Appendix B

404(b)(1) Guidelines Analysis

SECTION 404(b)(1)ALTERNATIVES ANALYSIS

LOOP 202 SOUTH MOUNTAIN FREEWAY PROJECT

SPL-2002-00055

Table of Contents

1. Introduction

The Arizona Department of Transportation (ADOT), in coordination with the Federal Highway Administration (FHWA), is proposing to construct the South Mountain Freeway (SMF), State Route Loop 202 (SR202L) in the southwestern portion of the Phoenix metropolitan area. The approximately 22-mile-long freeway will be constructed as an eight-lane divided, access-controlled facility, with four travel lanes in each direction. The freeway would connect Interstate 10 (Maricopa Freeway) to Interstate 10 (Papago Freeway) and complete the SR202L system. The SMF, originally proposed in 1985, is being delivered using a public-private-partnership (P3) Design-Build-Maintain (DBM) approach. The project would be funded using state, federal and local dollars, and the DBM mechanism includes the involvement of a private group (Connect 202 Partners [C202P]) in the final design, construction, and maintenance of the freeway for 30-years.

Figure 1. Approximate Route of the South Mountain Freeway. Source: http://www.phoenixnewtimes.com/news/adot-releases-flyover-video-south-mountain-freeway-9169168

ADOT and FHWA prepared a Final Environmental Impact Statement (FEIS) for the project, which was released to the public on September 26, 2014. The U.S. Army Corps of Engineers (Corps) participated in development of the FEIS as a cooperating agency and provided information and comments specific to its expertise and authority. ADOT and FHWA issued their Record of Decision (ROD) in March 2015, selecting a build alternative for the project. This 404(b)(1) analysis considers the impacts to the aquatic environment resulting from design variations of the selected alternative as well as other alternatives that were considered in the FEIS.

1.1. Section 404(b)(1) Regulatory Background

The purpose of the Guidelines developed by the U.S. Environmental Protection Agency (EPA) pursuant to Section 404(b)(1) of the Clean Water Act (CWA) is to restore and maintain the chemical, physical, and biological integrity of waters of the United States (WUS) through the control of discharges of dredged and fill material. 40 Code of Federal Regulations (CFR) § 230.1(a). Fundamental to these Section 404(b)(1) Guidelines is the precept that dredged or fill material should not be discharged into the aquatic ecosystem, unless it can be demonstrated that such a discharge will not have an unacceptable adverse impact either individually or in combination with known and/or probable impacts of other activities affecting the ecosystems of concern. 40 CFR § 230.1(c).

Section 404 of the CWA authorizes the Corps to issue permits for the discharge of dredged or fill materials into WUS, including wetlands, defined at 33 CFR Part 328, and as clarified by interagency "Rapanos" guidance published in 2007 and revised in 2008, include coastal and inland waters, lakes, rivers, and streams, including adjacent wetlands and tributaries.

The Section 404(b)(1) Guidelines (40 CFR Part 230 et seq.) are the substantive environmental criteria used by the Corps to evaluate permit applications involving the discharge of dredged or fill material into WUS. The Section 404(b)(1) Guidelines at 40 CFR § 2301.10 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 Section 404(b)(1) Guidelines. The Section 404(b)(1) 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 impact 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 likelihood of

the destruction or adverse modification of a habitat which is determined by the Secretary of 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 the WUS. Findings of significant degradation related to the proposed discharge shall be based upon appropriate factual determinations, evaluations, and tests required by subparts B and G, after consideration of subparts C through F, with special emphasis on the persistence and permanence of the effects outlined in those subparts;

4. And, unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem.

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 purposes." 40 CFR §§ 230.10(a), 230.3(q). "If it is otherwise a practicable alternative, an area not presently owned by an applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered." 40 CFR § 230.10(a)(2).

The term "special aquatic sites," as defined by the Section 404(b)(1) Guidelines, includes "geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values." 40 CFR § 230.3. The Section 404(b)(1) Guidelines specifically name sanctuaries and refuges, wetlands, mud flats, vegetated shallows, coral reefs, and riffle and pool complexes as special aquatic sites. Each of these six special aquatic sites are defined in subpart E of the 404(b)(1) Guidelines.

