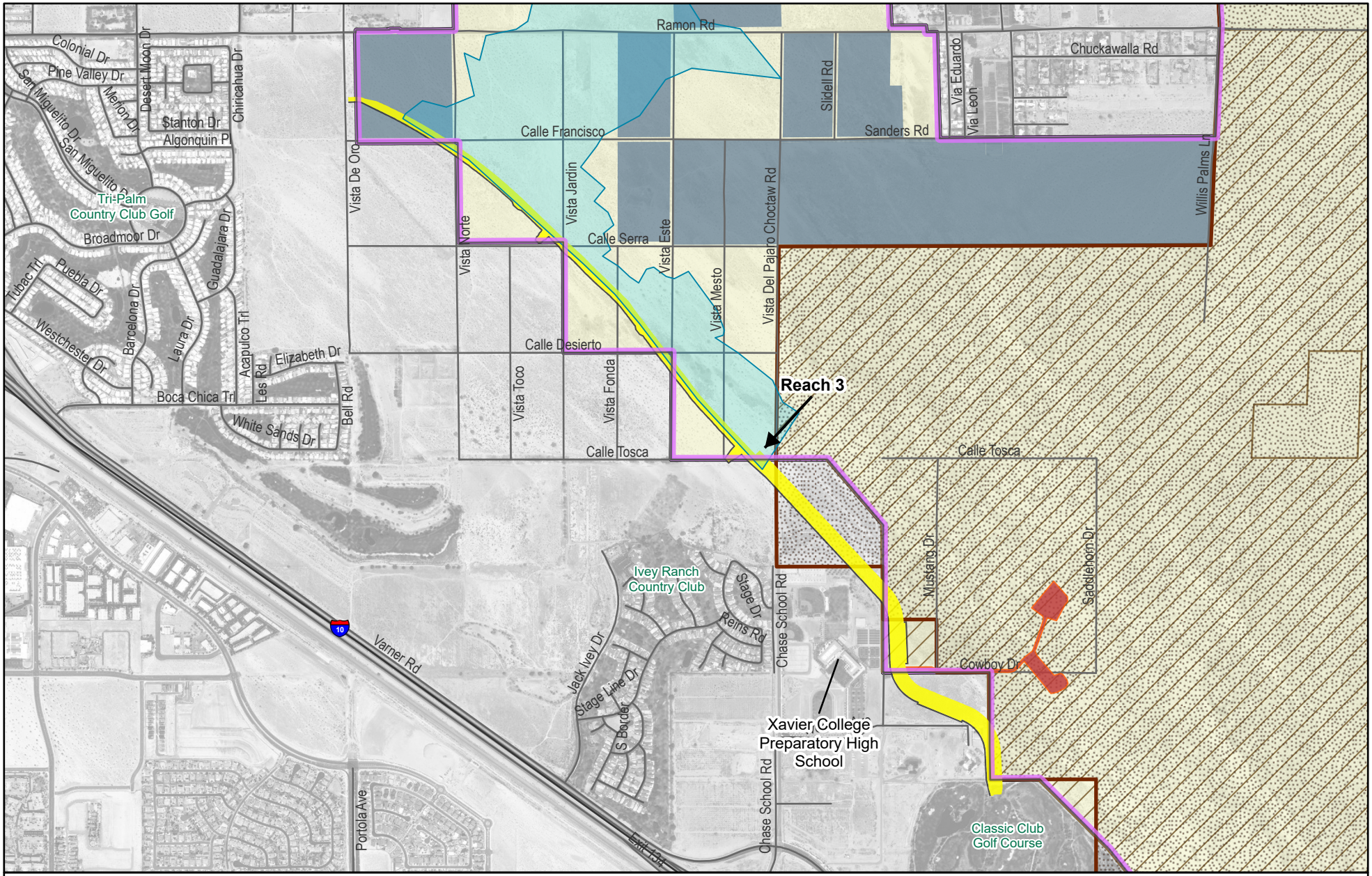


Figure 2-3

Alternative 1: Reach 3 Alignment

The curved channel configuration would minimize disruptions to sand migration onto the Preserve/ Refuge because, in comparison to a levee design, the channel would not create a vertical obstruction to sand migration (with the exception of a short length of Reach 3 Channel where the embankment would be approximately 3 feet high). Sand that blows into the channel or is deposited during storm events would be removed from the channel and placed on the active wind corridor for natural migration onto the Preserve/Refuge.

Storm flows leaving Reach 3 would flow into the existing stormwater conveyance system located within the Classic Club Golf Course.

- **Reach 4.** Reach 4 (see Figure 2-4) is comprised of an approximately 10,300-foot long (2.0-mile) incised trapezoidal channel (Reach 4 Channel). The Reach 4 Channel would range from 200 to 350 feet in width and convey stormwater flows from the southeast end of the Classic Club Golf Course and continue south then east, adjacent to the south of the existing alignment of Avenue 38. The channel would span a fallow jojoba farm and be immediately adjacent to the Preserve/Refuge. The Riverside County Board of Supervisors previously approved the realignment of Avenue 38 as a County project which would move Avenue 38 adjacent and south of the proposed Reach 4 Channel. Realignment of the road would now occur as a component of the proposed Project, where CVWD would build two of the four proposed lanes, including shoulders and gutters. The Reach 4 Channel would terminate at Washington Street and tie into existing stormwater conveyance facilities located in the Del Webb / Sun City development (see "Washington Street Crossing" discussion below).
- **Washington Street Crossing.** At Washington Street the proposed Project would include construction of a conveyance system to direct stormwater flows under Washington Street and into an existing stormwater conveyance system with the capacity to transmit Project-related flows (see Figure 2-4). The maximum area that could be affected by this crossing is estimated to be 5 acres, accounting for any road realignment that may be necessary. On the downstream side of the Washington Street crossing, an existing stormwater basin (Sun City Collection Basin) would be deepened (excavate approximately 9,000 cubic yards [CY]) to accommodate flows diverted by the proposed Project. This basin is currently landscaped and would be fully restored to conditions agreed to by the Sun City development following completion of the proposed Project. The southbound side of Washington Street, south of the realigned Avenue 38 and just north of Las Montanas Road/Del Webb Blvd., where the current road is three lanes (one southbound and two northbound), would be widened as part of the proposed Project to make it easier to turn on and off of the relocated Avenue 38.
- **Floodway.** The proposed Project includes acquisition of an approximate 550-acre floodway located along the levees and in the active wind corridor between Reach 1 and Reach 3 (see Figure 1-3). Development would be prohibited in this floodway to protect the wind corridor and limit disruptions to sand migration. Drainages located within the floodway would be preserved and would receive additional flow as larger storm events convey flow along the floodway. In addition, it is likely that new channels will form within this area as flows coalesce on the face of the levee and convey flow to downstream areas. During O&M of the proposed Project suitable material (e.g., fine sands) that accumulate along the levees and channels would be excavated and distributed in the floodway area for natural distribution onto the Preserve or placed in the proposed U.S. Fish and Wildlife Service (USFWS) sediment disposal area (see Figure 2-5).

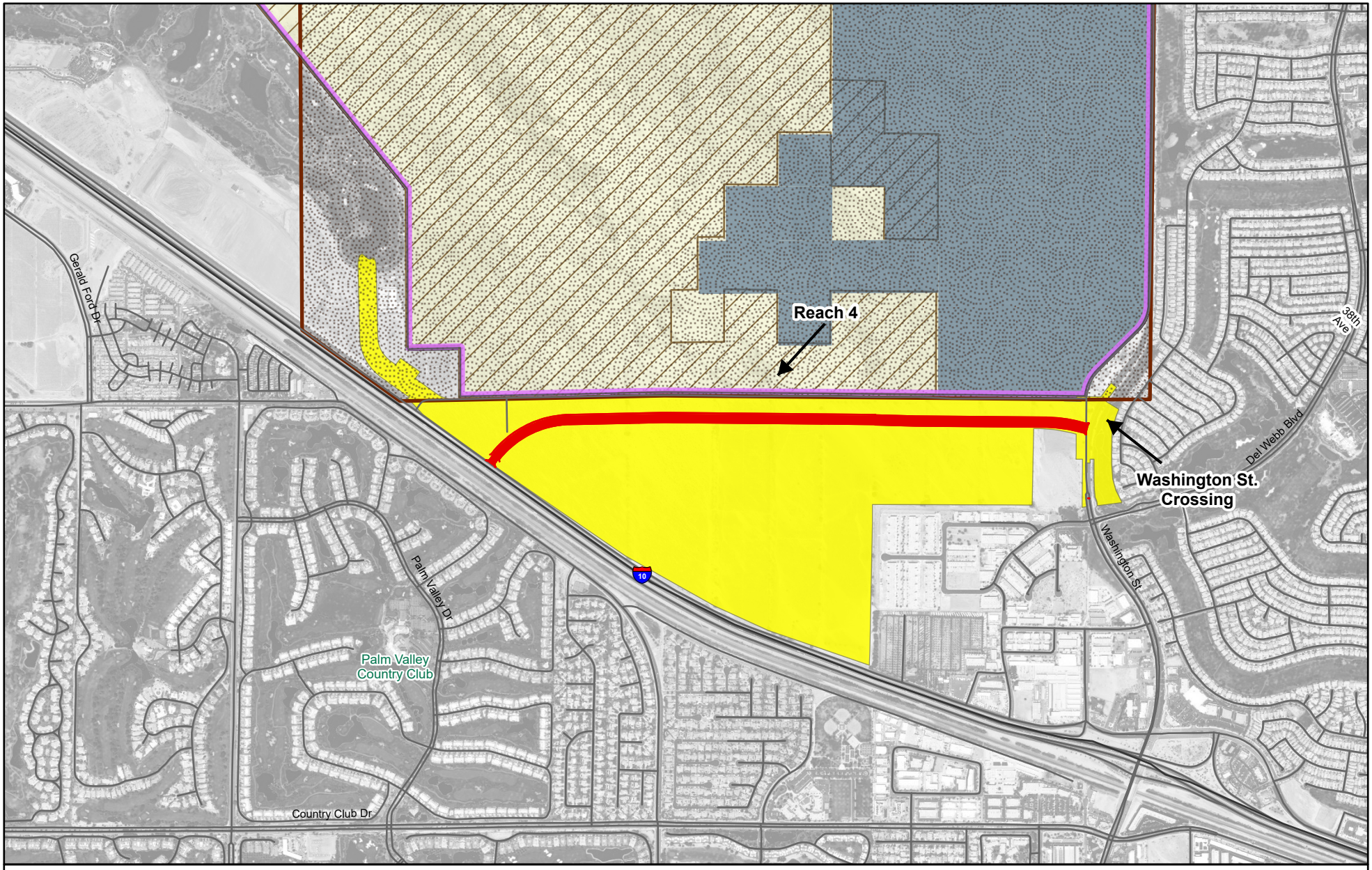


Figure 2-4

Alternative 1: Reach 4 Alignment

Initial Screening

This alternative represents the culmination of a long-term alternatives development process that occurred for the purpose of addressing the flood risk situation in the Thousand Palms area. This alternative has incorporated refinements that have been developed since the 1999 Feasibility Study was completed to address changes in land use in the project area and other conditions that affect the siting, alignment, and design of project features. For this reason, as CVWD's preferred alternative, this alternative was brought forward for further screening and analysis.

2.2.2 Alternative 2: Removal of Reach 2 Alignment

Under this alternative Reach 2 would not be constructed. Reaches 1, 3, and 4 would be implemented as described for the proposed Project (see Figure 2-6).

Initial Screening

This alternative was considered in an effort to reduce impacts to waters of the U.S. by removing a levee in an area with lower risk to housing. However, under this alternative the existing Mirage Substation would not receive flood protection other than an existing berm which currently protects the site. In the event of a 100-year flood event, with current levels of protection, the substation would become partially inundated (NHC, 2017). Residences to the southwest are not anticipated to be inundated during a 100-year flood event (NHC, 2017). However, removing this reach could increase potential flood risk to downstream areas and would not meet the purpose and need of the project. For this reason, this alternative was removed from consideration in this document.

2.2.3 Alternative 3: Modified Reach 3 Alignment Option A

Under this alternative, Option A would tilt Reach 3 approximately six to 10 degrees to the west/southwest away from the active wind corridor. Reaches 1,2, and 4 would be implemented as described for the proposed Project (Figure 2-7).

Initial Screening

This alternative was considered in an effort to reduce impacts to waters of the U.S. by avoiding several large ephemeral drainages that occur along the Reach 3 alignment. However, this alternative decreases the flood protection for the area and conflicts with the purpose and need of the project. Because of the shifting alluvial fans in the area, it is difficult to predict flood flow paths with certainty. Reach 3, as well as the other project features, were designed to maximize the interception of flood flows while accommodating the dynamic nature of alluvial systems. For this alternative, the northwestern end of the Reach 3 levee would be lowered by 10 degrees to avoid impacts to ephemeral washes. However, by implementing this alternative the modified Reach 3 may not be able to intercept flows coming from Reaches 1 and 2 and flows that may travel westward near the downstream edges of the alluvial fans, across Vista de Oro, south of Ramon Road. Due to the anticipated shifting of coalescing alluvial fan flows and their unpredictable flow path, even a minor relocation of the end of Reach 3 south or east of its proposed location reduces the ability of the Reach 3 levee to effectively intercept flows toward Vista de Oro, which would result in potential flooding to the existing community and future planned developments protected by Reach 3. Any deviation in the Reach 3 proposed location would diminish the project's ability to achieve the Project objectives and presents a significant risk and liability to community. For these reasons, this alternative was removed from consideration in this document.

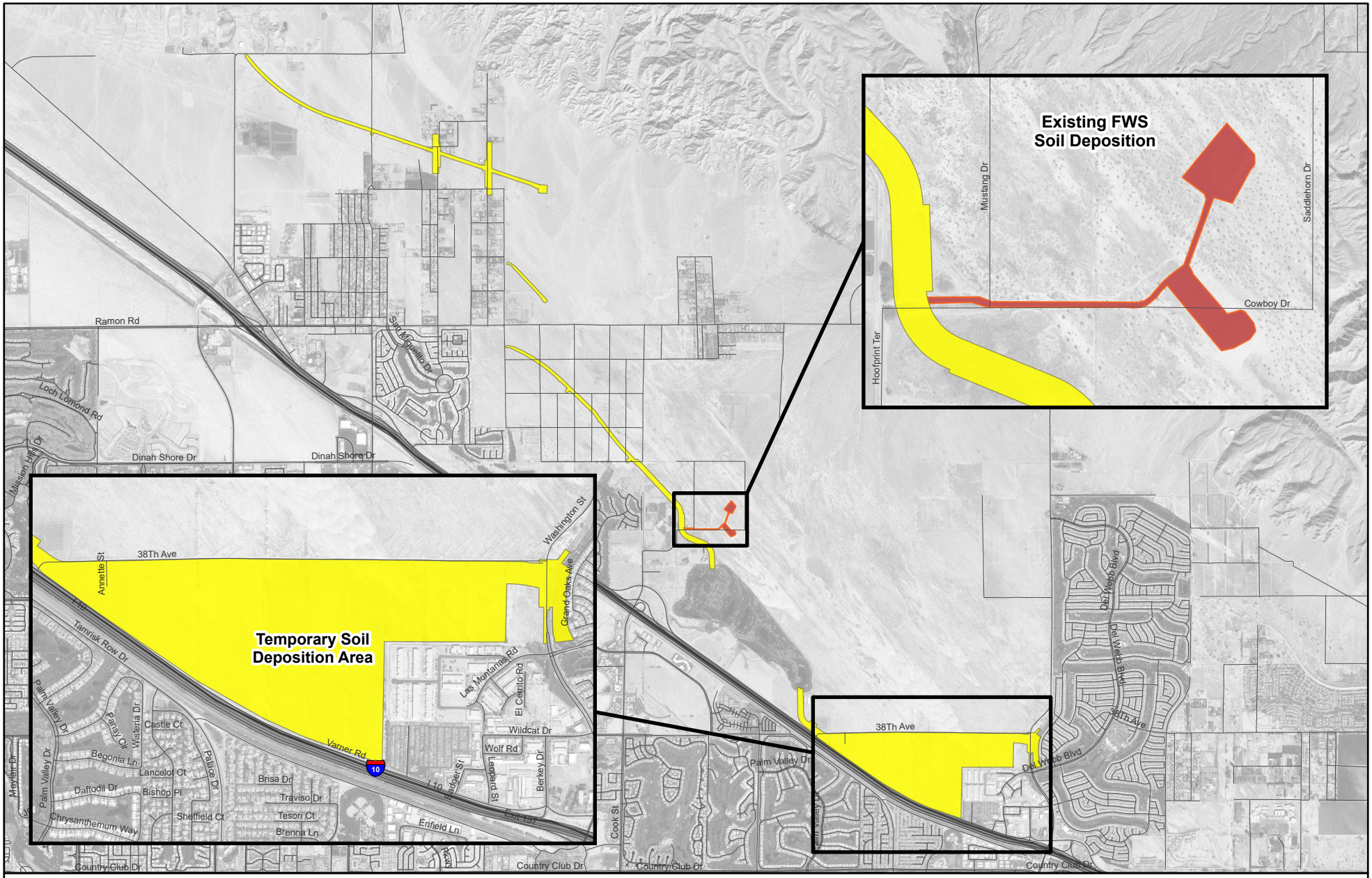


Figure 2-5

Sand Disposal Areas

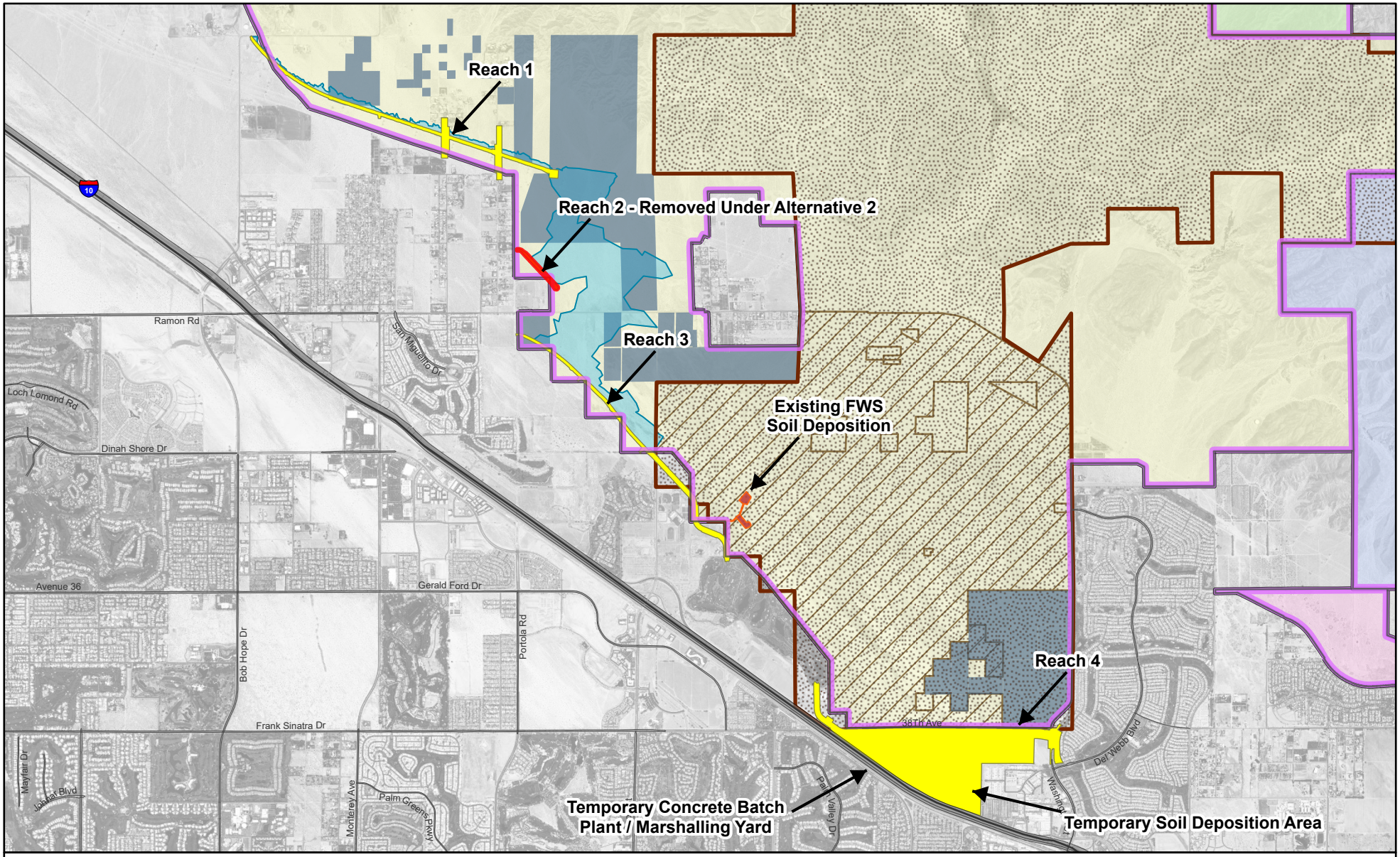


Figure 2-6

Alternative 2:
Removal of Reach 2 Alignment

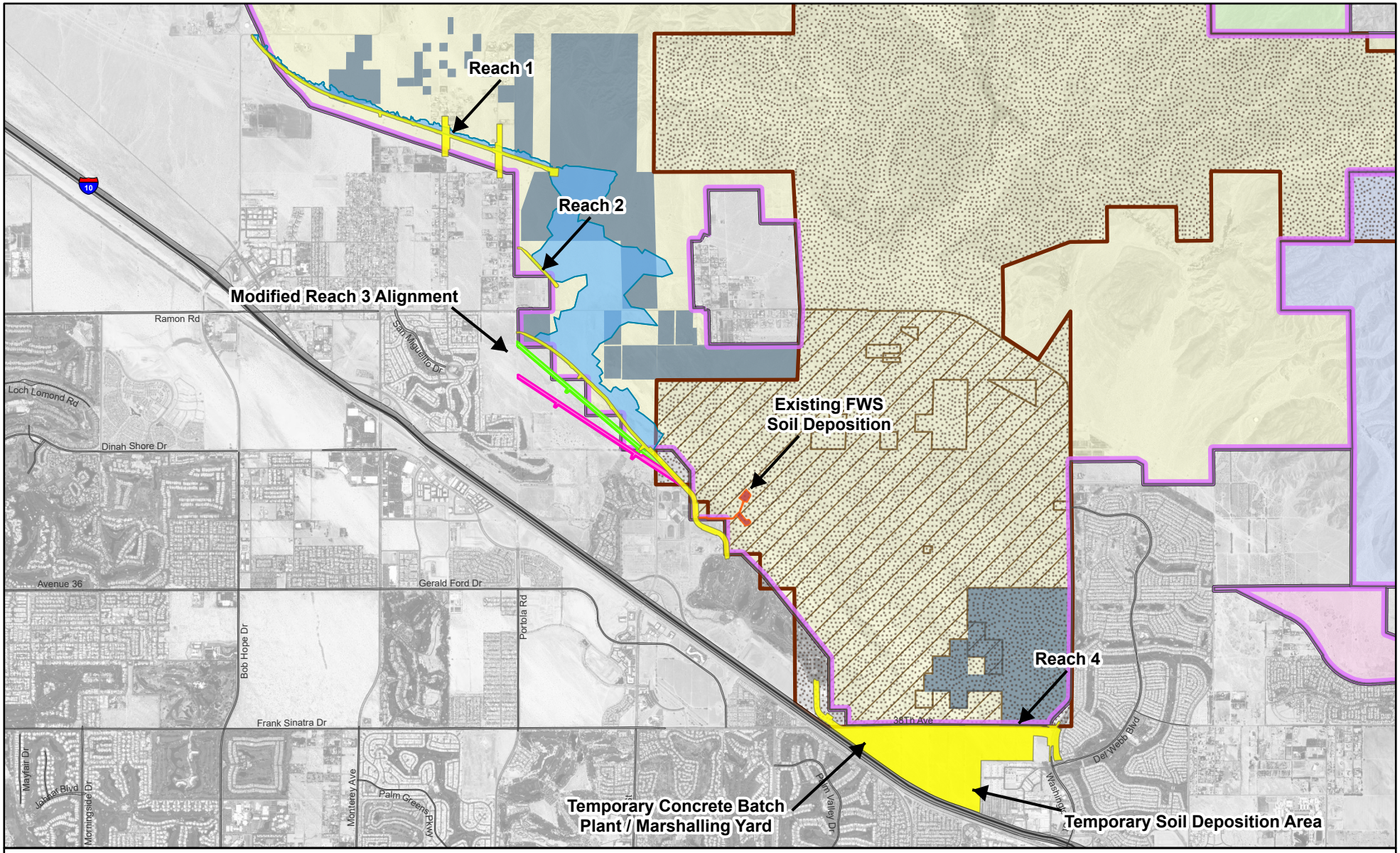


Figure 2-7

Alternative 3: Modified Reach 3 Alignment

2.2.4 Alternative 3: Modified Reach 3 Alignment Option B

Under this alternative, Option B would tilt Reach 3 approximately 17 degrees to the west/southwest away from the active wind corridor. Reaches 1,2, and 4 would be implemented as described for the proposed Project (Figure 2-7).

Initial Screening

This alternative was considered in an effort to reduce impacts to waters of the U.S. by avoiding several large ephemeral drainages that occur in or near the Reach 3 alignment. Under this alternative the Reach 3 levee would be lowered by 17 degrees. Similar to Alternative 3: Modified Reach 3 Alignment Option A this alternative pose potential flood risks for the region. Under this alternative the modified Reach 3 would increase the areas where flood flows could bypass the Reach as they flow from Reaches 1 and 2, and other upstream areas. Any deviation in the Reach 3 proposed location would diminish the project's ability to achieve the Project objectives and presents a significant risk and liability to the community. For these reasons, this alternative was removed from consideration in this document.

2.2.5 No-Action Alternative

Under the No Action alternative, construction and operation of the Project would not occur and existing conditions related to flood hazard would continue to persist. Without the Project or additional flood protection, potentially catastrophic flooding would continue to threaten the Thousand Palms area, potentially resulting in the destruction of property and possibly loss of life. In the absence of the Project, new construction on properties in flood hazard areas would continue to be subject to flood-proofing requirements imposed by Riverside County. Due to the ongoing hazard, other flood protection strategies may be proposed in the future to address the area's flooding problem. Properties currently included in Federal Emergency Management Agency (FEMA) Flood Hazard Areas would continue to be included in such areas, and potentially required to purchase flood insurance.

Initial Screening

This alternative is a required element for the EIR/EIS analysis and was brought forward for further screening and analysis.

2.2.6 Previously Approved Project

The 1999 Final EIS/EIR prepared by the Corps identified Alternative 6 as the Preferred Alternative. The Previously Approved Project is an earlier iteration of the current Project and includes structural changes and a shift in the alignment of some Project features to account for updated baseline conditions. In addition, the current proposed Project has eliminated temporary disturbance areas on the upstream side of Project features in order to minimize potential effects on the Coachella Valley Preserve (Preserve), the Coachella Valley National Wildlife Refuge (Refuge) and waters of the U.S.

The Previously Approved Project consists of levees with no channels. Levees 2 through 4 would be set back approximately 500 feet from the boundary of the Preserve to assure 100-year flows are not increased on the Preserve and that scour (i.e., removal of sediment caused by swift-moving water) is not induced on the Preserve as a result of the levee (USACE, 2000). In comparison, Reaches 3 and 4 of the proposed Project define portions of the Preserve boundary, as provided in the current MSHCP which was approved and permitted in 2008 (Figure 2-8). The Previously Approved Project is summarized below.

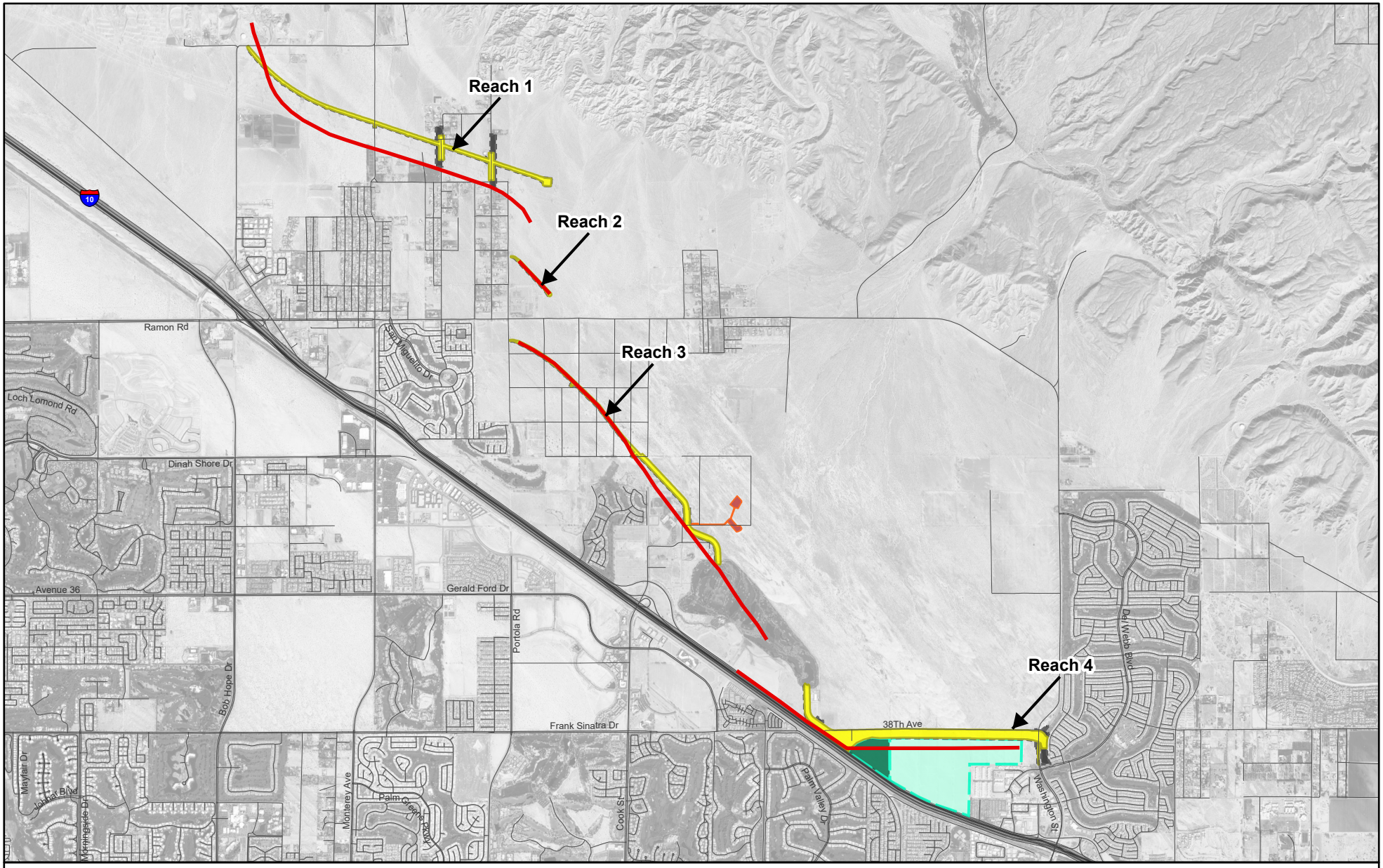


Figure 2-8

Comparison of 2020 and 2000 Alignments

- **Levee 1.** This levee**,** referred to in the 2000 document as the "Transmission Corridor Levee", would be located within an existing SCE utility corridor, specifically along the Devers-Palo Verde 500-kV No. 2 (DPV2) Transmission Line Project right-of-way. Levee 1 would initiate near the junction of Rio Del Sol Road and 28th Avenue and terminate east of Via Las Palmas.
- **Levee 2.** This levee, referred to in the 2000 document as a "Wind Corridor Levee", would have the same alignment as Reach 2 of the proposed Project.
- **Levee 3.** This levee, also referred to in the 2000 document as a "Wind Corridor Levee", would begin approximately 2,000 feet south of Levee 2 and runs along the south side of the wind corridor to the western and southwestern boundary of the Preserve. In comparison with Reach 3 of the proposed Project, this levee would continue through the Classic Club Golf Course. Levee 3 would also traverse a larger portion of Xavier High School than would Reach 3 of the proposed Project. When the 2000 Final EIS/EIR was prepared neither the golf course or the high school had been constructed. Levee 3 also did not transition into a channel, as it would under the proposed Project.
- **Levee 4.** This levee, referred to in the 2000 document as the "Cook Street Levee", would run along the north side of I-10 and across the southern boundary of the Preserve. The levee for the proposed Project would be located north of the Cook Street Levee slightly below Avenue 38.

Initial Screening

The Previously Approved Project was eliminated from consideration for further analysis due to land use conflicts associated with changes in baseline conditions that occurred since this alternative was considered in 2000. Since that time the Xavier High School and the Classic Club Golf Course have been constructed. The alignment of the Previously Approved Project would result in direct impacts to Xavier High School and the Classic Club Golf Course. This would require the acquisition of a substantial portion of both properties and the golf course would no longer support recreation. In addition, the alignment of Levee 1 would overlay a designated SCE utility corridor supporting existing gas and transmission lines. Construction of the Previously Approved Project would result in substantial impacts to the local community and disrupt existing land uses. Because the purpose and need of the proposed action is to protect the community of Thousand Palms from flood hazard this alternative was eliminated from further consideration in this document.

2.2.7 Complete Channelization Alternative

The 2000 EIR/EIS assessed a Complete Channelization Alternative which was also evaluated in the 1999 Feasibility Study (Figure 2-9). This alternative included an extensive network of channels supplemented with levees to direct surface runoff from the Long Canyon area (north-northwest of the proposed Project facilities) through the existing Del Webb / Sun City development (east of the proposed Project facilities) into the Coachella Canal siphon near Madison Street (south-southeast of the terminus of proposed Project facilities at Washington Street). Downstream of the Del Webb / Sun City development flows would be guided to the existing Coachella Canal siphon by a 2.5 mile, 7-foot tall levee. At the siphon crossing, flows would enter the Thousand Palms Wash channel which converges with the Whitewater River downstream of I-10. The walls and existing levees surrounding the siphon would be raised from 8 to 10 feet in height to accommodate increased flows. Major components of this alternative include more than 20 miles of channels, drop structures along several reaches of the main channel and at the channel inlets, in-channel sediment management basins, and levees parallel to the channel along the Preserve to minimize sedimentation. (USACE, 2000)

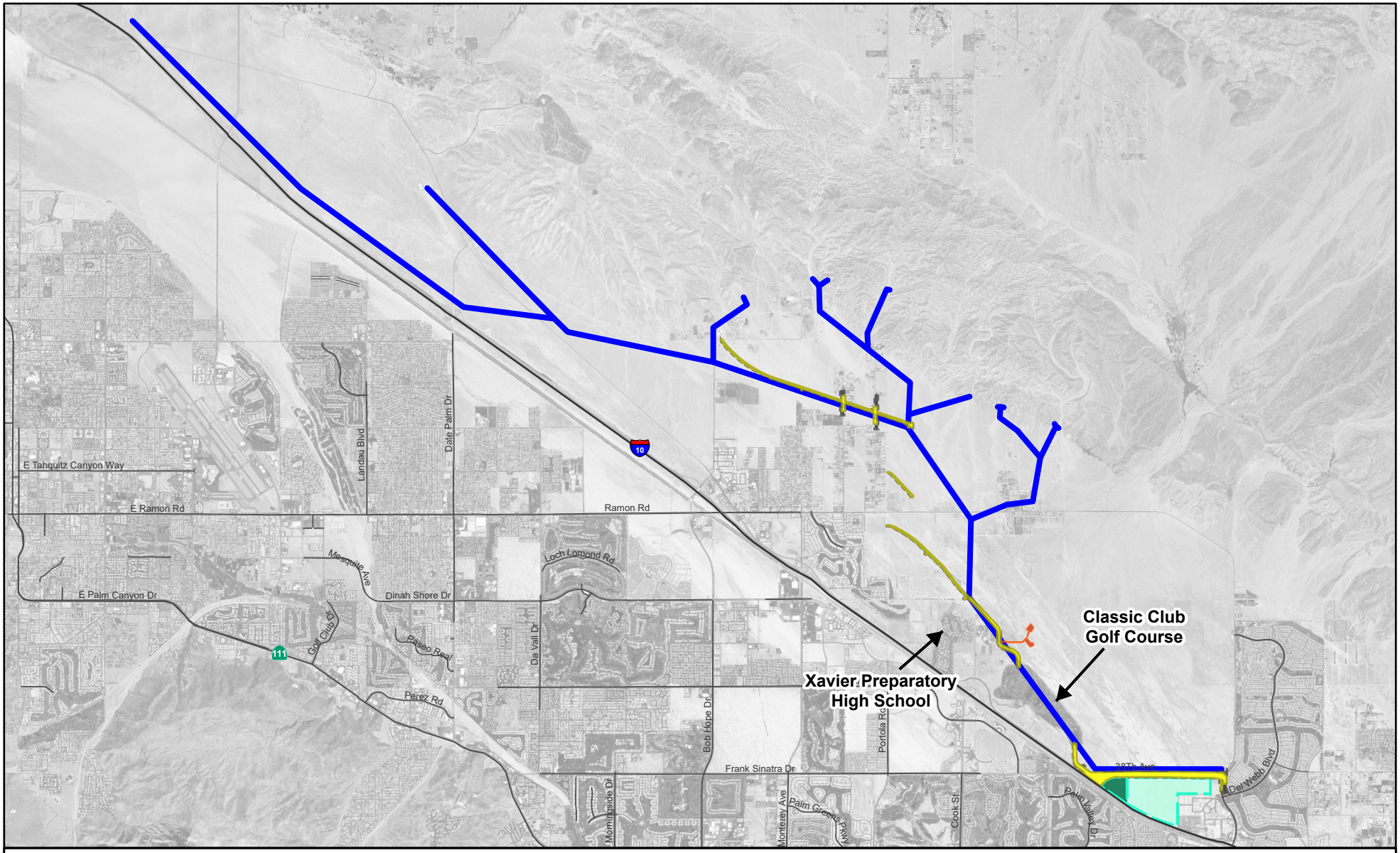


Figure 2-9

Complete Channelization Alternative

This alternative was originally developed when less development existed in the Project area. Under current conditions this alternative would conflict with numerous land uses, including but not limited to ten residential properties, six commercial/industrial institutional properties, as well as twelve existing roadways and a transmission line corridor. Roads that would be traversed by a levee or channel would either be terminated at the crossing or spanned by installing road crossings similar to those identified for the proposed Project.

Initial Screening

The Complete Channelization Alternative was eliminated from further analysis due to extensive land use conflicts associated with the type and amount of property that would need to be acquired to construct the channels and levees. This alternative would include more than 20 miles of channels, more than twice as much as the proposed Project (Alternative 1). When this alternative was analyzed in the 2000 EIR/EIS there was less development in the region. Since 2000 development has expanded in the Project area and construction of this alternative would require the acquisition and removal of extensive residential and commercial developments, including portions of the existing Del Webb / Sun City development. Implementation of this alternative would also result in the loss of habitat in the Preserve/Refuge.

In addition, this alternative would conflict with the Purpose and Need of the Project, which is to provide flood protection while facilitating the transport of sand onto the Preserve/Reserve. The design of this alternative would adversely affect the wind corridor by trapping and funneling material away from the Preserve/Reserve. Due to these land use conflicts, unacceptable significant impacts, and the lack of benefits to the Preserve/Reserve, this alternative was removed from further consideration in this document.

2.2.8 I-10 Channel Alternative

The 2000 EIR/EIS assessed an I-10 Channel Alternative which was also evaluated in the 1999 Feasibility Study (Figure 2-10). Under this alternative, the Project would be configured as one long channel (main channel) and three shorter channels (collector channels). The main channel would be approximately 25 miles in length and would be located adjacent and north of I-10. The channel would initiate at the mouth of Long Canyon, approximately 8 miles north-northwest of the upstream end of Reach 1 under the proposed Project (Alternative 1) and continue along I-10 past the Indio Hills eventually discharging storm flows onto the Preserve/Refuge. Collector channels would direct storm flows from the Indio Hills into the main channel.

Initial Screening

The I-10 Channel Alternative was eliminated from analysis due to extensive land use conflicts associated with the type and amount of property that would need to be acquired to construct the channels and levees. Since 2000 development has expanded in the Project area and construction of this alternative would require the acquisition and removal of extensive residential and commercial developments. For example, some of the frontage properties located in the development footprint are residential properties, including all the homes located on Westchester Drive in Thousand Palms. Several developments would be bisected by this alternative, resulting in split communities along with lost homes. This alternative would also result in severe impacts to commercial properties as the alignment would cross numerous commercial developments. Similar to the information provided for the Complete Channelization Alternative, the I-10 Channel Alternative would conflict with a variety of existing land uses at approximately 65 locations. Additionally, 75 roads would either be clocked by alternative elements or road crossings would have to be reconstructed.

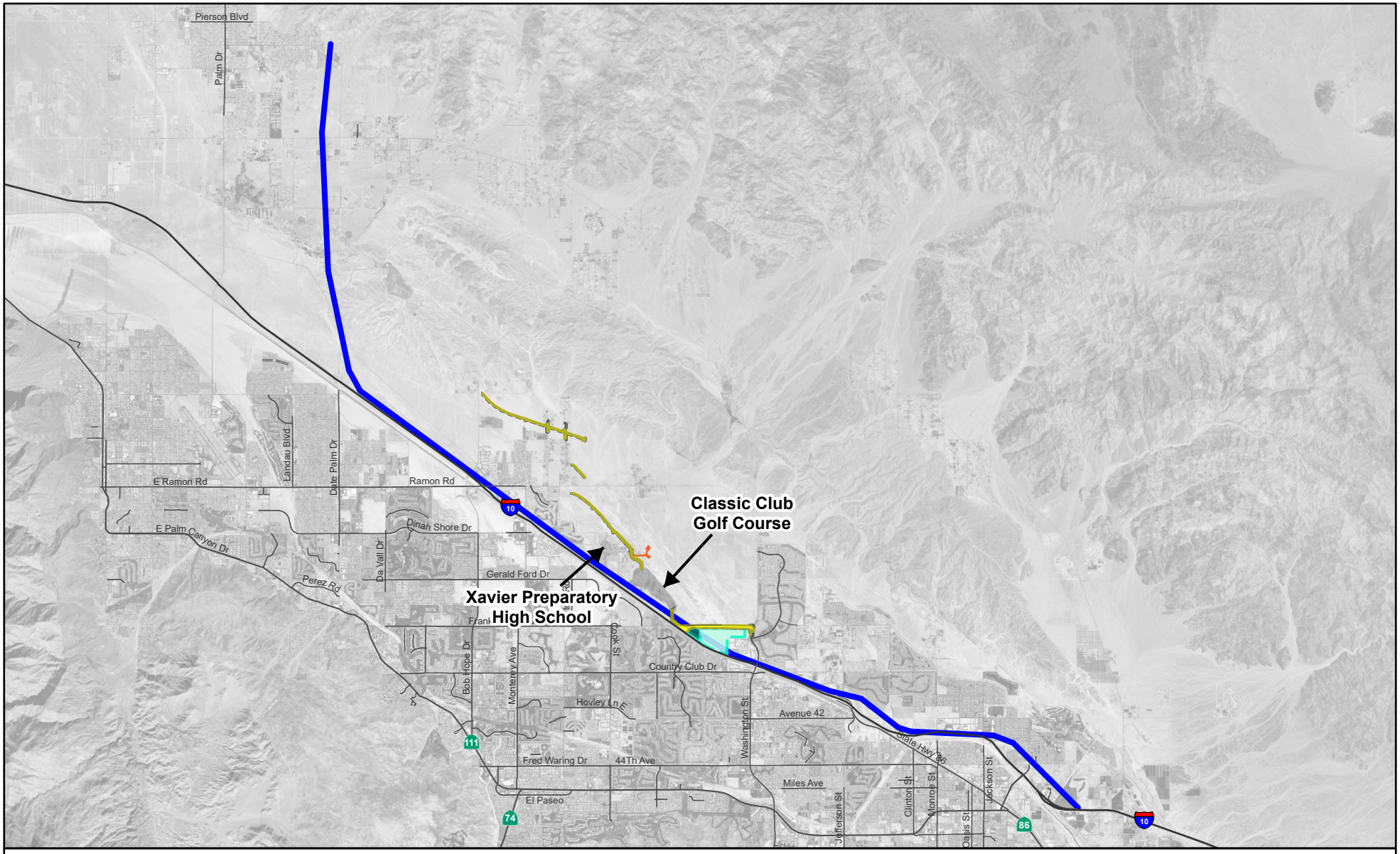


Figure 2-10

I-10 Channelization Alternative

In addition, this alternative would conflict with the Purpose and Need of the Project, which is to provide flood hazard protection to the maximum number of developed and planned development areas located within the FEMA-designated flood hazard zone in the Thousand Palms area while avoiding and minimizing adverse effects to wildlife and habitat and enhancing aeolian sand transport within the Coachella Valley Preserve. The discharge point on the Preserve boundary is located too far south to provide any benefit to sensitive habitat as fluvially-transported sand that would otherwise be deposited on the Preserve/Refuge would be directed to stormwater conveyance systems south/southeast of the CVFTL habitat areas. The design of this alternative would also adversely affect the wind corridor by trapping and funneling material away from the Preserve/Reserve. This alternative would substantially increase direct and indirect impacts to waters of the U.S. by altering hydrology across the alluvial fan and disrupting natural stream function.