If the proposed activity would involve a discharge into a special aquatic site, such as a wetland, the Section 404(b)(1) Guidelines distinguish between those projects that are water dependent and those that are not. A water-dependent project is one that requires access to or proximity to or siting within a special aquatic site to achieve its basic purpose, such as a marina. A non-water-dependent project is one that does not require access to or proximity to or siting within a special aquatic site to achieve its basic purpose, such as a housing development.

The Section 404(b)(1) Guidelines establish two presumptions for projects that propose a discharge into a special aquatic site. First, it is presumed that there are practicable alternatives to non-water-dependent 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 impact on the aquatic ecosystem, unless clearly demonstrated otherwise." 40 CFR § 230.10(a)(3). The thrust of the Section 404(b)(1) Guidelines is that applicants should

design proposed projects to meet the overall project purpose while avoiding impacts on aquatic environments. This approach is emphasized in a Memorandum of Agreement ("MOA") between the EPA and the Department of the Army ("DA") concerning the determination of mitigation under the Section 404(b)(1) Guidelines (EPA 1990), as modified by the Corps and EPA Final Mitigation Rule promulgated at 33 CFR Parts 325, 332; 40 CFR Part 230. The MOA articulates the Section 404(b)(1) Guidelines' "sequencing" protocol as first, avoiding impacts; second, minimizing impacts; and third, providing practicable compensatory mitigation for unavoidable impacts and no overall net loss of functions and services.

1.2. Organization of Report

This Section 404(b)(1) alternatives analysis is based primarily on the findings of the SMF FEIS and Section 4(f) Evaluation. It also incorporates specific information from ADOT's November 4, 2016 Department of the Army permit application pertaining to the Corps-regulated aspects of the proposed project, including amendments to this application provided by ADOT. The impact evaluations herein are summarized as applicable from the FEIS and subsequent reevaluations for the proposed project and its alternatives, and the Section 404(b)(1) alternatives analysis is not intended to be a stand-alone document.

The FEIS was prepared by FHWA (as the federal lead agency) and ADOT in accordance with the requirements of the National Environmental Policy Act (NEPA) (42 USC 4341 *et seq*.) and in conformance with the Council for Environmental Quality (CEQ) regulations implementing NEPA.

This document provides information and analysis that allows the Corps to make a determination of the least environmentally damaging practicable alternative (LEDPA). Section 1 provides the **Introduction**, including the proposed project background, CWA Section 404(b)(1) regulatory background, and this organization section. Section 2 provides the **Description of Proposed Project**. Section 3 discusses the **Basic and Overall Project Purpose**. Section 4 discusses the **Alternatives Considered**. Section 5 discusses the **Existing Conditions** as it relates to WUS. Section 6 discusses the **Impact Analysis**, as set forth in Subparts C through H of the Section 404(b)(1) Guidelines. Section 7 presents **Actions to Minimize Adverse Effects**. Section 8 discusses **Compensatory Mitigation** for unavoidable impacts to WUS. Section 9 presents the **Literature Cited**.

2. Description of Proposed Project

On November 4, 2016, ADOT applied for a standard individual permit under Section 404 of the CWA to discharge dredged or fill material into aquatic resources presumed to be WUS. A preliminary jurisdictional determination (PJD) that identified potential WUS within the review area was provided by the Corps in March 2014 and revised[1] in November 2016 and in October 2017. The revisions were requested by ADOT to incorporate changes in the review area and to correct an inaccurate acreage total provided for one of the aquatic resources.

The proposed discharges of fill material into WUS would be associated with constructing drainage crossings to convey flows under the proposed freeway. In the Pecos segment (Figure 2), a shared-use path would also be constructed paralleling the freeway to the south between 40th street and 17th Avenue. The path is proposed to replace the recreation value that Pecos Road currently provides to runners, walkers, and cyclists. Since the freeway would replace Pecos Road and be closed to these types of activities, the shared-use path would allow these activities to continue. The path would cross WUS using the same structures. WUS that would be impacted are located in the Pecos, Center, and Salt River Segments.

On October 3, 2017, ADOT amended their complete application for a DA permit to incorporate minor changes that had occurred since they submitted their initial application as a result of design refinement and consultation with the Gila River Indian Community (Community) on the design in the Center Segment. The minor changes involved the following: (1) change in design at the Salt River to include additional area that was determined to be needed for access and to construct the northern bridge abutment. Although the northern bridge abutment is not within WUS, temporary excavation for the abutment would extend southward into WUS; (2) On the Pecos Segment, the shared-use path was realigned in some areas to go over the tops of some culverts, which necessitated minor increases in culvert lengths; (3) In the Center Segment east of the Community's Vee Quiva Casino, drainage structures were modified to address concerns that the freeway would exacerbate existing flooding concerns; and (4) Other changes that have occurred elsewhere on the project include refinements to earthwork limits that have resulted in minor changes to culvert lengths, and minor changes in the length or width of concrete or riprap erosion protection aprons at the outlets of culverts.

[1] The review area for the original PJD provided by the Corps in March 2014 was the survey area or the project footprint identified by ADOT and FHWA in the FEIS. The revision to the PJD in November 2016 was requested to correct an inaccurate acreage provided for one aquatic resource and to identify potential WUS in additional temporary construction easements and permanent drainage easements that were added to the project and considered in the FEIS/ROD Reevaluation No. 5 completed June 2017 by ADOT and FHWA. In October 2017, the PJD was revised once again to incorporate additional temporary construction easement needed in the Salt River bed, as identified in the FEIS/ROD Reevaluation No. 6, also completed by ADOT and FWHA in June 2017.