Due to these land use conflicts and the lack of benefits to the Preserve/Reserve, construction of the I-10 Channel Alternative would result in unacceptable significant impacts and was removed from consideration in this document.

2.2.9 Detention Basins Alternative

The Detention Basins Alternative would include a series of eight stormwater/sediment detention basins, located at the mouth of the Indio Hills canyons, designed to capture, and attenuate storm flows. The detention basins would allow for a substantially lower outflow discharge and reduce the necessary size of downstream flood control facilities. Each detention basin would be approximately 3- to 24-acres in size with a total storage volume ranging from 28 to 261 acre-feet. Most of the basins would include below-ground storage to avoid qualifying as a State of California dam. All basins would be designed to drain within approximately one day following a storm event (USACE, 2000).

The Detention Basins Alternative would include a network of channels to convey stormwater flows through the Del Webb / Sun City area to the existing Coachella Canal siphon. These channels would be similar in scope and design as described in the Complete Channelization Alternative and the I-10 Channel Alternative. Flows from this area are directed into the Thousand Palms Wash channel eventually joining the Whitewater River downstream of I-10.

Initial Screening

The Detention Basins Alternative was eliminated from analysis for the same rationale presented for the Complete Channelization Alternative and the I-10 Channel Alternative. Primarily that land use disruptions and local roadway interferences would be substantial and adverse and would result in unacceptable impacts to the local community. In addition, this alternative would not achieve the Purpose and Need of the Project, which is to provide flood hazard protection to the maximum number of developed and planned development areas located within the FEMA-designated flood hazard zone in the Thousand Palms area while avoiding and minimizing adverse effects to wildlife and habitat and enhancing aeolian sand transport within the Coachella Valley Preserve. The basins would also result in substantial disruption to the hydrology and sediment transport processes that occur in upstream areas of the alluvial fans. This would substantially alter the services and functions of the washes and result in adverse effects to a variety of native plant and animal species. The basins would substantially alter the movement of blow sand to the Preserve/Refuge by trapping sediment in locations outside the active wind corridor. The detention basins would substantially disrupt natural stream processes to downstream areas, substantially increasing the loss to State and Federal Waters. Although the channels would be smaller under the Detention Basins Alternative, land use conflicts would still be substantial. In addition, the detention basins would require extensive operations and maintenance efforts to ensure that sediment does not collect in the basins and compromise their flood control capacity.

Due to these land use conflicts and the lack of benefits to the Preserve/Reserve, the Detention Basins Alternative was removed from consideration in this document.

2.2.10 Reach 1 South of Utility Corridor Alternative

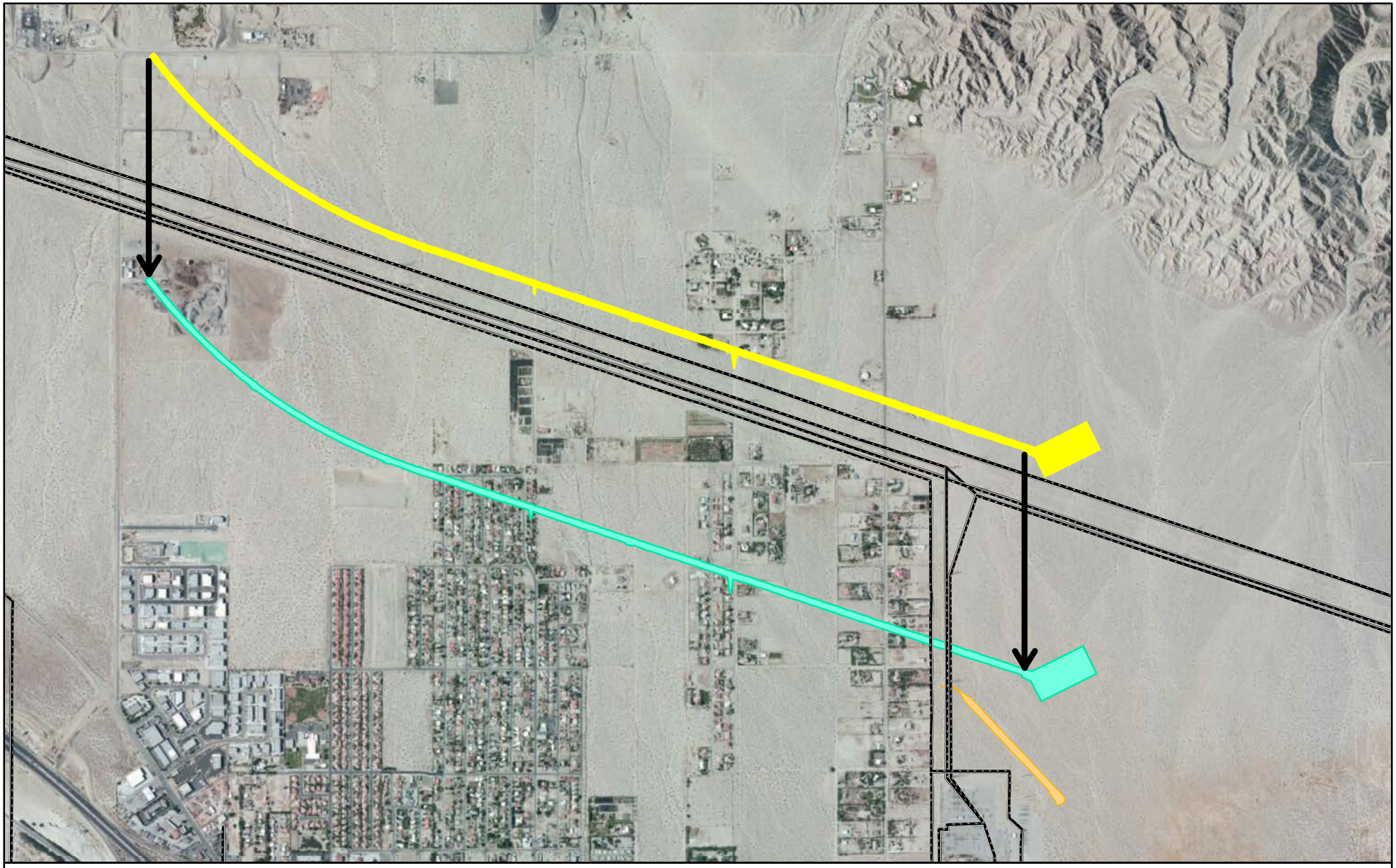
Under this alternative the Reach 1 levee would be located south of the existing SCE utility corridor compared to the northern location for the proposed Project (Figure 2-11). In order to avoid flooding of the utility corridor during and following a storm event, the levee would be situated approximately 1,000 feet south of the utility corridor. The distance between Reach 1 and the utility corridor varies from approximately 700 feet to approximately 2,000 feet south of the corridor depending on the location. All other features of this alternative would be the same as described for the proposed Project (Reach 1 of Alternative 1). Implementation of this alternative would minimize impacts to sand migration by moving the levee farther away from the active wind corridor and reduce impacts to jurisdictional waters of the U.S.

This alternative would also avoid the loss of approximately five or six properties located north of the utility corridor, which would occur under the proposed Project. However, this alignment would require the acquisition of all or parts of approximately 58 properties, 28 of which are residential, that occur south of the utility corridor to account for the levee's permanent footprint and the new flood zone located along the face of the levee. The 28 residential properties to be acquired for this alternative have an estimated land value of approximately $1,686,022. The 30 non-residential properties have an estimated land value of approximately $8,912,662. In total, the combined estimated land value associated with properties to be acquired in part or in full to accommodate the revised alignment of Reach 1 is approximately $10,598,684. It is important to note that this estimate may not reflect the value of certain improvements implemented on the properties and would be expected to change with current market values in the region. Property values were estimated by comparing the Project footprint with the county assessor's office assessed values for the land. Any structures on the land were considered based on current market values of homes and properties in the region. As described in Section 2.2.1, the proposed Project alignment of Reach 1 would affect five residential properties (approximately $227,816 in combined land value) and 32 non-residential properties (approximately $1,531,726 in combined land value), for a total of 37 properties with combined land value of $1,759,542.

This alternative would affect 21 more properties and displace more people than the proposed Project's Reach 1 alignment. In addition, this would increase the cost of land acquisition by approximately $8,839,142.

Initial Screening

The Reach 1 South of Utility Corridor Alternative would require the acquisition and conversion of approximately 58 existing private properties, 28 of which are residential homes. Construction of the levee in this location would result in substantially greater impacts to sensitive receptors from noise, traffic congestion, exposure to fugitive dust, and disproportionally effect minority communities. In addition, this alternative would not meet the purpose and need of the project by protecting the maximum amount of property with Thousand Palms. Due to these substantial conflicts with existing land uses and the purpose and need compared to the proposed Project, this alternative was eliminated from further analysis in this document.



Existing Transmission Lines

Permanent Disturbance Area

Proposed Reach 1

Reach 1: shifted south of transmission corridor

Reach 2: same as proposed project

0 0.25 0.5 Miles

Figure 2-11

Reach 1
Levee Alternative

2.2.11 Continuous Reach 1 Alternative

Under the Continuous Reach 1 Alternative, Reaches 1 and 2 (referred to as Reach 1a) would consist of one continuous levee. Reach 1a would be designed as described for Reach 1 of the proposed Project, except that the levee's downstream end would turn to the south to protect the existing Mirage Substation. All other components of this alternative would be the same as described for the proposed Project.

Initial Screening

In this alternative the Reach 1a levee would traverse the existing SCE utility corridor, a high-pressure gas line, and a fiber optic line. Construction of this alternative would require re-alignment of the natural gas line, fiber optic cables, and modification to the existing transmission lines. In addition, connecting Reaches 1 and 2 would create a substantial barrier that would disrupt the wind corridor and the distribution of wind-blown sand to the Preserve/Refuge. This would cause a larger disruption to aeolian processes and sand reaching the Preserve/Refuge compared to the proposed Project. This alternative would reduce impacts to several drainages at the end of Reach 1. Due to the substantial impacts to aeolian transport and the disruption of local utilities compared to the proposed Project, this alternative was eliminated from further consideration in this document.

2.2.12 Straight Reach 3 Alternative

Under this alternative Reach 3 would be configured in a straight alignment through what is now the Xavier High School and the Classic Club Golf Course. Similar to the proposed Project, Reach 3 would consist of both a levee and an excavated channel. The upstream portion of Reach 3 would consist of a levee approximately 1.23-miles long varying in height from 14 to 18 feet. The downstream portion of Reach 3 would consist of a 1.01-mile long trapezoidal channel with a bottom width of 90 feet and a depth ranging from 14 to 18 feet. A 5-foot high levee would run along the west side of the excavated channel to protect the area to the west from flooding. The freeboard levee also allows for the collection of the excavated channel material. Reaches 1, 2, and 4 of this alternative would be the same as described for the proposed Project.

This alternative would require the removal or modification to existing developments on the Xavier High School property and the Classic Club Golf. Most of the high school's existing athletic facilities, including the football stadium, would need to be removed. Most of the Classic Club Golf Course would also need to be removed. Although Reach 3 does not extend all the way down to the bottom of what is now the Classic Club Golf Course, this alternative would likely render the golf course unusable. Based on construction requirements it is plausible that the entire golf course and associated facilities would need to be removed to facilitate development of this alternative. In addition, residential developments adjacent to and north of the golf course would need to be removed under this alternative.

O&M activities associated with the Straight Reach 3 Alternative would be the same as described for the proposed Project, except sand removal activities along the Reach 3 portion of this alternative would not be required as frequently when compared to the proposed Project. The straight alignment of Reach 3 would further reduce impacts to the wind corridor.

Initial Screening

The Straight Reach 3 Alternative would require the acquisition of lands associated within the Xavier High School athletic facilities, residential properties, and the conversion of the Classic Club Golf Course property from its existing recreational uses to a flood control system. Construction of the levee in this

location would result in substantially greater impacts to sensitive receptors from noise, traffic congestion, exposure to fugitive dust, and disproportionally effect minority communities, and recreationists. Due to these substantial land use conflicts, this alternative was eliminated from further consideration in this document.

2.2.13 Reach 3 With Debris Basin

This alternative was suggested during scoping by Stantec on behalf of the H.N. and Frances C. Berger Foundation to reduce land acquisitions of both public use and educational properties, as well as to reduce conveyance of sediment and debris on to the Classic Club Golf Course. The proposed alignment for Reach 3, specifically the channel portion, would be pushed farther east of three currently vacant properties (APNs 694-050-007, 695-070-011, 695-070-015), as well as the Xavier College Preparatory High School and the Pegasus Riding Academy. Additionally, a debris basin would be added immediately north of the tie-in with the Classic Club Golf Course. All other features of this alternative would be the same as described for the proposed Project.

Initial Screening

This alternative would avoid direct loss of the athletic fields at Xavier College Preparatory High School and potentially the loss of the Pegasus Riding Academy; however, depending on the size and exact location of the debris basin, the Pegasus Riding Academy could continue to be impacted, if not more so than the proposed Project. Moving Reach 3 farther west would place it on the Preserve/Refuge, which would conflict with the CVMSHCP. Per the Project objectives, Reach 3 is intended to better define portions of the Preserve boundary, not redefine and reduce the Preserve lands. This alternative would also result in greater disruption of aeolian transport (sand migration) and associated biological resources impacts to sensitive wildlife, including the Coachella Valley fringe-toed lizard (federally listed, threatened; State listed endangered), Coachella Valley milk vetch (federally listed, threatened; rare and endangered in California), among other sand-dependent special-status species. The Classic Club Golf Course was designed to accept the flood flows of the Project, including associated debris; a flood easement agreement with CVWD was previously established prior to construction of the golf course (see Section 1.2, Project History and Previous Studies). As such, the debris basin, is not necessary, other than to minimize cleanup activities within the golf course.

Furthermore, the size of the debris basin with consideration of the quantity of flood flow and debris is likely inadequate to prevent much of any reduction in the amount of material passed downstream during a significant flood event. A study completed in 2013 by Parsons Brinkerhoff (2013) considered sediment removal facilities to determine their locations and effectiveness. Modeling was completed with two trial sediment basin sizes, which were assumed to be enlargements of the Reach 3 Channel, with the following modifications: (1) a weir at the point Reach 3 connects to the Classic Club Golf Course with a crest elevation of 165 feet, (2) flattened slope of the Reach 3 Channel from approximately 0.003 ft/ft to 0.001 ft/ft, and (3) widened channel invert from 86 feet to 172 feet (Trial 1) and 258 feet (Trial 2). The Trial 1 and Trial 2 sediment basins were estimated to remove approximately 16 acre-feet of sediment (46%) and 19.2 acre-feet of sediment (55%), respectively (PB, 2013). The basin would have to get substantially larger to approach 100 percent removal. The substantial increase in cost for widening the Reach 3 Channel, as well the additional biological resources and large-scale land use impacts associated with doubling or tripling the width of the channel, eliminated consideration of implementing this strategy for sediment control.

Due to the substantial impacts to aeolian transport, the refuge, and impacts to sensitive species of plants and wildlife compared to the proposed Project, this alternative was eliminated from further consideration in this document.

2.2.14 Reach 3 Paralleling Classic Club Golf Course

This alternative was suggested during scoping by Stantec on behalf of the H.N. and Frances C. Berger Foundation to reduce land acquisitions of both public use and educational properties, as well as to reduce conveyance of flood flows on to the Classic Club Golf Course. The proposed alignment for Reach 3, specifically the channel portion, would be pushed farther east of three currently vacant properties (APNs 694-050-007, 695-070-011, 695-070-015), as well as the Xavier College Preparatory High School and the Pegasus Riding Academy. Reach 3 would then parallel the Classic Club Golf Course rather than tying into the existing stormwater conveyance system located within the Classic Club Golf Course. All other features of this alternative would be the same as described for the proposed Project.

Initial Screening

This alternative would avoid direct loss of the athletic fields at Xavier College Preparatory High School and potentially the loss of the Pegasus Riding Academy. Moving Reach 3 farther west would place it on the Preserve/Refuge, which would conflict with the CVMSHCP. Per the Project objectives, Reach 3 is intended to better define portions of the Preserve boundary, not redefine and reduce the Preserve lands. This alternative would also result in greater disruption of aeolian transport (sand migration) and associated biological resources impacts to sensitive wildlife, including the Coachella Valley fringe-toed lizard (federally listed, threatened; State listed endangered), Coachella Valley milk vetch (federally listed, threatened; rare and endangered in California, among other sand-dependent special-status species. The Classic Club Golf Course was designed to accept the flood flows of the Project, including associated debris; a flood easement agreement with CVWD was previously established prior to construction of the golf course (see Section 1.2, Project History and Previous Studies). Due to the substantial biological resource impacts, conflicts with the purpose and need, and minimal improvement in land use impacts, this alternative was eliminated from further consideration in this document.

2.2.15 Reach 3 West of Xavier High School Alternative

This alternative would place Reach 3 to the west of the Xavier High School. All other features of this alternative would be the same as described for the proposed Project.

Initial Screening

This alternative reduces the disruption of aeolian transport onto the Preserve/Refuge and would avoid the direct loss of the athletic fields at Xavier High School. This alternative would not reduce the flood risk or provide flood protection to the high school or adjacent properties. In addition, construction of the levee in this location would be adjacent to residential properties and result in substantially greater impacts to sensitive receptors from noise, traffic congestion, and exposure to fugitive dust. Due to these substantial land use conflicts and because this alternative does not meet the purpose and need, this alternative was eliminated from further consideration in this document.

2.2.16 Reach 1 Culverts Alternative

This alternative would include the installation of bottomless culverts in the Reach 1 levee to allow the passage of water during small storm events. The purpose of using culverts under the Reach 1 levee would be to allow low and medium flows to pass under Reach 1 to maintain some elements of natural hydrology and sediment transport to the channels while still providing flood protection to the community of Thousand Palms under heavy flow conditions. All other aspects of this alternative would be the same as described for the proposed Project.

Initial Screening

The placement of bottomless culverts on the Reach 1 levee would compromise the integrity of the structure and would conflict with the FEMA and Corps guidelines for levee construction. The placement of culverts would require design changes to the levee to accommodate bypass flows and ensure flood protection during large storm events. However, culverts in Reach 1 would be prone to failure due to the large sediment loads that are known from the watershed. Alternatively, they would need to be sized to allow clean out and the passage of sediment. Sizing these culverts to accommodate sediment and water would diminish the flood control capacity of the levee during large storm events. While it may be possible to install a gate to control the flow, crews may not be available to close the gates in time to react to a large storm event. Flash floods associated with seasonal thunderstorms occur so quickly that adequate warning time to close the flood gates may not be possible. Although the placement of culverts in the levee would maintain connectivity to drainages below the levees, it is still likely that many drainages would remain isolated from their historic conditions. In addition, water would be forced through discrete areas forming new drainages that may compromise flood protection. Because culverts would diminish flood protection and conflict with the purpose and need, this alternative was eliminated from further consideration in this document.

2.2.17 Non-Structural Alternative

This alternative would consist of a flood warning system of alarms and/or announcements that would be broadcasted in the Project area. The system would provide information to local residents of an impending flood and the need to evacuate the area.

Initial Screening

Flood warning systems were eliminated from further consideration as a viable flood control project because flash floods associated with seasonal thunderstorms occur so quickly that adequate warning time is not available for residents to evacuate from the floodway in time to avoid the hazard. In addition, some people may not hear or respond to the warnings and would be at risk from flood waters and debris flows.

This alternative would not meet the Project Objectives or the Purpose/Need of providing flood hazard protection to existing properties and structures, and existing properties and structures would continue to be subject to flood hazards. Additionally, this alternative would not facilitate sand migration and blowsand habitat replenishment on the Preserve/Refuge. Under current conditions, sediment and blow sand is washed into developed areas and is no longer available in the wind corridor. Because this alternative does not meet the purpose and need of the proposed project it was eliminated from further consideration on this document.

2.2.18 Off-Site Alternatives

A 404(b)(1) alternatives analysis typically considers "off-site" alternatives as a means for considering locations where waters of the U.S. could be avoided, or impacts reduced. For flood hazard reduction projects, locations for project elements are generally confined to the watershed, which comprises the broader area of concern for the project. Locating project features outside the watershed would not be a relevant means of addressing flooding within the watershed of concern. The alternatives formulated for this project and described above considered locations throughout the watershed. Therefore, no additional off-site alternatives were considered.

Initial Screening

No off-site alternatives were brought forward for screening. Because they do not meet the purpose and need of the project.

3.0 Alternatives Analysis

As described in Section 2.0 above, the alternatives formulation process considered 18 alternative scenarios for further screening and analysis. Seventeen alternatives were screened out from further consideration for the reasons stated above and were not brought forward for further consideration.

This section provides a description of the screening process that is required under the 404(b)(1) guidelines. The screening process provides a means of using specified criteria to progressively screen out alternatives to eventually arrive at designating an alternative as the Least Environmentally Damaging Practicable Alternative (LEDPA). The LEDPA is the only alternative that can be permitted by the Corps under Section 404 the Clean Water Act. The screening process follows the steps outlined below:

1. Determine whether an alternative meets the project purpose. If an alternative does not meet the project purpose, it is not brought forward for further screening.
2. Determine whether an alternative is considered practicable. Further explanation of practicability is provided below. If an alternative is not considered practicable, it is not brought forward for further screening.
3. All alternatives considered practicable are compared with respect to impacts to waters of the U.S. Consideration is also made with respect to other adverse environmental effects that are associated with the alternatives being compared.

3.1 Project Purpose

The purpose for this project is to provide flood hazard protection to the maximum number of developed and planned development areas located within the FEMA-designated flood hazard zone in the Thousand Palms area while avoiding and minimizing adverse effects to wildlife and habitat and enhancing aeolian sand transport within the Coachella Valley Preserve. Alternatives were evaluated on the achievement of the following objectives that are tiered from the project purpose:

- Reduce the likelihood and consequences of flooding on human life and safety;
- Reduce the risk of flood damages, including critical infrastructure, within the area;

- Develop and implement environmentally sustainable flood risk management features consistent with natural geomorphic processes and ecological functions, particularly sand migration, of the proposed Project area; and,
- Use environmentally sustainable designs and construction methodologies, which would minimize environmental impacts from future operation and maintenance actions in the proposed Project area.

Of the alternatives considered after initial screening, only one alternative would meet the project purpose and is screened for practicability further below. The remaining alternatives would not meet the project purpose for the reasons described below:

- **Alternative 2: Removal of Reach 2 Alignment**. This Alternative does not meet the purpose and need because it does not provide flood protection for portions of the city of Thousand Palms including the SCE Mirage electrical sub-station which would be subject to partial flooding.
- **Alternative 3: Modified Reach 3 Alignment Option A**. This Alternative does not meet the purpose and need because it increases flood risk to the community of Thousand Palms below Reach 3.
- **Alternative 3: Modified Reach 3 Alignment Option B**. This Alternative does not meet the purpose and need because it increases flood risk to the community of Thousand Palms below Reach 3.
- **No-Action Alternative**. This alternative would not provide flood protection to the Thousand Palms area, potentially resulting in the destruction of property and possibly loss of life.
- **Reach 3 With Debris Basin**. This alternative would result in substantial impacts to aeolian sand transport, the federal wildlife refuge, and adversely affect sensitive species of plants and wildlife including the Coachella Valley fringe-toed lizard (federally listed, threatened; State listed endangered), Coachella Valley milk vetch (federally listed, threatened; rare and endangered in California, among other sand-dependent special-status species compared to the proposed Project.
- **Reach 3 Paralleling Classic Club Golf Course**. This alternative would result in greater impacts to the federal wildlife refuge, disruption of aeolian transport and associated biological resources impacts to sensitive wildlife, including the Coachella Valley fringe-toed lizard (federally listed, threatened; State listed endangered), Coachella Valley milk vetch (federally listed, threatened; rare and endangered in California, among other sand-dependent special-status species compared to the proposed project.
- **Reach 3 West of Xavier High School Alternative**. This alternative would not reduce the flood risk or provide flood protection to the high school or adjacent properties.
- **Reach 1 Culverts Alternative**. This alternative would diminish flood protection and could compromise the integrity of the levee.
- **Non-Structural Alternative**. This alternative would not provide flood hazard protection to existing properties and structures, and existing properties and structures would continue to be subject to flood hazards.

3.2 Practicability Screening

An alternative is considered practicable if "it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the overall project purpose" [40 CFR § 230.10(a)(2)]. In this section, the three alternatives that meet the project purpose are screened using criteria based on cost, existing technology, and logistics. The three alternatives brought forward for further screening are:

- Alternative 1 (Preferred Project)

Cost Practicability

Cost was analyzed in the context of the overall scope of the project and whether it is unreasonably expensive to construct, operate, and maintain. The cost of acquiring land from willing sellers was also considered and what economic impact that would have on the region from the loss of private lands. With the exception of the no action alternative, each alternative requires the acquisition of private lands and in Reach 1 several private residences would need to be acquired to construct the levee. To support the evaluation of costs CVWD assessed the number of private parcels that would have to be acquired, the costs of engineering, and construction. Preliminary estimates conclude the project will cost approximately $70,000,000.00.

Alternative 1 (Preferred Project): Lowest project cost. Requires the least acquisition of private lands compared to other alternatives screened from the analysis.

Existing Technology

The technological practicability criterion considered whether an alternative was capable of being implemented with existing construction materials and methods while maintaining efficiency and minimizing environmental impacts. For an alternative to be practicable, construction and O&M activities should be implemented while satisfying these conditions.

Alternative 1 (Preferred Project): The proposed alternative could be constructed using available technology.

Logistics

There are logistical factors to consider that constrain the engineering design of the proposed Project, including: layout of permanent and temporary project features and how they relate to meeting the overall project purpose and applicable land use plans, policies, and regulations; necessary private property acquisitions; and project access. In order to be practicable, an alternative should optimize these factors through specific geographic placement of a project, necessary acquisitions of private properties by the project applicant, and the use of existing access routes.

- **Alternative 1 (Preferred Project):** The logistical factors are practicable for this alternative.

This alternative requires the acquisition of private lands in Reach 1 several private residences would need to be acquired to construct the levee.

3.3 Environmental Effects

Table 3.2-1 provides a summary of the alternative criteria selection for the alternative that has been brought forth for analysis. Further analysis for the proposed onsite alternative is presented below.

Table 3.2-1. Practicability of On-Site Alternative

Practicability Criteria	Preferred Alternative (Alternative 1)
Project Purpose	
Meets Overall Project Purpose	Yes
Cost Criteria	
Cost	$70,000,000

Table 3.2-1. Practicability of On-Site Alternative

Practicability Criteria	Preferred Alternative (Alternative 1)
Difference Compared to Preferred Alternative	Yes
Meets Cost Criteria	Yes
Technology Criteria	
Meets Technology Criteria	Yes
Logistics Criteria	
Number of Displaced Properties	7 Residential 37 Non-Residential
Meets Logistics Criteria	Yes
Environmental Criteria	
Impacts to Waters of the US (acres)	Perm: 10.62 Downstream: 17.98 Total: 28.6
Impacts to Sand Migration	Increase of sand supply by 9-14 percent
Total Impacts to Native Vegetation Communities (acres)	273.80
Total Impacts to Critical Habitat – Coachella Valley Milk-Vetch (acres)	14.32
Total Impacts to Critical Habitat – CVFTL (acres)	109.49
Impacts to Cultural, Tribal, or Paleontological Resources	None
Practicable Alternative	**Yes**

3.3.1 Impacts to the Aquatic Ecosystem

The Project would affect ephemeral jurisdictional waters of the U.S. during construction by placing fill material into the drainages to construct levees, channel, and by redirecting runoff away from existing natural channels. Direct impacts would include the removal of native vegetation, the discharge of fill, temporary degradation of water quality, and altered hydrology. Indirect impacts could include alterations to the existing topographical and hydrological conditions to downstream areas that are blocked by the levees.

The levees, channels, and other Project facilities will redirect water flows towards the east, reducing or eliminating the surface flow south (downstream) of the Project. Downstream habitat that could be affected by reduced surface flow is similar to that in the adjacent reaches, and it is interspersed with developed areas. Some of the habitat is in isolated patches surrounded by development. Construction of the levees and channels would redirect runoff and sediment along the upstream sides of the linear project features.

Habitat functions in much of the Project area have been compromised to some degree from illegal dumping, invasive weeds, and OHV use. Reach 1 is located immediately north of a utility right of way which bisect the drainages in the area and provides access for illegal dumping and vehicle passage. Although transient individuals of CVFTL and other species may occur in Reach 1 the drainages in this area. OHV use is also common in the drainages along Reach 3.

3.3.1.1 Alternative 1

Alternative 1 would result in permanent impacts to approximately 17,162 linear feet (LF) and indirect or downstream impacts to 75,407 LF (95,805 total LF) of non-wetland waters of the U.S. Special aquatic sites do not occur in the Alternative 1 footprint or downstream areas and would not be impacted by construction. This amounts to approximately 10.62 acres of permanent impacts and 17.98 acres of downstream impacts (28.6 total acres) to non-wetland waters of the U.S. These impacts are summarized in Table 3.3-1, below. The impacts to waters of the U.S. associated with Alternative 1 are illustrated in Figures A-1 through A-12 of Appendix A.

Table 3.3-1. Impacts to Waters of the US (Alternative 1)

Impact to Waters of the US	Linear Feet	Acres
Permanent	17,162	10.62
Indirect/Downstream	75,407	17.98
Total	95,569	28.6

3.3.2 Other Adverse Environmental Consequences

The alluvial fans, sand fields, and shallow drainages present in the project area support a broad assemblage of native vegetation, dunes, wildlife, and invasive non-native plant species. Road construction and improvements, site preparation for construction of levees, and other Project activities would necessitate removing existing vegetation and habitat.

Direct impacts to wildlife could occur from Project construction and O&M activities because of mechanical crushing, trampling, and disturbance from human activity. Disturbance to wildlife would be associated with the removal of vegetation, construction, and maintenance of the channels and levees and other Project facilities, and changes to existing topographical and hydrological conditions. Indirect impacts to wildlife could include degradation of water quality, changes in hydrology, interference with fluvial and aeolian sand transport, and the spread of invasive weeds.

3.3.2.1 Alternative 1

Implementation of Alternative 1 would result in permanent impacts of approximately 117.82 acres and temporary impacts of approximately 155.98 acres (273.80 total acres) to native vegetation communities. Table 3.3-4, below, provides a summary of these impacts.

Table 3.3-4. Impacts to Native Vegetation Communities (Alternative 1)

Impacts to Native Vegetation Communities	Active Sand Dune/Stabilized Sand Field	Cheesebush Scrub	Creosote Scrub	Creosote Hummocks	Total
Permanent	26.78	3.62	54.89	32.53	117.82
Temporary	48.65	0.84	17.10	89.39	155.98
Total	75.43	4.46	71.99	121.92	273.80

The proposed Project area includes USFWS-designated Critical Habitat for Coachella Valley milk-vetch and CVFTL. In the proposed Project area, Critical Habitat for Coachella Valley milk-vetch is encompassed by Critical Habitat for CVFTL. Under Alternative 1, a total of approximately 14.32 acres of Critical Habitat for Coachella Valley milk-vetch would be affected. This includes 3.31 acres of temporary and 11.01 of

permanent impacts. Additionally, approximately 109.49 acres of Critical Habitat for CVFTL, including 23.77 acres of temporary impacts and 85.72 acres of permanent impacts would occur under Alternative 1. Table 3.3-5 provides a summary of impacts acreages to Critical Habitat under Alternative 1. Most of these impacts occur to areas that do not support the species and are included in the critical habitat designation because they provide important sand fine grain material used by these species.

Table 3.3-5. Impacts to Critical Habitat (Alternative 1)

Critical Habitat	Permanent	Temporary	Total
Coachella Valley Milk-vetch	11.01	3.31	14.32
CVFTL	85.72	23.77	109.49

There are no significant cultural or tribal resources located within the Area of Potential Effect (APE) for the proposed Project. Therefore, potential impacts to cultural or tribal resources associated with implementation of Alternative 1 would only result from unanticipated or inadvertent discoveries during construction. Activities associated with O&M would be unlikely to adversely affect unanticipated cultural or tribal resources. Similarly, the proposed Project area is not located within a paleontologically sensitive area and impacts to buried resources are unlikely during construction or O&M activities associated with Alternative 1.

Implementation of the preferred alternative would increase the sand supply to the Preserve by 9 – 14 percent. This would mainly be attributed to the diversion of water and sediment to the east and southeast towards the primary sand deposition areas along Reach 1. Under current conditions, sand is lost to the system when it is carried into developed areas outside the wind corridor during seasonal storms.

3.4 Conclusions

3.4.1 Preferred Alternative (Alternative 1)

Only Alternative 1 meets the overall project purpose to protect the community of Thousand Palms while minimizing impacts to the aeolian and fluvial sand transport. This alternative also meets the cost, technology, logistics, and environmental effects criteria and therefore, is a practicable alternative. Alternative 1 would:

- Result in 10.62 acres of permanent impacts and 17.98 acres of downstream impacts (28.6 total acres) to non-wetland waters of the U.S.
- Result in the loss of7 Residential and 37 Non-Residential properties.

3.4.4 Conclusions

Each of the alternatives considered in this 404 (B)(1) were evaluated based on meeting the project purpose and need and their ability to have similar cost, technology, and logistics criteria and, therefore, are practicable alternatives. Based on the above practicability analysis there are no less environmentally damaging practicable alternatives for the proposed Project that fully meets the overall project purpose than Alternative 1. As such, the preferred alternative (Alternative 1) is the LEDPA for the proposed Project. Impacts of Alternative 1 on the physical, chemical, and biological components of the aquatic environment are presented and discussed in Section 4.0 of this document.

3.5 Compensatory Mitigation

To offset permanent and indirect impacts to state and federal waters, CVWD is planning to preserve and enhance a total of 70.41 acres of existing drainages following the acquisition of the 550-acre floodway located along Reaches 1 through 3. The Conceptual Mitigation Plan developed for the project identified the project would require 30.28 acres of mitigation under this approach, thus meeting the mitigation requirements while providing surplus acreage and an overall substantial net gain in the function and values of aquatic resources. The 550-acre floodway was selected as the primary source of compensatory mitigation because the area supports a variety of channels, it meets the purpose and need of the project, it ensures that storm flows are conveyed through the project area to the Whitewater River, and it enhances and preserves important fluvial and aeolian wind processes in the region. Under existing conditions, the channels convey storm flows into residential and commercial areas that damage properties and increase the potential for introducing contaminants to the system. In addition, fine sands important to the long-term preservation of the Coachella National Wildlife Refuge are currently lost under existing conditions. Placement of the levees and the preservation of the 550-acre floodway will increase sediment transport to the Refuge and enhance sand habitat within the 550-acre floodway. Development would be prohibited in this floodway and the floodway will covey storm flows southeast towards Reach 3 before entering the channel and flowing through Reach 4. The floodway will drastically increase the extent of jurisdictional waters by increasing the flows from additional canyons in the Indio Hills resulting in a floodway that varies from about 600 feet wide to more than 1 mile wide. Water in this portion of the floodway will travel south towards, and eventually crossing Ramon Road. These features are expected to be inundated during larger storm events.

Development would be prohibited in this floodway to protect the wind corridor and limit disruptions to sand migration. Utilizing the floodway for mitigation will preserve the existing water bodies within the same watershed, and in the same habitats, as well as through enhancement due to increased connectivity and merged flows.

4.0 Existing Conditions, Impacts Analysis and Actions to Minimize Adverse Effects

This section describes the existing physical, chemical, and biological conditions of the proposed Project area.

4.1 Physical and Chemical Characteristics of the Aquatic and Upland Environment

4.1.1 Jurisdictional Determination

A Preliminary Jurisdictional Waters and Wetlands Delineation Report has been prepared for the proposed Project, using pre-2015 rules and guidance for determining geographic jurisdiction (33 CFR 328.3 [1986] as informed by 2003 SWANCC and 2008 Rapanos Guidance documents). The Corps Carlsbad Field Office responded with a Preliminary Jurisdictional Determination in June 2020. There are no intermittent or perennial streams or wetland waters of the US within the proposed Project area. All delineated aquatic features within the proposed Project area are characterized as ephemeral desert drainages (see Figures A-1 through A-12 in Appendix A).

4.1.2 Physical Substrate

Existing Conditions: Soil types in the study area are identified in the "Soil Survey of Riverside County, California, Coachella Valley Area" prepared by the USDA Soil Conservation Service. The dominant soils present on the alluvial fans of the Indio Hills are mostly gravelly sand (Carsitas: CdC), cobbly sand (Carsitas: ChC), and fine sand (Carsitas: CkB). The soils are high in soluble salts and low in organic matter. It is likely that the alluvial fans below the Indio Hills were at least partially formed from historical deposition of sediments prior to the uplift of the hills (USACE, 1997). In the dune areas south of Ramon Road, the soils surface is composed of fine sands (Myoma: MaD) (USACE, 2000).

Weathering of granitic and metamorphic rock in the mountains surrounding the study area has produced large quantities of sand-sized and finer sediment composed primarily of quartz, biotite, and feldspar. Frequent, strong winds blow from the northwest towards the southeast through the San Gorgonio Pass and the Project area, distributing these fine-grained materials throughout large areas of the northern Coachella Valley, and forming dune complexes and sand sheets including in the Coachella Valley Preserve. Sand movement occurs primarily along a wind corridor, which runs in a northwest-to-southeast direction between the Indio Hills and the Whitewater River (USACE, 2000).

Impacts: Construction of the proposed Project is expected to take approximately 27 months to complete. Construction activities would include clearing, grading, trenching and excavation to build the levees and channels. The proposed Project would affect physical substrates of waters of the US during construction and O&M, by placing fill material into jurisdictional waters to construct levees; constructing channels or other flood control structures across jurisdictional drainages; and redirecting runoff away from existing natural channels During these activities, both permanent and temporary impacts to the substrates associated with waters of the US would occur. Implementation of the Alternative 1 would permanently and temporarily impact roughly 10.62 acres and 4.50 acres of channel substrate, respectively. Additionally, approximately 17.98 acres of channel substrate would potentially be affected by downstream impacts (see Figures A-1 through A-12 in Appendix A).

Mitigation Measures: As a part of the proposed Project, CVWD would acquire approximately 550 acres of the floodway located along the levees and in the active wind corridor between Reach 1 and Reach 3. Land acquisition in the floodway would offset impacts if the acquired land is managed and maintained as habitat for special-status species. To further reduce impacts to physical substrates of waters of the US, Mitigation Measures (MMs) BIO-6 (Compensate for Habitat Loss) and MM BIO-19 (Minimize and Mitigate Impacts and Ensure No Net Loss for Jurisdictional Waters) would be implemented.

Prior to proposed Project construction, a water quality certification under Section 404 of the CWA would be obtained from the Regional Water Quality Control Board (RWQCB). The requirements and conditions of the water quality certification would be included as special conditions of the Corps permit decision as necessary and would further mitigate any adverse impacts associated with physical substrates of waters of the U.S.

4.1.3 Currents, Circulation, and Drainage Patterns

Existing Conditions: The proposed Project area does not support any perennial streams or wetland waters of the U.S.; however, numerous ephemeral drainages and desert washes traverse the proposed Project area. During most of the year, there is little or no surface water flow largely due to extremely limited rainfall. During large storm events, flash floods with sharp peaks and short durations are common. Most of these flows eventually percolate into the ground on alluvial fans and along mainstream channels.

Impacts: Construction and operation of the proposed Project would substantially alter the natural drainage patterns in the immediate Project area. Floodwaters with a predominantly southerly flow would be intercepted and directed generally towards the east-southeast. These intercepted flows would be concentrated from sheet flows to more channel-like flows along the toes of the levees and within the channelized reaches. This concentrated stormwater flow could lead to localized increases in erosion and sedimentation. However, the proposed Project includes the installation of a sediment basin at the downstream end of Reach 1, which would reduce storm flow velocity and avoid adverse effects associated with erosion or channel migration.

Additionally, the Reach 4 channel would divert stormwater flows from the southeast end of the Classic Club Golf Course to Washington Street, at which point flows would be guided under Washington Street and into an existing conveyance system with the capacity to transmit proposed Project-related flows. These flows would discharge into an existing detention basin that would be deepened as part of the proposed Project. The proposed Project would deepen the existing Sun City Collection detention basin, such that the current infiltration capacity of the Project area is maintained. Therefore, off-site flooding would not increase from baseline conditions due to construction or operation of the proposed Project.

Under proposed Project conditions, fluvial transport of sand via erosion and sedimentation to the aeolian transport corridor would not only be maintained but would be increased in a supply-limited corridor, which represents a beneficial effect (Lancaster, 2015). Overall, the substantial drainage alteration induced by construction and operation of the proposed Project would result in a substantial beneficial effect for flood protection of residential structures, as well as the supply of sand for aeolian transport to critical habitat. The pattern of erosion and sedimentation in the Project area would be substantially altered through construction and operation of the proposed Project. However, the wind transport corridor for downwind sand transport would be largely undisturbed and may benefit from an increased sand supply (Lancaster, 2015). Sand deposition along the toes of the levees and within the channelized reaches would be removed, distributed, and adaptively managed to not disrupt the existing sand transport capacity of the Project area.

The change in existing stormwater flow patterns would protect existing housing units from the baseline 100-year flood and would divert stormwater flows into an existing conveyance system with adequate capacity. The proposed Project would also increase the sand supply for the aeolian transport corridor within the Project area (Lancaster, 2015), which would be a beneficial impact.

Mitigation Measures: CVWD and the Corps have developed Environmental Commitments (ECs) to be implemented as part of the Project design and/or construction, or O&M activities. ECs are considered part of the proposed Project and would be incorporated during all Project activities. In order to reduce impacts associated with the disruption of the existing sand transport capacity within the proposed Project area, EC SM-1 (Sand Removal and Distribution or Disposal) and EC SM-2 (Adaptive Management Plan) would be implemented. Through implementation of these ECs, sand deposition along the toes of the levees and within the channelized reaches would be removed, distributed, and adaptively managed

4.1.4 Suspended Particulates and Turbidity

Existing Conditions: The proposed Project area does not support any perennial streams or wetland waters of the U.S. and there have been no water quality studies conducted for the proposed Project, thus the existing levels of suspended particulates and turbidity that naturally occur in the proposed Project area have not been measured. Water quality of surface runoff flows would be dependent on materials picked up on the ground surface, which is primarily comprised of natural desert substrates. The proposed Project area is subject to short-term, high-intensity rain events. These naturally occurring, unevenly distributed,

and often extreme events result in temporary increases in suspended particulates and turbidity levels while water is present and flowing in the proposed Project area.

Impacts: Under the proposed Project, there is a potential for water quality impacts due to increased turbidity to non-wetland waters of the US during grading, trenching, and excavation activities. During construction, portions of the proposed Project area may be subject to potential erosion through the removal of stabilizing vegetation and exposure of erodible materials. Some proposed Project activities would include: (1) placing fill materials into waters of the US to construct levees; (2) construction channels or other flood control structures across drainages; and (3) redirecting runoff away from existing natural channels. Cleared, unvegetated, and graded areas exposed to wind, rain, and surface runoff could potentially result in increased turbidity in and immediately downstream from proposed Project work areas. As previously mentioned, there is no water quality data specific to the proposed Project; however, the proposed Project area is subject to short-term, high-intensity rain events that temporarily increase suspended particulates/turbidity in waters of the US throughout the general region. The potential for loosened soil to be transported to a nearby waterbody would be minimized by the generally arid nature of the Project area. Most of the waterbodies within the Project area are ephemeral, and only carry stream flow during and shortly after storm events. Also, the Project area contains an abundance of already loose or poorly consolidated soils (mostly sand) that are routinely transported downstream during storm events. The additional amount of loose soil that would be generated during Project construction would represent a small portion of the total amount of existing loose or poorly consolidated soil within the Project area. A report on the effects of the proposed Thousand Palms flood control structures on the supply of sand-sized sediment to the aeolian sand transport system concluded that the system is supply-limited and that the increased fluvial transport and deposition of sand that would occur under the proposed Project would represent a beneficial impact to the aeolian sand transport system (Lancaster, 2015).

Mitigation Measures: As part of the proposed Project, a Stormwater Pollution Prevention Program (SWPPP), including Best Management Practices (BMPs), would be implemented in compliance with the conditions set forth in State and federal permits or authorizations (California Fish & Game Code Sections 1600-1616 and CWA Sections 401 and 404). Additionally, EC W-2 (Limit Construction During Precipitation Events), MM BIO-6 (Compensate for Habitat Loss), and BIO-19 (Minimize and Mitigate Impacts and Ensure No Net Loss for Jurisdictional Waters) would be implemented to reduce impacts associated with increased levels of suspended particles and turbidity.

Prior to proposed Project construction, a water quality certification under Section 404 of the CWA would be obtained from the RWQCB. The requirements and conditions of the water quality certification would be included as special conditions of the Corps permit decision as necessary and would further mitigate any adverse impacts associated with increased levels of suspended particles and turbidity.

4.1.5 Water Quality

Existing Conditions: The region surrounding the proposed Project area receives runoff from six distinct watersheds (hydrologic subunits) which drain a total area of 421 square miles (USACE, 1997). Following is a summary list of the six watersheds relevant to the proposed Project area.

- **Morongo Wash**. This watershed, located at the western edge of the region, drains an area of approximately 157.8 square miles north of I-10 (USACE, 1997). During normal storm events/conditions, water from the Morongo Wash watershed discharges through three highway bridges at I-10 to the mid-valley area and/or to Whitewater River.

- **Long Canyon/Willow Hole**. This basin is located in the western part of the region and drains an area of approximately 51 square miles (USACE, 1997). The Long Canyon stream system has its headwaters in the Little San Bernardino Mountains and discharges onto an alluvial fan in western Sky Valley. On the alluvial fan, these streams are joined by flows diverted from East-West Wide Canyons and exits Sky Valley at Willow Hole into the Edom Hill area.
- **East and West Wide Canyons**. This watershed is approximately 31.5 square miles in size and drains a portion of the Little San Bernardino Mountains (USACE, 1997). The streams are intercepted at the canyon mouth by Wide Canyon Dam and diverted to the Willow Hole area.
- **Thousand Palms Canyon**. This watershed encompasses about 81.5 square miles of both mountain and valley areas (USACE, 1997). The stream system originates in the Little San Bernardino Mountains, branches through eastern Sky Valley, enters the Indio Hills, and emerges into the Coachella Valley through Thousand Palms Canyon.
- **Pushawalla Canyon**. This watershed is 35.5 square miles in size and originates in the Little San Bernardino Mountains (USACE, 1997). Streams flow in a southerly direction across Sky Valley and pass through the Indio Hills via Pushawalla Canyon, generally parallel to Thousand Palms Canyon.
- **Indio Hills/Coachella Valley**. This watershed is approximately 63.5 square miles in size and is generally bounded by the Indio Hills on the north, I-10 on the south, Flat Top Mountain on the west, and Whitewater River on the east (USACE, 1997). Flood waters from the all the watersheds described above drain into this area. All these flows ultimately discharge eastward to the Whitewater River.
- **Whitewater River.** The Whitewater River is the main drainage course in the Coachella Valley, where it flows in the Whitewater River Stormwater Channel north and northwest of Washington Street (the downstream end of the proposed Project's Reach 4), and in the Coachella Valley Stormwater Channel to the south and southeast of Washington Street. Collectively this drainage system is referred to as the Whitewater River and Coachella Valley Stormwater Channel. This drainage system originates on the southerly slopes of the San Bernardino Mountains and flows in a southeasterly direction through the Coachella Valley and terminates at the Salton Sea.

In addition to the major watersheds listed above, a number of ephemeral drainages that typically only convey surface flows in response to precipitation events are present in the proposed Project area. Given the ephemeral nature of the drainages that occur in the proposed Project area, no specific water quality studies have been conducted for the proposed Project.

Impacts: Construction of the proposed Project would involve the use of heavy equipment and machinery. Use of this construction equipment would involve the handling, use, and storage of hazardous materials, such as diesel fuel, gasoline, lubrication oil, cement slurry, hydraulic fluid, antifreeze, transmission fluid, and lubricating grease. Accidental releases or spills of hazardous materials used during construction could result in the direct contamination of waterbodies within the proposed Project area or the indirect contamination of nearby waterbodies through subsequent transport by stormwater runoff. The potential for the accidental release or spill of a hazardous material to contaminate surface water or groundwater within or near the Project area would be relatively low due to the ephemeral nature of most streams in the proposed Project area. Also, the quantity of hazardous materials that would be handled, used, and stored during construction of the proposed Project would be small enough such that an accidental release or spill could be quickly contained and removed for safe disposal.

Construction of the proposed Project, including excavation and trenching, may encounter shallow groundwater. The potential to encounter shallow groundwater within the Project area is low due as the depth to groundwater throughout the Project area generally exceeds 40 feet below ground surface (bgs).

One exception is the presence of several desert fan palm oases that are sustained by groundwater welling up along fault fractures (USACE, 2000). In the event that shallow groundwater is encountered, dewatering of the excavation or trenching site may be required. If improperly managed, these dewatering activities could result in the discharge of contaminated groundwater.

Mitigation Measures: As mentioned above, a SWPPP, including BMPs, and a RWQCB water quality certification would be implemented as part of the proposed Project. Additionally, EC W-1 (Hazardous Spills) and EC W-2 (Limit Construction During Precipitation Events) would be implemented to further reduce impacts associated with water quality.

4.1.6 Flood Control Functions

Existing Conditions: Average annual precipitation is generally low in the Coachella Valley, but intense storms frequently produce precipitation in a single month which exceeds the normal annual value, and sometimes average annual precipitation is exceeded by more than 100 percent by a single summer thunderstorm. These episodes of intense rainfall, combined with the steep terrain of the surrounding mountains and relatively little vegetation to impede runoff, have historically caused flash floods along the water courses and alluvial fans of the Whitewater River basin.

Due to expanding development throughout the Coachella Valley over the past decade, a larger population of residents is now subject to public safety issues associated with flood hazards increasing the need for flood control and flood hazard protection in the Project area. The portion of the valley north of I-10 is designated as a Special Flood Hazard Area by the Federal Emergency Management Agency (FEMA), indicating that the area would be inundated during the 100-year storm event.

In addition, south of the proposed Project footprint, I-10 acts as a partial barrier to flood flows emanating from the Indio Hills. As a result, interior drainage problems can occur in the southeastern corner of the Thousand Palms area, adjacent to the Coachella Valley Preserve. Flooding can be a problem in this area and along the northern side of I-10, as far north as the Long Canyon drainage.

FEMA publishes Flood Insurance Rate Maps (FIRMs) to identify areas subject to flooding during different flood events, such as 100-year floods. A 100-year flood has a 1/100 or one percent chance of occurring in any given year. The practice is to avoid or restrict construction within the 100-year flood zones, or to engage in flood proofing techniques such as elevating building pads or by constructing flood walls and levees.

Impacts: Construction of the proposed Project would add roughly six miles of levees for the purpose of protecting residents of the Thousand Palms area from seasonal and periodic flooding. The proposed Project would purposefully redirect flood flows away from inhabited areas, removing people and structures from risk of damage due to flooding. The proposed Project would not involve the construction or installation of holding ponds, dams, or any other water storage structures which could potentially rupture and cause flooding. The overall purpose for the proposed Project is to provide flood hazard protection to the areas which are currently located within the FEMA-designated flood hazard zone and floodplain, thus removing the areas at risk from the flood hazard area. These areas are currently at risk of flooding due to the nature of the stormwater runoff from the nearby mountains and the coalescing alluvial fans.

Construction and operation of the proposed Project would purposefully redirect flood flows away from housing units and inhabited areas while maintaining or enhancing the fluvial transport and infiltration capacity of the Project area. Additional housing units would be protected from the 100-year flood and the surrounding areas would be removed from the FEMA flood hazard zone, thus removing the existing risk to life or property from flooding, and not adding any new risk of exposure. This would be a beneficial impact.

Mitigation Measures: No mitigation measures associated with flood control functions are included as part of the proposed Project as implementation of the proposed Project would result in beneficial impacts associated with flood control.

4.1.7 Aquifer Recharge

Existing Conditions: The proposed Project area is underlain by the Coachella Valley Groundwater Basin, which is generally bounded on the north and east by the San Bernardino and Little San Bernardino Mountains and on the south and west by the Santa Rosa and San Jacinto Mountains. There is some flow of groundwater throughout the basin; however, movement of water between sub-basins is limited by fault barriers, basin constrictions, and areas of low permeability. Depth to groundwater varies across the basin, with the depth of domestic, municipal, and irrigation wells ranging from 47 to 1,420 feet (DWR, 2004). Surface runoff and subsurface inflow are significant sources of recharge to local groundwater (DWR, 2004). Following are summary descriptions of the four sub-basins that make up the Coachella Valley Groundwater Basin.

- **Mission Creek Subbasin**. This subbasin is approximately 76 square miles in size and underlies the northwestern portion of the Coachella Valley, north of the proposed Project area. This sub-basin is bounded on the north and east by the Mission Creek Fault (North Branch San Andreas Fault) and on the south by the Banning Fault (South Branch San Andreas Fault), with the San Bernardino Mountains to the west. Both the Mission Creek Fault and the Banning Fault are barriers to groundwater movement. Water level differences across the Banning Fault, between the Mission Creek Subbasin and Garnet Hill Subbarea, are approximately 200 to 250 feet (CVWD, 2012).
- **Whitewater River (Indio) Subbasin**. This sub-basin is approximately 525 square miles in size and encompasses a major portion of the Coachella Valley floor. The proposed flood control facilities are located within the Thousand Palms Sub-area of the Whitewater River Subbasin. This sub-area is peripheral, with unconfined groundwater conditions. Unlike the other aquifers in the Whitewater River Subbasin, which have a calcium bicarbonate chemical characteristic, groundwater in the Thousand Palms sub-area is sodium sulfate in character. The chemical differences suggest that recharge to the Thousand Palms sub-area comes primarily from the Indio Hills and is limited in supply. The Whitewater River Subbasin includes five Subareas: Palm Springs, Garnet Hill, Thermal, Thousand Palms, and Oasis Subareas. (CVWD, 2012). This subbasin is drained by the Whitewater River and its tributaries. The Whitewater River rarely flows throughout the year and flow in its tributaries is intermittent.
- **San Gorgonio Pass Subbasin**. This sub-basin is located northeast of the Garnet Hill Fault and the Whitewater River Subbasin. It is considered a distinct sub-basin because the Banning and Garnet Hill Faults are effective barriers to groundwater movement. The main source of recharge to the sub-basin is the Whitewater River through the permeable deposits which underlie Whitewater Hill. (CVWD, 2012)
- **Desert Hot Springs Subbasin**. This sub-basin is located in the alluvial fan area between the Little San Bernardino Mountains and the Indio Hills. The San Andreas and Mission Creek Faults form the south-westerly boundary of the sub-basin. This subarea is not extensively developed except in the Desert Hot Springs area. (CVWD, 2012)

Impacts: Construction of the proposed Project would require the use of water for dust suppression, soil conditioning, and the mixing of soil cement. Approximately 647.9 acre-feet of water would be required for construction of the proposed Project. It is anticipated that this water would be obtained from public hydrants supplied by the CVWD. Construction water use for the proposed Project would be temporary and would represent a small percentage of the total available water supply from the CVWD. Construction water use would not directly deplete groundwater supplies.

A small amount of dewatering, however, may be required during construction of the proposed Project, but these dewatering activities would be temporary and would not adversely affect the production of a nearby well or substantially deplete groundwater supplies. Neither construction nor operation of the proposed Project would substantially interfere with groundwater recharge; impervious surfaces would be small and distributed throughout the watershed. Sufficient permeable surfaces would remain throughout the watershed such that the rate of groundwater recharge would remain unchanged as a result of construction and operation of the proposed Project.

Mitigation Measures: Neither construction nor operation of the proposed Project would result in substantial groundwater extraction or dewatering which would adversely affect a nearby water well or substantially deplete groundwater supplies. Construction and operation of the proposed Project would not substantially interfere with groundwater recharge because sufficient permeable surfaces would remain throughout the watershed such that infiltration rates would remain unchanged. Consequently, no mitigation associated with groundwater recharge has been presented.

4.2 Biological Characteristics of the Aquatic Environment

4.2.1 Threatened or Endangered Species

Existing Conditions: The Draft EIR/EIS includes details regarding the methodologies that were used to determine the potential for threatened and endangered species to occur in the proposed Project area (CVWD/USACE, 2020). These methods consisted of literature searches, consultation with applicable agencies and local experts, and a variety of field surveys. Through these efforts, it was determined that one federally-listed plant species, Coachella Valley milk-vetch, and two federally-listed wildlife species, desert tortoise and CVFTL occur, or have the potential to occur, in the proposed Project area. A single Coachella Valley milk-vetch was observed within Reach 4 along the northern shoulder of Avenue 38 during surveys conducted in 2010. This occurrence was not observed during surveys conducted in 2013 or 2016; however, this species may occur only as dormant seed in periods of low rainfall. Desert tortoise has not been observed in the proposed Project area; however, unoccupied potential desert tortoise burrows were observed during surveys. Desert tortoise is only rarely observed in the general vicinity of the proposed Project area. It has a moderate potential for occurrence in the proposed Project area, although only rarely and in very low numbers. The California Natural Diversity Data Base (CNDDB) reports numerous CVFTL occurrences near each proposed Project Reach. However, many of these observations are historic data. Surveys conducted for the proposed Project detected several CVFTL within Reach 4 and the adjacent sand deposition area as recently as 2013.

USFWS-designated Critical Habitat for Coachella Valley milk-vetch and CVFTL also occur in the proposed Project area (see Figure 4-1). The Coachella Valley milk-vetch requires fluvial or aeolian sand habitat and the CVFTL requires aeolian sand habitat. Therefore, the boundary of the designated Critical Habitat for each species extends beyond the limits of the species' distribution to include the upwind and upstream sand source, which is essential in maintaining fluvial and aeolian sand habitat (USFWS, 1985; USFWS, 2013).

The proposed Project area supports an assemblage of native vegetation communities and habitats, including creosote scrub and hummocks, cheesebush scrub, and active sand dunes/stabilized sand fields (the vegetation types described in this report use the Sawyer et al. [2009] classifications). Additionally, several unnamed ephemeral drainages flow throughout the proposed Project area. Ephemeral streams in the arid west provide important habitat for wildlife and are responsible for much of the biotic diversity

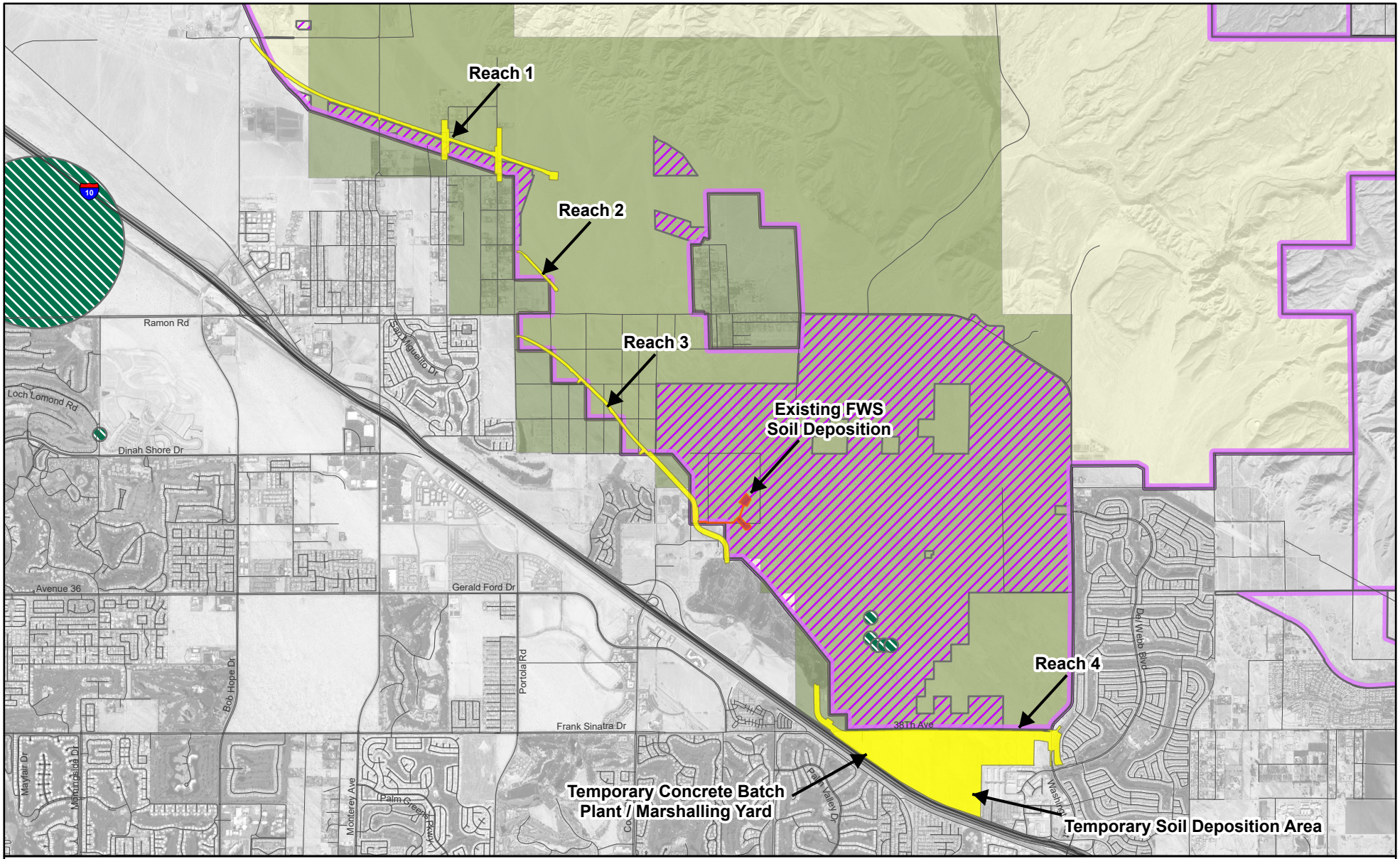


Figure 4-1

Critical Habitat Near Proposed Project Area

(Levick et al., 2008). They have higher moisture content and provide shade and cooler temperatures within the channel. In cases where the habitat is distinct in species composition, structure, or density, wash communities provide habitat values not available in the adjacent uplands. Wash dependent vegetation along desert washes drive food webs, provide seeds for regeneration, habitat for wildlife, access to water, and create cooler, more hospitable microclimatic conditions essential for a number of plant and animal species. Baxter (1988) noted that washes, because of their higher diversity plant communities, are probably important foraging locations for desert tortoise; in smaller washes, there is greater cover and diversity of spring annuals, providing important food sources. Although these drainages do not provide the same complexity, structure, and species composition as more mesic, riparian systems, arid drainages provide important structural features and play an important role in dispersal for a variety of wildlife species.

Impacts: The proposed Project could have potential direct and indirect impacts to Coachella Valley milk-vetch, desert tortoise, and CVFTL. These could include loss of habitat, trampling or crushing from heavy equipment, vehicles, or foot traffic, alterations to the native seed bank due to soil compaction, and modifications to existing hydrological conditions. Potential indirect impacts could include the disruption of native seed banks through soil alterations, the accumulation of fugitive dust, increased erosion and sediment transport, disruption of the sand transport system, and the colonization of non-native, invasive plant species.

Implementation of Alternative 1 would result in temporary impacts to approximately 3.31 acres and permanent impacts to approximately 11.01 acres (14.32 total acres) of Critical Habitat for Coachella Valley milk-vetch. It would also result in temporary impacts to approximately 23.77 acres and permanent impacts to approximately 85.72 acres (109.49 total acres) of Critical Habitat for CVFTL.

Mitigation Measures: The proposed Project includes numerous ECs and MMs that are required to minimize or avoid impacts to T&E species and Critical Habitat. These include, but are not limited to, EC B-3 (Avoid Impacts to Sensitive Species), MM BIO-1 (Conduct Preconstruction Biological Resources Surveys), MM BIO-2 (Conduct Biological Monitoring and Reporting), MM BIO-10 (Conduct Coachella Valley Fringe-Toed Lizard and Flat-Tailed Horned Lizard Surveys, Monitoring, and Avoidance), and MM BIO-12 (Conduct Desert Tortoise Surveys, Monitoring, and Avoidance).

4.2.2 Fish, Crustaceans, Mollusks, and Other Aquatic Organisms in the Food Web

The drainages that occur within the proposed Project area are defined as ephemeral and are typically dry. Water conveyance is infrequent and only occurs following precipitation events of intensities that are sufficient enough to result in flowing water. As such, drainages present in the proposed Project area do not support suitable habitat for fish, crustaceans, mollusks, or other aquatic organisms.

4.2.3 Other Wildlife

Existing Conditions: The distribution of wildlife in the proposed Project area varies depending on location, vegetation community, and disturbance level. There is no aquatic habitat in the proposed Project area and no fish or amphibians are expected to occur. As identified in the Draft EIR/EIS, five non-listed, special status wildlife species were detected within the proposed Project area during surveys conducted for the proposed Project, including: burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*), Bendire's thrasher (*Toxostoma bendirei*), Colorado Valley woodrat (*Neotoma albigula venusta*), and Palm Springs round-tailed ground squirrel (*Xerospermophilus tereticaudus chlorus*) (CVWD/USACE, 2020).

Although not identified during surveys, the proposed Project area supports suitable habitat for 16 additional non-listed, special-status wildlife species. The Draft EIR/EIS identified each of these species as having a moderate to high potential to occur. These include: Coachella Valley giant sand treader cricket (*Macrobaenetes valgum*), Coachella Valley Jerusalem cricket (*Stenopalmatus caehuilaensis*), golden eagle (*Aquila chrysaetos*), prairie falcon (*Falco mexicanus*), Le Conte's thrasher (*Toxostoma lecontei*), black-tailed gnatcatcher (*Polioptila melanura*), vermilion flycatcher (*Pyrocephalus rubinus*) flat-tailed horned lizard (*Phrynosoma mcallii*), Palm Springs pocket mouse (*Perognathus longimembris bangsi*), earthquake Merriam's kangaroo rat (*Dipodomys merriami collinus*), western mastiff bat (*Eumops perotis californicus*), western yellow bat (*Lasiurus xanthinus*), pocketed free-tailed bat (*Nyctinomops femerosaccus*), big free-tailed bat (*N. macrotis*), American badger (*Taxidea taxus*), and desert kit fox (*Vulpes macrotis arsipus*).

Impacts: The proposed Project would permanently impact 10.62 acres and temporarily impact 4.50 acres of waters of the US. Additionally, approximately 17.98 acres would potentially be affected by downstream impacts. The proposed Project would also result in the permanent disturbance of 117.82 acres and temporary disturbance of 155.98 acres of native vegetation communities.

Implementation of the proposed Project would result in direct and indirect impacts to non-aquatic biological resources, including wildlife, their habitat, and their movement corridors. Construction of the proposed Project could have direct effects on non-aquatic wildlife as a result of mortality or habitat loss. Construction activities such as grading, trenching, and the movement of vehicles and heavy equipment may result in the direct mortality of terrestrial species. Non-aquatic wildlife may also be indirectly affected by construction of the proposed Project as a result of noise, vibration, night lighting, the introduction of invasive weed species, and fugitive dust.

Construction activities could also directly and indirectly impact nesting birds found in and adjacent to the proposed Project area through the removal of native vegetation or the destruction or abandonment of active nests.

Mitigation Measures: To minimize and avoid impacts to non-aquatic wildlife, numerous ECs and MMs would be implemented as part of the proposed Project. These include, but are not limited to, the following: MM BIO-1 (Conduct Preconstruction Biological Resource Surveys); MM BIO-2 (Conduct Biological Monitoring and Reporting); MM BIO-8 (Prepare and Implement an Integrated Weed Management Plan); MM BIO-10 (Ensure Wildlife Impact Avoidance and Minimization); MM BIO-14 (Conduct Preconstruction Surveys and Monitoring for Breeding Birds); MM BIO-15 (Conduct Surveys and Avoidance for Burrowing Owl); MM BIO-16 (Conduct Surveys and Avoidance for Bat Roosts); MM BIO-17 (Conduct Surveys and Avoidance for Special-Status Small Mammals); and, MM BIO-18 (Conduct Surveys and Avoidance for American Badger and Desert Kit Fox).

4.3 Special Aquatic Sites

There are no special aquatic sites (as defined by 40 CFR 230.40-45) located within the proposed Project area.

4.4 Human Use Characteristics of the Aquatic Environment

4.4.1 Municipal and Private Water Supplies

Existing Conditions: The CVWD provides water-related services for most of the Coachella Valley, including the Thousand Palms area. The CVWD's sources of water supply include local groundwater, Colorado River water, and the State Water Project. Water from the Colorado River is delivered to the Coachella Valley by

the Coachella Canal, which is a branch of the All-American Canal. The Coachella Canal is 122 miles long and branches out from the All-American Canal 37 miles downstream from the All-American Canal's origin at Imperial Dam on the Colorado River. Lake Cahuilla is the terminal reservoir for the Coachella Canal and provides storage for a reserve supply of water. In addition, the CVWD exchanges its allocation of water from the State Water Project with the Metropolitan Water District (MWD) for water from the Colorado River. The water exchanged with MWD is delivered from MWD's Colorado River Aqueduct, which crosses the Coachella Valley. (USACE, 2000)

Impacts: It is possible that construction and operation of the proposed Project could contaminate one of these sources of public water supply either through increased sedimentation or through indirect contamination of the waterbody from the accidental release and subsequent transport by storm water of a hazardous material. The potential for contamination of a public water supply is very low due to the generally arid nature of the Project area, the distance between Project activities and public water supplies, and the small amounts of hazardous materials that would be used during construction and operation of the proposed Project.

Mitigation Measures: BMPs would be established through EC W-1 (Hazardous Spills) and EC W-2 (Limit Construction During Precipitation Events). Additionally, MMs PS-2 (Refueling Practices), PS-3 (Worker Training), PS-4 (Human Waste), PS-5 (Phases I Environmental Site Assessment), and PS-6 (Worker Environmental Awareness Program) would be implemented to reduce potential impacts associated with water supplies.

4.4.2 Recreational and Commercial Fisheries

All waters of the U.S. that occur in the proposed Project area are characterized as ephemeral. The waters of the U.S. occurring in the proposed Project area do not support opportunities for recreational or commercial fisheries.

4.4.3 Water-Related Recreation

The proposed Project area does not support opportunities for water-related recreation.

4.4.4 Aesthetics

Existing Conditions: With respect to aesthetics, the general study area boundaries include Interstate 10 (I-10) to the southwest, the Indio Hills to the northeast and east; Flat Top Mountain, Edom Hill, and the mouth of Long Canyon to the northwest; and Coachella Canal Siphon on the southeast. This area is approximately 45 square miles in size and is considered sufficient to capture all potential aesthetic impacts of the proposed Project (USACE, 2000). The community of Thousand Palms is located within the study area for aesthetics, and cities in the vicinity include Palm Springs to the northwest, Cathedral City to the southwest, the City of Indio to the southeast.

Impacts. Construction of the proposed Project would alter the visual character of the project area as a whole, primarily due to the development of the levees which, although would be designed to blend in with the natural surroundings, would result in a disruption of the viewshed. Foreground views of the desert landscape would be obstructed for residences located in proximity to the levee in Reach 1, as well as for recreationists using the regional trails located near Reach 1 and Reach 3. Impacts to scenic vistas would be significant and unavoidable.

The proposed Project would permanently impact approximately 10.62 acres of a broader total of 55.08 acres of waters of the US that occur within the proposed Project area. This represents approximately 19.3

percent of those that are present in the proposed Project area. Temporary impacts to waters of the US would occur to approximately 4.50 acres where necessary to allow for construction of the proposed Project components and approximately 17.98 acres may potentially be affected by downstream impacts. The ephemeral drainages that occur within the proposed Project area viewshed are currently unvegetated or sparsely vegetated with desert plants that also typically occur in the surrounding upland habitats and are not visually unique.

Mitigation Measures. Impacts to aesthetic resources resulting from the proposed Project are significant and unavoidable. To reduce these impacts, EC-V1 (Design Consistent with Surroundings) would be implemented.

4.4.5 Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

Existing Conditions: There are several designated conservation lands in the proposed Project vicinity. These include: the state-owned Coachella Valley Ecological Reserve; the Coachella Valley National Wildlife Refuge, which is mostly owned by the USFWS and includes part of the Coachella Valley Ecological Reserve; and the Coachella Valley Preserve which encompasses U.S. Bureau of Land Management (BLM) Area of Critical Environmental Concern (ACEC) land as well as privately owned conservation lands. Together these conservation lands help to protect a large dune system and its biological resources.

Located immediately adjacent to the proposed Project boundary to the north and east is the 15,000-acre Preserve (see Figure 4-2). The Preserve is managed per direction of the CVMSHCP, and in compliance with a Natural Community Conservation Plan (NCCP) Permit issued by the California Department of Fish and Wildlife (CDFW) in September of 2008, with a final permit for the CVMSHCP issued USFWS in October of 2008 (CVAG, 2014). The Coachella Valley National Wildlife Refuge, managed by the USFWS in conjunction with the Sonny Bono Salton Sea National Wildlife Refuge Complex, comprises approximately 3,709 acres within the Preserve (USFWS, 2011). Whereas the Refuge is managed exclusively by the USFWS, the Preserve is jointly managed by The Nature Conservancy, the BLM, the California Department of Fish and Wildlife (CDFW), the USFWS, and the Center for Natural Lands Management (USFWS, 2011). As noted, the Preserve is managed in compliance with a 2008 permit issued by the USFWS. Both the Preserve and the Refuge protect a large sand dune complex that provides habitat for the CVFTL, which is listed as a threatened species by the federal government and as an endangered species by the State of California.

The Coachella Valley Preserve would be traversed by portions of Reaches 3 and 4. This open space area provides many outdoor recreational opportunities including sightseeing, hiking, bird watching, photography, and picnicking. Overnight camping and off-highway vehicle (OHV) use are restricted within the Preserve. The Preserve also contains several palm oases including the Thousand Palms Oasis, and Willis and Indian Palms Oases. Horses and bicycles are not allowed in any of the palm oases. The Preserve is open every day from sunrise to sunset (CNLM, 2012).

Impacts: Secondary objectives of the proposed Project are to enhance the viability of the Coachella Valley Preserve and Wildlife Refuge (respectively) by establishing clear boundaries; avoiding disruption of aeolian (wind) processes for sand transport; preserving an approximately 550-acre floodway area; and replenishing sand on the Preserve/Refuge during the O&M phase by collecting material that has gathered along Project facilities and redistributing it on the Preserve/Refuge within the active wind corridor, whereas such materials would otherwise continue traveling downwind/downstream away from the protected habitat areas. As such, implementation of the proposed Project would ultimately result in beneficial impacts to the Preserve.

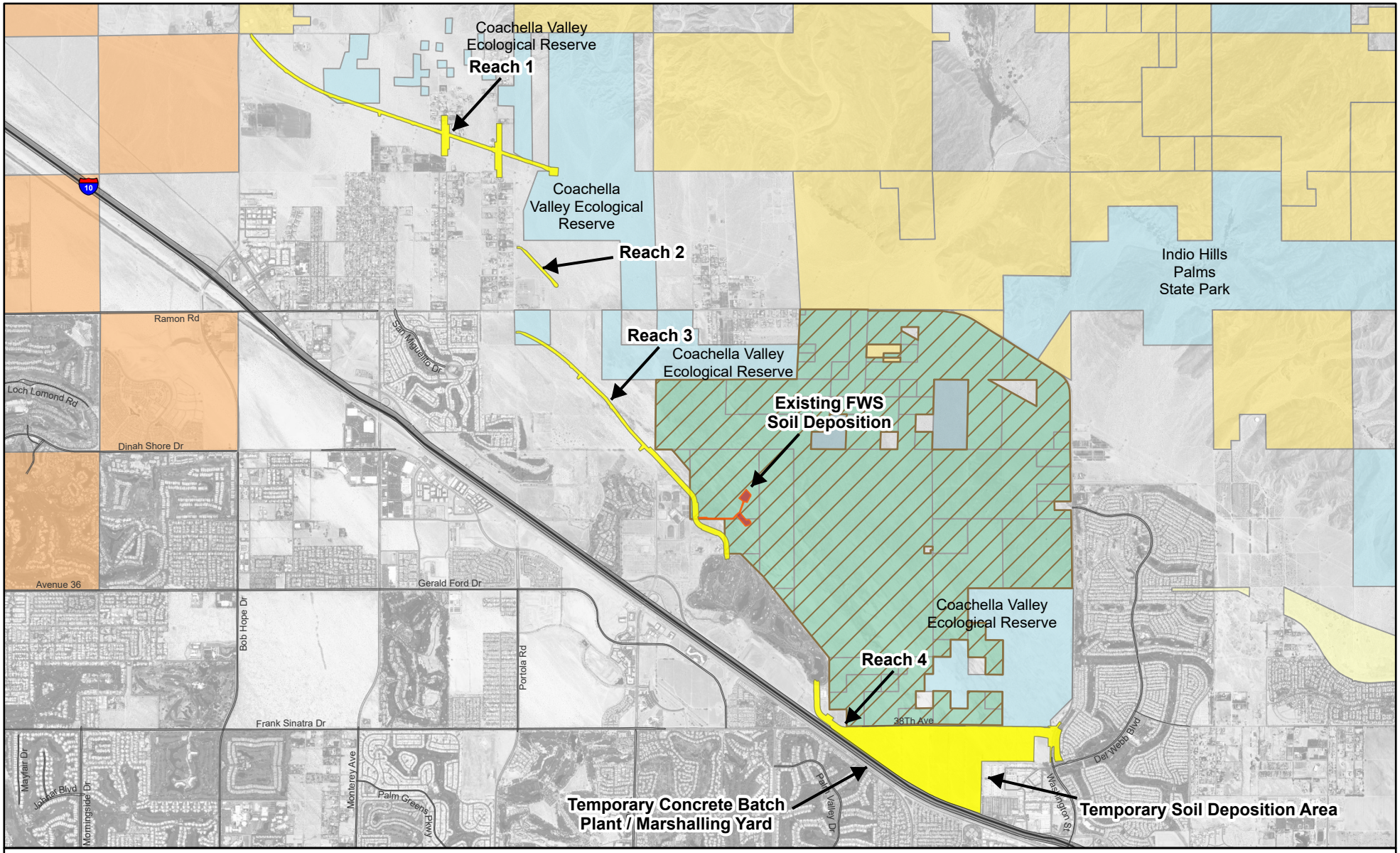


Figure 4-2

Land Ownership in the Proposed Project Area

Mitigation Measures: In order to ensure that beneficial impacts are maintained, the proposed Project requires the implementation of EC SM-1 (Sand Removal and Distribution or Disposal), EC SM-2 (Adaptive Management Plan), MM SM-1 (Minimize Sand Impacts), and MM SM-2 (Prepare and Implement a Sand Migration Management Plan).

5.0 Determination of Cumulative Effects on the Aquatic Environment

Cumulative effects associated with the proposed Project are described in detail in Section 5.0 of the Draft EIR/EIS (CVWD/USACE, 2020). That analysis determined that implementation of the proposed Project would contribute to significant and unavoidable cumulative impacts to Aesthetics, Air Quality (specifically PM10 and PM2.5 air pollutant emissions), Land Use and Recreation, Noise, and Traffic. With implementation of mitigation measures, cumulative impacts to sand migration would be reduced to less than significant. Lastly, there would be no cumulative impacts to Biological Resources; Cultural Resources; Paleontological Resources; Public Safety; Socioeconomics and Environmental Justice; Topography, Geology, and Soils; and Water Resources.

Existing and future projects analyzed in the Draft EIR/EIS, including those listed in Table 5.1-1, which are considered to result in potentially cumulative impacts, are under the jurisdiction of the CVWD; County of Riverside; the cities of Palm Desert, Rancho Mirage, Indio, and Palm Springs; US Fish and Wildlife Service (USFWS); Bureau of Land Management (BLM–Palm Springs); and Coachella Valley Association of Governments (CVAG). In compiling this list, additional agencies and organizations were contacted to determine all potential cumulative projects, including the community of Bermuda Dunes; cities of Cathedral City, Palm Desert, Indian Wells, and La Quinta; Coachella Valley National Wildlife Refuge; Bureau of Indian Affairs (Agua Caliente Reservation); and California State Lands Commission.

5.1 Baseline Conditions

The "geographic scope" of the analysis of cumulative impacts refers to the area within which cumulative impacts are likely to occur. For the proposed Project, the majority of the cumulative effects analysis makes a broad, regional evaluation of the impacts of existing and reasonably foreseeable future projects that affect waters of the US, plant communities, wildlife, and habitats within the northern Coachella Valley.

The area of potential cumulative effects for water resources is defined as the drainage area bordered by the south flanks of the Little San Bernardino Mountains on the north and east, the Morongo Wash/Mission Creek drainage divide on the west, and Interstate 10 (I-10) on the south. Cumulative impacts for water quality and resources are assessed based on consideration of past, current, and future development. In particular, the projects that could have the greatest potential to combine with the Project's effects on water resources are listed in Table 5.1-1 and illustrated in Figure 5-1.

Table 5.1-1. Projects with Potential to Contribute to Cumulative Effects

Project ID and Type	Project Name	Location	Description and Status
APN 648-030-016 Domestic Water Supply	Mission Hills Pressure Zone Infrastructure Improvements	Northeast intersection of Rio Del Sol Road and Vista Chino Drive	Construction of a potable water reservoir facility that includes up to three 6.5-million-gallon reservoirs, a retention basin, and a graded access road. A new 36-inch diameter pipeline running south from the reservoir site and then west to a private easement is also proposed. Status: Bidding.

Table 5.1-1. Projects with Potential to Contribute to Cumulative Effects

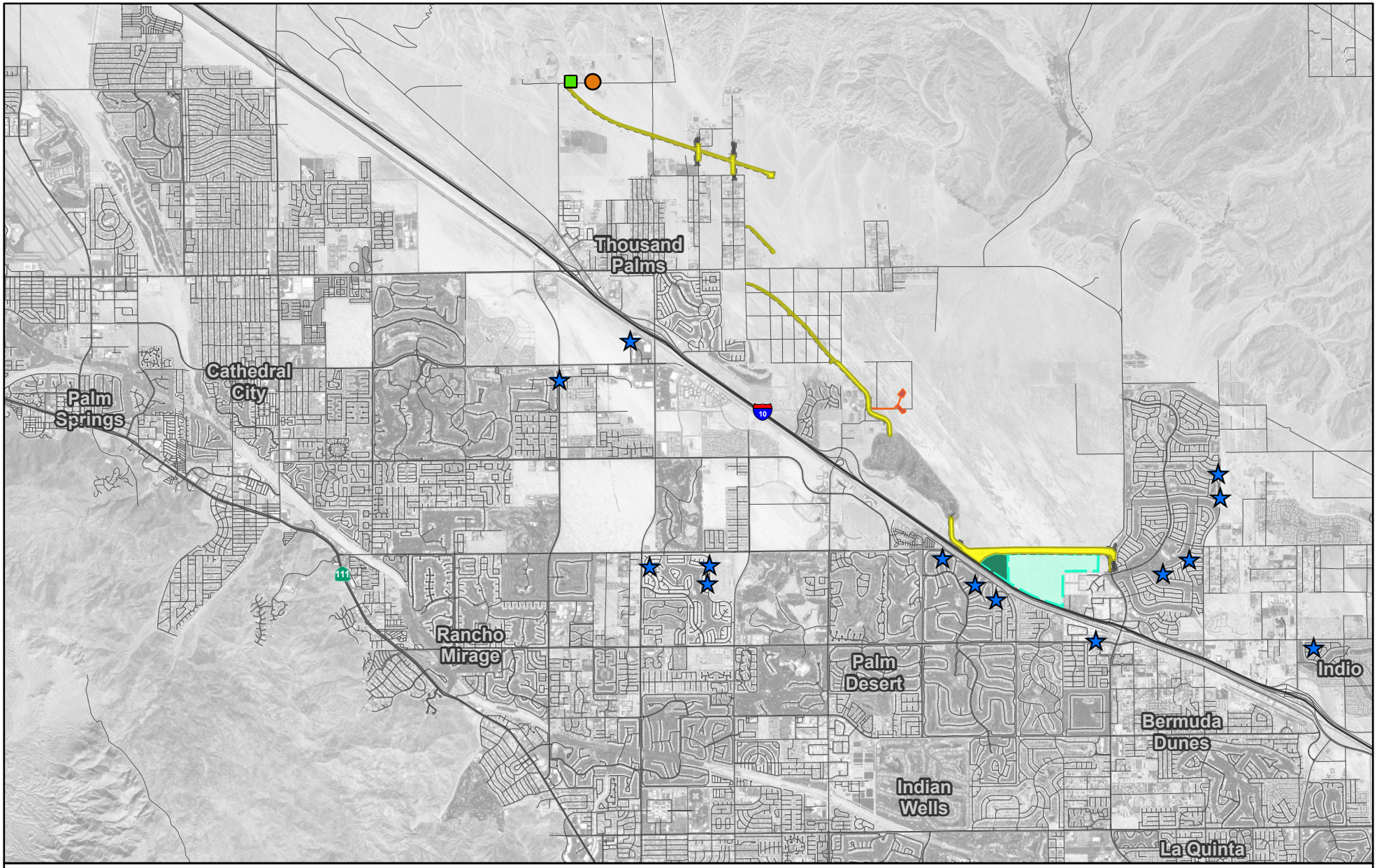
Project ID and Type	Project Name	Location	Description and Status
APN 648-030-020 Domestic Water Supply	Sky Mountain Reservoir No. 4605 and Pipeline	North of Vista Chino Drive, and approximately one-half mile east of Rio del Sol	Construction of two 10-million-gallon reservoirs and associated water conveyance pipeline. Status: Construction 2016/2017.
Domestic Water Treatment	Chromium-6 Water Treatment Facilities Project	Various sites within the Coachella Valley	Installation of chromium-6 water treatment facilities throughout the Coachella Valley. Status: Construction planned for spring/winter 2016 for duration of 3 years.

5.2 Context

At the landscape level, the proposed Project is large compared to other activities that have occurred within the geographic area. However, in terms of impacts to waters of the US when compared to other reasonably foreseeable projects (see Table 5.1-1), the proposed Project is typical of other activities in the watershed.

The proposed Project would be located in the Coachella Valley in an area characterized by braided, erosive stream channels, flash flooding, alluvial fan conditions, low rainfall, sparse vegetation, and the potential for wind erosion. There are no perennial or intermittent drainages within the proposed Project area. Alterations to hydrology and water quality from surface runoff would be dependent on disturbances to the ground surface, which is primarily comprised of natural desert. Cumulative impacts to water quality are not anticipated due to the low amount of rainfall received in the region, the irregularity of subsequent flow events, and the lack of impervious surfaces that would be constructed as part of the proposed Project. The proposed Project includes ECs and MMs that have been designed to limit the potential adverse effects on hydrology and water quality, as well as to ensure that implementation of the proposed Project would adhere to applicable regulatory requirements for both the construction and the O&M phases. These regulatory requirements would not only apply to the proposed Project, but to all foreseeable projects in the region. Therefore, cumulative impacts on surface water quality of receiving waters from the proposed Project and future projects in the watershed would be addressed through compliance with applicable regulatory requirements that are intended to be protective of beneficial uses of the receiving waters.