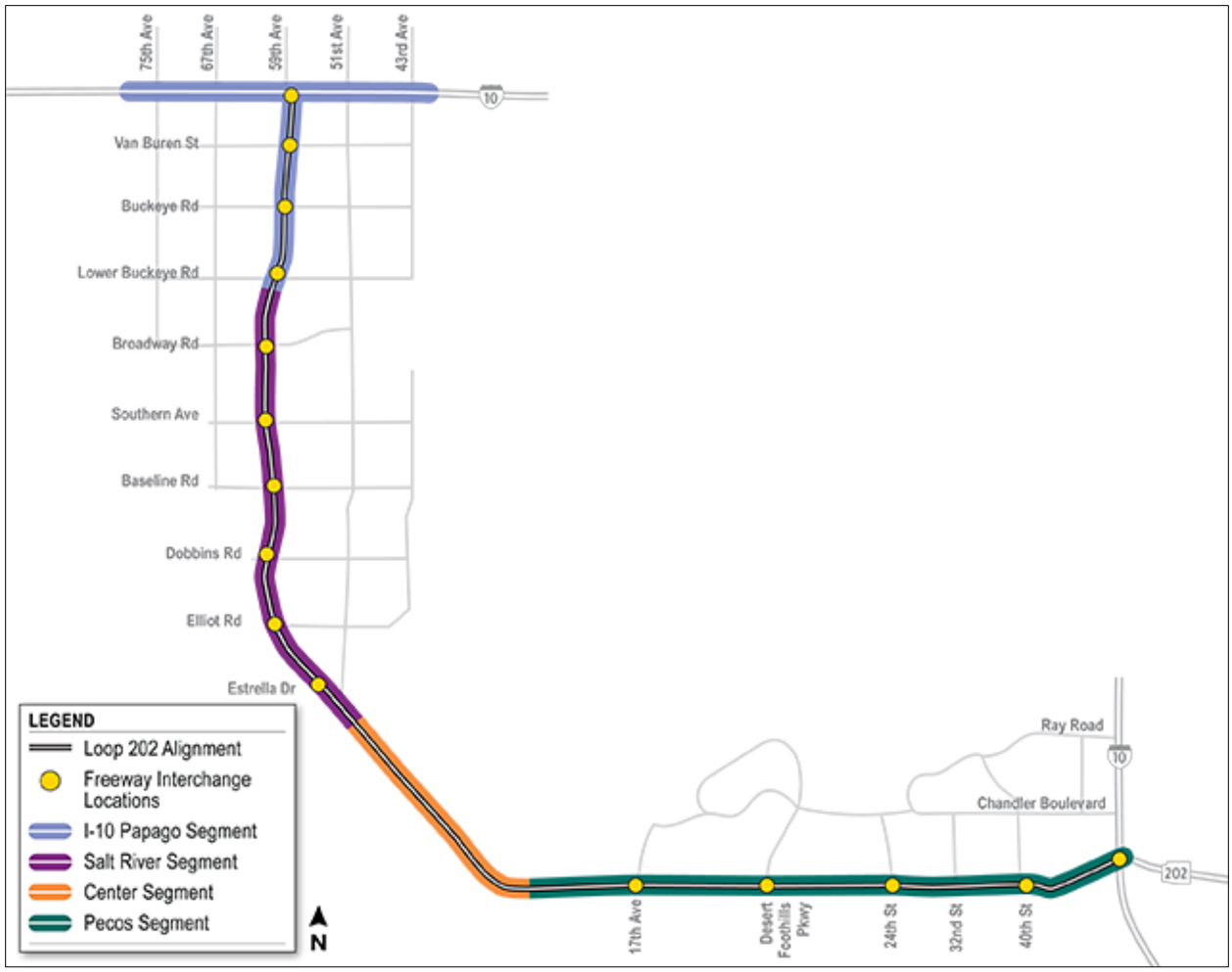

Figure 2. Construction Segments of the Proposed Project. Source: www.southmountainfreeway.com

The proposed project involves constructing culverts, bridges, and channels/ditches at 49 WUS crossings located in the Pecos, Center, and Salt River Segments. Culverts are the primary proposed structure at 41 crossings, including the Laveen Area Conveyance Channel (LACC). Bridges are the primary proposed structure at six crossings, including four multi-use crossings that span five WUS, and Eastbound (EB) and Westbound (WB) bridges over the Salt River. Channels/ditches are the primary proposed structure at the remaining 2 crossings. Culverts would consist of concrete box culverts or corrugated metal, concrete, or plastic pipes with a concrete outlet apron, riprap outlet protection, or grouted riprap placed upstream or downstream of the structure as appropriate for the particular site. Existing culverts along Pecos Road would be replaced with new structures. While multi-use crossings would span WUS, some channel realignment or riprap may occur. All WUS would be passed under the freeway and existing flow characteristics such as discharge, velocity, or water surface elevation would be maintained outside of the project limits[2].

[2] For the purposes of this document, the project limits are defined as the project ROW, temporary construction easements, and permanent drainage easements.

The LACC, which consists of a concrete-lined low flow channel contained within a larger earthen channel, carries irrigation tail water nearly year-round within the Salt River Segment. At the request of the City of Phoenix, C202P would conduct sediment and debris removal activities within the channel during initial construction of the freeway (which includes the culvert in the LACC). These activities would be conducted up to 50 feet outside of the project right-of-way (ROW), and would include the removal of deposited sediment, debris, woody and herbaceous vegetation (including exotic/invasive species), or other obstructions that compromise the integrity of the channel or impede flows within the LACC.

The overall proposed design of the bridges through the Salt River and its associated floodplain includes two approximately 2,660-foot long 16-span Precast/Prestressed Concrete BT82 Girder bridges with 15 piers each. Piers are each supported by four 72-inch diameter drilled shaft columns, and average span widths are approximately 170-feet between the piers. Design of the Salt River Bridges would involve the construction of 22 pier columns within WUS supporting portions of six piers and associated scour protection aprons. Details on the activities proposed in each water of the U.S. is described in Table 1.