While the Project might combine with other projects in the region, offsite soil mobilization which could lead to violations of water quality standards, waste discharge requirements, or contaminate groundwater, is unlikely to combine with other projects in the region with implementation of the SWPPP, project-specific BMPs, and in consideration of the temporal nature of construction overlap, and the arid climate in the region. Impacts would not be cumulatively considerable. The Project's construction water use would be temporary and represent a small percentage of the total available water supply from the CVWD, such that water supply impacts would not be cumulatively considerable. The Project has been designed to tie into existing facilities with capacity to accept the flood flows and would purposefully redirect storm water flows within the region to remove people and structures from risk of damage due to flooding resulting in a beneficial impact.



Sources: Riverside County, 2016; City of Palm Desert, 2016; City of Rancho Mirage, 2016; City of Indio, 2016; City of Palm Springs, 2016; USFWS, 2016; BLM, 2016; CVAG, 2016; Coachella Valley National Wildlife Refuge, 2016

0 2 Miles

- Permanent Impact Area
- Temporary Impact Area
- Temporary Soil Deposition Area
- Temporary Concrete Batch Plant/ Marshalling Yard
- Existing FWS Soil Deposition
- Mission Hills Pressure Zone Infrastructure Improvements
- Sky Mountain Reservoir No. 4605 and Pipeline
- Chromium-6 Water Treatment Facilities Project

Figure 5-1

Cumulative Projects

As described in the Draft EIR/EIS, the proposed Project would be expected to contribute only a small amount to the cumulative effects related to sand migration and biological resources. Development in the proposed Project area could affect (directly and indirectly) sand source areas and fluvial transport, which would result in a significant cumulative impact. However, the proposed Project has specifically been designed with the objective of enhancing the viability of the Preserve/Refuge by establishing clear boundaries for the Preserve/Refuge, minimizing disruption of aeolian processes for sand transport, preserving an approximately 550-acre floodway area, and replenishing sand on the Preserve/Refuge during the O&M phase. With these features, and implementation of EC SM-1 (Sand Removal and Distribution or Disposal), EC SM-2 (Adaptive Management Plan), and Mitigation Measures SM-1 (Minimize Sand Impacts), and SM-2 (Prepare and Implement a Sand Migration Management Plan) during Project construction would be reduced to a less-than-significant level. As such, the Project's sand migration impacts would not be cumulatively considerable. Implementation of MM BIO-6 (Compensate for Habitat Loss) and MM BIO-19 (Minimize and Mitigate Impacts to Jurisdictional Waters) would reduce cumulative impacts to biological resources to less than significant as these require compensation for both permanent and temporary impacts to biological resources.

Based on the above, the proposed Project's contribution, in combination with past, present, and reasonably foreseeable project, to potential cumulative impacts at the watershed level would not be cumulatively significant.

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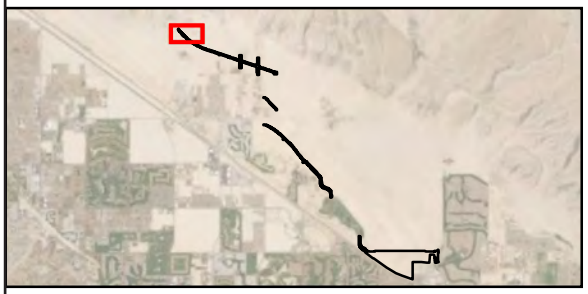
Appendix A

Impacts to Waters of the U.S.

Image Source: DigitialGlobe, 2018



Permanent Disturbance Area
Temporary Disturbance Area

Non-wetland Waters of the U.S.
Permanent Impact
Temporary Impact
Downstream Impact

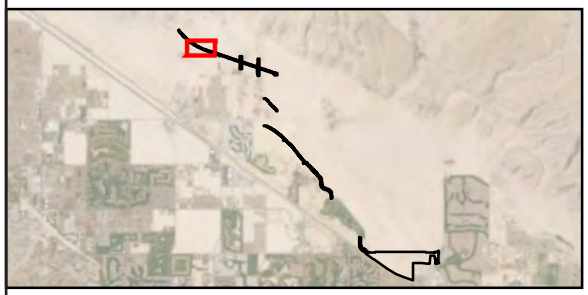
100 0 200 Feet

Figure A-1

**Alternative 1:
Impacts to Waters of the U.S.**

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018



Permanent Disturbance Area
Temporary Disturbance Area

Non-wetland Waters of the U.S.
Permanent Impact
Temporary Impact
Downstream Impact

100 0 200 Feet

Figure A-2

**Alternative 1:
Impacts to Waters of the U.S.**

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

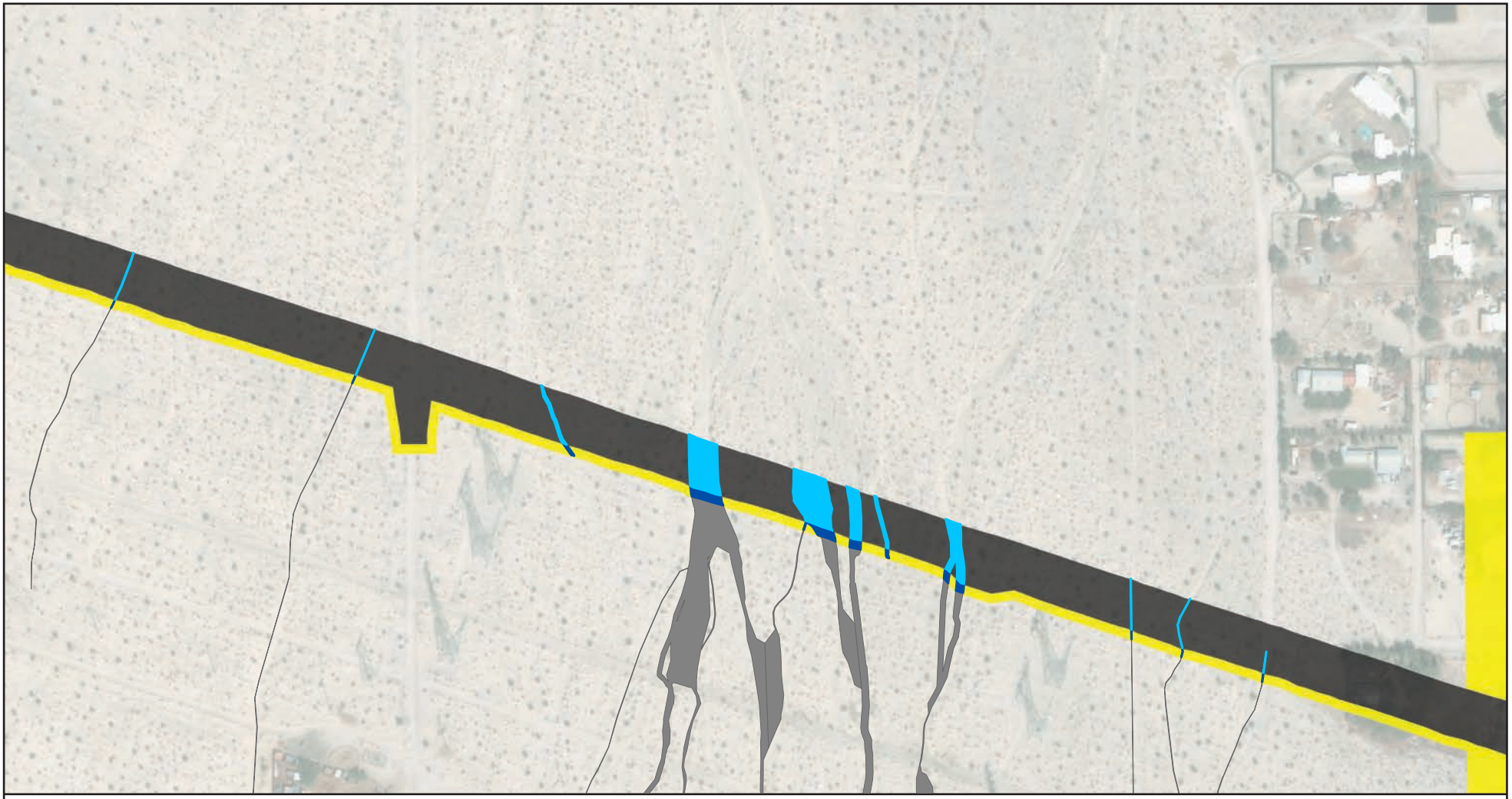
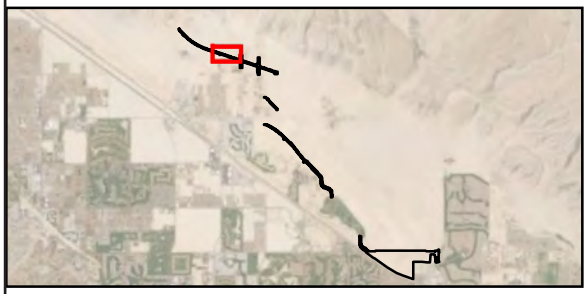


Image Source: DigitialGlobe, 2018



Permanent Disturbance Area
Temporary Disturbance Area

Non-wetland Waters of the U.S.
Permanent Impact
Temporary Impact
Downstream Impact

100 0 200 Feet

Figure A-3

**Alternative 1:
Impacts to Waters of the U.S.**

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

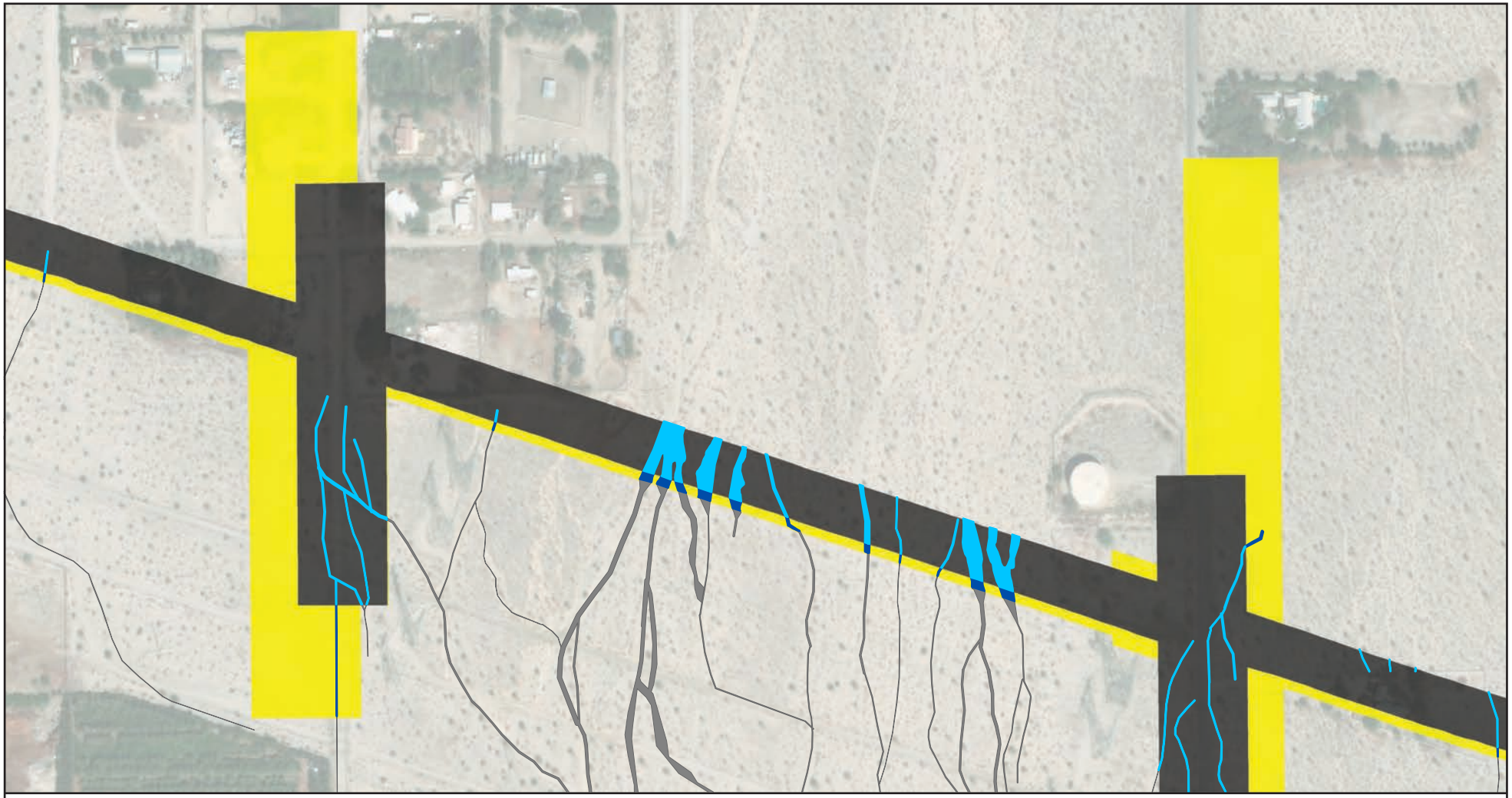
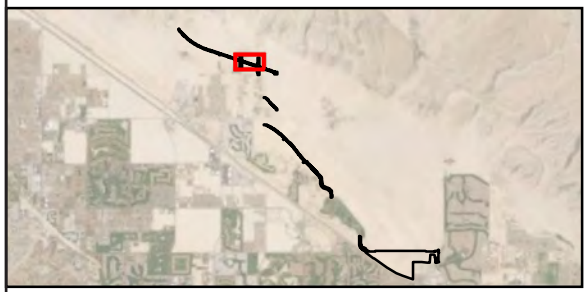


Image Source: DigitialGlobe, 2018



Permanent Disturbance Area
Temporary Disturbance Area

Non-wetland Waters of the U.S.
Permanent Impact
Temporary Impact
Downstream Impact

100 0 200 Feet

Figure A-4

**Alternative 1:
Impacts to Waters of the U.S.**

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

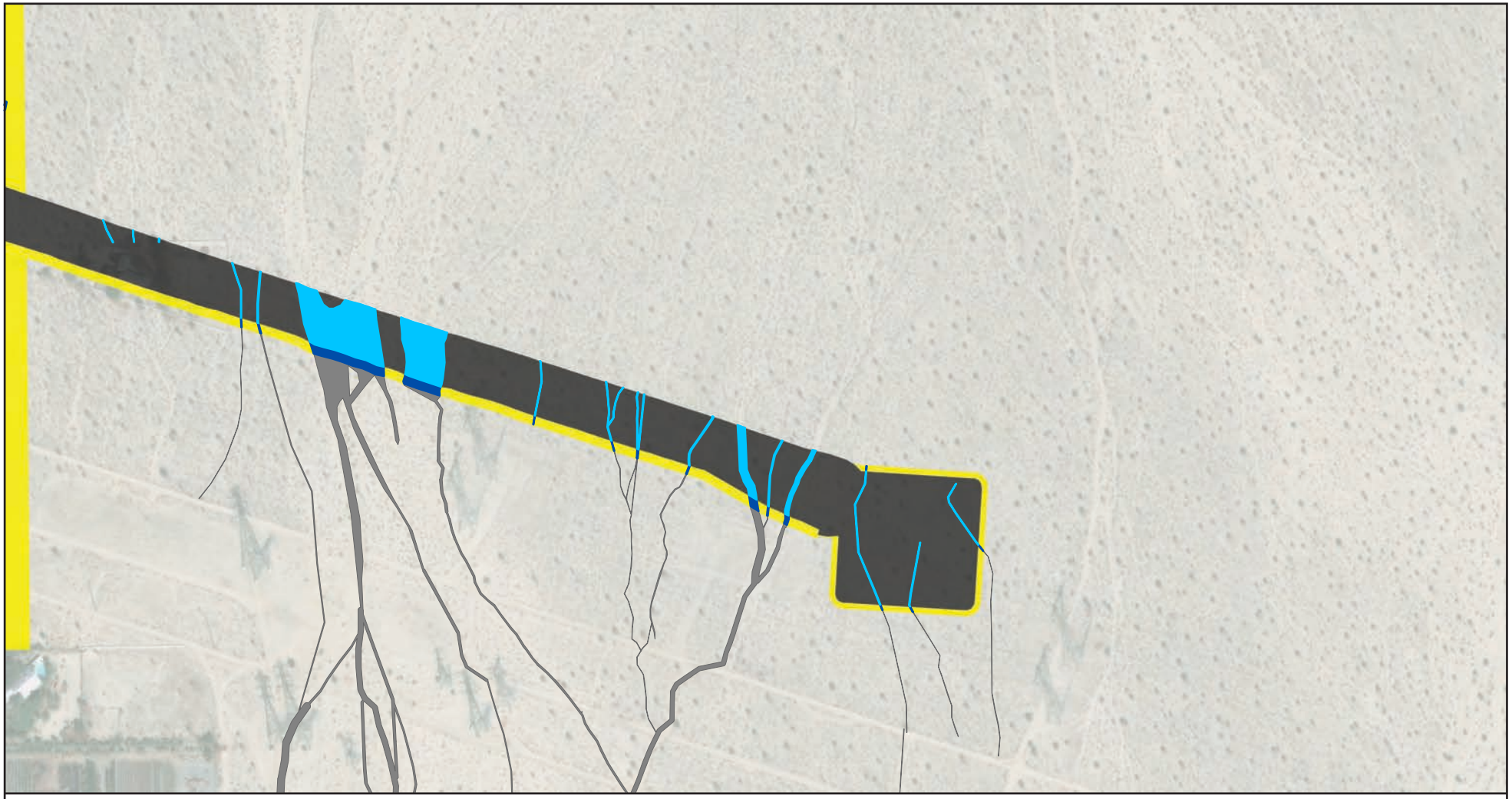
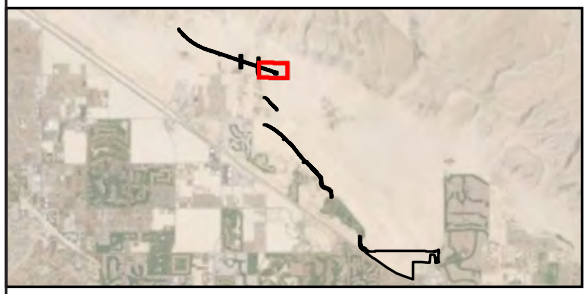


Image Source: DigitialGlobe, 2018



Permanent Disturbance Area
Temporary Disturbance Area

Non-wetland Waters of the U.S.
Permanent Impact
Temporary Impact
Downstream Impact

100 0 200 Feet

Figure A-5

**Alternative 1:
Impacts to Waters of the U.S.**

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

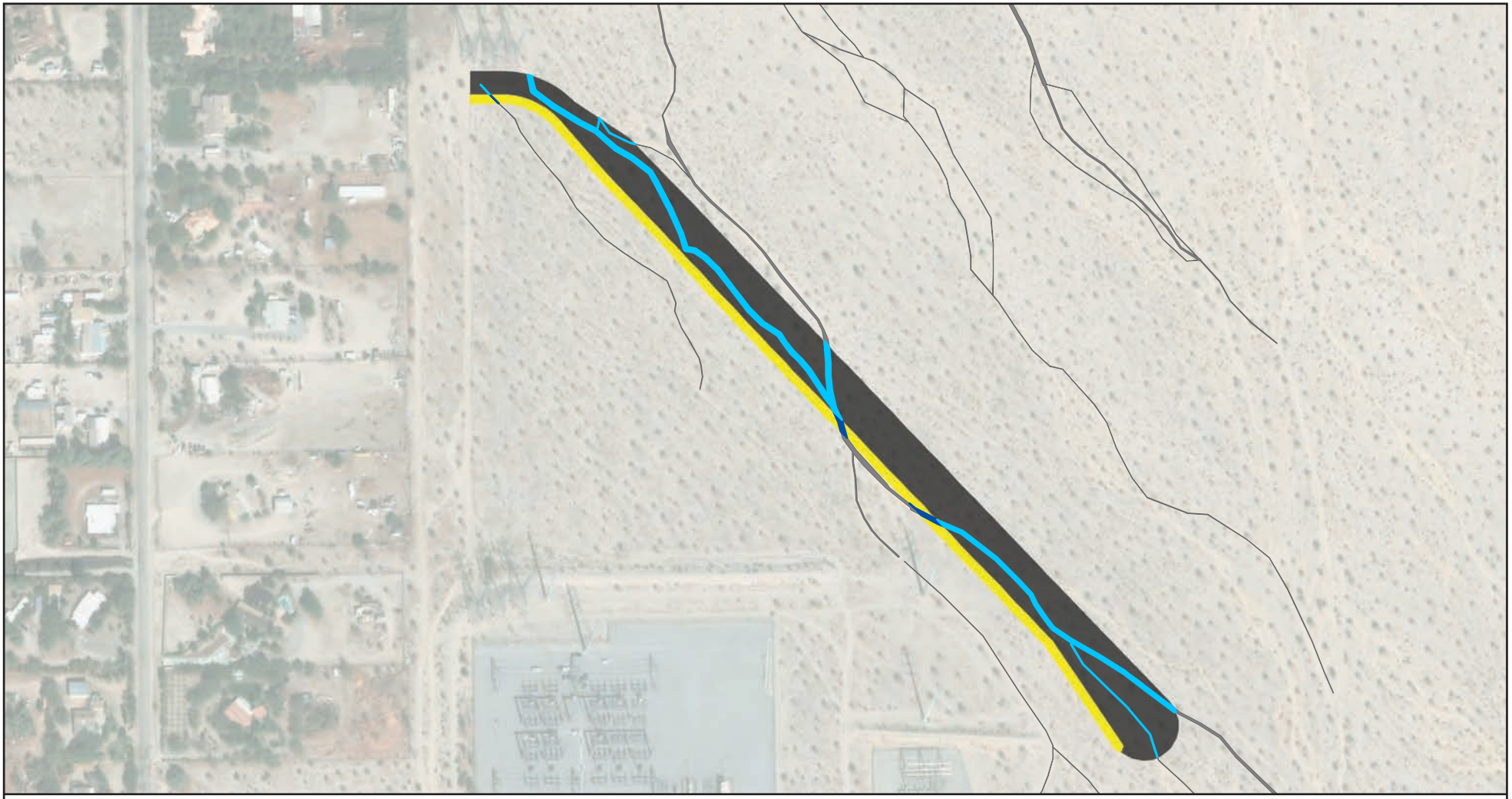


Image Source: DigitialGlobe, 2018

Permanent Disturbance Area
Temporary Disturbance Area

Non-wetland Waters of the U.S.
Permanent Impact
Temporary Impact
Downstream Impact

100 0 200 Feet

Figure A-6

**Alternative 1:
Impacts to Waters of the U.S.**

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

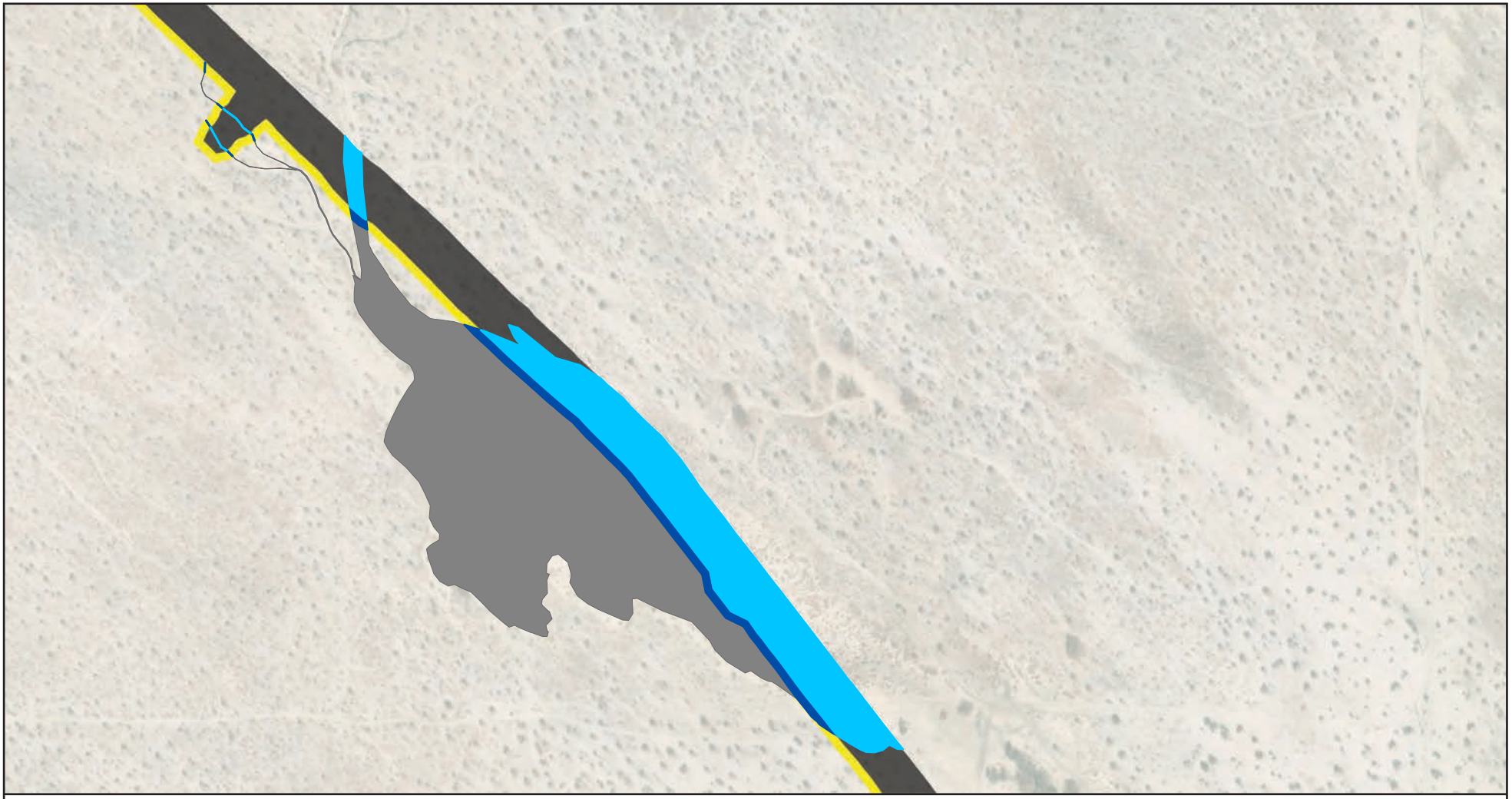
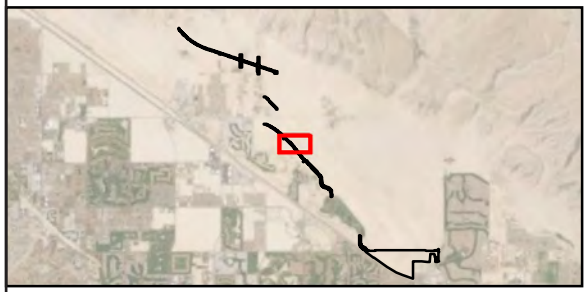


Image Source: DigitialGlobe, 2018



Permanent Disturbance Area
Temporary Disturbance Area

Non-wetland Waters of the U.S.
Permanent Impact
Temporary Impact
Downstream Impact

100 0 200
Feet

Figure A-7

**Alternative 1:
Impacts to Waters of the U.S.**

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

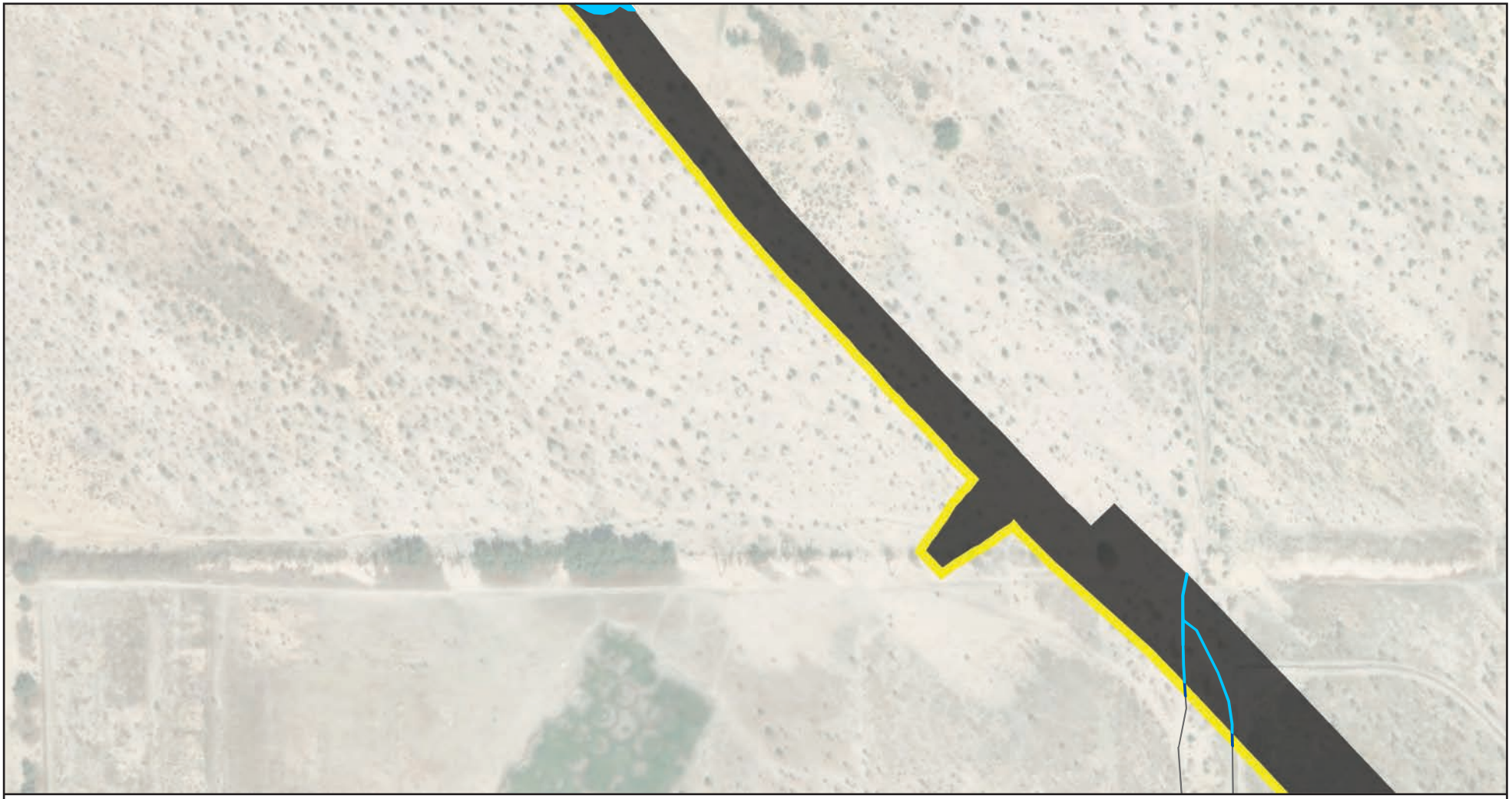
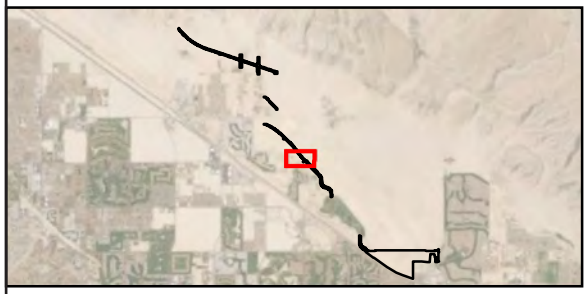


Image Source: DigitialGlobe, 2018



Permanent Disturbance Area
Temporary Disturbance Area

Non-wetland Waters of the U.S.
Permanent Impact
Temporary Impact
Downstream Impact

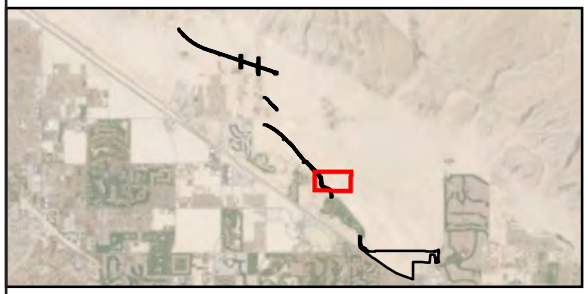
100 0 200 Feet

Figure A-8

**Alternative 1:
Impacts to Waters of the U.S.**

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018



Permanent Disturbance Area
Temporary Disturbance Area

Non-wetland Waters of the U.S.
Permanent Impact
Temporary Impact
Downstream Impact

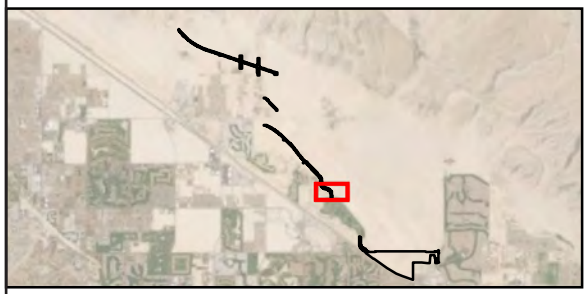
100 0 200 Feet

Figure A-9

**Alternative 1:
Impacts to Waters of the U.S.**

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018



Permanent Disturbance Area
Temporary Disturbance Area

Non-wetland Waters of the U.S.
Permanent Impact
Temporary Impact
Downstream Impact

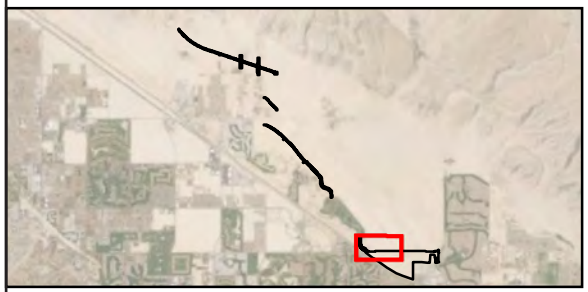
100 0 200 Feet

Figure A-10

**Alternative 1:
Impacts to Waters of the U.S.**

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018



Permanent Disturbance Area
Temporary Disturbance Area

Non-wetland Waters of the U.S.
Permanent Impact

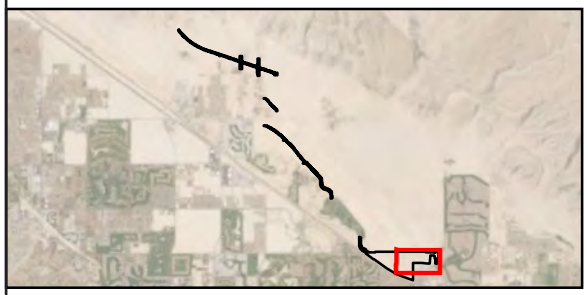
100 0 200 Feet

Figure A-11

**Alternative 1:
Impacts to Waters of the U.S.**

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018



Permanent Disturbance Area
Temporary Disturbance Area

Non-wetland Waters of the U.S.
Permanent Impact
Temporary Impact
Downstream Impact

100 0 200 Feet

Figure A-12

**Alternative 1:
Impacts to Waters of the U.S.**

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

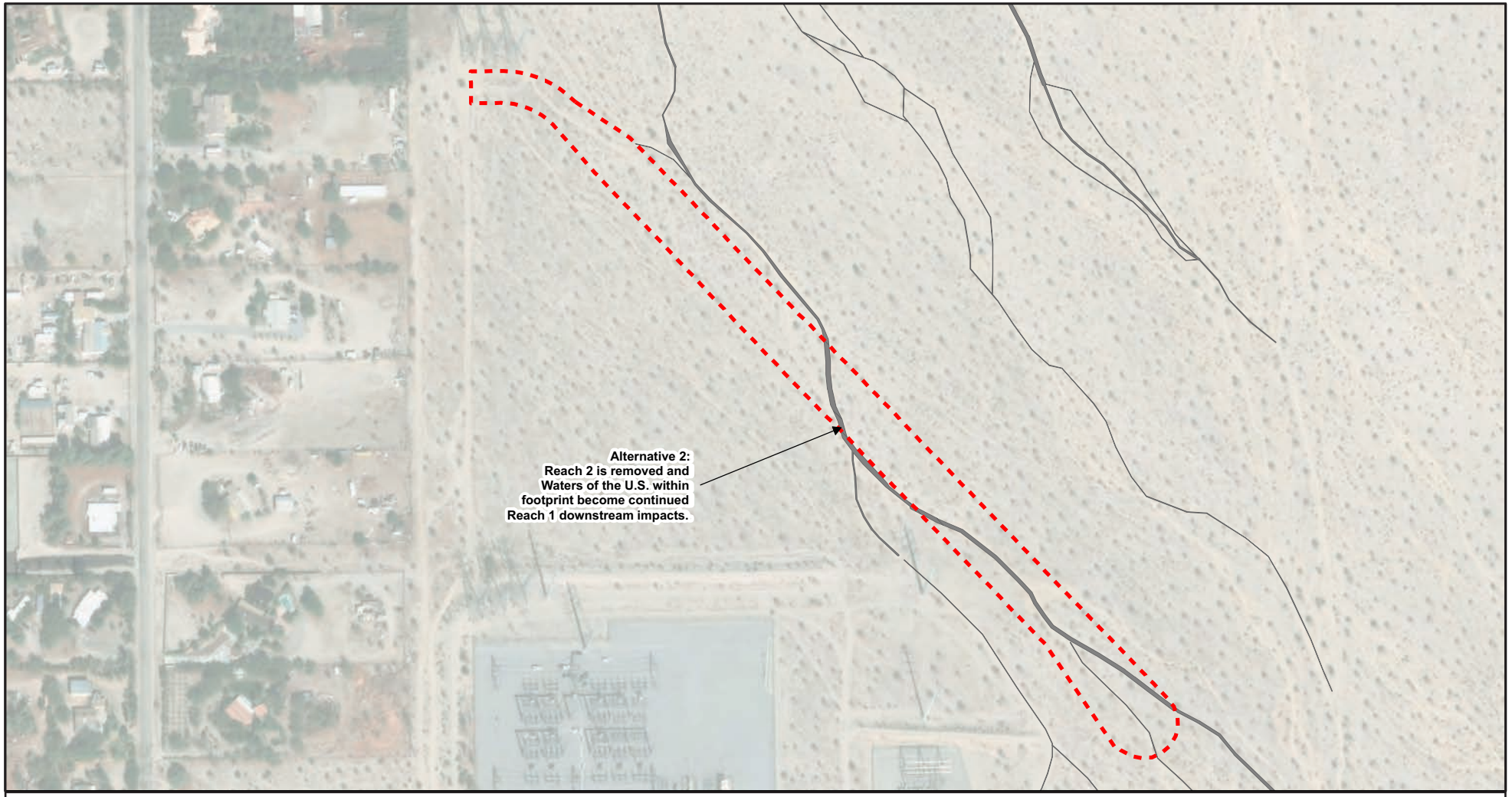


Image Source: DigitialGlobe, 2018

Alt 2: Reach 2- Removed

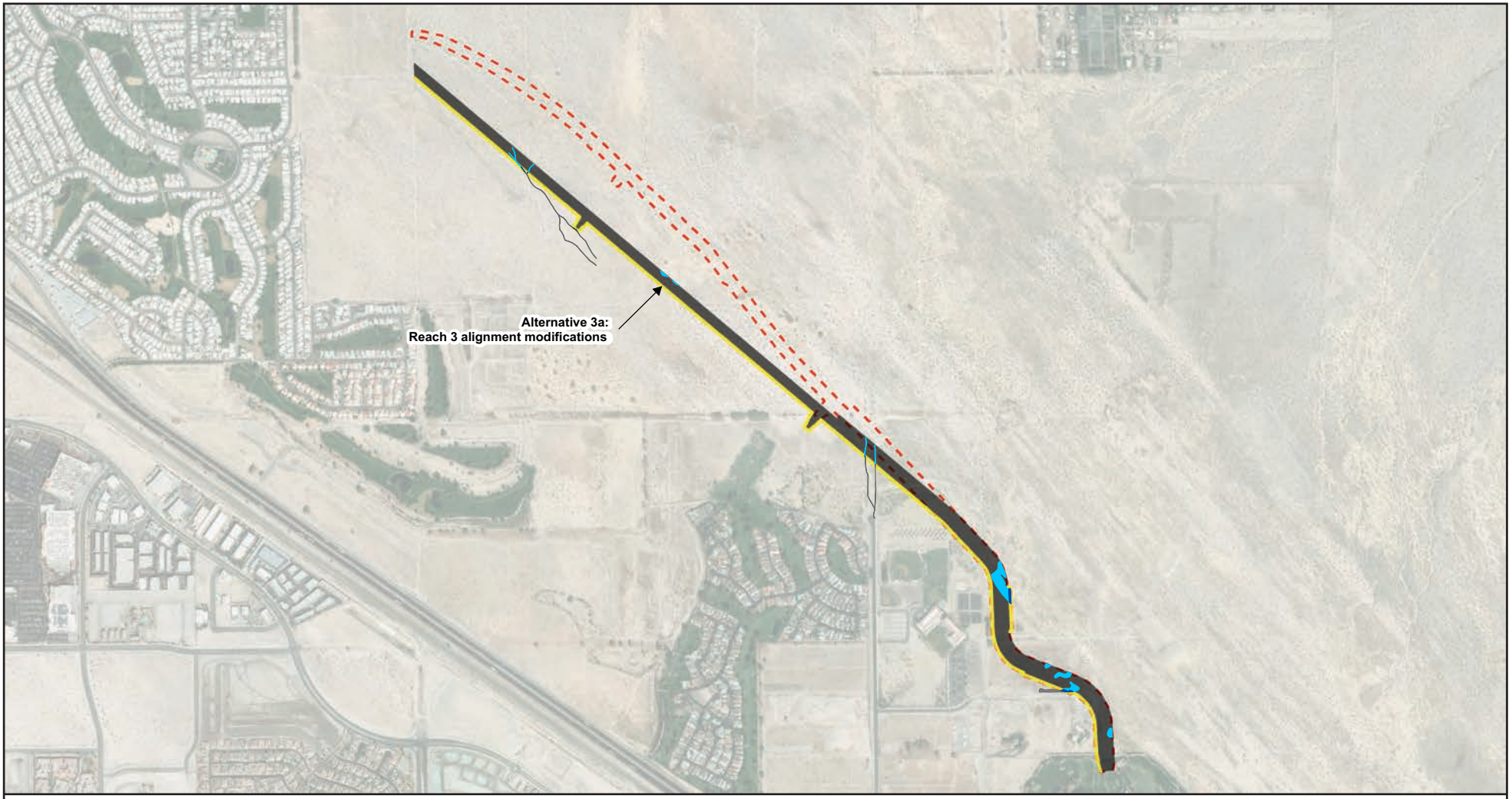
Downstream Waters of the U.S.

100 0 200 Feet

Figure A-13

Alternative 2:
Modified Impacts to Waters of the U.S.

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.



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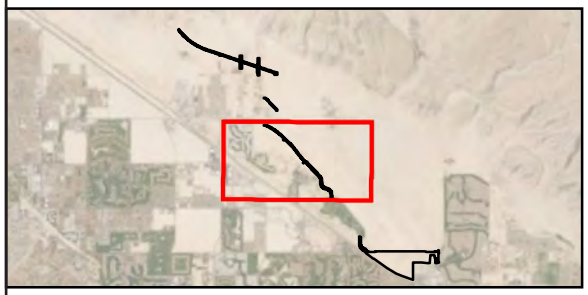


Alt 3a: Permanent Disturbance Area
Alt 3a: Temporary Disturbance Area
Alt 1: Proposed Project Area

Non-wetland Waters of the U.S.
Permanent Impact
Temporary Impact
Downstream Impact

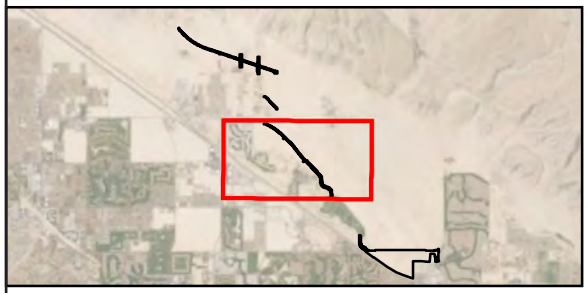
500 0 1,000 Feet

Figure A-14

**Alternative 3a:
Modified Impacts to Waters of the U.S.**

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018



Alt 3b: Permanent Disturbance Area
Alt 3b: Temporary Disturbance Area
Alt 1: Proposed Project Area

Non-wetland Waters of the U.S.
Permanent Impact
Temporary Impact
Downstream Impact

500 0 1,000 Feet

Figure A-15

**Alternative 3b:
Modified Impacts to Waters of the U.S.**

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Appendix B

Conceptual Compensatory Mitigation Plan

Conceptual Compensatory Mitigation Plan
Thousand Palms Flood Control Project

Prepared for:

Coachella Valley Water District
75-515 Hovley Lane East
Palm Desert, CA 92211

Prepared by:

Aspen Environmental Group
5020 Chesebro Road, Suite 200
Agoura Hills, CA 91301

December 2021

Table of Contents

List of Tables

Attachments

1.0 Introduction

This report presents a conceptual compensatory mitigation plan (Plan) for the Thousand Palms Flood Control Project (Project). The proposed Plan was developed by Aspen Environmental Group (Aspen) and the Coachella Valley Water District (CVWD) as a first step to evaluating and mitigating project related impacts to aquatic systems for the proposed Project. This report provides a semi-quantitative, function-based approach to assigning habitat values in order to develop compensatory mitigation ratios for permanent impacts to episodic aquatic systems subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE).

As part of a 404 permit authorizing impacts to federal waters, the 404 permit may require the permittee to obtain compensatory mitigation lands, conduct stream restoration or enhancement activities in federal waters to compensate or offset project permanent impacts, or participate in an in-lieu fee program. The 2008 Federal Mitigation Rule recommends that a functional or condition assessment be completed at the impact site to quantify ecological losses (debits) and at the mitigation site to quantify projected ecological gains (credits), which would be realized if the mitigation project is successfully implemented (33 CFR 332.3(f)(1), 2008).

1.1 Project Description

The Project is located in the Thousand Palms area of the Coachella Valley in Riverside County, California. CVWD proposes to construct a series of flood control improvements (i.e., levees, channels, and energy dissipaters) to reduce flood hazards in the Thousand Palms area. Implementation of the Project has the potential to result in 10.62 acres of permanent and 4.50 acres of temporary impacts to ephemeral drainages under the jurisdiction of the USACE. In addition, the Project is expected to result in indirect impacts to approximately 17.98 acres of ephemeral waters located below the levees or channels. Flood control improvements associated with the Project would reduce flood hazards from coalescing alluvial fans in the area between the Indio Hills and Interstate 10. A community of approximately 3,000 homes (encompassing approximately 2,000 acres) is present downslope of the Review Area and lacks storm water control features. It is the Projects primary objective to protect existing and future development in this area.

The Project includes levees, channels, and energy dissipating structures. The levees and channels would be comprised of native material excavated from the Project footprint. To provide scour protection, the upslope sides of each levee and channel would be armored with soil cement, which is typically a compacted, high-density mix of pulverized rocks and soils combined with cement and water.

As a secondary objective, the Project would maintain or improve an important sand transport corridor (via aeolian and/or fluvial means) to the Coachella Valley Preserve. A portion of the 15,000-acre Coachella Valley Preserve, including the Coachella Valley National Wildlife Refuge, is located in and adjacent to portions of the project. The lands lying within the Preserve are owned and administered by the U.S. Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), and the California Department of Fish and Wildlife (USACE, 2000). The Preserve supports Critical Habitat, including sand dunes, for populations of the State endangered and federally threatened Coachella Valley fringe-toed lizards.

The Project is broken into four reaches starting with Reach 1 in the northwest and ending with Reach 4 in the southeast (see Figure 1). The four Reaches are further described below:

1.1.1 Reach 1

Reach 1 is comprised of a 12,667-foot-long (2.4 miles) levee (Levee 1) with an access road at Via Las Palmas. Levee 1 would have a height of approximately 11.5 feet on the upstream end, increasing to

approximately 14 feet on the downstream end, in order to ensure capacity associated with a 100-year storm event. Levee 1 would initiate approximately 0.1 miles to the east of the intersection of 28th Avenue and Rio del Sol and then extend in an east-southeasterly direction. The levee would generally run parallel to and north of Southern California Edison's (SCE) existing utility corridor. Continuing in a southeasterly direction, Levee 1 would cross over Sierra del Sol and Desert Moon Drive. Water and sediment from the Indio Hills would flow naturally toward Reach 1 and be diverted by the project to the 550-acre floodway in the wind corridor.

1.1.3 Reach 2

Reach 2 is comprised of a 1,747-foot-long (0.33 mile) levee (Levee 2) with a height of approximately 14 feet. Levee 2 is located in the mid-alluvial fan area just northeast of an existing electrical substation and adjacent residential development. Reach 2 would accept flows from Reach 1 and divert flows to the southeast along the western border of the Coachella Valley Preserve. Levee 2 would be situated in the direction of the prevailing wind to avoid interference with aeolian processes, or the movement of sand by wind.

1.1.4 Reach 3

Reach 3 is comprised of a 6,498-foot-long (1.23 mile) levee (Levee 3), an access road, and a 5,314-foot-long (1.01 mile) incised channel (Reach 3 Channel). Levee 3 would have a height of approximately 14 feet at the upstream end, increasing to approximately 18 feet at the downstream end in order to accommodate the 100-year storm event. Levee 3 would initiate approximately 2,000 feet southwest of the downstream end of Levee 2, roughly 1,000 feet south of Ramon Road. Levee 3 would run parallel to the north of the future Cook Avenue, then transition to an incised channel. The Reach 3 Channel would divert flows from Levee 3 into the Classic Club Golf Course, where existing stormwater drainage features are sufficient to transport flows through the golf course property. The Project would not alter the Classic Club Golf Course, and the Project has been developed in coordination with golf course management.

A portion of the Reach 3 Channel would traverse athletic facilities located in the northeast corner of the Xavier High School, then turn south to follow the school's eastern border before turning east and terminating at the Classic Club Golf Course. The Reach 3 Channel would be supplemented with a five-foot-tall embankment on the west side and lined with either concrete or soil cement. A 15-foot-wide access road would be located adjacent to the north (east) of Levee 3 and the Reach 3 Channel to support operation and maintenance activities. A proposed sediment disposal site is also located just east of Reach 3 near the Pegasus Therapeutic Riding facility.

1.1.5 Reach 4

Reach 4 is comprised of an approximately 10,560-foot-long (two-mile) incised channel (Reach 4 Channel). The Reach 4 Channel would accept stormwater flows from the southeast end of the Classic Club Golf Course and continue south then east, north of Avenue 38 (to be re-aligned) and Interstate 10. Reach 4 is located immediately south of the Coachella Valley Preserve and would terminate at Washington Street near the community of Del Webb / Sun City where the flows enter existing storm water facilities. A sediment disposal area is also included in Reach 4. This area will be used to dispose of excess sediment that accumulates in the Reach 4 Channel.

1.1.6 Floodway

The Project includes acquisition of an approximate 550-acre floodway located along the levees and on the active wind corridor between Reach 1 and Reach 3. Development would be prohibited on this floodway

area to protect the existing sand transport corridor. During operation and maintenance of the Project, some of the material that accumulates along Project levees and channels would be excavated and distributed on the preserved floodway to provide source material for natural sand distribution onto the Preserve. There are numerous stream channels within the floodway, and these are evaluated as part of the mitigation for Project impacts as described in this report. As flood flows are diverted from Reach 1, increased hydrology in the floodway is expected to enhance existing alluvial fan features and create additional episodic areas through natural processes.

2.0 Assessment Methods

To evaluate the overall stream health in the Project area this evaluation considers the Stream Functions Pyramid Framework (USEPA 2012) and the stream functions framework created by the US Army Corp of Engineers (USACE) for determining and evaluating objectives for stream restoration projects (Fischenich, 2006). This approach is a systematic method to apply current scientific understanding and best professional judgment about conditions in arid aquatic systems that considers hydrologic, biogeochemical, and habitat-support functions. Aspen identified key functions and assessment indices that evaluates the physical, chemical, and biological characteristics of the drainages that will be directly and indirectly disturbed by construction of the project and drainages located downstream of the levees which will be degraded from the redirection of flows. This report also evaluates the physical, chemical, and biological characteristics of the drainages located in the 550-acre floodway to better understand the pre- and post-project benefits of the project. The floodway is an existing mitigation component to the project in regard to sand transport and will also be subject to enhanced ephemeral flows during precipitation events, significantly providing mitigation for impacts to federal waters.

2.1 Environmental Components

This evaluation considers the Stream Functions Pyramid Framework (Harman et al. 2012) and other factors in order to assess the stream health and evaluate mitigation requirements that may result from the construction and maintenance of the proposed project. This plan also evaluates changes to existing stream functions from conveying flow to these systems.

This method is based on a set of environmental factors supported by a series of decision indices that require the data collector to consider a variety of biotic and abiotic factors. These include:

- Hydrology (transport of water from the watershed to the stream) Factor-1.
- Hydraulic (transport of water in the channel, floodplain, or sediments) Factor- 2.
- Geomorphology (transport of organic material and sediment to create bed conditions) Factor-3.
- Physicochemical (temperature, oxygen, and processing organic matter) Factor-4.
- Biology (biodiversity found within the system) Factor-5.
- Anthropogenic Disturbances (effects of adjacent land use and human disturbances) Factor-6

These environmental factors consider hydrology, hydraulics, geomorphology, physiochemical, and the biological resources present in the system. This evaluation also includes an evaluation of anthropogenic disturbances that may affect overall stream health. These factors form a pyramid that are supported by each successive level. For example, hydrology or the presence of water is the basis of the pyramid that supports all other stream functions. Each of these factors combine to provide the functions and services

that ultimately support the presence of aquatic organisms (Biology- Level 5). How these factors all contribute to stream health in the project area is discussed qualitatively below.

For each environmental factor there are decision indices that support the conclusion or evaluation of the environmental factor. A numeric value of -1, 0, or +1 is assigned to each decision index which is used to calculate overall stream health. Generally, streams that have lower stream scores are considered to have lower functions and services compared to streams with higher scores. Each of the environmental factors and several of their decision indices is presented below.

2.1.1 Factor 1. Hydrology

Factor 1 considers the transport of water from the watershed to the streams that occur within the Thousand Palms floodplain.

Factor 1 Decision Indices:

- Drainages flow unimpeded from their headwaters?
- Watershed is intact and free from development?
- Watershed affects local channel formation for storms under 10-year event?

2.1.2 Factor 2. Hydraulics

Factor 2 considers the transport of water in the channel, floodplain, or underlying sediment.

Factor 2 Decision Indices:

- Drainages are free from obstructions or physical structures that impede or redirect flow?
- Drainages connects to downstream waters through natural features?
- Drainages supports temporary surface water storage during less than 10-year storm event?

2.1.3 Factor 3. Geomorphology

Factor 3 considers if the system functions in the transport of organic material and sediment to create bed conditions that support vegetation and wildlife.

Factor 3 Decision Indices:

- Drainages maintain sediment for aeolian transport.
- Drainages provide substrate and structural components that support vegetation and wildlife?
- Drainages contain floodprone areas, terraces, and other features?

2.1.4 Factor 4. Physicochemical

Factor 4 considers the water temperature, dissolved oxygen, and the processing of organic matter in the creeks.

Factor 4 Decision Indices:

- Drainage supports organic matter?
- Channels support pools or other ponding areas?

- Water temperatures are affected by flow, shade, or other factors in this system?

2.1.5 Factor 5. Biological

Factor 5 considers the biological resources that are dependent on the stream function in this system.

Factor 5 Decision Indices:

- Drainage supports aquatic dependent plants or wildlife?
- Drainage supports listed plants or wildlife and contributes to their habitat?
- Drainage relatively free from invasive plants or animals?

2.1.6 Factor 6. Anthropogenic Disturbance

Factor 6 considers the effects of adjacent land uses, roadways, off-highway vehicle use, and other human disturbance in this system.

Factor 6 Decision Indices:

- Drainages not subject to disturbance from OHV use, equestrian use, roads, or other infrastructure?
- Drainages not affected by other human induced influences (such as trash) that may affect stream health?

For each environmental factor, a series of decision indices was reviewed that support the conclusion or evaluation of the environmental factor. Using the decision indices, a numeric value ranked as -1, 0, or +1 was assigned for each of the environmental factors. For the five factors a maximum of 17 points can be achieved. This rank would be given to a pristine drainage supporting sensitive plants and wildlife found in an undeveloped area free from disturbance and with direct connectivity with their receiving waters. The rank is not meant to devalue the existing system but to provide a mechanism to evaluate overall habitat conditions and stream functions compared to the proposed mitigation sites.

3.0 Baseline Conditions and Functions

Baseline conditions of the habitat and stream channels is described in detail in the Draft EIS/EIR and the Preliminary Jurisdictional Delineation and Wetland Determination Report (Aspen, 2020). This report focuses on the drainages mapped within the Project area that were presented in an Aquatic Resources Delineation Report submitted to the USCAE on June 9, 2020 and approved by the USACE in 2020. Table 1 provides a summary of the drainages within the Project area that were determined to have a defined Ordinary High-Water Mark (OHWM) and are under the jurisdiction of the USACE. In addition, there are approximately 70 braided drainages that would be preserved in the 550-acre floodway as in-kind mitigation as a component of compensatory mitigation. The drainages within the floodway flow through creosote bush scrub, cheese bush scrub, and areas that are primarily barren or support sparse vegetation such as portions of the active channel, hard pans, and sand dunes.

Table 1. Measurements and Classifications of Jurisdictional Waters of the U.S.

Drainage ID	Latitude	Longitude	Drainage Area (acres)	Drainage Length (feet)	Drainage Width (feet)[1]	Dominant Vegetation Type
1-1	33.84466383	-116.4038552	0.003	146	0.9	Disturbed/Developed

Table 1. Measurements and Classifications of Jurisdictional Waters of the U.S.

Drainage ID	Latitude	Longitude	Drainage Area (acres)	Drainage Length (feet)	Drainage Width (feet)[1]	Dominant Vegetation Type
1-2	33.84463967	-116.4037696	0.035	160	9.5	Disturbed/Developed
1-3	33.84406318	-116.4031467	0.013	145	3.9	Disturbed/Developed
1-4	33.8437784	-116.4028461	0.018	134	5.9	Disturbed/Developed
1-5[3]	33.84227207	-116.4009543	0.047	171	12.0	Creosote Scrub
1-6	33.84100848	-116.3989095	0.038	168	9.9	Creosote Scrub
1-7	33.83979783	-116.3964145	0.021	233	3.9	Creosote Scrub
1-8[3]	33.83862613	-116.3931115	0.039	173	9.8	Creosote Scrub
1-9	33.83881385	-116.3931107	0.003	104	1.3	Creosote Scrub
1-10[3]	33.83788999	-116.3903711	0.003	134	1.0	Creosote Scrub
1-12	33.83741838	-116.3885969	0.003	123	1.1	Creosote Scrub
1-13	33.83702754	-116.3871893	0.023	175	5.7	Creosote Scrub
1-14	33.83671542	-116.3860891	0.207	138	65.3	Creosote Scrub
1-15	33.83661868	-116.3853749	0.218	145	65.5	Creosote Scrub
1-16	33.83624794	-116.3849682	0.076	135	24.5	Creosote Scrub
1-17	33.83621541	-116.3847329	0.020	143	6.1	Creosote Scrub
1-18[3]	33.83614684	-116.3842019	0.095	166	24.9	Creosote Scrub
1-19	33.83585659	-116.3829285	0.003	137	1.0	Creosote Scrub
1-20	33.83573544	-116.3825836	0.003	139	0.9	Creosote Scrub
1-21	33.83548222	-116.3819479	0.002	69	1.3	Creosote Scrub
1-22	33.83443864	-116.3799598	0.024	512	2.0	Creosote Scrub
1-23	33.83435157	-116.3797481	0.010	197	2.2	Creosote Scrub
1-24	33.83420191	-116.3796014	0.007	166	1.8	Creosote Scrub
1-25	33.83417431	-116.379897	0.017	193	3.8	Creosote Scrub
1-26	33.83369647	-116.3796248	0.006	263	1.0	Creosote Scrub
1-27	33.83311593	-116.3798172	0.007	308	1.0	Creosote Scrub
1-28	33.83451781	-116.3786217	0.002	46	1.9	Creosote Scrub
1-29	33.83445464	-116.3773713	0.188	140	58.5	Creosote Scrub
1-30	33.83436453	-116.376993	0.090	140	28.0	Creosote Scrub
1-31	33.83416532	-116.376836	0.055	144	16.6	Creosote Scrub
1-32	33.83403118	-116.3765535	0.017	187	4.0	Creosote Scrub
1-33	33.83386363	-116.3758866	0.030	152	8.6	Creosote Scrub
1-34	33.83382195	-116.3756706	0.003	149	0.9	Creosote Scrub
1-35	33.8335468	-116.3753635	0.006	136	1.9	Creosote Scrub
1-36	33.83383965	-116.375111	0.104	154	29.4	Creosote Scrub
1-37	33.83342018	-116.3748379	0.110	166	28.9	Creosote Scrub
1-38	33.83276116	-116.3736735	0.007	305	1.0	Creosote Scrub
1-39	33.83199147	-116.3735208	0.016	676	1.0	Creosote Scrub
1-40	33.83346104	-116.3731725	0.029	962	1.3	Creosote Scrub
1-41	33.8330378	-116.3731801	0.007	150	2.0	Creosote Scrub
1-42	33.83305178	-116.3722441	0.001	55	0.8	Creosote Scrub
1-43	33.83297355	-116.3720247	0.001	26	1.7	Creosote Scrub
1-44	33.83292202	-116.371836	0.001	8	0.5	Creosote Scrub
1-45	33.83259761	-116.3712333	0.003	148	0.9	Creosote Scrub
1-46	33.83258921	-116.3711059	0.006	139	1.9	Creosote Scrub
1-47	33.83259327	-116.3706905	0.532	153	151.5	Creosote Scrub
1-48	33.83207084	-116.3698428	0.299	175	74.4	Creosote Scrub
1-49	33.83199453	-116.3690235	0.003	144	0.9	Creosote Scrub

Table 1. Measurements and Classifications of Jurisdictional Waters of the U.S.

Drainage ID	Latitude	Longitude	Drainage Area (acres)	Drainage Length (feet)	Drainage Width (feet)[1]	Dominant Vegetation Type
1-50	33.83202187	-116.3685301	0.004	158	1.1	Creosote Scrub
1-51	33.8319695	-116.3684406	0.002	96	0.9	Creosote Scrub
1-52	33.83176836	-116.3683092	0.003	149	0.9	Creosote Scrub
1-53	33.83173431	-116.3682833	0.003	145	0.9	Creosote Scrub
1-54	33.83167864	-116.3678611	0.007	147	2.1	Creosote Scrub
1-55	33.83173969	-116.3675337	0.070	191	16.0	Creosote Scrub
1-56	33.83165599	-116.367251	0.008	173	2.0	Creosote Scrub
1-57	33.83159035	-116.3669983	0.033	180	8.0	Creosote Scrub
1-58	33.83127586	-116.3666981	0.008	340	1.0	Creosote Scrub
1-59	33.83092794	-116.3662463	0.004	161	1.1	Creosote Scrub
1-60	33.83116539	-116.3659087	0.004	179	1.0	Creosote Scrub
2-1	33.82304396	-116.3708062	0.001	58	0.8	Creosote Scrub
2-2	33.82312197	-116.3704838	0.392	1874	9.1	Creosote Scrub
2-3	33.82285547	-116.3699907	0.001	30	1.5	Creosote Scrub
2-4	33.82273688	-116.369775	0.002	104	0.8	Creosote Scrub
2-5	33.82137564	-116.3682912	0.029	140	9.0	Creosote Scrub
2-6	33.8189734	-116.365909	0.007	333	0.9	Creosote Scrub
3-1	33.8095457	-116.3630288	0.004	157	1.1	Creosote Scrub
3-2	33.80938056	-116.3631784	0.003	112	1.2	Creosote Scrub
3-3	33.80896859	-116.3621075	0.155	225	30.0	Cheesebush Scrub
3-4	33.80672521	-116.3592614	3.939	1498	114.5	Asian Mustard Stand
3-5	33.80163678	-116.3536505	0.028	276	4.4	Asian Mustard Stand
3-6	33.80115813	-116.3533849	0.028	315	3.9	Asian Mustard Stand
3-7	33.79665531	-116.3485887	1.002	435	100.3	Asian Mustard Stand
3-8	33.79375687	-116.3466935	0.048	47	44.5	Allscale scrub
3-9	33.79347004	-116.3460187	0.185	220	36.6	Allscale scrub
3-10	33.79302899	-116.3456504	0.197	254	33.8	Allscale scrub
3-11	33.79160581	-116.3442987	0.107	60	77.7	Creosote Scrub
4-1	33.77466181	-116.333238	0.338	177	83.2	Asian Mustard Stand
4-2	33.77423311	-116.3329984	0.450	289	67.8	Active Sand Dune / Stabilized Sand Field
4-3	33.77221977	-116.3143107	0.448	336	58.1	Active Sand Dune / Stabilized Sand Field
4-4	33.77194789	-116.3106466	1.011	377	116.8	Active Sand Dune / Stabilized Sand Field
4-5	33.77210541	-116.3090468	1.465	695	91.8	Active Sand Dune / Stabilized Sand Field
4-6	33.77234974	-116.3072497	0.102	112	39.7	Active Sand Dune / Stabilized Sand Field
4-7	33.77209484	-116.3067289	0.230	162	61.8	Active Sand Dune / Stabilized Sand Field
4-8	33.77263532	-116.3054702	0.270	387	30.4	Active Sand Dune / Stabilized Sand Field
4-9	33.77251705	-116.3041076	0.121	357	14.8	Active Sand Dune / Stabilized Sand Field
4-10	33.77105103	-116.3069854	1.924	521	160.9	Active Sand Dune / Stabilized Sand Field
Total:	--	--	15.087	20,398	1913.2	--

3.1 Reach Descriptions and Stream Assessment

The baseline conditions and functions for each of the Reaches is evaluated below based on field work, existing environmental documents, and aerial imagery. Each of the reaches is described for baseline conditions and overall habitat conditions. In addition, each reach includes a description of the general hydrology, hydraulics, geomorphology, physiochemical, biological resources, and anthropogenic disturbances that affect stream functions. Table 2 (Stream Assessment Indicators and Stream Function) provides a numerical ranking for each of the assessment indicators evaluated in this report.

3.1.1 Reach 1

Reach 1 includes sixty drainages mapped as waters of the U.S. (see Figure 1). These drainages originate within two miles to the north of the Project area in six unnamed canyons within the Indio Hills. Water from these canyons flow south onto an extensive alluvial fan. Vegetation within these drainages is dominated by creosote bush (*Larrea tridentata*), with other species such as smoke tree (*Psorothamnus spinosus*), desert lavender (*Hyptis emoryi*), catclaw (*Senegalia greggii*), cheesebush (*Ambrosia salsola*) and Schott's dalea (*Psorothamnus schottii*) also being present but in limited numbers. The vegetation within Reach 1 and throughout the Project area is described in more details in the Preliminary Jurisdictional Delineation and Wetland Determination Report (Aspen, 2020).

Drainages 1-1 through 1-46 are impacted by upstream development that restricts or impedes flows. This includes paved and unpaved roads such as 28th Avenue, Sierra Del Sol, Vista Chino, Via Las Palmas, and others. It also includes approximately 12 industrial developments including a sand and gravel quarry, automotive scrap yard, and various other facilities. Approximately 40 residential properties are also present off of Desert Moon Dr. and Via Las Palmas. This extensive development has altered flows to many of the drainages in Reach 1. Drainages 1-47 through 1-60, near the eastern end of Reach 1 are the only drainages that are unimpeded north of Reach 1.

Anthropogenic disturbances are common in most of Reach 1 and includes off-road vehicles, illegal trash dumping, green waste disposal, and a Southern California Edison (SCE) powerline corridor. These activities impact the function and health of these drainages.

Downstream connectivity is also important to understand the function and importance of these drainages. Drainages 1-1 through 1-13, 1-19 through 1-21, and 1-38 through 1-46 appear to end within a 0.5-mile or less of the Project area.

Drainages 1-14 through 1-18 coalesce into a single drainage which eventually enter The Club at Shenandoah Springs, a golf course and trailer park with a series of low-flow fairways designed to carry storms flows. These flows would eventually reach detention basins along the southern edge of The Club at Shenandoah Springs. A review of aerial images available through Goggle Earth from 1996 through 2019 shows no clear evidence that flows have reached The Club at Shenandoah Springs during this time period.

Drainages 1-22 through 1-37 coalesce into a single drainage which flows south along the west side of several residential properties. The bulk of the flows travel south and eventually reach Ramon Rd. where they flow on the road and enter several smaller drainages south of Ramon Rd. These drainages also do not appear to flow with any regularity based on a review of aerial images from 1996 to 2019.

Stream Ranking

Reach 1 was separated into two sub reaches. This decision was made because Drainages 1-47 through 1-60, near the eastern end of Reach 1, are the only drainages that flow unimpeded from their headwaters

compared to other drainages in this reach. Based on the stream Assessment Indicators identified in Table 2, Reach 1 (Drainages 1-1 through 1-46) was assigned a score of 0 compared to Reach 1 (Drainages 1-47 through 1-60) which was assigned a score of 4. The higher scores of Reach 1 (Drainages 1-47 through 1-60) were primarily related to the unimpeded hydrology, reduced obstructions from roads, and lower human disturbance compared to Reach 1 (Drainages 1-1 through 1-46).

Table 2. Stream Assessment Indicators and Stream Function Reach's 1 Through 4.

	Reach 1 Drainages		Reach 2	Reach 3	Reach 4
	1-46	47-60			
Stream Assessment Indicators	**Stream Assessment Score: No: -1, Partial: 0, Yes: +1**				
Factor 1: Hydrology					
Drainages flow unimpeded from their headwaters?	-1	+1	+1	-1	-1
Watershed is intact and free from development?	0	0	0	-1	0
Watershed affects local channel formation for storms under 10-year event?	+1	+1	+1	-1	-1
Factor 2: Hydraulics					
Drainages are free from obstructions or physical structures that impede or redirect flow?	-1	0	-1	-1	-1
Drainages connects to downstream waters through natural features?	0	0	0	-1	-1
Drainages supports temporary surface water storage during less than 10-year storm event?	+1	+1	0	+1	0
Factor 3: Geomorphology					
Drainages maintain sediment for aeolian transport.	0	0	0	+1	-1
Drainages provide substrate and structural components that support vegetation and wildlife?	+1	+1	+1	+1	+1
Drainages contain floodprone areas, terraces, and other features?	+1	+1	+1	+1	0
Factor 4: Physiochemical					
Drainage supports organic matter?	+1	+1	+1	+1	+1
Channels support pools or other ponding areas?	0	0	0	+1	0
Water temperatures are affected by flow, shade, or other factors in this system?	0	0	0	+1	0
Factor: 5 Biological Resources					
Drainage support aquatic dependent plants or wildlife?	-1	-1	-1	0	-1
Drainage supports listed plants or wildlife and contributes to their habitat?	0	0	0	0	+1
Drainage relatively free from invasive plants or animals?	0	0	0	-1	-1
Factor 6: Anthropogenic Disturbances					
Drainages not subject to disturbance from OHV use, equestrian use, roads, or other infrastructure?	-1	-1	-1	-1	-1
Drainages not affected by other human induced influences that may affect stream health?	-1	0	0	0	0
Total Ranking by Assessment Area	0	4	2	0	-5
Total Rank by Reach	2		2	0	-5

3.1.2 Reach 2

Reach 2 includes six drainages that are all interconnected braids of the same channel. This channel also crosses through Reach 1 near drainages 1-47 and 1-48. Flows that enter these six drainages originate in an unnamed canyon about 2.7 miles north of Reach 2 in the Indio Hills. The vegetation in these drainages is similar to what is described under Reach 1 above.

Drainages 2-1 through 2-6 all flow nearly unimpeded from the Indio Hills. Unpaved roads along the SCE utility corridor may alter the flow pattern within Reach 1 which may influence the flows in Reach 2. A second SCE utility corridor that runs north to south between Reaches 1 and 2 may also be shifting flows to the east. Downstream of Reach 2, flows from these drainages cross Ramon Rd. and eventually enter Reach 3.

Stream Ranking

Based on the Stream Assessment Indicators identified in Table 2, Reach 2 was assigned a score of 2. Reach 2 scores were influenced by the large unobstructed watershed and general stream channel configuration. While there are some roads that divert flow, large areas appear to maintain connectivity with upstream areas and human disturbance is moderate.

3.1.3 Reach 3

Reach 3 includes 11 drainages that generally flow from northwest to southeast. The primary source of water in Reach 3 is from upstream drainages, some of which are within Reaches 1 and 2. These flows enter Reach 3 at drainage 3-3 which continues downstream into drainages 3-4, 3-5, 3-6, and 3-7. Flows through the eastern half of Reach 3 change from clearly defined desert washes to poorly defined playas and low-lying areas. Most of the flows in this reach eventually reach the expansive sand dunes which largely block flows and cause ponding. Drainages 3-7 through 3-10 represent these low-lying areas where water seasonally ponds. Ponding water results in aggressive seasonal proliferations of non-native Asian mustard (*Brassica tournefortii*) and other non-native species. The remainder of the sand dune habitat is vegetated with sparse creosote bush and numerous annuals such as Spanish needle (*Palafoxia arida*), pincushions (*Chaenactis* spp.), and hairy desert sunflower (*Geraea canescens*).

Drainages 3-1 and 3-2 originate within Reach 3 and quickly merge with flows from drainage 3-3. Drainage 3-3 is incised where it has cut into the vast sand fields that form the western edge of the sand dunes that provide habitat for Coachella Valley fringe-toed lizards. Drainage 3-3 quickly changes from an incised, well-defined drainage, to a broad poorly defined playa.

Flows in Reach 3 are largely unimpeded by anthropogenic influences but are subject to heavy off-highway vehicle use. These drainages are impeded by the sand dunes which are slightly higher in elevation in comparison to the ponded areas to the west. Reach 3 intentionally wraps around several areas of develop, as described in Section 1.1.4.

Stream Ranking

Based on the Stream Assessment Indicators identified in Table 2, Reach 3 was assigned a score of 0. Reach 3 scores were influenced by the presence of Ramon Road which captures and diverts flow and the presence of dunes and development which reduce connectivity with downstream areas under most storm regimes. Many areas along Reach 3 are subject to routine OHV or were used as green waste areas (east of Xavier High School) and no longer connect to downstream areas. In addition, ponded areas support extensive weed occurrences.

3.1.4 Reach 4

Reach 4 includes ten drainages. These drainages show indicators of flow and hydrology, likely the result of large episodic storms. The drainages are discontinuous, and it is difficult to understand flow patterns in this Reach. Drainages 4-1 and 4-2 are located within a detention basin just south of the Classic Club Golf Club and this basin has no outlets. Drainages 4-3 through 4-10 are poorly defined drainages that formed following significant storm flows. With the exception of some runoff from Avenue 38 that may enter drainages 4-8 and 4-9, water must travel more than 3.5 miles from Thousand Palms Canyon to the north to reach these drainages. The water must also cross an active sand dune system. Based on a review of aerial images from Reach 4, these drainages receive water on a greater than 10-year frequency.

Human uses in Reach 4 also impact these drainages. Drainages 1 and 2 are within a detention basin that is periodically maintained. Drainages 4-3 through 4-10 are all located in areas that appear to have been previously cleared, presumably for agriculture. A series of old windrows of tamarisk (*Tamarix ramosissima*) are also present between drainages 4-3 and 4-10 which were likely planted to catch drifting sand. Evidence of an old irrigation system is also present near several of these drainages. Illegal off-road vehicles and trash dumping are also prevalent in Reach 4 and may impact these drainages. In addition to the tamarisk windrows, the vegetation is largely dominated by annual and short-lived perennial dune species that have begun to move in to Reach 4 from the active dunes to the north of Avenue 38. These include species such as birdcage evening primrose (*Oenothera deltoides*), desert sand verbena (*Abronia villosa*), and milk-vetches (*Astragalus* spp.).

Stream Ranking

Based on the Stream Assessment Indicators identified in Table 2, Reach 4 was assigned a score of -5. Reach 4 scores were strongly influenced by the location of the Reach in the watershed. Reach 4 is located below a dune system that effectively blocks flows from entering or leaving the Reach under all but the largest storm events. In addition, what flows that accumulate from rain events are trapped with little chance of connecting to downstream channels. Similar to other sites many portions of Reach 4 are also subject to human disturbance including OHV use, illegal camping, and trash dumping. While Reach 4 has a high potential to support listed plants and wildlife species it also contains numerous weeds that grow after winter rains.

3.1.5 Floodway

The proposed Project includes acquisition of an approximate 550-acre floodway located along the levees and in the active wind corridor between Reach 1 and Reach 3 (see Figure 1). Development would be prohibited in this floodway to protect the wind corridor and limit disruptions to sand migration. The floodway will covey storm flows southeast towards Reach 3 before entering the channel and flowing through Reach 4. The floodway will result from water flowing into the levee, ponding momentarily, and then finding the downslope path of least resistance. Flows will travel southeast along the toe of the levee and based on modeling, a 190-year storm will result in a floodway that varies from about 20 feet wide to more than 300 feet wide as it narrows and widens based on topography and slope. The floodway will hit an energy dissipater at the east end of Reach 1 before flows turn south towards Reach 2.

At the eastern end of Reach 1, the floodway will have increased velocity and will merge with flows from additional canyons in the Indio Hills resulting in a floodway that varies from about 600 feet wide to more than 1 mile wide. Water in this portion of the floodway will travel south towards, and eventually crossing Ramon Road. The western portion of the floodway will hit Reach 2 and will protect the SCE substation from inundation. At Ramon Road, the floodway will be approximately 0.55 miles wide.

South of Ramon Road, the floodway will shift slightly west and will narrow as it hits the levee in Reach 3. This levee will cause the floodway to eventually coalesce as water hits the active sand dunes. Approximately 1.3 miles from the northwest end of Reach 3, the levee will transition to a channel which will convey flows around Xavier High School and the Pegasus Therapeutic Riding facility before terminating into the Classic Club Golf Course. Flows will continue through a water conveyance system within the Classic Club Golf Course for approximately 1.1 miles before reaching Reach 4.

Water that reaches Reach 4 will travel east through a concrete-lined channel that parallels Avenue 38. Construction of the channel in Reach 4 will impact drainages 4-1, 4-2, 4-9, and portions of drainages 4-3 through 4-8. The remainder of the drainages in Reach 4 are expected to be impacted by a proposed sediment disposal site.

Habitat along the floodway matches the descriptions of vegetation for each Reach. The floodway includes numerous drainages which often include the upstream portions the drainages that were identified for each Reach (see Figure 1). In addition, there are several large networks of drainages that flow nearly unimpeded from their headwaters in the Indio Hills where the floodway widens between Reach 1 and Reach 2. These drainages do cross two existing dirt access roads and a transmission line corridor however the larger drainages are not obstructed by the roadbed. The floodway also includes several large areas that pond above Ramon Road and immediately upstream of Reach 3 (see Figure1).

Stream Ranking

Based on the Stream Assessment Indicators identified in Table 2, the floodway was assigned an average score of 3. This includes a high score of score of 8 through Reach 2, and a score of 4 for a short section of the floodway at the east end of Reach 1 to a low of 0 at Reach 3. Reach 3 scores were influenced by the presence of Ramon Road which captures and diverts flow and the presence of dunes and development which reduce connectivity with downstream areas under most storm regimes. Many areas along Reach 3 are subject to routine OHV and no longer connect to downstream areas. In addition, ponded areas support extensive weed occurrences.

Table 3. Stream Assessment Indicators and Stream Functions for the Floodway.

	Floodway Reaches				
	Reach 1 Area Above Streams		Reach 2	Reach 3	Reach 4
	1-46	47-60			
Stream Assessment Indicators	Stream Assessment Score: No: -1, Partial: 0, Yes: +1				
Factor 1: Hydrology					
Drainages flow unimpeded from their headwaters?	-1	+1	+1	-1	N/A
Watershed is intact and free from development?	0	0	0	-1	N/A
Watershed affects local channel formation for storms under 10-year event?	+1	+1	+1	-1	N/A
Factor 2: Hydraulics					
Drainages are free from obstructions or physical structures that impede or redirect flow?	-1	0	+1	-1	N/A
Drainages connects to downstream waters through natural features?	0	0	0	-1	N/A
Drainages supports temporary surface water storage during less than 10-year storm event?	+1	+1	+1	+1	N/A

Table 3. Stream Assessment Indicators and Stream Functions for the Floodway.					
	Floodway Reaches				
	Reach 1 Area Above Streams		Reach 2	Reach 3	Reach 4
	1-46	47-60			
Stream Assessment Indicators	Stream Assessment Score: No: -1, Partial: 0, Yes: +1				
Factor 3: Geomorphology					
Drainages maintain sediment for aeolian transport.	0	0	+1	+1	N/A
Drainages provide substrate and structural components that support vegetation and wildlife?	+1	+1	+1	+1	N/A
Drainages contain flood prone areas, terraces, and other features?	+1	+1	+1	+1	N/A
Factor 4: Physiochemical					
Drainage supports organic matter?	+1	+1	+1	+1	N/A
Channels support pools or other ponding areas?	0	0	+1	+1	N/A
Water temperatures are affected by flow, shade, or other factors in this system?	0	0	0	+1	N/A
Factor 5: Biological Resources					
Drainage supports aquatic dependent plants or wildlife?	-1	-1	-1	0	N/A
Drainage supports listed plants or wildlife and contributes to their habitat?	0	0	0	0	N/A
Drainage relatively free from invasive plants or animals?	0	0	0	-1	N/A
Factor 6: Anthropogenic Disturbances					
Drainages not subject to disturbance from OHV use, equestrian use, roads, or other infrastructure?	-1	-1	0	-1	N/A
Drainages not affected by other human induced influences that may affect stream health?	-1	0	0	0	N/A
Total Ranking by Assessment Area	0	4	8	0	N/A
Total Rank by Reach	2		8	0	N/A
Average Floodway Ranking	3				

4.0 Project Impacts to Aquatic Resources

4.1 Levee Construction

The Project is expected to directly impact portions of all drainages in Reaches 1 through 4 (see Table 1 and Table 4). These impacts will result from fill placement in drainages for construction of the levee, channel, and construction access. The diversion of flow will result in increased hydrology to many of the drainages within the floodway that will be created by the construction of levees in Reaches 1, 2, and portions of Reach 3. The Project has been designed to avoid and minimize impacts to Waters of the U.S. to the greatest extent feasible, while maximizing flood control impacts to the community, but will result in unavoidable and permanent impacts to 87 drainages. Permanent impacts will require compensatory mitigation, whereas all areas of temporary impacts will be restored.

Table 4. Impacts to Jurisdictional Waters of the U.S.			
Waters of the U.S.			
Location	**Impact Type**	**Area (Acres)**	**Length (Linear Feet)**
Reach 1	Permanent	2.23	10,042
	Temporary	0.37	1,527
Reach 2	Permanent	0.41	2,319
	Temporary	0.02	127
Reach 3	Permanent	4.97	2,355
	Temporary	0.76	331
Reach 4	Permanent	3.01	2,446
	Temporary	3.35	1,251
Downstream	Indirect	17.98	75,407
Permanent Total		**10.62**	**17,162**
Temporary Total		**4.50**	**3,236**
Downstream Indirect		**17.98**	75,407
Grand Total		**33.1**	**95,805**

* Grand total calculation only includes Permanent and Temporary impacts, not Indirect.

4.2 Downstream Indirect Impacts

The Project is expected to result in indirect impacts to portions of the stream channel in downstream areas below the levees. These areas will no longer receive the same amount of flow during large storms that would occur after construction of the project. All of these channels are ephemeral and most only flow during large rain events. In addition, most of these channels have altered hydrologic patterns from the establishment of paved roads, graded dirt access roads, OHV use, and illegal trash dumping. While scouring flows will be attenuated, they would be expected to still provide functions and services based on rainfall and coalescing sheet flows in downstream areas.

Based on the existing conditions in the region and the disturbed sections of the channels it is expected that these drainages will continue to function as ephemeral streams even if some flow is cut off from the channels. Based on a comparison of upstream and downstream areas along the Colorado River Aqueduct and levees associated with Interstate 10, downstream areas still supported similar vegetative cover compared to upstream areas. Loss of hydrologic connectivity can reduce the abundance of annual plants and is more likely to adversely affect riparian or microphyll vegetation communities that are more dependent of seasonal flows compared to vegetation in the project area.

Placement of the levee will change the amount of water that flows to drainages 1-1 through 1-57 in Reach 1. As discussed above, these drainages either terminate shortly after crossing through Reach 1 as the alluvial fan becomes distributary or enter residential developments that eventually flow into detention

basins. The downstream portions of these drainages provide minimal biological value and function. Furthermore, the downstream portions of these drainages will continue to convey storm flows that originate downstream of the levee during rainfall events. The downstream vegetation and habitat are not expected to significantly change as a result of the project.

All drainages within Reach 2 flow parallel to the floodway and levee. Project construction is not expected to alter any downstream portions of these drainages because they will remain in the floodway. Vegetation and habitat are also not expected to change significantly downstream of Reach 2 because much of it is currently developed as a substation with a small patch of creosote bush.

Drainages within Reach 3 also generally flow parallel to the levee and floodway. The levee construction is not expected to block flows to downstream drainages but instead will shift these drainages into the floodway or concrete-line channel. Downstream vegetation and habitat are primarily sand fields vegetated with creosote bush and one large patch of tamarisk, all of which are not expected to be negatively impacted by project construction.

In Reach 4, all drainages are poorly defined playas and channels as discussed above. These drainages do not provide functional stream channels and also provide limited habitat. Downstream impacts to drainages in Reach 4 are not expected to alter their form and function. Aeolian processes are likely to continue to influence the downstream habitat in Reach 4.

4.3 Summary of Project Impacts and Floodway

4.3.1 Reach 1

Reach 1 is expected to impact 2.60 acres of USACE waters. The overall stream assessment for Reach 1 is 2. Similarly, the floodway in Reach 1 was given an overall stream assessment of 2. Due to the broad extent of Reach 1, this Reach has further been broken into two segments that encompass drainages 1-1 through 1-46 and 1-47 through 1-60. The overall stream assessment for drainages 1-1 through 1-46 was given a score of 0, as was the floodway. The overall stream assessment for drainages 1-47 through 1-60 was given a score of 4, as was the floodway.

4.3.2 Reach 2

Reach 2 is expected to impact 0.43 acres of USACE waters. The overall stream assessment for Reach 2 is 2. The floodway in Reach 2 was given a significantly higher overall stream assessment of 8, mostly due to the larger area of largely unobstructed channels that facilitate the aeolian and fluvial sediment deposition.

4.3.3 Reach 3

Reach 3 is expected to impact 5.73 acres of USACE waters. The overall stream assessment for Reach 2 is 0. Similarly, the floodway in Reach 3 was given an overall stream assessment of 0.

4.3.4 Reach 4

Reach 4 is expected to impact 6.36 acres of USACE waters. The overall stream assessment for Reach 2 is -5. There is no floodway as part of Reach 4, therefore there is no stream assessment for the floodway.

5.0 Mitigation Strategy

5.1 Mitigation Considered

The 2008 compensatory mitigation rule provides several mechanisms for mitigating permanent and unavoidable impacts. These mechanisms in order of preference are:

- Mitigation Bank –sites are restored, enhanced, created, or preserved through the purchase of credits and then maintained by a mitigation bank sponsor.
- In-Lieu Fee Program - sites are restored, enhanced, created, or preserved through a governmental or non-profit through the purchase of credits.
- Permittee-Responsible Mitigation (In-Kind) – sites are restored, enhanced, created, or preserved by the permittee in similar stream type and in the same or adjacent systems, and permittee is responsible for maintenance.
- Permittee-Responsible Mitigation (Out-of-Kind) – sites are restored, enhanced, created, or preserved by the permittee in a different stream type or location, and permittee is responsible for maintenance.