Table 1 – Construction Activities in WUS

Count	Wash Name and Number	Existing Structure[1]	Primary Construction Activities	Proposed Structure[1]	Inlet Protection	Outlet Protection
1	Wash 1 (W1)	4-10'x7'x149' CBC	Remove existing culvert and construct new culvert with inlet and outlet concrete aprons, riprap outlet protection, and channel grading.	4-10'x5'x449' RCBC	36'x71' concrete apron	22'x60' concrete apron; 28'x75' riprap
2	Constructed Channel 1 (C1)	3-8'x4'x121' CBC	Remove existing culvert and construct new culvert with inlet and outlet concrete aprons and riprap outlet protection.	4-10'x4'x215' RCBC	25'x56' concrete apron	13'x50' concrete apron; 55'x88' riprap
3	Constructed Channel 3 (C3)	6-10'x5'x133' CBC	Construct new culvert north of existing culvert with inlet and outlet concrete aprons and riprap outlet protection.	6-10'x5'x215' RCBC	10'x85' concrete apron	15'x90' concrete apron; 31'x77' riprap
4	Constructed Channel 4 (C4)	3-81"x59"x120' CMPA	Remove existing culvert and construct concrete-lined channel and 2 new culverts, one with concrete inlet apron, and the other with concrete outlet apron and riprap outlet protection.	49'x1,438' CC; 3-10'x6'x37' RCBC; 3-10'x6'x236' RCBC	10'x45'concrete apron	21'x52' concrete apron; 37'x52' riprap

Table 1 – Construction Activities in WUS

Count	Wash Name and Number	Existing Structure[1]	Primary Construction Activities	Proposed Structure[1]	Inlet Protection	Outlet Protection
5	Wash 2 (W2)	2-87"x63"x120' CMPA	Remove existing culvert and construct new concrete-lined channel, CHDPEPP, and culvert with concrete outlet apron and riprap outlet protection.	52'x564' CC; 18"x44' CHDPEPP; 2-10'x5'x232' RCBC;	N/A	15'x32' concrete apron; 97'x20' riprap
6	Constructed Channel 5 (C5)	2-81"x59"x164' CMPA	Remove existing culvert and construct new culvert with inlet and outlet concrete aprons and riprap outlet protection.	3-72"x253' RCP	61'x50' concrete apron	22'x50' concrete apron; 34'x44' riprap
7	Wash 3 (W3)	3-96"x138' CMP	Remove existing culvert and construct new culvert with outlet riprap energy dissipater.	2-12'x8'x518' RCBC	N/A	77'x85' riprap energy dissipater
8	Wash 4 (W4)	1-78"x214' CMP	Remove existing culvert and construct new culvert with riprap outlet protection.	1-8'x6'x372' RCBC	N/A	35'x85' riprap
9	Wash 5 (W5)	2-78"x170' CSP	Small animal crossing. Remove existing CSP and construct new culvert with inlet channel grading, grouted riprap inlet protection, and grouted riprap outlet protection. culvert floors lined with 4" of non-shrink grout covered with 8" of natural substrate.	2-72"x330' CMP (Small Animal Crossing)	20'x41' grouted riprap	20'x37' grouted riprap
10	Constructed Channel 6 (C6)	5-90"x196' CMP	Remove existing culvert and construct new culvert with inlet and outlet concrete aprons and riprap outlet protection.	4-10'x7'x222' RCBC	20'x56' concrete apron	19'x49' concrete apron; 35'x60' riprap
11	Wash 43 (W43)	3-24"x136' CMP	Remove existing culvert and construct new culvert with riprap inlet and outlet protection and outlet channel grading.	2-36"x361' RCP	34'x40' riprap	10'x40' riprap
12	Truncated Wash West (T2)	1-18"x153' CMP	Remove existing culvert and construct new culvert with riprap outlet protection and channel grading.	1-24"x321' RCP	N/A	8'x24' riprap