It is understood that mitigation banks and in-lieu fee programs are preferred compensatory mitigation mechanisms as these have additional assurances in place to minimize risks and uncertainties of their continued preservation. However, the 550-acre was identified as an important area for preservation in the Coachella Valley Multi-Species Habitat Conservation Plan (CVMSHCP). The preservation of this area is essential because it is located in an important wind corridor and sand transport area that provides fine sediments to the Coachella National Wildlife Refuge. The refuge is home to several State and federally endangered species including the Coachella Valley fringe-toed lizard and the Coachella Valley milk-vetch. As part of the design of the Project, which was considered in the CVMSHCP, and as a condition of the Biological Opinion issued by the United States Fish and Wildlife Services, the 550-acre floodway will be preserved from any future development. The existing 70.41 acres of Waters of the U.S. within the floodway will be preserved and enhanced with activities such as trash removal and fencing. Because these waters are available, have a mechanism in place to ensure their protection, play an essential role in the preservation and enhancement of important functions and services, and will be enhanced through increased flows and fine sediment transport, the PRM mitigation is appropriate for this project. The multiple functions and services of the 550-acre floodway allow a comprehensive compensatory mitigation approach that meets different resource agency requirements and provides CVWD with a cost-effective approach.

5.2 Permittee-Responsible Mitigation (In-Kind)

To offset permanent and indirect impacts to state and federal waters, CVWD is planning to preserve and enhance existing drainages following the acquisition of the 550-acre floodway located along Reaches 1 through 3. The 550-acre floodway was selected as the primary source of compensatory mitigation because the area supports a variety of channels, it meets the purpose and need of the project, it ensures that storm flows are conveyed through the project area to the Whitewater River, and it enhances and preserves important fluvial and aeolian wind processes in the region. Under existing conditions, the channels convey storm flows into residential and commercial areas that damage properties and increase the potential for introducing contaminants to the system. In addition, fine sands important to the long-

term preservation of the Coachella National Wildlife Refuge are currently lost under existing conditions. Placement of the levees and the preservation of the 550-acre floodway will increase sediment transport to the Refuge and enhance sand habitat within the 550-acre floodway. Development would be prohibited in this floodway and the floodway will covey storm flows southeast towards Reach 3 before entering the channel and flowing through Reach 4. The floodway will drastically increase the extent of jurisdictional waters by increasing the flows from additional canyons in the Indio Hills resulting in a floodway that varies from about 600 feet wide to more than 1 mile wide. Water in this portion of the floodway will travel south towards, and eventually crossing Ramon Road. These features are expected to be inundated during larger storm events.

The floodway will be clearly delineated to avoid risk to people and property which will also provide clear boundaries and signage indicating that these areas are off limits to trespass, off-road vehicles, trash dumping, and other human land uses and impacts. Control of invasive species and other enhancements may also be implemented by CVWD to control Asian mustard and tamarisk within the floodway.

Utilizing the floodway for mitigation will preserve the existing water bodies within the same watershed, and in the same habitats, as well as through enhancement due to increased connectivity and merged flows. Areas of temporary impacts will be mitigated through restoration to the original contouring following construction. The mitigation ratios were determined utilizing the stream assessment conducted by Reach, compared to the average stream assessment of the floodway. The overall average floodway score was used to determine the mitigation ratios due to Reach 4 and the downstream indirect impacts not having an associated floodway score. Overall, the floodway has a higher stream function than many of the drainages in the impact area. A lower mitigation ratio was utilized where the stream assessment for each Reach was lower than the average stream assessment for the floodway. The minimum mitigation ratio has been established at 1:1, which is the minimum ratio allowed under the USACE 2008 mitigation rule.

Where the stream assessment for the Reach was higher than the average stream assessment for the floodway, the ratio was increased by 2 for each score higher than the average floodway score. Reach 1 was assessed in two segments, and therefore each segment received its own mitigation ratio. Table 5 below provides the mitigation ratios by Reach for the required acres needed for mitigation for permanent and indirect impacts.

A stream assessment was not conducted for indirect impacts to drainages downstream of the levees. Most of the downstream drainages are affected by the same disturbances described for waters subject to permanent impacts. Many of these drainages have minimal biological value and have been heavily affected by illegal trash dumping and nearby development. The downstream drainages are positioned on the broader scale alluvial fan in a location where they become distributary and decrease in prominence with flow direction. Indirect impacts from the loss of upstream flows in this area are expected to be minimal with the greatest impact within a short distance from the levees. The loss of any function from to downstream areas from the levee construction will be mitigated through the preservation and enhancement of the floodway. To mitigate for indirect impacts, the minimum mitigation ratio of 1:1 was used. This coincides with the Mitigation Ratio Setting Checklists provided in Attachment B.

Table 5. Proposed Mitigation Ratios for Permanent and Indirect Impacts to Waters of the U.S.					
Reach	**Stream Assessment Score**	**Average Floodway Score**	**Impacted Acres**	**Proposed Mitigation Ratio**	**Acres of Mitigation Needed Based on Proposed Mitigation Ratio**
1 (Drainages 1-46)	0	3	1.39	1:1	1.39
1 (Drainages 47-60)	4	3	0.84	3:1	2.52
2	2	3	0.41	1:1	0.41
3	0	3	4.97	1:1	4.97
4	-5	3	3.01	1:1	3.01
Downstream Indirect Impacts	NA	3	17.98	1:1	17.98
Total Existing Mitigation Acreage Available on 550-acre Floodway for Preservation					*70.41*
Total Proposed Mitigation Needed					**30.28**

The floodway will preserve a total of 70.41 acres (1.54 acres of USACE waters in Reach 1; 47.86 acres in Reach 2; and 21.00 acres in Reach 3). The total acres that need to be mitigated based on the proposed ratios provided in Table 5 is 30.28. Therefore, the floodway will preserve and enhance about two times the anticipated required mitigation for impacts to waters of the U.S. In addition, several drainages will receive increased connectivity, and flows that have been partially obstructed upstream. It is expected that the acreage and quality of drainages within the floodway will increase, which is evident in the hydrology study (see Figures 2 and 3).

The 550-acre floodway will be protected by a conservation easement and the CVMSHCP provides a framework for the long-term management of the mitigation area. This reduces risk and uncertainty factors. Development would be prohibited in this floodway to protect the wind corridor and limit disruptions to sand migration.

6.0 Summary and Conclusions

The proposed mitigation strategy will preserve approximately 70.41 acres of existing jurisdictional streambeds through the acquisition and enhancement of the 550-acre floodway to off-set the permanent loss of approximately 10.62 acres of waters of the US, and indirect impacts to approximately 17.98 acres of waters of the US. The waters within the floodway will be managed and maintained in perpetuity to ensure that the floodway continues to function and convey storm flows and provide essential benefits to downstream areas.

7.0 References

Aspen (Aspen Environmental Group). 2020. Preliminary Jurisdictional Delineation and Wetland Determination Report for the Thousand Palms Flood Control Project. Prepared for the Coachella Valley Water District.

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Attachment A

Figures

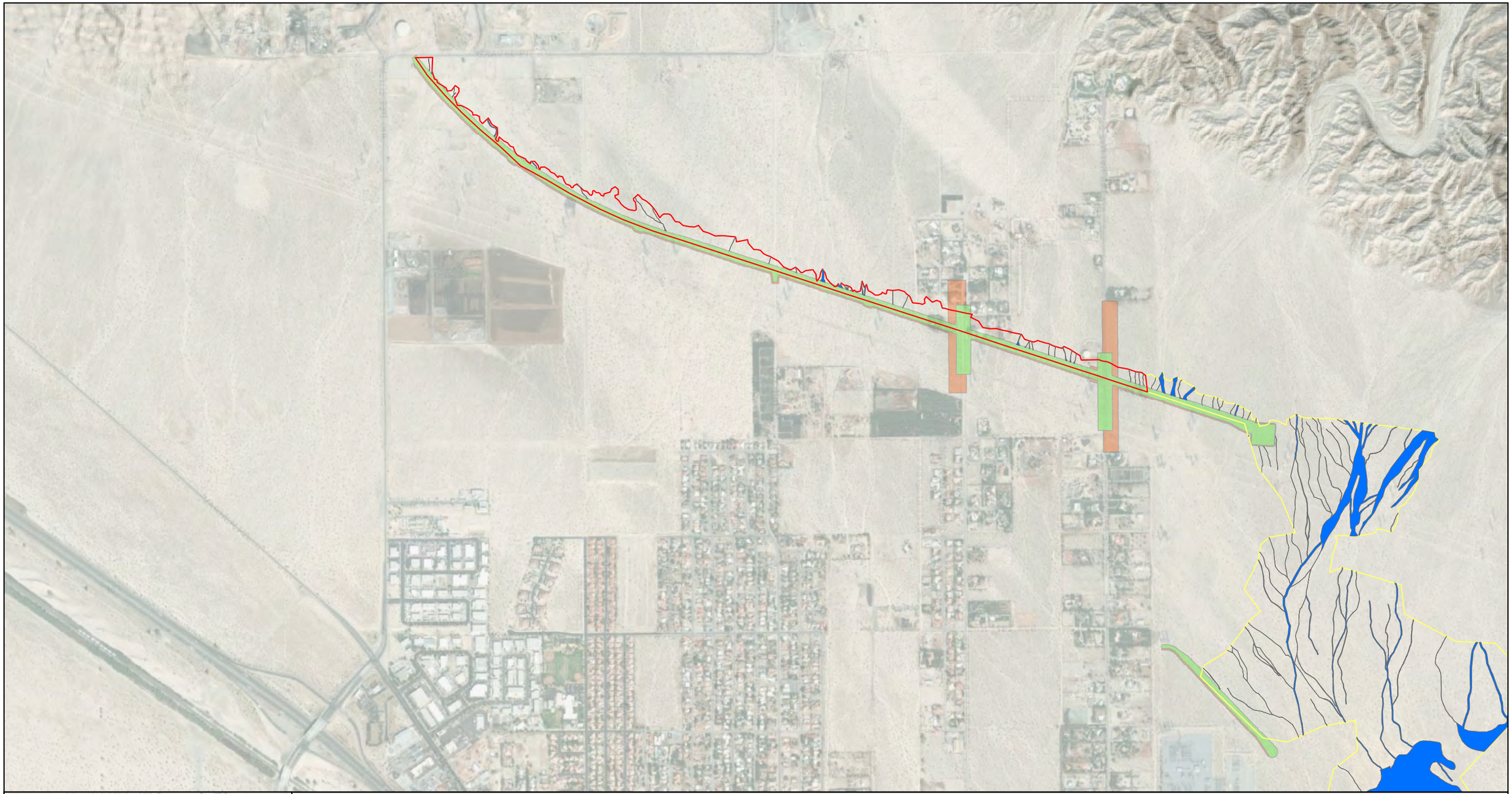


Image Source: DigitialGlobe, 2018

- Floodway Reach 1
- Floodway Reach 2
- Preserved Floodway Waters
- Permanent
- Temporary

Reach 1 and 2

Preserved Floodway Waters

Reach 3

Study Area

RIVERSIDE COUNTY

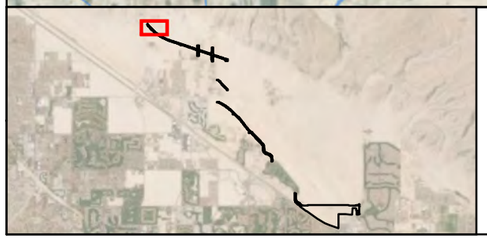
Image Source: DigitialGlobe, 2018

1,000 0 1,000 Feet

Floodway Reach 2
Floodway Reach 3
Preserved Floodway Waters
Permanent
Temporary

Reach 2 and 3

Preserved Floodway Waters



Review Area
Permanent Disturbance Area
Temporary Disturbance Area
20-foot Maintenance Area

Floodway (8.83 ac of Non-wetland Waters of the U.S. in Floodway)
Non-wetland Waters of the U.S.
Permanent: 10.6 ac (1.23 ac in 20-foot Maintenance Area)
Temporary: 4.5 ac
X-X Drainage Number

Sample Location
Ordinary High Water Mark
X-X Data Sheet Number

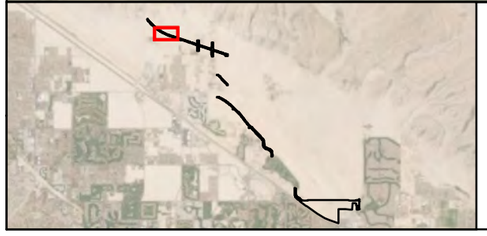
100 0 200 Feet

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018

Figure 1A.

Aquatic Resources Delineation Map



Review Area

Permanent Disturbance Area

Temporary Disturbance Area

20-foot Maintenance Area

Floodway
(8.83 ac of Non-wetland Waters of the U.S. in Floodway)

Non-wetland Waters of the U.S.
Permanent: 10.6 ac (1.23 ac in 20-foot Maintenance Area)
Temporary: 4.5 ac

X-X Drainage Number

Sample Location

Ordinary High Water Mark

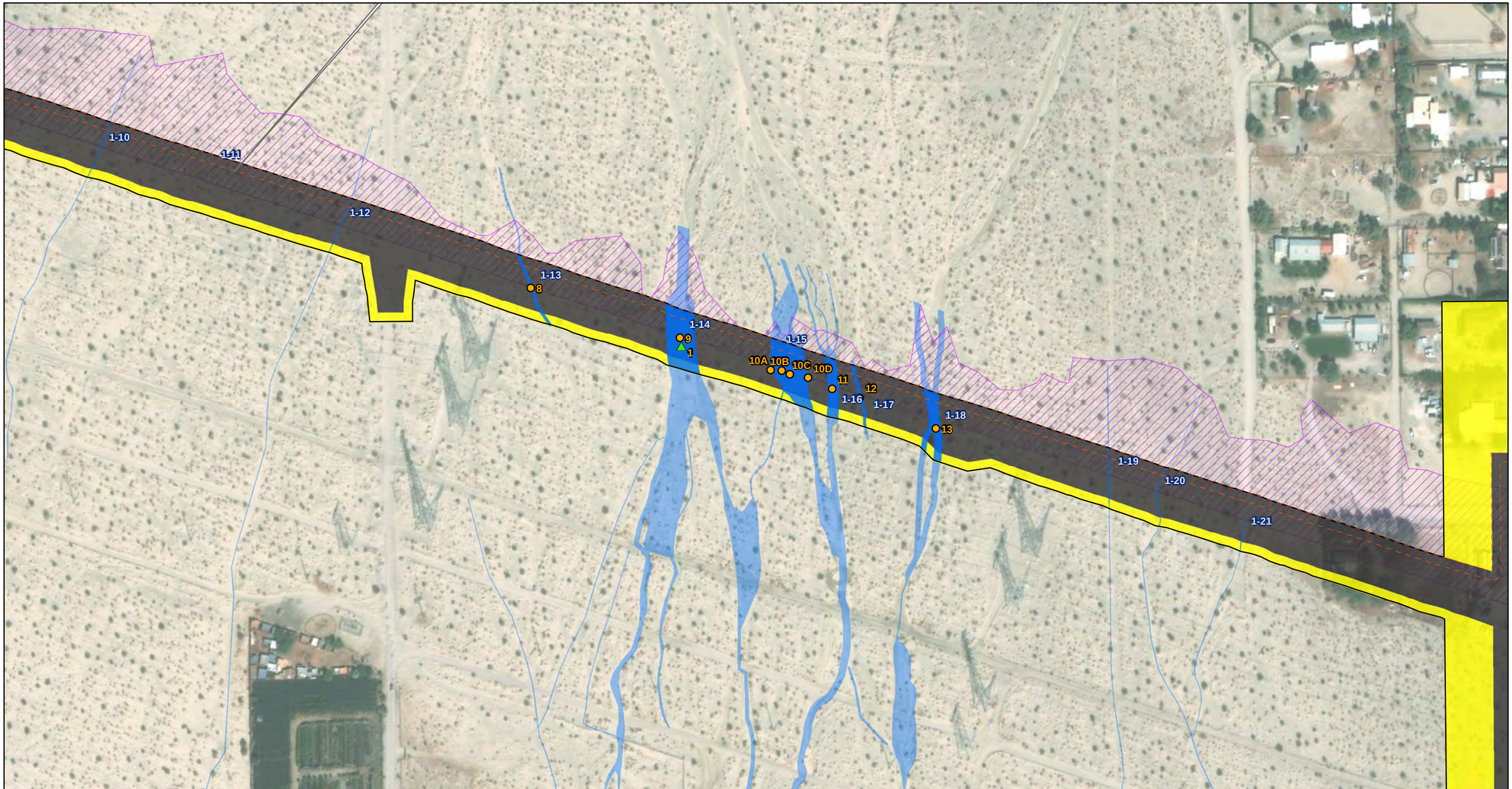
100 0 200 Feet

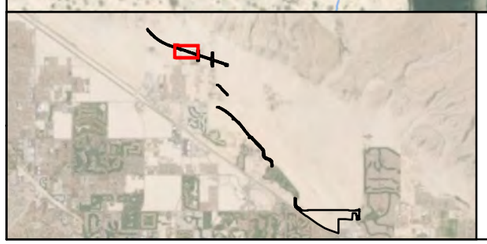
Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018

Figure 1B.

Aquatic Resources Delineation Map





Review Area

Permanent Disturbance Area

Temporary Disturbance Area

20-foot Maintenance Area

Floodway
(8.83 ac of Non-wetland Waters of the U.S. in Floodway)

Non-wetland Waters of the U.S.
Permanent: 10.6 ac (1.23 ac in 20-foot Maintenance Area)
Temporary: 4.5 ac

X-X Drainage Number

Sample Location

Ordinary High Water Mark

Wetland Sample Location

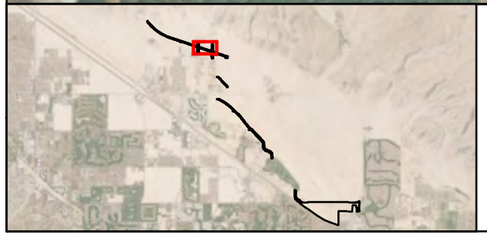
100 0 200 Feet

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018

Figure 1C.

Aquatic Resources Delineation Map



Review Area

Permanent Disturbance Area

Temporary Disturbance Area

20-foot Maintenance Area

Floodway
(8.83 ac of Non-wetland Waters of the U.S. in Floodway)

Non-wetland Waters of the U.S.
Permanent: 10.6 ac (1.23 ac in 20-foot Maintenance Area)
Temporary: 4.5 ac

X-X Drainage Number

Sample Location

Ordinary High Water Mark

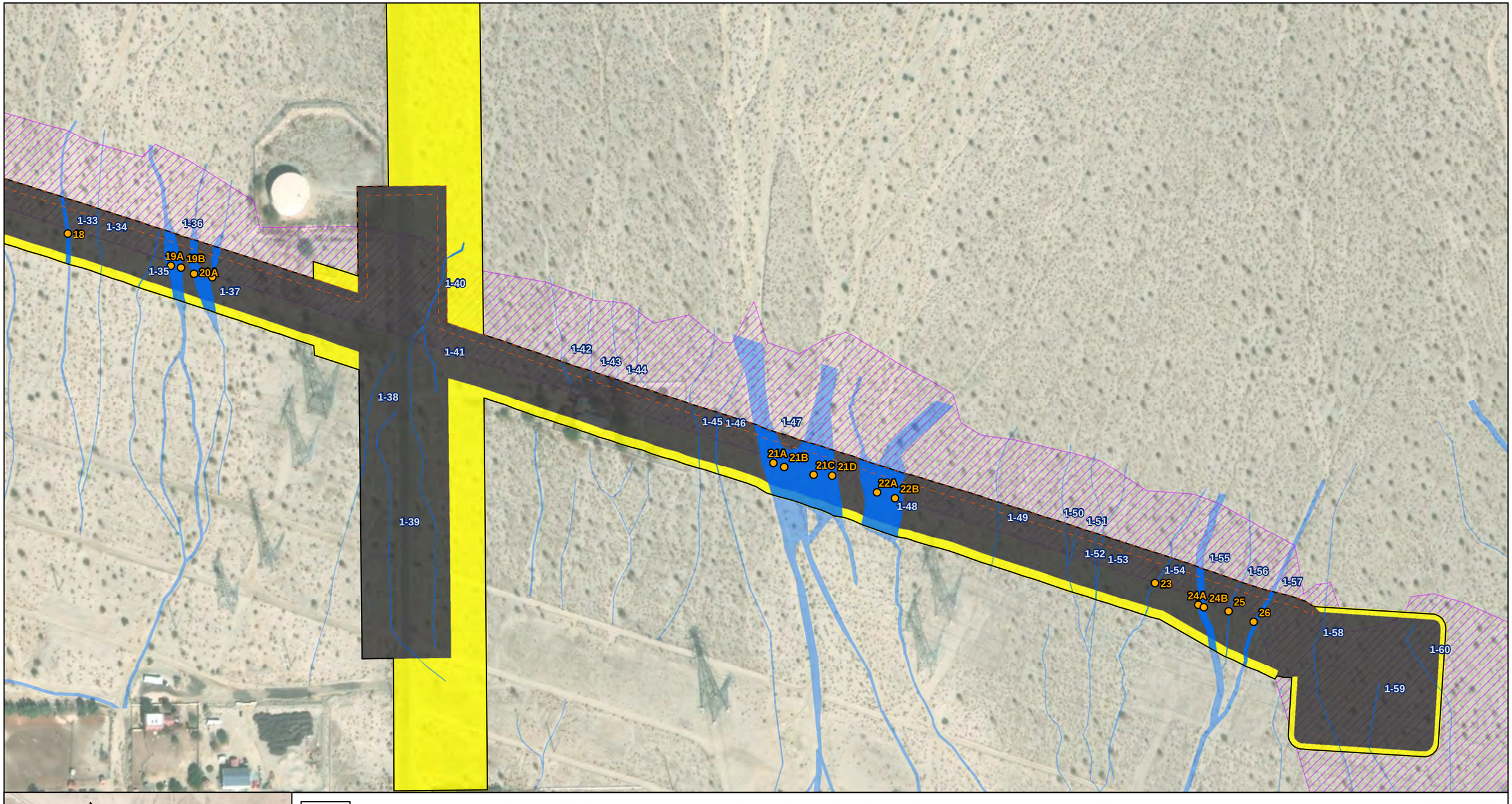
100 0 200 Feet

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018

Figure 1D.

Aquatic Resources Delineation Map



Review Area

Permanent Disturbance Area

Temporary Disturbance Area

20-foot Maintenance Area

Floodway

(8.83 ac of Non-wetland Waters of the U.S. in Floodway)

Non-wetland Waters of the U.S.
Permanent: 10.6 ac (1.23 ac in 20-foot Maintenance Area)
Temporary: 4.5 ac

X-X Drainage Number

Sample Location

Ordinary High Water Mark

100 0 200 Feet

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018

Figure 1E.

Aquatic Resources Delineation Map

Review Area

Permanent Disturbance Area

Temporary Disturbance Area

20-foot Maintenance Area

Floodway
(8.83 ac of Non-wetland Waters of the U.S. in Floodway)

Non-wetland Waters of the U.S.
Permanent: 10.6 ac (1.23 ac in 20-foot Maintenance Area)
Temporary: 4.5 ac

X-X Drainage Number

Sample Location

Ordinary High Water Mark

Wetland Sample Location

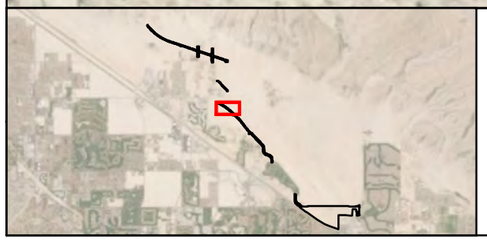
100 0 200 Feet

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018

Figure 1F.

Aquatic Resources Delineation Map



Review Area

Permanent Disturbance Area

Temporary Disturbance Area

20-foot Maintenance Area

Floodway
(8.83 ac of Non-wetland Waters of the U.S. in Floodway)

Non-wetland Waters of the U.S.
Permanent: 10.6 ac (1.23 ac in 20-foot Maintenance Area)
Temporary: 4.5 ac

X-X Drainage Number

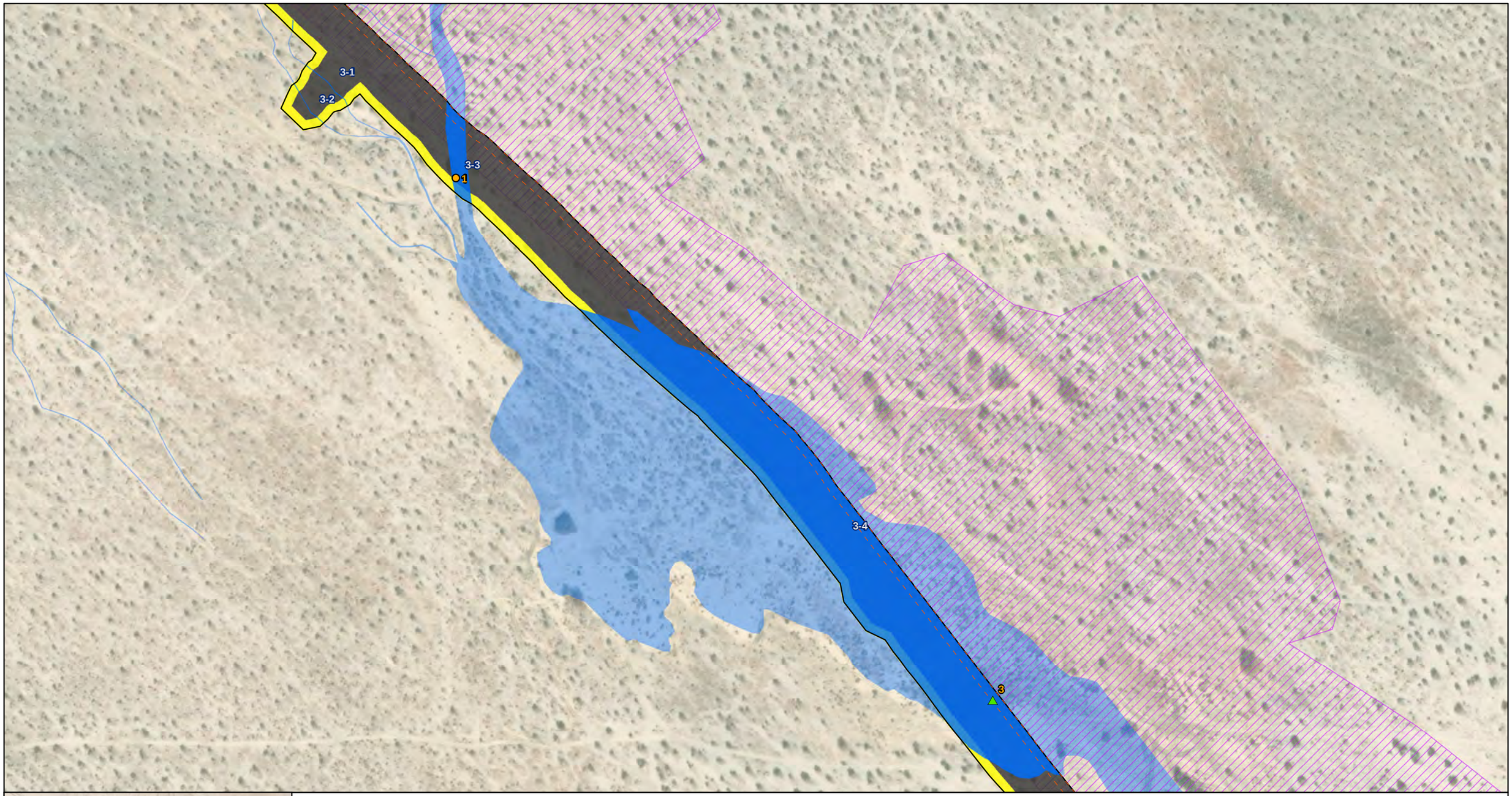
100 0 200 Feet

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Figure 1G.

Aquatic Resources Delineation Map

Image Source: DigitialGlobe, 2018



Review Area

Permanent Disturbance Area

Temporary Disturbance Area

20-foot Maintenance Area

Floodway
(8.83 ac of Non-wetland Waters of the U.S. in Floodway)

Non-wetland Waters of the U.S.
Permanent: 10.6 ac (1.23 ac in 20-foot Maintenance Area)
Temporary: 4.5 ac

X-X Drainage Number

Sample Location

Ordinary High Water Mark

Wetland Sample Location

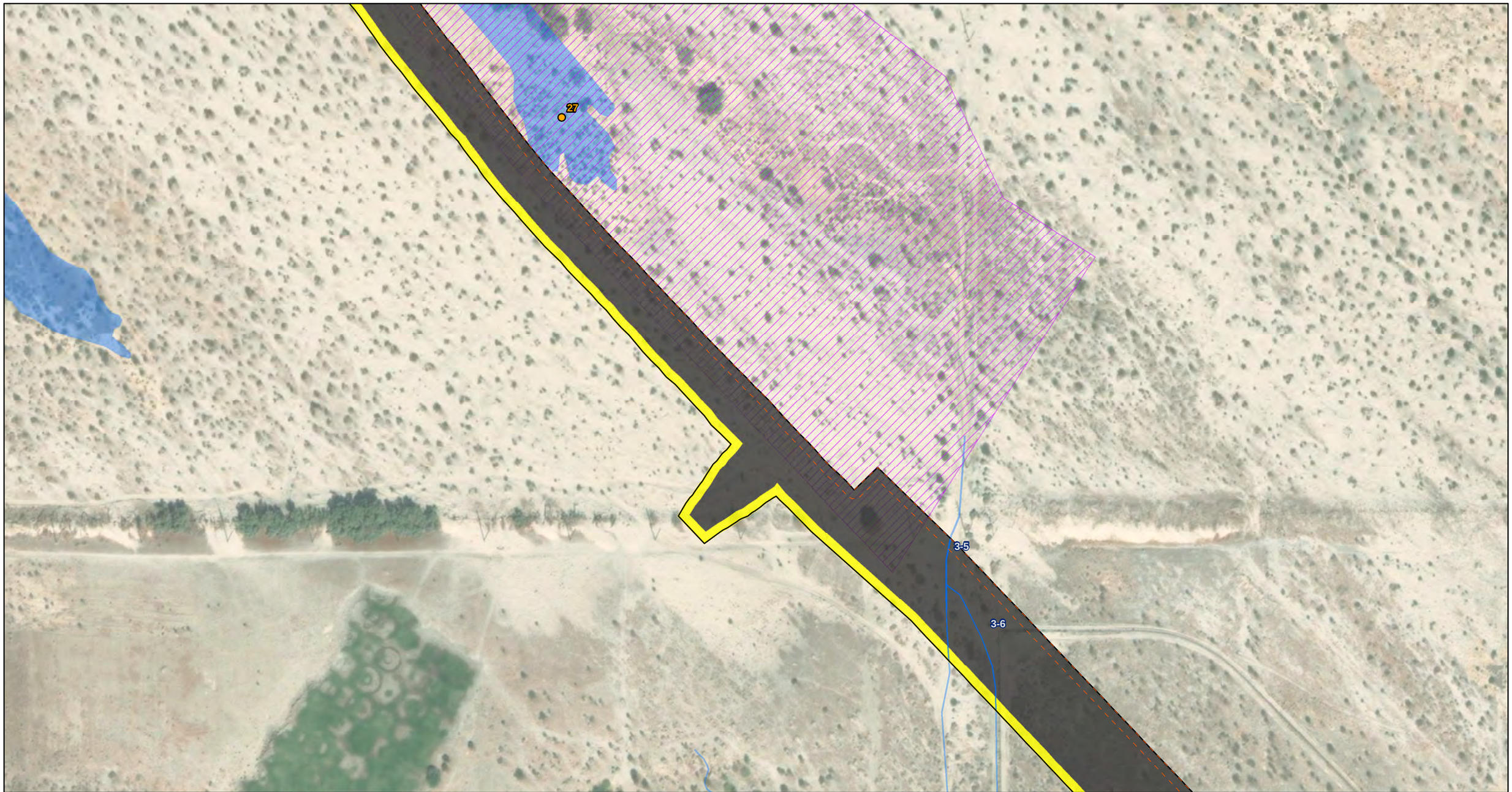
100 0 200 Feet

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018

Figure 1H.

Aquatic Resources Delineation Map



Review Area

Permanent Disturbance Area

Temporary Disturbance Area

20-foot Maintenance Area

Floodway
(8.83 ac of Non-wetland Waters of the U.S. in Floodway)

Non-wetland Waters of the U.S.
Permanent: 10.6 ac (1.23 ac in 20-foot Maintenance Area)
Temporary: 4.5 ac

X-X Drainage Number

Sample Location

Ordinary High Water Mark

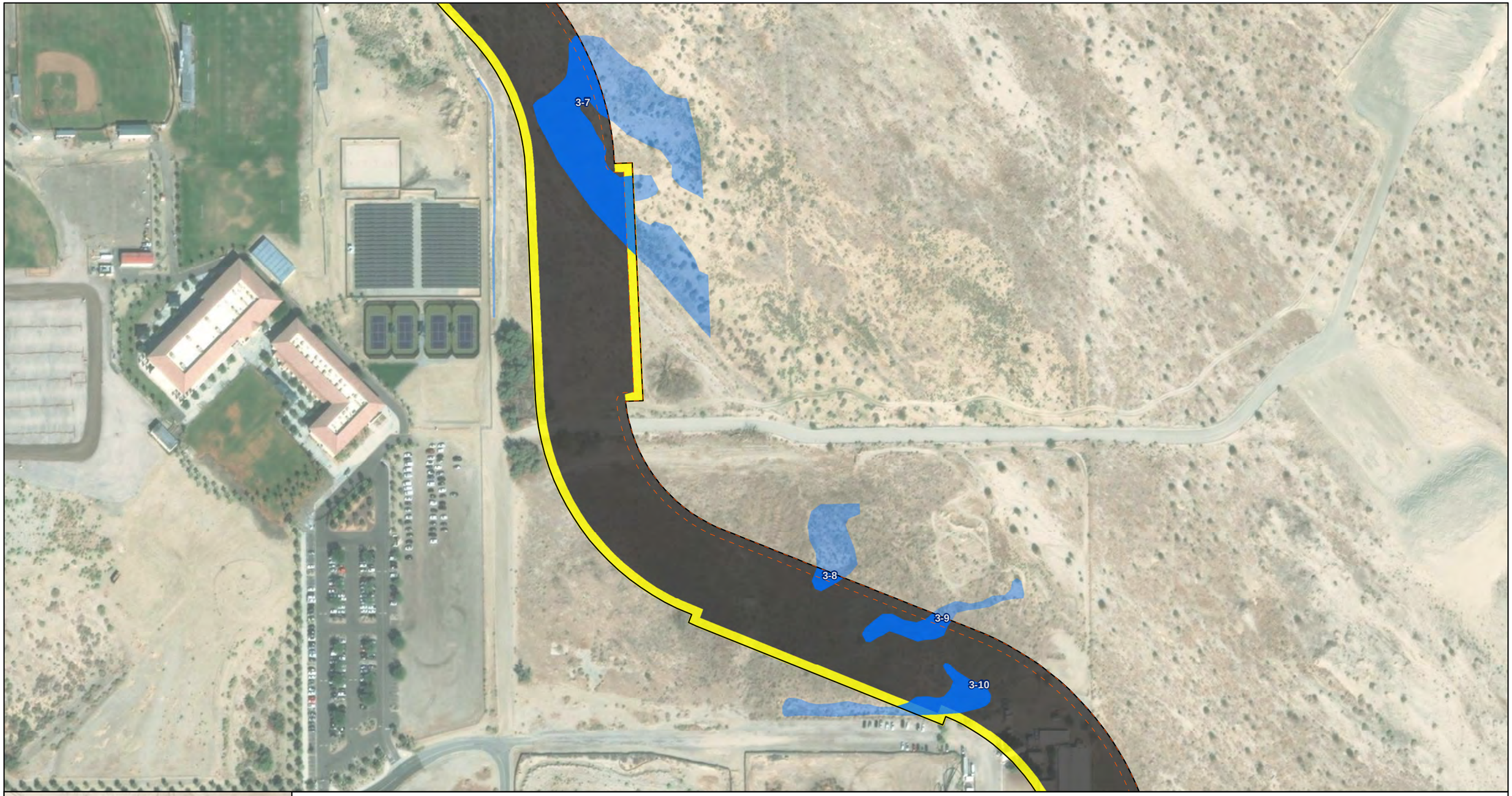
100 0 200 Feet

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018

Figure 1I.

Aquatic Resources Delineation Map



Review Area

Permanent Disturbance Area

Temporary Disturbance Area

20-foot Maintenance Area

Non-wetland Waters of the U.S.
Permanent: 10.6 ac (1.23 ac in 20-foot Maintenance Area)
Temporary: 4.5 ac

X-X Drainage Number

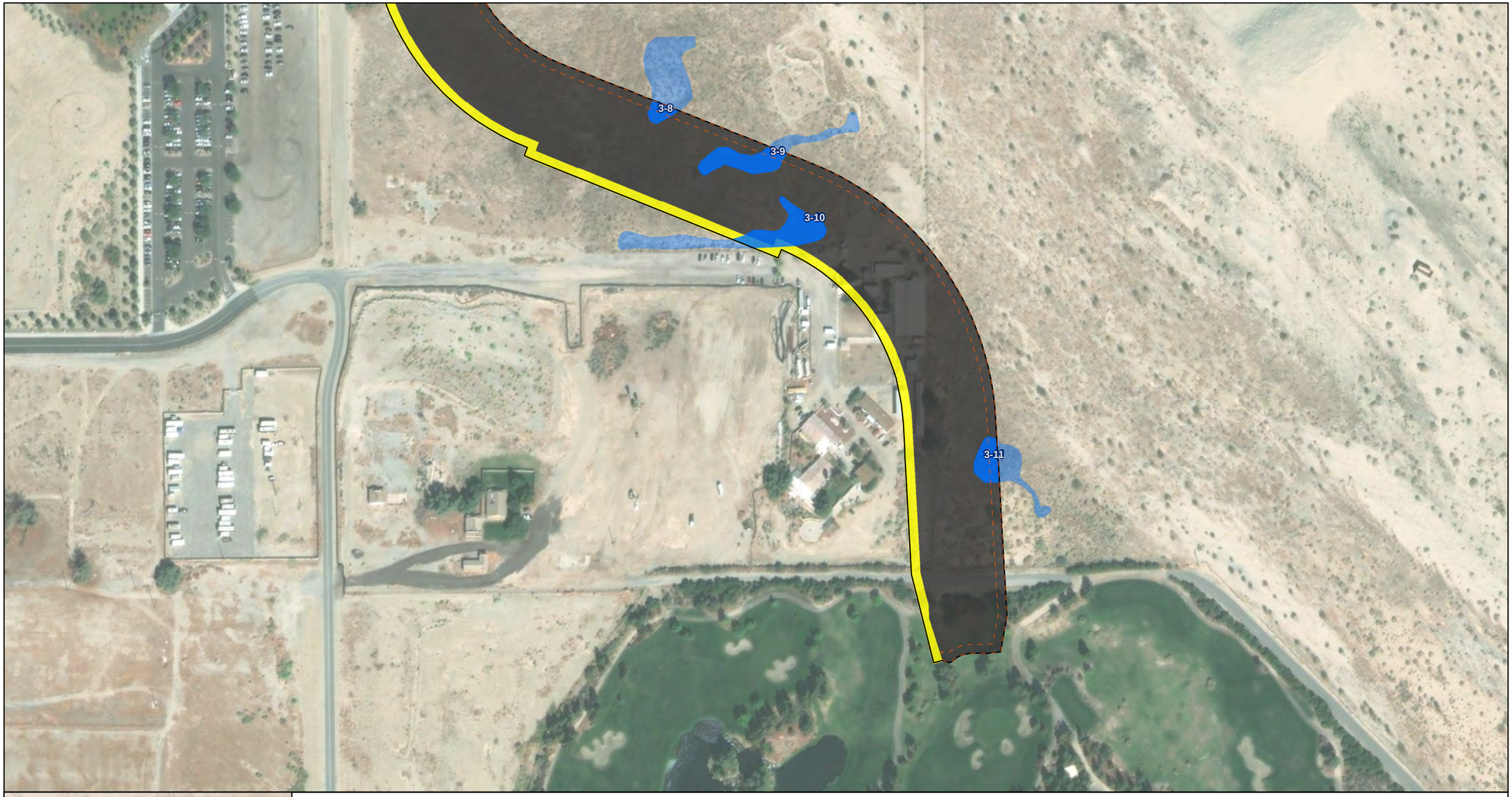
100 0 200 Feet

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Figure 1J.

Aquatic Resources Delineation Map

Image Source: DigitialGlobe, 2018



Review Area

Permanent Disturbance Area

Temporary Disturbance Area

20-foot Maintenance Area

Non-wetland Waters of the U.S.
Permanent: 10.6 ac (1.23 ac in 20-foot Maintenance Area)
Temporary: 4.5 ac

X-X Drainage Number

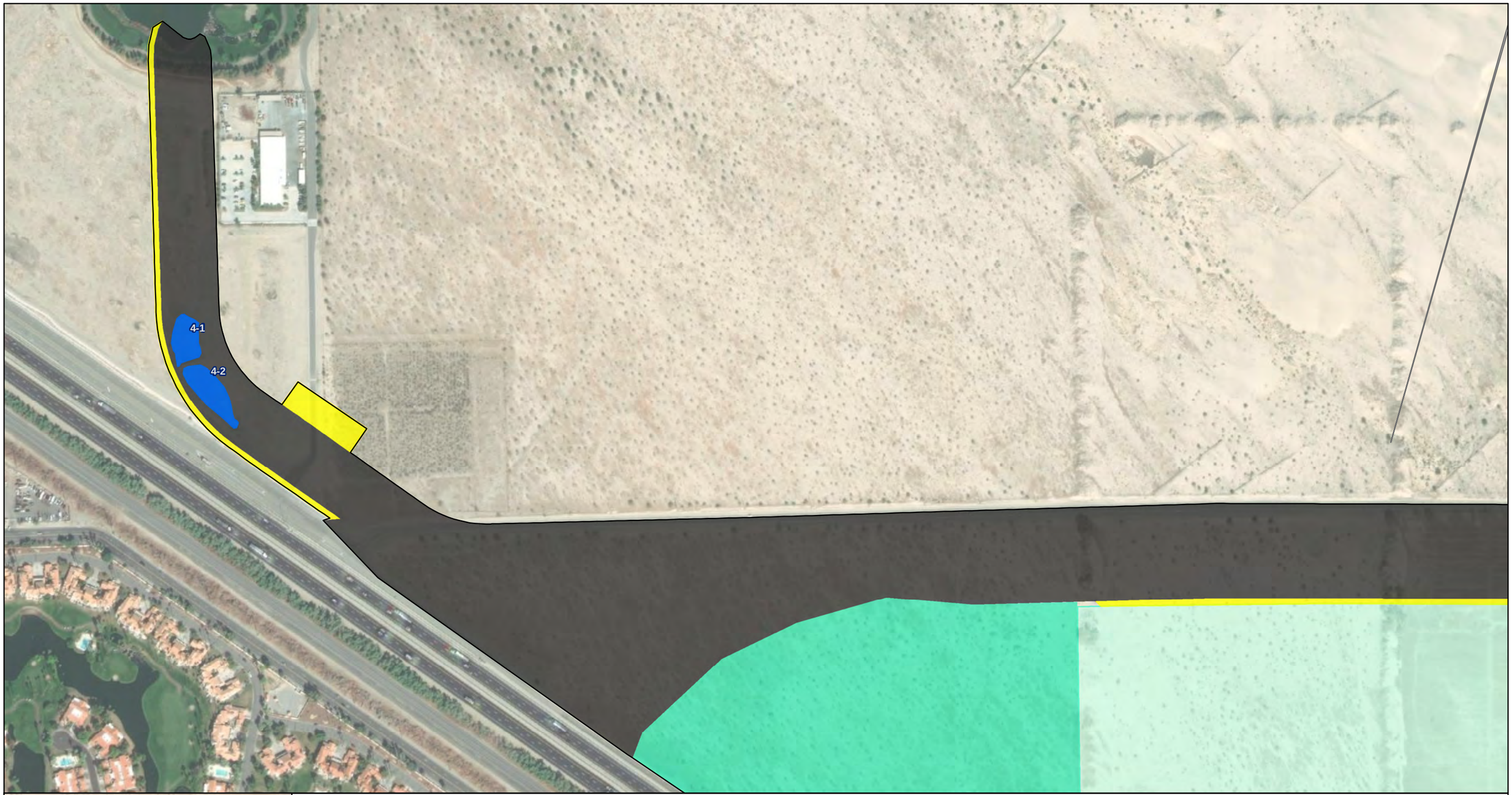
100 0 200 Feet

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Figure 1K.

Aquatic Resources Delineation Map

Image Source: DigitialGlobe, 2018



Review Area

Permanent Disturbance Area

Temporary Disturbance Area

Temporary Soil Deposition Area

Temporary Concrete Batch Plant/Marshalling Yard

Non-wetland Waters of the U.S.
Permanent: 10.6 ac (1.23 ac in 20-foot Maintenance Area)
Temporary: 4.5 ac

X-X Drainage Number

100 0 200 Feet

Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018

Figure 1L.

Aquatic Resources Delineation Map

Review Area

Permanent Disturbance Area
Temporary Disturbance Area
Temporary Soil Deposition Area

Non-wetland Waters of the U.S.
Permanent: 10.6 ac (1.23 ac in 20-foot Maintenance Area)
Temporary: 4.5 ac

X-X Drainage Number

Sample Location
Ordinary High Water Mark

100 0 200 Feet

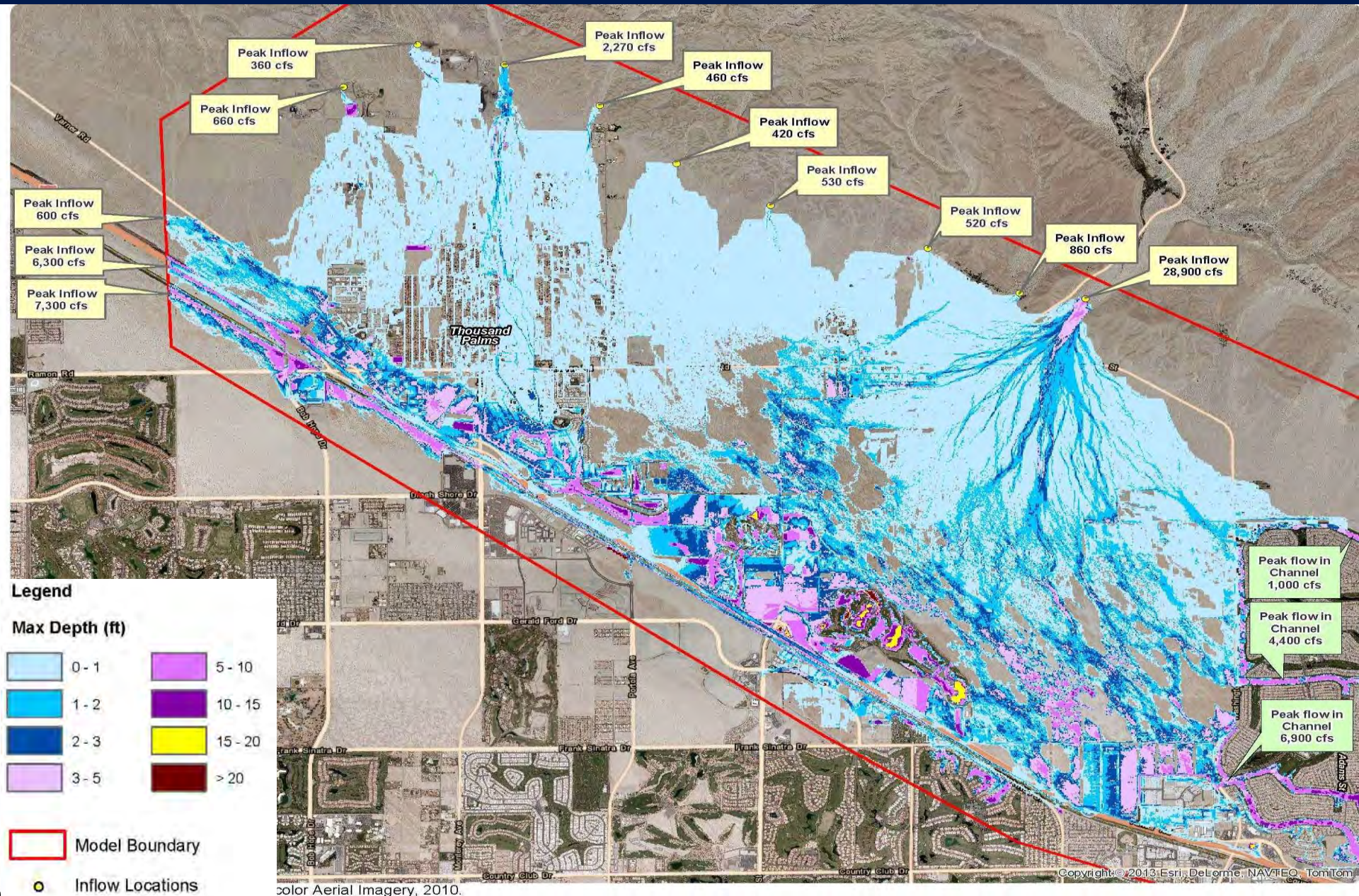
Data Source: Field Surveys Conducted by Justin Wood and Chris Huntley on December 19 and 20, 2018, February 22, March 18, 19, and September 16, 2019.

Image Source: DigitialGlobe, 2018

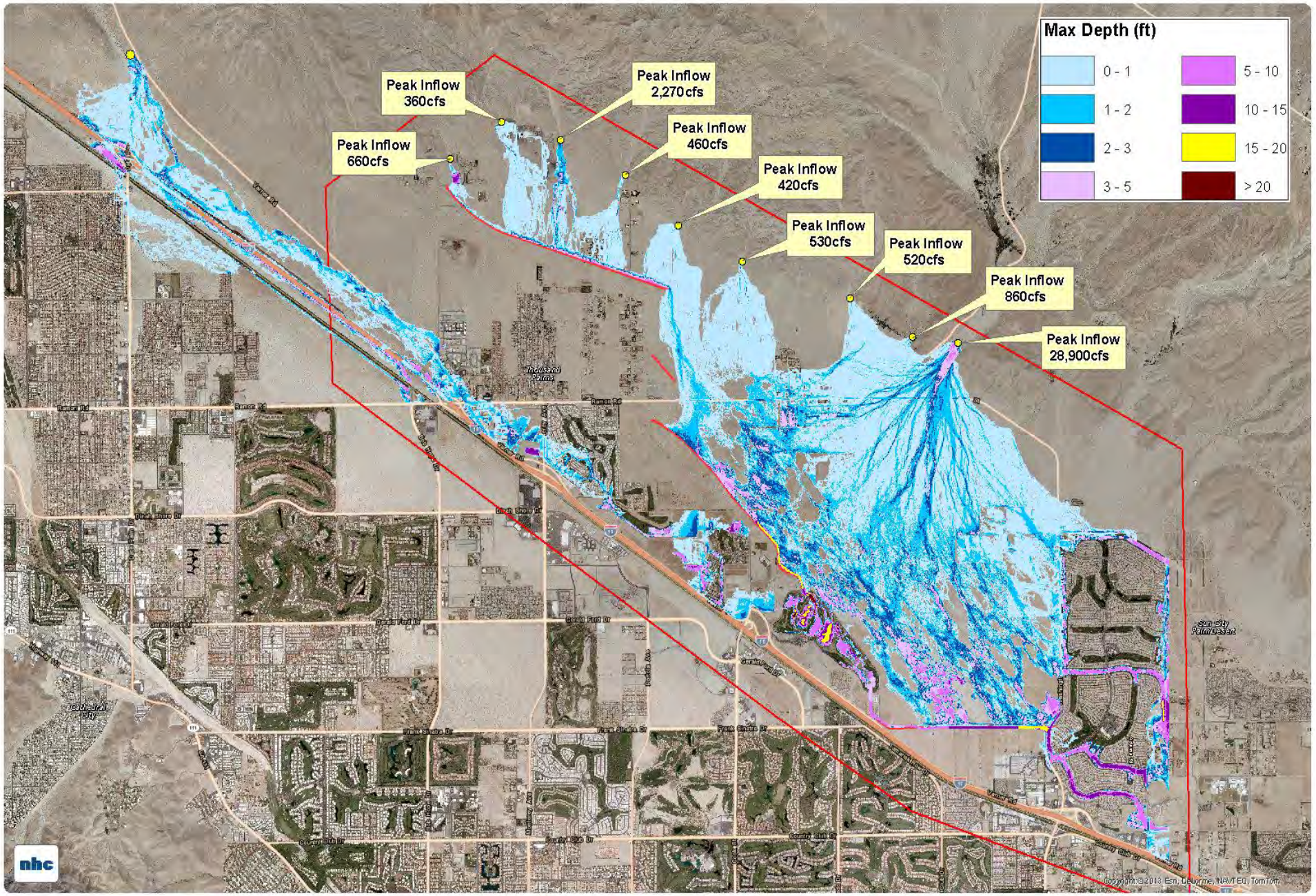
Figure 1M.

Aquatic Resources Delineation Map

Thousand Palms Flood Hazards



TPFCP with NCC Preferred



Attachment B

Mitigation Ratio Setting Checklists

Attachment 12501.2-SPD - Instructions for Completing Mitigation Ratio-Setting Checklist.

These instructions contain specific numeric adjustments (discrete, e.g., +1.0, or ranges, e.g., +0.25 to +4.0) that were determined by the PDT after assessing a variety of impact-mitigation scenarios and determining adjustments for each step that, in combination with other step adjustments, produce a reasonable range of final mitigation ratios. For steps where a range of adjustments is provided, PMs are directed to the attached examples for additional guidance. PMs **must** enter a separate justification for each adjustment within the checklist. PMs may deviate from the guidance provided herein if such deviations can be documented in the checklist with sufficient justification.

<table>
<tr><td>1</td><td colspan="4">Date: ____6/13/2021_____ Corps file no.: _____ Project Manager: _____

Impact site name: Indirect Impacts ORM impact resource type: river/stream Hydrology: ephemeral
Cowardin or HGM type: riverine _ Impact area (acres): 17.98 Impact distance (linear feet): 75,407

For impact site name, multiple discrete (as entered in ORM) impacts are to be evaluated using multiple checklists; however, multiple impacts to one habitat type (Cowardin or HGM) could be lumped together to determine a mitigation ratio using one checklist. For each proposed impact to waters of the U.S., the project manager (PM) should consider each factor and, if applicable, document consideration in response column(s) using applicable procedures or guidelines. For mitigation proposals with multiple mitigation sites and/or types, see QMS procedure 12501 (section 7.3).</td></tr>
<tr><td></td><td></td><td>Column A:
Mitigation site name: Floodway
Mitigation type: Preservation
Resource type: River/stream
Cowardin/HGM type: Riverine
Hydrology: Ephemeral</td><td>Column B (optional):
Mitigation site name: _____
Mitigation type: _____
Resource type: _____
Cowardin/HGM type: _____
Hydrology: _____</td><td>Column C (optional):
Mitigation site name: _____
Mitigation type: _____
Resource type: _____
Cowardin/HGM type: _____
Hydrology: _____</td></tr>
<tr><td>2</td><td>QUALITATIVE impact-mitigation comparison:

Has a Corps-approved functional/condition assessment been obtained? If not, complete step 2; otherwise, complete step 3.
Yes ☐ No ☐

Optional: use Table 1 (below).

Qualitative assessment of functional loss at the impact site versus expected functional gain at the mitigation site may warrant a lower or higher mitigation ratio. Adjustments for</td><td>Note: steps 2 and 3 are mutually exclusive. If step 2 is used, then complete the rest of the checklist (steps 4-10).

Starting ratio: 1:1
Ratio adjustment: -2
Baseline ratio: 1:3
PM justification: Functional gain would be more than the expected functional loss (see attached table)</td><td>Starting ratio: 1:1
Ratio adjustment: ___
Baseline ratio: __:__
PM justification:</td><td>Starting ratio: 1:1
Ratio adjustment: ___
Baseline ratio: __:__
PM justification:</td></tr>
</table>

	preservation-only mitigation, which provides no functional gain, should generally fall towards the high end of the range (towards 3-4). Preservation-only of non-aquatic habitats (upland buffer) may warrant adjustments higher than 4. Using the list of functions below, compare impact (functional loss) and proposed mitigation (functional gain) at impact (I) and mitigation (M) sites. If, for most functions, I < M, then use a single adjustment less than 0 and equal or greater than -2.0; if I = M, then use adjustment of 0; or if I > M, then use adjustment greater than 0 and less than or equal to 4. Add adjustment to starting ratio of 1:1 to obtain baseline ratio. If adjustment is less than 0 (negative), add absolute value of adjustment to right (impact) side of starting ratio; otherwise, add to left (mitigation) side. See examples in attachment 12501.3. For a suite of potential functions from HGM (alternate lists of functions may be used), see Table 1 (below).			
3	**QUANTITATIVE impact-mitigation comparison**: Use step 3 if a Corps-approved functional/condition assessment been obtained. In general, project managers should consider requiring a functional/condition assessment and using step 3 for projects where total permanent impacts exceed 0.5 acre or 300 linear feet. Acceptable functional/condition assessment methods must be aquatic resource-based, standardized, comparable from site to site, peer-reviewed, unmodified, and approved by the applicable Corps District. If a district-approved method is not available, use step 2.	Note: steps 2 and 3 are mutually exclusive. If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Complete the rest of the checklist (steps 4-10 or steps 4 and 6-10, as appropriate). Baseline ratio from BAMI spreadsheet (attached): __:__	Baseline ratio from BAMI procedure (attached): __:__	Baseline ratio from BAMI procedure (attached): __:__

	Use Before-After-Mitigation-Impact (BAMI) spreadsheet (attachment 12501.4) (if a district-approved functional/condition method is not available, use step 2 instead). See example below. Note: In an extreme case, the BAMI procedure could result in a ratio (and overall mitigation proposal) unacceptable to the Corps. For example, providing a very large but low quality mitigation site (low functional gain resulting a in a very high ratio) may result in functional gain equaling loss numerically, but this may not be acceptable because the required compensatory mitigation must be appropriate to the scope and degree of the impacts (see 33 CFR 320.4(r)(2)).			
4	**Mitigation site location**: Mitigation located outside impacted watershed generally warrants a higher mitigation ratio. The project manager will determine the appropriate Hydrologic Unit Code (HUC) to define the term "watershed" in this context. Is mitigation located outside of the impacted watershed? If yes, +1.0, if no, +0.	Ratio adjustment: 0 PM justification: impact and mitigation would be within the same watershed	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
5	**Net loss of aquatic resource surface area**: Different types of mitigation result in varying net losses of aquatic resource area. For definitions of mitigation types, see mitigation rule at 33 CFR 332.2. Re-establishment or establishment +0, rehabilitation, enhancement, preservation +1.0 (these three mitigation types result in a net loss of aquatic resource area in cases where permanent loss of waters of the U.S. is authorized and not offset by either re-establishment or establishment).	Note: If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Ratio adjustment: +1 PM justification: enhancement/preservation	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
6	**Type conversion:** Out-of-kind mitigation may warrant a higher mitigation ratio. However, out-of-kind mitigation can be appropriate if the proposed mitigation habitat type serves the	Ratio adjustment: 0 PM justification: mitigation is in-kind	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:

	aquatic resource needs of the watershed/ecoregion. In considering out-of-kind mitigation, project managers should consider whether impacts or mitigation would consist of rare or regionally significant habitat types (e.g., vernal pools). Project manager will determine the relative values of different habitat types and document herein. Justification for the use of out-of-kind mitigation must be documented herein. Would mitigation result in: (A) conversion from a highly valuable and/or rare habitat type to a common type? Or (B) vice versa? Magnitude of adjustment should vary with value of habitats involved. Calculate ratio adjustment based on answers to questions (A) and (B): Y,N: +0.25 to +4.0; N,Y: -0.25 to -4.0; N,N: +0.			
7	**Risk and uncertainty:** Mitigation ratios should reflect the inherent uncertainty of mitigation. Factors to consider include: 1) permittee-responsible mitigation; 2) mitigation site did not formerly support targeted aquatic resources; 3) difficult-to-replace resources (see 33 CFR 332.3(e)(3) and (f)(2)); 4) modified hydrology (e.g., high-flow bypass); 5) artificial hydrology (e.g., pumped water source); 6) structures requiring long-term maintenance (e.g., outfalls, drop structures, weirs, bank stabilization structures); 7) planned vegetation maintenance (e.g., mowing, landclearing, fuel modification activities); 8) e.g., shallow, buried structures (riprap, clay liners), and 9) absence of long-term preservation mechanism. Note: this list is not all-inclusive. Each factor can range from +0.1 to +0.3 depending on the level of anticipated risk and the amount of maintenance or management required to sustain the compensatory mitigation project. Sum factor adjustments (+0 if no factors). Generally, uncertainty in banks and in	Ratio adjustment: 0 PM justification: Risk and uncertainty factors are minimal because minimal maintenance of mitigation is required and the CVMSHCP provides a framework for long-term management of the mitigation area.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:

	lieu fee programs is accounted for in the credit release process.			
8	**Temporal loss**: Constructed habitats take time to mature and replace aquatic functions; this typically warrants a higher mitigation ratio in cases where a delay is planned between impacts and full replacement of functions. Project manager should estimate the time between when the authorized impacts occur and constructed mitigation is expected to replace lost functions, including the monitoring period. In cases where all performance standards are expected to be achieved prior to impacts, no temporal loss should be assessed (for permittee-responsible only). Similarly, in cases where interim performance standards are expected to be achieved, a lower ratio adjustment may be appropriate. Unexpected delays in compensatory mitigation project implementation should be handled as compliance actions. a. For scheduled, known delays between impacts and construction of mitigation: multiply delay (in months) by 0.05; b. To account for time required for full replacement of functions during monitoring period: generally, if mitigation is comprised of trees/woodlands or saltmarsh, +3; if shrubs, +2; if herbaceous, +1; c. Add adjustments from steps (a) and (b).	Ratio adjustment: 0 PM justification: No planned delay, impact and mitigation to be constructed simultaneously	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
9	**Final mitigation ratio(s):** Project manager should enter the final mitigation ratio(s) arrived at after consideration of the above factors (either qualitative OR quantitative). Project manager should enter the extent of authorized impacts and required mitigation by area (acreage) and/or distance (linear feet), as well as the corresponding resource type (lake, non-tidal wetland, other, pond, stream/river/ocean, tidal	Column A: 1. Baseline ratio from step 2 or 3 = 1:3 2. Total adjustments = +1 3. Final ratio: 1:1 Proposed impact (total): 17.98 acre ___ linear feet to	Column B: 1. Baseline ratio from step 2 or 3 = __:__ 2. Total adjustments = ___ 3. Final ratio: __ : __ Remaining impact: _____ Required mitigation: ___ acre	Column C: 1. Baseline ratio from step 2 or 3 = __:__ 2. Total adjustments = ___ 3. Final ratio: __ : __ Remaining impact: _____ Required mitigation: ___ acre

	wetland) and Cowardin or Hydrogeomorphic Method (HGM) classification type. To obtain the final mitigation ratio*: a. Take baseline ratio from step 2 or 3; b. Add ratio adjustments from steps 4-8; c. If total of adjustments is greater than 0 (positive), add total to left (mitigation) side of baseline ratio; d. If total of adjustments is less than 0 (negative), add ABS of total to right (impact) side of baseline ratio; Note 1: minimum ratio = 1:1 if step 2 used. If step 3 used, final ratio can be less than 1:1 assuming completed functional/condition assessment, in combination with other steps, justifies a ratio less than 1:1 (i.e., total of adjustments is negative). Note 2: Final ratio in each column should be as calculated. If desired, express ratio equal to X:1 (traditional format: for example, 1:4 = 0.25:1), but ONLY in step 9's PM comments and in step 10.	Resource type: River/stream Cowardin or HGM: Riverine Hydrology: Ephemeral Required mitigation: 17.98 acre ___ linear feet of Mitigation type: Enhancement/ Preservation Resource type: Same Cowardin or HGM: Same Hydrology: Same Additional PM comments: *Calculated ratio is 2:3 (or 0.66:1), but without functional assessment, 1:1 is min ratio allowed under 2008 mitigation rule.	___ linear feet of Mitigation type: _____ Resource type: _____ Cowardin or HGM: _____ Hydrology: _____ Additional PM comments:	___ linear feet of Mitigation type: _____ Resource type: _____ Cowardin or HGM: _____ Hydrology: _____ Additional PM comments:
10	**Final compensatory mitigation requirements:** Summarize the checklist results, combining all required mitigation for this impact site.	PM summary: The final compensatory mitigation requirement for this impact site is the purchase of the floodway for the preservation of 17.98 acres of ephemeral stream habitat (1:1 ratio).		

*In the final determination of required mitigation, direct and indirect impacts should be considered:

a. Indirect impacts: Compensatory mitigation may be required to offset predictable indirect impacts. The PM should document any indirect impacts caused by the proposed/authorized activity.

b. Cumulative impacts: In some cases, cumulative impacts should be considered when determining if compensatory mitigation should be required. The extent of cumulative impacts should be documented using available information, such as analyses or data associated with a Special Area Management Plan (SAMP), Watershed Management Plan, land use/land cover scenario assessment, hydrologic modeling, etc. The information used should be fully cited herein and in the decision document. The assessment must focus on the proposed action's direct and indirect impacts (i.e., incremental impact of the proposed activity) in the context of the cumulative effects caused by past, present, and reasonably foreseeable actions, to reduce the proposed activity's contribution to cumulative effects in the region.

Step 2

Table 1 for step 2. Qualitative comparison of functions (functional loss vs. gain):

Function	Impact site	Mitigation site
Short- or long-term surface water storage	Small loss	Large gain
Subsurface water storage	No loss	No gain
Moderation of groundwater flow or discharge	Small loss	Large gain
Dissipation of energy	No loss	No gain
Cycling of nutrients	No loss	Large gain
Removal of elements and compounds	No loss	No gain
Retention of particulates	Small loss	Large gain
Export of organic carbon	No loss	No gain
Maintenance of plant and animal communities	Small loss	Large gain
	Step 2 adjustment:	-2

Step 2 Table 1 instructions:

1. Describe amount of functional loss (impact) and gain (mitigation) in each respective column. Gain and loss can be described in text (for example, small loss, moderate loss, large loss, no loss, etc.) or symbolically (for example, +, ++, +++, 0, ---, --, -).
2. Note: alternate lists of functions may be used.
3. Note: a single adjustment should be used to account for all functions combined (see example 7 in attachment 12501.3)

Attachment 12501.2-SPD - Instructions for Completing Mitigation Ratio-Setting Checklist.

These instructions contain specific numeric adjustments (discrete, e.g., +1.0, or ranges, e.g., +0.25 to +4.0) that were determined by the PDT after assessing a variety of impact-mitigation scenarios and determining adjustments for each step that, in combination with other step adjustments, produce a reasonable range of final mitigation ratios. For steps where a range of adjustments is provided, PMs are directed to the attached examples for additional guidance. PMs **must** enter a separate justification for each adjustment within the checklist. PMs may deviate from the guidance provided herein if such deviations can be documented in the checklist with sufficient justification.

<table>
<tr><td>1</td><td colspan="4">Date:6/13/2021 Corps file no.: _____ Project Manager: _____

Impact site name: Reach 1 (Drainages 1-46) ORM impact resource type: _river/stream Hydrology: Ephemeral
Cowardin or HGM type: Riverine Impact area (acres): 1.39 Impact distance (linear feet): 8042

For impact site name, multiple discrete (as entered in ORM) impacts are to be evaluated using multiple checklists; however, multiple impacts to one habitat type (Cowardin or HGM) could be lumped together to determine a mitigation ratio using one checklist. For each proposed impact to waters of the U.S., the project manager (PM) should consider each factor and, if applicable, document consideration in response column(s) using applicable procedures or guidelines. For mitigation proposals with multiple mitigation sites and/or types, see QMS procedure 12501 (section 7.3).</td></tr>
<tr><td></td><td></td><td>Column A:
Mitigation site name: Floodway
Mitigation type: Preservation and enhancement
Resource type: River/stream
Cowardin/HGM type: Riverine
Hydrology: Ephemeral</td><td>Column B (optional):
Mitigation site name: _____
Mitigation type: _____
Resource type: _____
Cowardin/HGM type: _____
Hydrology: _____</td><td>Column C (optional):
Mitigation site name: _____
Mitigation type: _____
Resource type: _____
Cowardin/HGM type: _____
Hydrology: _____</td></tr>
<tr><td>2</td><td>QUALITATIVE impact-mitigation comparison:

Has a Corps-approved functional/condition assessment been obtained? If not, complete step 2; otherwise, complete step 3.
Yes ☒ No ☐

Optional: use Table 1 (below).

Qualitative assessment of functional loss at the impact site versus expected functional gain at the mitigation site may warrant a lower or higher mitigation ratio. Adjustments for</td><td>Note: steps 2 and 3 are mutually exclusive. If step 2 is used, then complete the rest of the checklist (steps 4-10).

Starting ratio: 1:1
Ratio adjustment: -2
Baseline ratio: 1:3
PM justification: Functional gain would be more than the expected functional loss (see attached table)</td><td>Starting ratio: 1:1
Ratio adjustment: ___
Baseline ratio: __:__
PM justification:</td><td>Starting ratio: 1:1
Ratio adjustment: ___
Baseline ratio: __:__
PM justification:</td></tr>
</table>

	preservation-only mitigation, which provides no functional gain, should generally fall towards the high end of the range (towards 3-4). Preservation-only of non-aquatic habitats (upland buffer) may warrant adjustments higher than 4. Using the list of functions below, compare impact (functional loss) and proposed mitigation (functional gain) at impact (I) and mitigation (M) sites. If, for most functions, I < M, then use a single adjustment less than 0 and equal or greater than -2.0; if I = M, then use adjustment of 0; or if I > M, then use adjustment greater than 0 and less than or equal to 4. Add adjustment to starting ratio of 1:1 to obtain baseline ratio. If adjustment is less than 0 (negative), add absolute value of adjustment to right (impact) side of starting ratio; otherwise, add to left (mitigation) side. See examples in attachment 12501.3. For a suite of potential functions from HGM (alternate lists of functions may be used), see Table 1 (below).			
3	**QUANTITATIVE impact-mitigation comparison**: Use step 3 if a Corps-approved functional/condition assessment been obtained. In general, project managers should consider requiring a functional/condition assessment and using step 3 for projects where total permanent impacts exceed 0.5 acre or 300 linear feet. Acceptable functional/condition assessment methods must be aquatic resource-based, standardized, comparable from site to site, peer-reviewed, unmodified, and approved by the applicable Corps District. If a district-approved method is not available, use step 2.	Note: steps 2 and 3 are mutually exclusive. If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Complete the rest of the checklist (steps 4-10 or steps 4 and 6-10, as appropriate). Baseline ratio from BAMI spreadsheet (attached): __:__	Baseline ratio from BAMI procedure (attached): __:__	Baseline ratio from BAMI procedure (attached): __:__

	Use Before-After-Mitigation-Impact (BAMI) spreadsheet (attachment 12501.4) (if a district-approved functional/condition method is not available, use step 2 instead). See example below. Note: In an extreme case, the BAMI procedure could result in a ratio (and overall mitigation proposal) unacceptable to the Corps. For example, providing a very large but low quality mitigation site (low functional gain resulting a in a very high ratio) may result in functional gain equaling loss numerically, but this may not be acceptable because the required compensatory mitigation must be appropriate to the scope and degree of the impacts (see 33 CFR 320.4(r)(2)).			
4	**Mitigation site location**: Mitigation located outside impacted watershed generally warrants a higher mitigation ratio. The project manager will determine the appropriate Hydrologic Unit Code (HUC) to define the term "watershed" in this context. Is mitigation located outside of the impacted watershed? If yes, +1.0, if no, +0.	Ratio adjustment: 0 PM justification: The impact and mitigation would be within the same watershed.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
5	**Net loss of aquatic resource surface area**: Different types of mitigation result in varying net losses of aquatic resource area. For definitions of mitigation types, see mitigation rule at 33 CFR 332.2. Re-establishment or establishment +0, rehabilitation, enhancement, preservation +1.0 (these three mitigation types result in a net loss of aquatic resource area in cases where permanent loss of waters of the U.S. is authorized and not offset by either re-establishment or establishment).	Note: If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Ratio adjustment: +1 PM justification: Enhancement/Preservation	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
6	**Type conversion:** Out-of-kind mitigation may warrant a higher mitigation ratio. However, out-of-kind mitigation can be appropriate if the proposed mitigation habitat type serves the	Ratio adjustment: 0 PM justification: Mitigation is in-kind	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:

	aquatic resource needs of the watershed/ecoregion. In considering out-of-kind mitigation, project managers should consider whether impacts or mitigation would consist of rare or regionally significant habitat types (e.g., vernal pools). Project manager will determine the relative values of different habitat types and document herein. Justification for the use of out-of-kind mitigation must be documented herein. Would mitigation result in: (A) conversion from a highly valuable and/or rare habitat type to a common type? Or (B) vice versa? Magnitude of adjustment should vary with value of habitats involved. Calculate ratio adjustment based on answers to questions (A) and (B): Y,N: +0.25 to +4.0; N,Y: -0.25 to -4.0; N,N: +0.			
7	**Risk and uncertainty:** Mitigation ratios should reflect the inherent uncertainty of mitigation. Factors to consider include: 1) permittee-responsible mitigation; 2) mitigation site did not formerly support targeted aquatic resources; 3) difficult-to-replace resources (see 33 CFR 332.3(e)(3) and (f)(2)); 4) modified hydrology (e.g., high-flow bypass); 5) artificial hydrology (e.g., pumped water source); 6) structures requiring long-term maintenance (e.g., outfalls, drop structures, weirs, bank stabilization structures); 7) planned vegetation maintenance (e.g., mowing, land clearing, fuel modification activities); 8) e.g., shallow, buried structures (riprap, clay liners), and 9) absence of long-term preservation mechanism. Note: this list is not all-inclusive. Each factor can range from +0.1 to +0.3 depending on the level of anticipated risk and the amount of maintenance or management required to sustain the compensatory mitigation project. Sum factor adjustments (+0 if no	Ratio adjustment: 0 PM justification: Preservation of existing features within the same watershed. Risk and uncertainty factors are minimal because minimal maintenance of mitigation is required and the CVMSHCP provides a framework for long-term management of the mitigation area.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:

	factors). Generally, uncertainty in banks and in lieu fee programs is accounted for in the credit release process.			
8	**Temporal loss**: Constructed habitats take time to mature and replace aquatic functions; this typically warrants a higher mitigation ratio in cases where a delay is planned between impacts and full replacement of functions. Project manager should estimate the time between when the authorized impacts occur and constructed mitigation is expected to replace lost functions, including the monitoring period. In cases where all performance standards are expected to be achieved prior to impacts, no temporal loss should be assessed (for permittee-responsible only). Similarly, in cases where interim performance standards are expected to be achieved, a lower ratio adjustment may be appropriate. Unexpected delays in compensatory mitigation project implementation should be handled as compliance actions. a. For scheduled, known delays between impacts and construction of mitigation: multiply delay (in months) by 0.05; b. To account for time required for full replacement of functions during monitoring period: generally, if mitigation is comprised of trees/woodlands or saltmarsh, +3; if shrubs, +2; if herbaceous, +1; c. Add adjustments from steps (a) and (b).	Ratio adjustment: 0 PM justification: No planned delay, impact and mitigation would occur simultaneously.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
9	**Final mitigation ratio(s):** Project manager should enter the final mitigation ratio(s) arrived at after consideration of the above factors (either qualitative OR quantitative). Project manager should enter the extent of authorized impacts and required mitigation by area (acreage) and/or distance (linear feet), as well as the corresponding resource type (lake, non-	Column A: 1. Baseline ratio from step 2 or 3 = 1:3 2. Total adjustments = +1 3. Final ratio: 1 :1 Proposed impact (total): 1.39 acre ___ linear feet	Column B: 1. Baseline ratio from step 2 or 3 = __:__ 2. Total adjustments = ___ 3. Final ratio: __ : __ Remaining impact: _____	Column C: 1. Baseline ratio from step 2 or 3 = __:__ 2. Total adjustments = ___ 3. Final ratio: __ : __ Remaining impact: _____

	tidal wetland, other, pond, stream/river/ocean, tidal wetland) and Cowardin or Hydrogeomorphic Method (HGM) classification type. To obtain the final mitigation ratio*: a. Take baseline ratio from step 2 or 3; b. Add ratio adjustments from steps 4-8; c. If total of adjustments is greater than 0 (positive), add total to left (mitigation) side of baseline ratio; d. If total of adjustments is less than 0 (negative), add ABS of total to right (impact) side of baseline ratio; Note 1: minimum ratio = 1:1 if step 2 used. If step 3 used, final ratio can be less than 1:1 assuming completed functional/condition assessment, in combination with other steps, justifies a ratio less than 1:1 (i.e., total of adjustments is negative). Note 2: Final ratio in each column should be as calculated. If desired, express ratio equal to X:1 (traditional format: for example, 1:4 = 0.25:1), but ONLY in step 9's PM comments and in step 10.	to Resource type: ____river/stream_____ Cowardin or HGM: _____ Hydrology: ___ephemeral_____ Required mitigation: 1.39 acre ___ linear feet of Mitigation type: enhancement/ preservation Resource type: same Cowardin or HGM: same Hydrology: same Additional PM comments: *Calculated ratio is 2:3 (or 0.66:1), but without functional assessment, 1:1 is min ratio allowed under 2008 mitigation rule.	Required mitigation: ___ acre ___ linear feet of Mitigation type: _____ Resource type: _____ Cowardin or HGM: _____ Hydrology: _____ Additional PM comments:	Required mitigation: ___ acre ___ linear feet of Mitigation type: _____ Resource type: _____ Cowardin or HGM: _____ Hydrology: _____ Additional PM comments:
10	**Final compensatory mitigation requirements:** Summarize the checklist results, combining all required mitigation for this impact site.	PM summary: The final compensatory mitigation requirement for this impact site is the purchase of the floodway for the preservation of 1.39 acres of ephemeral stream habitat (1:1 ratio).		

*In the final determination of required mitigation, direct and indirect impacts should be considered:

a. Indirect impacts: Compensatory mitigation may be required to offset predictable indirect impacts. The PM should document any indirect impacts caused by the proposed/authorized activity.

b. Cumulative impacts: In some cases, cumulative impacts should be considered when determining if compensatory mitigation should be required. The extent of cumulative impacts should be documented using available information, such as analyses or data associated with a Special Area Management Plan (SAMP), Watershed Management Plan, land use/land cover scenario assessment, hydrologic modeling, etc. The information used should be fully cited herein and in the decision document. The assessment must focus on the proposed action's direct and indirect impacts (i.e., incremental impact of the proposed activity) in the context of the cumulative effects caused by past, present, and reasonably foreseeable actions, to reduce the proposed activity's contribution to cumulative effects in the region.

Step 2

Table 1 for step 2. Qualitative comparison of functions (functional loss vs. gain):

Function	Impact site	Mitigation site
Short- or long-term surface water storage	Small loss	Large gain
Subsurface water storage	No loss	No gain
Moderation of groundwater flow or discharge	Small loss	Large gain
Dissipation of energy	No loss	No gain
Cycling of nutrients	Small loss	Small gain
Removal of elements and compounds	No loss	No gain
Retention of particulates	Small loss	Large gain
Export of organic carbon	No loss	No gain
Maintenance of plant and animal communities	Small loss	Large gain
Step 2 adjustment:		-2

Step 2 Table 1 instructions:

1. Describe amount of functional loss (impact) and gain (mitigation) in each respective column. Gain and loss can be described in text (for example, small loss, moderate loss, large loss, no loss, etc.) or symbolically (for example, +, ++, +++, 0, ---, --, -).
2. Note: alternate lists of functions may be used.
3. Note: a single adjustment should be used to account for all functions combined (see example 7 in attachment 12501.3)

Attachment 12501.2-SPD - Instructions for Completing Mitigation Ratio-Setting Checklist.

These instructions contain specific numeric adjustments (discrete, e.g., +1.0, or ranges, e.g., +0.25 to +4.0) that were determined by the PDT after assessing a variety of impact-mitigation scenarios and determining adjustments for each step that, in combination with other step adjustments, produce a reasonable range of final mitigation ratios. For steps where a range of adjustments is provided, PMs are directed to the attached examples for additional guidance. PMs **must** enter a separate justification for each adjustment within the checklist. PMs may deviate from the guidance provided herein if such deviations can be documented in the checklist with sufficient justification.

<table>
<tr><td>1</td><td colspan="4">Date:6/13/2021 Corps file no.: _____ Project Manager: _____

Impact site name: Reach 1 (Drainages 47-60) ORM impact resource type: River/stream Hydrology: Ephemeral
Cowardin or HGM type: Riverine Impact area (acres): 0.84 Impact distance (linear feet): 2000

For impact site name, multiple discrete (as entered in ORM) impacts are to be evaluated using multiple checklists; however, multiple impacts to one habitat type (Cowardin or HGM) could be lumped together to determine a mitigation ratio using one checklist. For each proposed impact to waters of the U.S., the project manager (PM) should consider each factor and, if applicable, document consideration in response column(s) using applicable procedures or guidelines. For mitigation proposals with multiple mitigation sites and/or types, see QMS procedure 12501 (section 7.3).</td></tr>
<tr><td></td><td></td><td>Column A:
Mitigation site name: Floodway
Mitigation type:
Preservation/Enhancement
Resource type: River/stream
Cowardin/HGM type: Riverine
Hydrology: Ephemeral</td><td>Column B (optional):
Mitigation site name: _____
Mitigation type: _____
Resource type: _____
Cowardin/HGM type: _____
Hydrology: _____</td><td>Column C (optional):
Mitigation site name: _____
Mitigation type: _____
Resource type: _____
Cowardin/HGM type: _____
Hydrology: _____</td></tr>
<tr><td>2</td><td>QUALITATIVE impact-mitigation comparison:

Has a Corps-approved functional/condition assessment been obtained? If not, complete step 2; otherwise, complete step 3.
Yes ☒ No ☐

Optional: use Table 1 (below).

Qualitative assessment of functional loss at the impact site versus expected functional gain at the mitigation site may warrant a lower or higher mitigation ratio. Adjustments for</td><td>Note: steps 2 and 3 are mutually exclusive. If step 2 is used, then complete the rest of the checklist (steps 4-10).

Starting ratio: 1:1
Ratio adjustment: +1
Baseline ratio: 2:1
PM justification: Impacts and mitigation sites are the same habitat type, with slightly higher function in the impact area than the overall floodway (see attached table)</td><td>Starting ratio: 1:1
Ratio adjustment: ___
Baseline ratio: __:__
PM justification:</td><td>Starting ratio: 1:1
Ratio adjustment: ___
Baseline ratio: __:__
PM justification:</td></tr>
</table>

	preservation-only mitigation, which provides no functional gain, should generally fall towards the high end of the range (towards 3-4). Preservation-only of non-aquatic habitats (upland buffer) may warrant adjustments higher than 4. Using the list of functions below, compare impact (functional loss) and proposed mitigation (functional gain) at impact (I) and mitigation (M) sites. If, for most functions, I < M, then use a single adjustment less than 0 and equal or greater than -2.0; if I = M, then use adjustment of 0; or if I > M, then use adjustment greater than 0 and less than or equal to 4. Add adjustment to starting ratio of 1:1 to obtain baseline ratio. If adjustment is less than 0 (negative), add absolute value of adjustment to right (impact) side of starting ratio; otherwise, add to left (mitigation) side. See examples in attachment 12501.3. For a suite of potential functions from HGM (alternate lists of functions may be used), see Table 1 (below).			
3	**QUANTITATIVE impact-mitigation comparison**: Use step 3 if a Corps-approved functional/condition assessment been obtained. In general, project managers should consider requiring a functional/condition assessment and using step 3 for projects where total permanent impacts exceed 0.5 acre or 300 linear feet. Acceptable functional/condition assessment methods must be aquatic resource-based, standardized, comparable from site to site, peer-reviewed, unmodified, and approved by the applicable Corps District. If a district-approved method is not available, use step 2.	Note: steps 2 and 3 are mutually exclusive. If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Complete the rest of the checklist (steps 4-10 or steps 4 and 6-10, as appropriate). Baseline ratio from BAMI spreadsheet (attached): __:__	Baseline ratio from BAMI procedure (attached): __:__	Baseline ratio from BAMI procedure (attached): __:__

	Use Before-After-Mitigation-Impact (BAMI) spreadsheet (attachment 12501.4) (if a district-approved functional/condition method is not available, use step 2 instead). See example below. Note: In an extreme case, the BAMI procedure could result in a ratio (and overall mitigation proposal) unacceptable to the Corps. For example, providing a very large but low quality mitigation site (low functional gain resulting a in a very high ratio) may result in functional gain equaling loss numerically, but this may not be acceptable because the required compensatory mitigation must be appropriate to the scope and degree of the impacts (see 33 CFR 320.4(r)(2)).			
4	**Mitigation site location**: Mitigation located outside impacted watershed generally warrants a higher mitigation ratio. The project manager will determine the appropriate Hydrologic Unit Code (HUC) to define the term "watershed" in this context. Is mitigation located outside of the impacted watershed? If yes, +1.0, if no, +0.	Ratio adjustment: 0 PM justification: Impact and mitigation would be within the same watershed.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
5	**Net loss of aquatic resource surface area**: Different types of mitigation result in varying net losses of aquatic resource area. For definitions of mitigation types, see mitigation rule at 33 CFR 332.2. Re-establishment or establishment +0, rehabilitation, enhancement, preservation +1.0 (these three mitigation types result in a net loss of aquatic resource area in cases where permanent loss of waters of the U.S. is authorized and not offset by either re-establishment or establishment).	Note: If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Ratio adjustment: +1 PM justification: Enhancement/Preservation	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
6	**Type conversion:** Out-of-kind mitigation may warrant a higher mitigation ratio. However, out-of-kind mitigation can be appropriate if the proposed mitigation habitat type serves the	Ratio adjustment: 0 PM justification: Mitigation is in-kind.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:

	aquatic resource needs of the watershed/ecoregion. In considering out-of-kind mitigation, project managers should consider whether impacts or mitigation would consist of rare or regionally significant habitat types (e.g., vernal pools). Project manager will determine the relative values of different habitat types and document herein. Justification for the use of out-of-kind mitigation must be documented herein. Would mitigation result in: (A) conversion from a highly valuable and/or rare habitat type to a common type? Or (B) vice versa? Magnitude of adjustment should vary with value of habitats involved. Calculate ratio adjustment based on answers to questions (A) and (B): Y,N: +0.25 to +4.0; N,Y: -0.25 to -4.0; N,N: +0.			
7	**Risk and uncertainty:** Mitigation ratios should reflect the inherent uncertainty of mitigation. Factors to consider include: 1) permittee-responsible mitigation; 2) mitigation site did not formerly support targeted aquatic resources; 3) difficult-to-replace resources (see 33 CFR 332.3(e)(3) and (f)(2)); 4) modified hydrology (e.g., high-flow bypass); 5) artificial hydrology (e.g., pumped water source); 6) structures requiring long-term maintenance (e.g., outfalls, drop structures, weirs, bank stabilization structures); 7) planned vegetation maintenance (e.g., mowing, landclearing, fuel modification activities); 8) e.g., shallow, buried structures (riprap, clay liners), and 9) absence of long-term preservation mechanism. Note: this list is not all-inclusive. Each factor can range from +0.1 to +0.3 depending on the level of anticipated risk and the amount of maintenance or management required to sustain the compensatory mitigation project. Sum factor adjustments (+0 if no	Ratio adjustment: 0 PM justification: Preservation of existing features are within same watershed. Risk and uncertainty factors are minimal because minimal maintenance of mitigation is required and the CVMSHCP provides a framework for long-term management of the mitigation area.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:

	factors). Generally, uncertainty in banks and in lieu fee programs is accounted for in the credit release process.			
8	**Temporal loss**: Constructed habitats take time to mature and replace aquatic functions; this typically warrants a higher mitigation ratio in cases where a delay is planned between impacts and full replacement of functions. Project manager should estimate the time between when the authorized impacts occur and constructed mitigation is expected to replace lost functions, including the monitoring period. In cases where all performance standards are expected to be achieved prior to impacts, no temporal loss should be assessed (for permittee-responsible only). Similarly, in cases where interim performance standards are expected to be achieved, a lower ratio adjustment may be appropriate. Unexpected delays in compensatory mitigation project implementation should be handled as compliance actions. a. For scheduled, known delays between impacts and construction of mitigation: multiply delay (in months) by 0.05; b. To account for time required for full replacement of functions during monitoring period: generally, if mitigation is comprised of trees/woodlands or saltmarsh, +3; if shrubs, +2; if herbaceous, +1; c. Add adjustments from steps (a) and (b).	Ratio adjustment: 0 PM justification: No planned delay, impact and mitigation would occur simultaneously.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
9	**Final mitigation ratio(s):** Project manager should enter the final mitigation ratio(s) arrived at after consideration of the above factors (either qualitative OR quantitative). Project manager should enter the extent of authorized impacts and required mitigation by area (acreage) and/or distance (linear feet), as well as the corresponding resource type (lake, non-	Column A: 1. Baseline ratio from step 2 or 3 = 2:1 2. Total adjustments = +1 3. Final ratio: 3:1 Proposed impact (total): 0.84 acre ___ linear feet	Column B: 1. Baseline ratio from step 2 or 3 = __:__ 2. Total adjustments = ___ 3. Final ratio: __ : __ Remaining impact: _____	Column C: 1. Baseline ratio from step 2 or 3 = __:__ 2. Total adjustments = ___ 3. Final ratio: __ : __ Remaining impact: _____

	tidal wetland, other, pond, stream/river/ocean, tidal wetland) and Cowardin or Hydrogeomorphic Method (HGM) classification type. To obtain the final mitigation ratio*: a. Take baseline ratio from step 2 or 3; b. Add ratio adjustments from steps 4-8; c. If total of adjustments is greater than 0 (positive), add total to left (mitigation) side of baseline ratio; d. If total of adjustments is less than 0 (negative), add ABS of total to right (impact) side of baseline ratio; Note 1: minimum ratio = 1:1 if step 2 used. If step 3 used, final ratio can be less than 1:1 assuming completed functional/condition assessment, in combination with other steps, justifies a ratio less than 1:1 (i.e., total of adjustments is negative). Note 2: Final ratio in each column should be as calculated. If desired, express ratio equal to X:1 (traditional format: for example, 1:4 = 0.25:1), but ONLY in step 9's PM comments and in step 10.	to Resource type: river/stream Cowardin or HGM: Riverine Hydrology: ephemeral Required mitigation: 2.52 acre ___ linear feet of Mitigation type: enhancement/preservation Resource type: same Cowardin or HGM:same Hydrology: same Additional PM comments:	Required mitigation: ___ acre ___ linear feet of Mitigation type: _____ Resource type: _____ Cowardin or HGM: _____ Hydrology: _____ Additional PM comments:	Required mitigation: ___ acre ___ linear feet of Mitigation type: _____ Resource type: _____ Cowardin or HGM: _____ Hydrology: _____ Additional PM comments:
10	**Final compensatory mitigation requirements:** Summarize the checklist results, combining all required mitigation for this impact site.	PM summary: The final compensatory mitigation requirement for this impact site is the purchase of the floodway for the preservation of 2.52 acres of ephemeral stream habitat (3:1 ratio).		

*In the final determination of required mitigation, direct and indirect impacts should be considered:

a. Indirect impacts: Compensatory mitigation may be required to offset predictable indirect impacts. The PM should document any indirect impacts caused by the proposed/authorized activity.

b. Cumulative impacts: In some cases, cumulative impacts should be considered when determining if compensatory mitigation should be required. The extent of cumulative impacts should be documented using available information, such as analyses or data associated with a Special Area Management Plan (SAMP), Watershed Management Plan, land use/land cover scenario assessment, hydrologic modeling, etc. The information used should be fully cited herein and in the decision document. The assessment must focus on the proposed action's direct and indirect impacts (i.e., incremental impact of the proposed activity) in the context of the cumulative effects caused by past, present, and reasonably foreseeable actions, to reduce the proposed activity's contribution to cumulative effects in the region.

Step 2

Table 1 for step 2. Qualitative comparison of functions (functional loss vs. gain):

Function	Impact site	Mitigation site
Short- or long-term surface water storage	Small loss	Small gain
Subsurface water storage	No loss	No gain
Moderation of groundwater flow or discharge	Moderate loss	No gain
Dissipation of energy	No loss	No gain
Cycling of nutrients	Small loss	Small gain
Removal of elements and compounds	No loss	No gain
Retention of particulates	Moderate loss	Small gain
Export of organic carbon	No loss	No gain
Maintenance of plant and animal communities	Small loss	Small gain
Step 2 adjustment:		+1

Step 2 Table 1 instructions:

1. Describe amount of functional loss (impact) and gain (mitigation) in each respective column. Gain and loss can be described in text (for example, small loss, moderate loss, large loss, no loss, etc.) or symbolically (for example, +, ++, +++, 0, ---, --, -).
2. Note: alternate lists of functions may be used.
3. Note: a single adjustment should be used to account for all functions combined (see example 7 in attachment 12501.3)

Attachment 12501.2-SPD - Instructions for Completing Mitigation Ratio-Setting Checklist.

These instructions contain specific numeric adjustments (discrete, e.g., +1.0, or ranges, e.g., +0.25 to +4.0) that were determined by the PDT after assessing a variety of impact-mitigation scenarios and determining adjustments for each step that, in combination with other step adjustments, produce a reasonable range of final mitigation ratios. For steps where a range of adjustments is provided, PMs are directed to the attached examples for additional guidance. PMs **must** enter a separate justification for each adjustment within the checklist. PMs may deviate from the guidance provided herein if such deviations can be documented in the checklist with sufficient justification.

1	Date:6/13/2021 Corps file no.: _____ Project Manager: _____ Impact site name: Reach 2 (Drainages 2-1-26) ORM impact resource type: _river/stream Hydrology: __ephemeral Cowardin or HGM type: Riverine Impact area (acres): 0.41 Impact distance (linear feet): 2319 For impact site name, multiple discrete (as entered in ORM) impacts are to be evaluated using multiple checklists; however, multiple impacts to one habitat type (Cowardin or HGM) could be lumped together to determine a mitigation ratio using one checklist. For each proposed impact to waters of the U.S., the project manager (PM) should consider each factor and, if applicable, document consideration in response column(s) using applicable procedures or guidelines. For mitigation proposals with multiple mitigation sites and/or types, see QMS procedure 12501 (section 7.3).			
		Column A: Mitigation site name: Floodway Mitigation type: Preservation Resource type: River/stream Cowardin/HGM type: Riverine Hydrology: Ephemeral	Column B (optional): Mitigation site name: _____ Mitigation type: _____ Resource type: _____ Cowardin/HGM type: _____ Hydrology: _____	Column C (optional): Mitigation site name: _____ Mitigation type: _____ Resource type: _____ Cowardin/HGM type: _____ Hydrology: _____
2	**QUALITATIVE impact-mitigation comparison**: Has a Corps-approved functional/condition assessment been obtained? If not, complete step 2; otherwise, complete step 3. Yes ☒ No ☐ Optional: use Table 1 (below). Qualitative assessment of functional loss at the impact site versus expected functional gain at the mitigation site may warrant a lower or higher mitigation ratio. Adjustments for	Note: steps 2 and 3 are mutually exclusive. If step 2 is used, then complete the rest of the checklist (steps 4-10). Starting ratio: 1:1 Ratio adjustment: -1 Baseline ratio: 1:2 PM justification: Functional gain would be more than the expected functional loss (see attached table).	Starting ratio: 1:1 Ratio adjustment: ___ Baseline ratio: __:__ PM justification:	Starting ratio: 1:1 Ratio adjustment: ___ Baseline ratio: __:__ PM justification:

	preservation-only mitigation, which provides no functional gain, should generally fall towards the high end of the range (towards 3-4). Preservation-only of non-aquatic habitats (upland buffer) may warrant adjustments higher than 4. Using the list of functions below, compare impact (functional loss) and proposed mitigation (functional gain) at impact (I) and mitigation (M) sites. If, for most functions, I < M, then use a single adjustment less than 0 and equal or greater than -2.0; if I = M, then use adjustment of 0; or if I > M, then use adjustment greater than 0 and less than or equal to 4. Add adjustment to starting ratio of 1:1 to obtain baseline ratio. If adjustment is less than 0 (negative), add absolute value of adjustment to right (impact) side of starting ratio; otherwise, add to left (mitigation) side. See examples in attachment 12501.3. For a suite of potential functions from HGM (alternate lists of functions may be used), see Table 1 (below).			
3	**QUANTITATIVE impact-mitigation comparison**: Use step 3 if a Corps-approved functional/condition assessment been obtained. In general, project managers should consider requiring a functional/condition assessment and using step 3 for projects where total permanent impacts exceed 0.5 acre or 300 linear feet. Acceptable functional/condition assessment methods must be aquatic resource-based, standardized, comparable from site to site, peer-reviewed, unmodified, and approved by the applicable Corps District. If a district-approved method is not available, use step 2.	Note: steps 2 and 3 are mutually exclusive. If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Complete the rest of the checklist (steps 4-10 or steps 4 and 6-10, as appropriate). Baseline ratio from BAMI spreadsheet (attached): __:__	Baseline ratio from BAMI procedure (attached): __:__	Baseline ratio from BAMI procedure (attached): __:__

	Use Before-After-Mitigation-Impact (BAMI) spreadsheet (attachment 12501.4) (if a district-approved functional/condition method is not available, use step 2 instead). See example below. Note: In an extreme case, the BAMI procedure could result in a ratio (and overall mitigation proposal) unacceptable to the Corps. For example, providing a very large but low quality mitigation site (low functional gain resulting a in a very high ratio) may result in functional gain equaling loss numerically, but this may not be acceptable because the required compensatory mitigation must be appropriate to the scope and degree of the impacts (see 33 CFR 320.4(r)(2)).			
4	**Mitigation site location**: Mitigation located outside impacted watershed generally warrants a higher mitigation ratio. The project manager will determine the appropriate Hydrologic Unit Code (HUC) to define the term "watershed" in this context. Is mitigation located outside of the impacted watershed? If yes, +1.0, if no, +0.	Ratio adjustment: 0 PM justification: impact and mitigation would be within the same watershed	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
5	**Net loss of aquatic resource surface area**: Different types of mitigation result in varying net losses of aquatic resource area. For definitions of mitigation types, see mitigation rule at 33 CFR 332.2. Re-establishment or establishment +0, rehabilitation, enhancement, preservation +1.0 (these three mitigation types result in a net loss of aquatic resource area in cases where permanent loss of waters of the U.S. is authorized and not offset by either re-establishment or establishment).	Note: If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Ratio adjustment: +1 PM justification: Enhancement/Preservation	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
6	**Type conversion:** Out-of-kind mitigation may warrant a higher mitigation ratio. However, out-of-kind mitigation can be appropriate if the proposed mitigation habitat type serves the	Ratio adjustment: 0 PM justification: Mitigation is in-kind and on site.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:

	aquatic resource needs of the watershed/ecoregion. In considering out-of-kind mitigation, project managers should consider whether impacts or mitigation would consist of rare or regionally significant habitat types (e.g., vernal pools). Project manager will determine the relative values of different habitat types and document herein. Justification for the use of out-of-kind mitigation must be documented herein. Would mitigation result in: (A) conversion from a highly valuable and/or rare habitat type to a common type? Or (B) vice versa? Magnitude of adjustment should vary with value of habitats involved. Calculate ratio adjustment based on answers to questions (A) and (B): Y,N: +0.25 to +4.0; N,Y: -0.25 to -4.0; N,N: +0.			
7	**Risk and uncertainty:** Mitigation ratios should reflect the inherent uncertainty of mitigation. Factors to consider include: 1) permittee-responsible mitigation; 2) mitigation site did not formerly support targeted aquatic resources; 3) difficult-to-replace resources (see 33 CFR 332.3(e)(3) and (f)(2)); 4) modified hydrology (e.g., high-flow bypass); 5) artificial hydrology (e.g., pumped water source); 6) structures requiring long-term maintenance (e.g., outfalls, drop structures, weirs, bank stabilization structures); 7) planned vegetation maintenance (e.g., mowing, landclearing, fuel modification activities); 8) e.g., shallow, buried structures (riprap, clay liners), and 9) absence of long-term preservation mechanism. Note: this list is not all-inclusive. Each factor can range from +0.1 to +0.3 depending on the level of anticipated risk and the amount of maintenance or management required to sustain the compensatory mitigation project. Sum factor adjustments (+0 if no factors). Generally, uncertainty in banks and in	Ratio adjustment: 0 PM justification: Preservation of existing features within same watershed. Risk and uncertainty factors are minimal because minimal maintenance of mitigation is required and the CVMSHCP provides a framework for long-term management of the mitigation area.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:

	lieu fee programs is accounted for in the credit release process.			
8	**Temporal loss**: Constructed habitats take time to mature and replace aquatic functions; this typically warrants a higher mitigation ratio in cases where a delay is planned between impacts and full replacement of functions. Project manager should estimate the time between when the authorized impacts occur and constructed mitigation is expected to replace lost functions, including the monitoring period. In cases where all performance standards are expected to be achieved prior to impacts, no temporal loss should be assessed (for permittee-responsible only). Similarly, in cases where interim performance standards are expected to be achieved, a lower ratio adjustment may be appropriate. Unexpected delays in compensatory mitigation project implementation should be handled as compliance actions. a. For scheduled, known delays between impacts and construction of mitigation: multiply delay (in months) by 0.05; b. To account for time required for full replacement of functions during monitoring period: generally, if mitigation is comprised of trees/woodlands or saltmarsh, +3; if shrubs, +2; if herbaceous, +1; c. Add adjustments from steps (a) and (b).	Ratio adjustment: 0 PM justification: No planned delay, impact and mitigation would occur simultaneously.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
9	**Final mitigation ratio(s):** Project manager should enter the final mitigation ratio(s) arrived at after consideration of the above factors (either qualitative OR quantitative). Project manager should enter the extent of authorized impacts and required mitigation by area (acreage) and/or distance (linear feet), as well as the corresponding resource type (lake, non-tidal wetland, other, pond, stream/river/ocean, tidal	Column A: 1. Baseline ratio from step 2 or 3 = 1:2 2. Total adjustments = +1 3. Final ratio: 1: 1 Proposed impact (total): 0.41 acre ___ linear feet to	Column B: 1. Baseline ratio from step 2 or 3 = __:__ 2. Total adjustments = ___ 3. Final ratio: __ : __ Remaining impact: _____ Required mitigation: ___ acre	Column C: 1. Baseline ratio from step 2 or 3 = __:__ 2. Total adjustments = ___ 3. Final ratio: __ : __ Remaining impact: _____ Required mitigation: ___ acre

	wetland) and Cowardin or Hydrogeomorphic Method (HGM) classification type. To obtain the final mitigation ratio*: a. Take baseline ratio from step 2 or 3; b. Add ratio adjustments from steps 4-8; c. If total of adjustments is greater than 0 (positive), add total to left (mitigation) side of baseline ratio; d. If total of adjustments is less than 0 (negative), add ABS of total to right (impact) side of baseline ratio; Note 1: minimum ratio = 1:1 if step 2 used. If step 3 used, final ratio can be less than 1:1 assuming completed functional/condition assessment, in combination with other steps, justifies a ratio less than 1:1 (i.e., total of adjustments is negative). Note 2: Final ratio in each column should be as calculated. If desired, express ratio equal to X:1 (traditional format: for example, 1:4 = 0.25:1), but ONLY in step 9's PM comments and in step 10.	Resource type: river/stream Cowardin or HGM: Riverine Hydrology: ephemeral Required mitigation: 0.41 acre ___ linear feet of Mitigation type: enhancement/ preservation Resource type: same Cowardin or HGM: same Hydrology: same Additional PM comments:	___ linear feet of Mitigation type: _____ Resource type: _____ Cowardin or HGM: _____ Hydrology: _____ Additional PM comments:	___ linear feet of Mitigation type: _____ Resource type: _____ Cowardin or HGM: _____ Hydrology: _____ Additional PM comments:
10	**Final compensatory mitigation requirements:** Summarize the checklist results, combining all required mitigation for this impact site.	PM summary: The final compensatory mitigation requirement for this impact site is the purchase of the floodway for the preservation of 0.41 acres of ephemeral stream habitat (1:1 ratio).		

*In the final determination of required mitigation, direct and indirect impacts should be considered:

a. Indirect impacts: Compensatory mitigation may be required to offset predictable indirect impacts. The PM should document any indirect impacts caused by the proposed/authorized activity.

b. Cumulative impacts: In some cases, cumulative impacts should be considered when determining if compensatory mitigation should be required. The extent of cumulative impacts should be documented using available information, such as analyses or data associated with a Special Area Management Plan (SAMP), Watershed Management Plan, land use/land cover scenario assessment, hydrologic modeling, etc. The information used should be fully cited herein and in the decision document. The assessment must focus on the proposed action's direct and indirect impacts (i.e., incremental impact of the proposed activity) in the context of the cumulative effects caused by past, present, and reasonably foreseeable actions, to reduce the proposed activity's contribution to cumulative effects in the region.

Step 2

Table 1 for step 2. Qualitative comparison of functions (functional loss vs. gain):

Function	Impact site	Mitigation site
Short- or long-term surface water storage	Small loss	Small gain
Subsurface water storage	No loss	No gain
Moderation of groundwater flow or discharge	Small loss	Small gain
Dissipation of energy	No loss	No gain
Cycling of nutrients	Small loss	Small gain
Removal of elements and compounds	No loss	No gain
Retention of particulates	Small loss	Small gain
Export of organic carbon	No loss	No gain
Maintenance of plant and animal communities	Small loss	Large gain
	Step 2 adjustment:	-1

Step 2 Table 1 instructions:

1. Describe amount of functional loss (impact) and gain (mitigation) in each respective column. Gain and loss can be described in text (for example, small loss, moderate loss, large loss, no loss, etc.) or symbolically (for example, +, ++, +++, 0, ---, --, -).
2. Note: alternate lists of functions may be used.
3. Note: a single adjustment should be used to account for all functions combined (see example 7 in attachment 12501.3)

Attachment 12501.2-SPD - Instructions for Completing Mitigation Ratio-Setting Checklist.

These instructions contain specific numeric adjustments (discrete, e.g., +1.0, or ranges, e.g., +0.25 to +4.0) that were determined by the PDT after assessing a variety of impact-mitigation scenarios and determining adjustments for each step that, in combination with other step adjustments, produce a reasonable range of final mitigation ratios. For steps where a range of adjustments is provided, PMs are directed to the attached examples for additional guidance. PMs **must** enter a separate justification for each adjustment within the checklist. PMs may deviate from the guidance provided herein if such deviations can be documented in the checklist with sufficient justification.

1	Date: 6/13/2021 Corps file no.: _____ Project Manager: _____ Impact site name: Reach 3 (Drainages 3-1 to 3-11) ORM impact resource type: River/stream Hydrology: Ephemeral Cowardin or HGM type: Riverine Impact area (acres): 4.97 Impact distance (linear feet): 2355 For impact site name, multiple discrete (as entered in ORM) impacts are to be evaluated using multiple checklists; however, multiple impacts to one habitat type (Cowardin or HGM) could be lumped together to determine a mitigation ratio using one checklist. For each proposed impact to waters of the U.S., the project manager (PM) should consider each factor and, if applicable, document consideration in response column(s) using applicable procedures or guidelines. For mitigation proposals with multiple mitigation sites and/or types, see QMS procedure 12501 (section 7.3).			
		Column A: Mitigation site name: Floodway Mitigation type: Preservation Resource type: River/stream Cowardin/HGM type: Riverine Hydrology: Ephemeral	Column B (optional): Mitigation site name: _____ Mitigation type: _____ Resource type: _____ Cowardin/HGM type: _____ Hydrology: _____	Column C (optional): Mitigation site name: _____ Mitigation type: _____ Resource type: _____ Cowardin/HGM type: _____ Hydrology: _____
2	**QUALITATIVE impact-mitigation comparison**: Has a Corps-approved functional/condition assessment been obtained? If not, complete step 2; otherwise, complete step 3. Yes ☐ No ☐ Optional: use Table 1 (below). Qualitative assessment of functional loss at the impact site versus expected functional gain at the mitigation site may warrant a lower or higher mitigation ratio. Adjustments for	Note: steps 2 and 3 are mutually exclusive. If step 2 is used, then complete the rest of the checklist (steps 4-10). Starting ratio: 1:1 Ratio adjustment: -2 Baseline ratio: 1:3 PM justification: Functional gain would be more than the expected functional loss (see attached table).	Starting ratio: 1:1 Ratio adjustment: ___ Baseline ratio: __:__ PM justification:	Starting ratio: 1:1 Ratio adjustment: ___ Baseline ratio: __:__ PM justification:

	preservation-only mitigation, which provides no functional gain, should generally fall towards the high end of the range (towards 3-4). Preservation-only of non-aquatic habitats (upland buffer) may warrant adjustments higher than 4. Using the list of functions below, compare impact (functional loss) and proposed mitigation (functional gain) at impact (I) and mitigation (M) sites. If, for most functions, I < M, then use a single adjustment less than 0 and equal or greater than -2.0; if I = M, then use adjustment of 0; or if I > M, then use adjustment greater than 0 and less than or equal to 4. Add adjustment to starting ratio of 1:1 to obtain baseline ratio. If adjustment is less than 0 (negative), add absolute value of adjustment to right (impact) side of starting ratio; otherwise, add to left (mitigation) side. See examples in attachment 12501.3. For a suite of potential functions from HGM (alternate lists of functions may be used), see Table 1 (below).			
3	**QUANTITATIVE impact-mitigation comparison**: Use step 3 if a Corps-approved functional/condition assessment been obtained. In general, project managers should consider requiring a functional/condition assessment and using step 3 for projects where total permanent impacts exceed 0.5 acre or 300 linear feet. Acceptable functional/condition assessment methods must be aquatic resource-based, standardized, comparable from site to site, peer-reviewed, unmodified, and approved by the applicable Corps District. If a district-approved method is not available, use step 2.	Note: steps 2 and 3 are mutually exclusive. If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Complete the rest of the checklist (steps 4-10 or steps 4 and 6-10, as appropriate). Baseline ratio from BAMI spreadsheet (attached): __:__	Baseline ratio from BAMI procedure (attached): __:__	Baseline ratio from BAMI procedure (attached): __:__

	Use Before-After-Mitigation-Impact (BAMI) spreadsheet (attachment 12501.4) (if a district-approved functional/condition method is not available, use step 2 instead). See example below. Note: In an extreme case, the BAMI procedure could result in a ratio (and overall mitigation proposal) unacceptable to the Corps. For example, providing a very large but low quality mitigation site (low functional gain resulting a in a very high ratio) may result in functional gain equaling loss numerically, but this may not be acceptable because the required compensatory mitigation must be appropriate to the scope and degree of the impacts (see 33 CFR 320.4(r)(2)).			
4	**Mitigation site location**: Mitigation located outside impacted watershed generally warrants a higher mitigation ratio. The project manager will determine the appropriate Hydrologic Unit Code (HUC) to define the term "watershed" in this context. Is mitigation located outside of the impacted watershed? If yes, +1.0, if no, +0.	Ratio adjustment: 0 PM justification: Impact and mitigation would be within the same watershed.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
5	**Net loss of aquatic resource surface area**: Different types of mitigation result in varying net losses of aquatic resource area. For definitions of mitigation types, see mitigation rule at 33 CFR 332.2. Re-establishment or establishment +0, rehabilitation, enhancement, preservation +1.0 (these three mitigation types result in a net loss of aquatic resource area in cases where permanent loss of waters of the U.S. is authorized and not offset by either re-establishment or establishment).	Note: If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Ratio adjustment: +1 PM justification: Enhancement/Preservation	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
6	**Type conversion:** Out-of-kind mitigation may warrant a higher mitigation ratio. However, out-of-kind mitigation can be appropriate if the proposed mitigation habitat type serves the	Ratio adjustment: 0 PM justification: Mitigation is in-kind.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:

	aquatic resource needs of the watershed/ecoregion. In considering out-of-kind mitigation, project managers should consider whether impacts or mitigation would consist of rare or regionally significant habitat types (e.g., vernal pools). Project manager will determine the relative values of different habitat types and document herein. Justification for the use of out-of-kind mitigation must be documented herein. Would mitigation result in: (A) conversion from a highly valuable and/or rare habitat type to a common type? Or (B) vice versa? Magnitude of adjustment should vary with value of habitats involved. Calculate ratio adjustment based on answers to questions (A) and (B): Y,N: +0.25 to +4.0; N,Y: -0.25 to -4.0; N,N: +0.			
7	**Risk and uncertainty:** Mitigation ratios should reflect the inherent uncertainty of mitigation. Factors to consider include: 1) permittee-responsible mitigation; 2) mitigation site did not formerly support targeted aquatic resources; 3) difficult-to-replace resources (see 33 CFR 332.3(e)(3) and (f)(2)); 4) modified hydrology (e.g., high-flow bypass); 5) artificial hydrology (e.g., pumped water source); 6) structures requiring long-term maintenance (e.g., outfalls, drop structures, weirs, bank stabilization structures); 7) planned vegetation maintenance (e.g., mowing, landclearing, fuel modification activities); 8) e.g., shallow, buried structures (riprap, clay liners), and 9) absence of long-term preservation mechanism. Note: this list is not all-inclusive. Each factor can range from +0.1 to +0.3 depending on the level of anticipated risk and the amount of maintenance or management required to sustain the compensatory mitigation project. Sum factor adjustments (+0 if no factors). Generally, uncertainty in banks and in	Ratio adjustment: 0 PM justification: Preservation of existing features within same watershed. Risk and uncertainty factors are minimal because minimal maintenance of mitigation is required and the CVMSHCP provides a framework for long-term management of the mitigation area.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:

	lieu fee programs is accounted for in the credit release process.			
8	**Temporal loss**: Constructed habitats take time to mature and replace aquatic functions; this typically warrants a higher mitigation ratio in cases where a delay is planned between impacts and full replacement of functions. Project manager should estimate the time between when the authorized impacts occur and constructed mitigation is expected to replace lost functions, including the monitoring period. In cases where all performance standards are expected to be achieved prior to impacts, no temporal loss should be assessed (for permittee-responsible only). Similarly, in cases where interim performance standards are expected to be achieved, a lower ratio adjustment may be appropriate. Unexpected delays in compensatory mitigation project implementation should be handled as compliance actions. a. For scheduled, known delays between impacts and construction of mitigation: multiply delay (in months) by 0.05; b. To account for time required for full replacement of functions during monitoring period: generally, if mitigation is comprised of trees/woodlands or saltmarsh, +3; if shrubs, +2; if herbaceous, +1; c. Add adjustments from steps (a) and (b).	Ratio adjustment: 0 PM justification: No planned delay, impact and mitigation would occur simultaneously.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
9	**Final mitigation ratio(s):** Project manager should enter the final mitigation ratio(s) arrived at after consideration of the above factors (either qualitative OR quantitative). Project manager should enter the extent of authorized impacts and required mitigation by area (acreage) and/or distance (linear feet), as well as the corresponding resource type (lake, non-tidal wetland, other, pond, stream/river/ocean, tidal	Column A: 1. Baseline ratio from step 2 or 3 = 1:3 2. Total adjustments =+1 3. Final ratio: 1: 1 Proposed impact (total): 4.97 acre ___ linear feet to	Column B: 1. Baseline ratio from step 2 or 3 = __:__ 2. Total adjustments = ___ 3. Final ratio: __ : __ Remaining impact: _____ Required mitigation: ___ acre	Column C: 1. Baseline ratio from step 2 or 3 = __:__ 2. Total adjustments = ___ 3. Final ratio: __ : __ Remaining impact: _____ Required mitigation: ___ acre

	wetland) and Cowardin or Hydrogeomorphic Method (HGM) classification type. To obtain the final mitigation ratio*: a. Take baseline ratio from step 2 or 3; b. Add ratio adjustments from steps 4-8; c. If total of adjustments is greater than 0 (positive), add total to left (mitigation) side of baseline ratio; d. If total of adjustments is less than 0 (negative), add ABS of total to right (impact) side of baseline ratio; Note 1: minimum ratio = 1:1 if step 2 used. If step 3 used, final ratio can be less than 1:1 assuming completed functional/condition assessment, in combination with other steps, justifies a ratio less than 1:1 (i.e., total of adjustments is negative). Note 2: Final ratio in each column should be as calculated. If desired, express ratio equal to X:1 (traditional format: for example, 1:4 = 0.25:1), but ONLY in step 9's PM comments and in step 10.	Resource type: River/stream Cowardin or HGM:Riverine Hydrology: Ephemeral Required mitigation: 4.97 acre ___ linear feet Of Mitigation type: Preservation Resource type: Same Cowardin or HGM: Same Hydrology: Same Additional PM comments: *Calculated ratio is 2:3 (or 1:1.5), but without functional assessment, 1:1 is min ratio allowed under 2008 mitigation rule.	___ linear feet of Mitigation type: _____ Resource type: _____ Cowardin or HGM: _____ Hydrology: _____ Additional PM comments:	___ linear feet of Mitigation type: _____ Resource type: _____ Cowardin or HGM: _____ Hydrology: _____ Additional PM comments:
10	**Final compensatory mitigation requirements:** Summarize the checklist results, combining all required mitigation for this impact site.	PM summary: The final compensatory mitigation requirement for this impact site is the purchase of the floodway for the preservation of 4.97 acres of ephemeral stream habitat (1:1 ratio).		

*In the final determination of required mitigation, direct and indirect impacts should be considered:

a. Indirect impacts: Compensatory mitigation may be required to offset predictable indirect impacts. The PM should document any indirect impacts caused by the proposed/authorized activity.

b. Cumulative impacts: In some cases, cumulative impacts should be considered when determining if compensatory mitigation should be required. The extent of cumulative impacts should be documented using available information, such as analyses or data associated with a Special Area Management Plan (SAMP), Watershed Management Plan, land use/land cover scenario assessment, hydrologic modeling, etc. The information used should be fully cited herein and in the decision document. The assessment must focus on the proposed action's direct and indirect impacts (i.e., incremental impact of the proposed activity) in the context of the cumulative effects caused by past, present, and reasonably foreseeable actions, to reduce the proposed activity's contribution to cumulative effects in the region.

Step 2

Table 1 for step 2. Qualitative comparison of functions (functional loss vs. gain):

Function	Impact site	Mitigation site
Short- or long-term surface water storage	Small loss	Large gain
Subsurface water storage	No loss	No gain
Moderation of groundwater flow or discharge	Small loss	Large gain
Dissipation of energy	No loss	No gain
Cycling of nutrients	Small loss	Small gain
Removal of elements and compounds	No loss	No gain
Retention of particulates	Small loss	Large gain
Export of organic carbon	No loss	No gain
Maintenance of plant and animal communities	Small loss	Large gain
Step 2 adjustment:		-2

Step 2 Table 1 instructions:

1. Describe amount of functional loss (impact) and gain (mitigation) in each respective column. Gain and loss can be described in text (for example, small loss, moderate loss, large loss, no loss, etc.) or symbolically (for example, +, ++, +++, 0, ---, --, -).
2. Note: alternate lists of functions may be used.
3. Note: a single adjustment should be used to account for all functions combined (see example 7 in attachment 12501.3)

Attachment 12501.2-SPD - Instructions for Completing Mitigation Ratio-Setting Checklist.

These instructions contain specific numeric adjustments (discrete, e.g., +1.0, or ranges, e.g., +0.25 to +4.0) that were determined by the PDT after assessing a variety of impact-mitigation scenarios and determining adjustments for each step that, in combination with other step adjustments, produce a reasonable range of final mitigation ratios. For steps where a range of adjustments is provided, PMs are directed to the attached examples for additional guidance. PMs **must** enter a separate justification for each adjustment within the checklist. PMs may deviate from the guidance provided herein if such deviations can be documented in the checklist with sufficient justification.

<table>
<tr><td>1</td><td colspan="4">Date: 6/13/2021 Corps file no.: _____ Project Manager: _____

Impact site name: Reach 4 (Drainages 41 to 4-10) ORM impact resource type: River/stream Hydrology: Ephemeral
Cowardin or HGM type: Riverine Impact area (acres): 3.01 Impact distance (linear feet): 2446

For impact site name, multiple discrete (as entered in ORM) impacts are to be evaluated using multiple checklists; however, multiple impacts to one habitat type (Cowardin or HGM) could be lumped together to determine a mitigation ratio using one checklist. For each proposed impact to waters of the U.S., the project manager (PM) should consider each factor and, if applicable, document consideration in response column(s) using applicable procedures or guidelines. For mitigation proposals with multiple mitigation sites and/or types, see QMS procedure 12501 (section 7.3).</td></tr>
<tr><td></td><td></td><td>Column A:
Mitigation site name: Floodway
Mitigation type: Preservation
Resource type: River/stream
Cowardin/HGM type: Riverine
Hydrology: Ephemeral</td><td>Column B (optional):
Mitigation site name: _____
Mitigation type: _____
Resource type: _____
Cowardin/HGM type: _____
Hydrology: _____</td><td>Column C (optional):
Mitigation site name: _____
Mitigation type: _____
Resource type: _____
Cowardin/HGM type: _____
Hydrology: _____</td></tr>
<tr><td>2</td><td>QUALITATIVE impact-mitigation comparison:

Has a Corps-approved functional/condition assessment been obtained? If not, complete step 2; otherwise, complete step 3.
Yes ☒ No ☐

Optional: use Table 1 (below).

Qualitative assessment of functional loss at the impact site versus expected functional gain at the mitigation site may warrant a lower or higher mitigation ratio. Adjustments for</td><td>Note: steps 2 and 3 are mutually exclusive. If step 2 is used, then complete the rest of the checklist (steps 4-10).

Starting ratio: 1:1
Ratio adjustment: -2
Baseline ratio: 1:3
PM justification: Functional gain would be more than the expected functional loss (see attached table).</td><td>Starting ratio: 1:1
Ratio adjustment: ___
Baseline ratio: __:__
PM justification:</td><td>Starting ratio: 1:1
Ratio adjustment: ___
Baseline ratio: __:__
PM justification:</td></tr>
</table>

	preservation-only mitigation, which provides no functional gain, should generally fall towards the high end of the range (towards 3-4). Preservation-only of non-aquatic habitats (upland buffer) may warrant adjustments higher than 4. Using the list of functions below, compare impact (functional loss) and proposed mitigation (functional gain) at impact (I) and mitigation (M) sites. If, for most functions, I < M, then use a single adjustment less than 0 and equal or greater than -2.0; if I = M, then use adjustment of 0; or if I > M, then use adjustment greater than 0 and less than or equal to 4. Add adjustment to starting ratio of 1:1 to obtain baseline ratio. If adjustment is less than 0 (negative), add absolute value of adjustment to right (impact) side of starting ratio; otherwise, add to left (mitigation) side. See examples in attachment 12501.3. For a suite of potential functions from HGM (alternate lists of functions may be used), see Table 1 (below).			
3	**QUANTITATIVE impact-mitigation comparison**: Use step 3 if a Corps-approved functional/condition assessment been obtained. In general, project managers should consider requiring a functional/condition assessment and using step 3 for projects where total permanent impacts exceed 0.5 acre or 300 linear feet. Acceptable functional/condition assessment methods must be aquatic resource-based, standardized, comparable from site to site, peer-reviewed, unmodified, and approved by the applicable Corps District. If a district-approved method is not available, use step 2.	Note: steps 2 and 3 are mutually exclusive. If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Complete the rest of the checklist (steps 4-10 or steps 4 and 6-10, as appropriate). Baseline ratio from BAMI spreadsheet (attached): __:__	Baseline ratio from BAMI procedure (attached): __:__	Baseline ratio from BAMI procedure (attached): __:__

	Use Before-After-Mitigation-Impact (BAMI) spreadsheet (attachment 12501.4) (if a district-approved functional/condition method is not available, use step 2 instead). See example below. Note: In an extreme case, the BAMI procedure could result in a ratio (and overall mitigation proposal) unacceptable to the Corps. For example, providing a very large but low quality mitigation site (low functional gain resulting a in a very high ratio) may result in functional gain equaling loss numerically, but this may not be acceptable because the required compensatory mitigation must be appropriate to the scope and degree of the impacts (see 33 CFR 320.4(r)(2)).			
4	**Mitigation site location**: Mitigation located outside impacted watershed generally warrants a higher mitigation ratio. The project manager will determine the appropriate Hydrologic Unit Code (HUC) to define the term "watershed" in this context. Is mitigation located outside of the impacted watershed? If yes, +1.0, if no, +0.	Ratio adjustment: 0 PM justification: Impact and mitigation would be within the same watershed.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
5	**Net loss of aquatic resource surface area**: Different types of mitigation result in varying net losses of aquatic resource area. For definitions of mitigation types, see mitigation rule at 33 CFR 332.2. Re-establishment or establishment +0, rehabilitation, enhancement, preservation +1.0 (these three mitigation types result in a net loss of aquatic resource area in cases where permanent loss of waters of the U.S. is authorized and not offset by either re-establishment or establishment).	Note: If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Ratio adjustment: +1 PM justification: Enhancement/Preservation	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
6	**Type conversion:** Out-of-kind mitigation may warrant a higher mitigation ratio. However, out-of-kind mitigation can be appropriate if the proposed mitigation habitat type serves the	Ratio adjustment: 0 PM justification: Mitigation is in-kind.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:

	aquatic resource needs of the watershed/ecoregion. In considering out-of-kind mitigation, project managers should consider whether impacts or mitigation would consist of rare or regionally significant habitat types (e.g., vernal pools). Project manager will determine the relative values of different habitat types and document herein. Justification for the use of out-of-kind mitigation must be documented herein. Would mitigation result in: (A) conversion from a highly valuable and/or rare habitat type to a common type? Or (B) vice versa? Magnitude of adjustment should vary with value of habitats involved. Calculate ratio adjustment based on answers to questions (A) and (B): Y,N: +0.25 to +4.0; N,Y: -0.25 to -4.0; N,N: +0.			
7	**Risk and uncertainty:** Mitigation ratios should reflect the inherent uncertainty of mitigation. Factors to consider include: 1) permittee-responsible mitigation; 2) mitigation site did not formerly support targeted aquatic resources; 3) difficult-to-replace resources (see 33 CFR 332.3(e)(3) and (f)(2)); 4) modified hydrology (e.g., high-flow bypass); 5) artificial hydrology (e.g., pumped water source); 6) structures requiring long-term maintenance (e.g., outfalls, drop structures, weirs, bank stabilization structures); 7) planned vegetation maintenance (e.g., mowing, landclearing, fuel modification activities); 8) e.g., shallow, buried structures (riprap, clay liners), and 9) absence of long-term preservation mechanism. Note: this list is not all-inclusive. Each factor can range from +0.1 to +0.3 depending on the level of anticipated risk and the amount of maintenance or management required to sustain the compensatory mitigation project. Sum factor adjustments (+0 if no factors). Generally, uncertainty in banks and in	Ratio adjustment: 0 PM justification: Preservation of existing features are within same watershed. Risk and uncertainty factors are minimal because minimal maintenance of mitigation is required and the CVMSHCP provides a framework for long-term management of the mitigation area.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:

	lieu fee programs is accounted for in the credit release process.			
8	**Temporal loss**: Constructed habitats take time to mature and replace aquatic functions; this typically warrants a higher mitigation ratio in cases where a delay is planned between impacts and full replacement of functions. Project manager should estimate the time between when the authorized impacts occur and constructed mitigation is expected to replace lost functions, including the monitoring period. In cases where all performance standards are expected to be achieved prior to impacts, no temporal loss should be assessed (for permittee-responsible only). Similarly, in cases where interim performance standards are expected to be achieved, a lower ratio adjustment may be appropriate. Unexpected delays in compensatory mitigation project implementation should be handled as compliance actions. a. For scheduled, known delays between impacts and construction of mitigation: multiply delay (in months) by 0.05; b. To account for time required for full replacement of functions during monitoring period: generally, if mitigation is comprised of trees/woodlands or saltmarsh, +3; if shrubs, +2; if herbaceous, +1; c. Add adjustments from steps (a) and (b).	Ratio adjustment: 0 PM justification: No planned delay, impact and mitigation would occur simultaneously.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
9	**Final mitigation ratio(s):** Project manager should enter the final mitigation ratio(s) arrived at after consideration of the above factors (either qualitative OR quantitative). Project manager should enter the extent of authorized impacts and required mitigation by area (acreage) and/or distance (linear feet), as well as the corresponding resource type (lake, non-tidal wetland, other, pond, stream/river/ocean, tidal	Column A: 1. Baseline ratio from step 2 or 3 = 1:3 2. Total adjustments = +1 3. Final ratio: 1:1 Proposed impact (total): 3.01 acres ___ linear feet to	Column B: 1. Baseline ratio from step 2 or 3 = __:__ 2. Total adjustments = ___ 3. Final ratio: __ : __ Remaining impact: _____ Required mitigation: ___ acre	Column C: 1. Baseline ratio from step 2 or 3 = __:__ 2. Total adjustments = ___ 3. Final ratio: __ : __ Remaining impact: _____ Required mitigation: ___ acre

	wetland) and Cowardin or Hydrogeomorphic Method (HGM) classification type. To obtain the final mitigation ratio*: a. Take baseline ratio from step 2 or 3; b. Add ratio adjustments from steps 4-8; c. If total of adjustments is greater than 0 (positive), add total to left (mitigation) side of baseline ratio; d. If total of adjustments is less than 0 (negative), add ABS of total to right (impact) side of baseline ratio; Note 1: minimum ratio = 1:1 if step 2 used. If step 3 used, final ratio can be less than 1:1 assuming completed functional/condition assessment, in combination with other steps, justifies a ratio less than 1:1 (i.e., total of adjustments is negative). Note 2: Final ratio in each column should be as calculated. If desired, express ratio equal to X:1 (traditional format: for example, 1:4 = 0.25:1), but ONLY in step 9's PM comments and in step 10.	Resource type: River/stream Cowardin or HGM: ____ Hydrology: Ephemeral Required mitigation: 3.01acres ___ linear feet of Mitigation type: Enhancement/ Preservation Resource type: Same Cowardin or HGM: Same Hydrology: Same Additional PM comments: *Calculated ratio is 2:3 (or 0.66:1), but without functional assessment, 1:1 is min ratio allowed under 2008 mitigation rule.	___ linear feet of Mitigation type: _____ Resource type: _____ Cowardin or HGM: _____ Hydrology: _____ Additional PM comments:	___ linear feet of Mitigation type: _____ Resource type: _____ Cowardin or HGM: _____ Hydrology: _____ Additional PM comments:
10	**Final compensatory mitigation requirements:** Summarize the checklist results, combining all required mitigation for this impact site.	PM summary: The final compensatory mitigation requirement for this impact site is the purchase of the floodway for the preservation of 3.01 acres of ephemeral stream habitat (1:1 ratio).		

*In the final determination of required mitigation, direct and indirect impacts should be considered:

a. Indirect impacts: Compensatory mitigation may be required to offset predictable indirect impacts. The PM should document any indirect impacts caused by the proposed/authorized activity.

b. Cumulative impacts: In some cases, cumulative impacts should be considered when determining if compensatory mitigation should be required. The extent of cumulative impacts should be documented using available information, such as analyses or data associated with a Special Area Management Plan (SAMP), Watershed Management Plan, land use/land cover scenario assessment, hydrologic modeling, etc. The information used should be fully cited herein and in the decision document. The assessment must focus on the proposed action's direct and indirect impacts (i.e., incremental impact of the proposed activity) in the context of the cumulative effects caused by past, present, and reasonably foreseeable actions, to reduce the proposed activity's contribution to cumulative effects in the region.

Step 2

Table 1 for step 2. Qualitative comparison of functions (functional loss vs. gain):

Function	Impact site	Mitigation site
Short- or long-term surface water storage	Small loss	Large gain
Subsurface water storage	No loss	No gain
Moderation of groundwater flow or discharge	Small loss	Large gain
Dissipation of energy	No loss	No gain
Cycling of nutrients	Small loss	Large gain
Removal of elements and compounds	No loss	No gain
Retention of particulates	Small loss	Large gain
Export of organic carbon	No loss	No gain
Maintenance of plant and animal communities	Small loss	Large gain
Step 2 adjustment:		-2

Step 2 Table 1 instructions:

1. Describe amount of functional loss (impact) and gain (mitigation) in each respective column. Gain and loss can be described in text (for example, small loss, moderate loss, large loss, no loss, etc.) or symbolically (for example, +, ++, +++, 0, ---, --, -).
2. Note: alternate lists of functions may be used.
3. Note: a single adjustment should be used to account for all functions combined (see example 7 in attachment 12501.3)