Table 1 – Construction Activities in WUS

Count	Wash Name and Number	Existing Structure[1]	Primary Construction Activities	Proposed Structure[1]	Inlet Protection	Outlet Protection
13	Wash 44 (W44)	1-18"x142' RCP	Remove existing culvert and construct new culvert with inlet channel grading, outlet riprap protection, and outlet channel grading.	1-30"x280' RCP	N/A	10'x19' riprap
14	Wash 6 (W6)	N/A	Concrete channel to redirect flows to W7.	20'x363' CC	N/A	N/A
15	Wash 7 (W7)	1-8'x4'x145' CBC	Remove existing culvert and construct new culvert with inlet concrete channel lining and riprap protection, concrete outlet apron and riprap outlet protection, and channel grading.	1-10'x6'x320' RCBC	10'x20' riprap; 22'x58' concrete channel	16'x34' concrete apron; 25'x63' riprap
16	Wash 8 (W8)	1-8'x4'x141' RCBC	Small animal crossing. Remove existing culvert and construct new culvert with grouted riprap inlet and outlet protection and outlet channel grading. culvert floor and grouted riprap covered with 12" of natural substrate.	1-10'x6'x243' RCBC (Small Animal Crossing)	62'x28' grouted riprap	24'x53' grouted riprap
17	Wash 9 (W9)	1-8'x4'x136' CBC	Remove existing culvert and construct new culvert with inlet and outlet concrete aprons, riprap protection, and channel grading.	1-10'x5'x254' RCBC	2-10'x18' riprap; 17'x28' concrete apron	18'x24' concrete apron; 20'x54' riprap
18	Wash 10 (W10)	1-8'x4'x167' CBC	Remove existing culvert and construct new culvert with inlet and outlet concrete aprons, riprap protection, and channel grading.	1-6'x6'x286' RCBC	10'x18' riprap; 19'x32' concrete apron	16'x31' concrete apron; 24'x62' riprap
19	Wash 11 (W11)	1-24"x165' RCP	Remove existing culvert and construct new culvert with inlet and outlet concrete aprons, riprap protection, and channel grading.	1-10'x6'x246' RCBC	10'x28' riprap; 19'x34' concrete apron	18'x33' concrete apron; 24'x64' riprap
20	Wash 12 (W12)	2-24"x154' RCP	Remove existing culvert and construct new culvert with inlet and outlet concrete aprons, riprap protection, and channel grading.	2-8'x5'x230' RCBC	10'x24' riprap; 17'x39' concrete apron	18'x45' concrete apron; 20'x73' riprap

Table 1 – Construction Activities in WUS

Count	Wash Name and Number	Existing Structure[1]	Primary Construction Activities	Proposed Structure[1]	Inlet Protection	Outlet Protection
21	Wash 13 (W13)	2-36"x159' RCP	Remove existing culvert and construct new culvert with inlet and outlet concrete aprons, riprap protection, and channel grading.	4-8'x5'x207' RCBC	28'x70' riprap; 9'x47' concrete apron	17'x47' concrete apron; 68'x77' riprap
22	Constructed Channel 7 (C7)	4-6'x5'x16' RCBC	Remove existing culvert and construct 2 new culverts, one with inlet and outlet concrete aprons and riprap protection.	1-18"x124' RCP; 3-10'x5'x240' RCBC	20'x60' concrete apron	15'x50' concrete apron; 45'x55' riprap
23	Wash 17 (W17)	N/A	Construct new bridge and 510'x50' earthen channel with 30' bottom width and 6:1 side slopes.	148'x167' Bridge (multi-use crossing)	N/A	N/A
24	Wash 18 (W18)	N/A	Construct new culvert with inlet channel grading and concrete apron and outlet concrete apron and riprap protection.	1-48"x282' CMP	8'x14' concrete apron	8'x14' concrete apron; 5'x18' riprap
25	Wash 19 (W19)	N/A	Construct new culvert with inlet channel grading and concrete apron and outlet concrete apron and riprap protection.	2-48"x192' CMP	9'x21' concrete apron	15'x28' concrete apron; 5'x32' riprap
26	Wash 20 (W20)	N/A	Construct new culvert with inlet channel grading and concrete apron and outlet concrete apron and riprap protection.	1-48"x198' CHDPEPP	9'x14' concrete apron	15'x20' concrete apron; 5'x20' riprap
27	Wash 21 (W21)	N/A	Construct new culvert with inlet channel grading and concrete apron and outlet concrete apron and riprap protection.	1-48"x220' CHDPEPP	8'x14' concrete apron	8'x14' concrete apron; 5'x20' riprap
28	Wash 22 (W22)	N/A	Construct new culvert with inlet channel grading and outlet concrete apron and riprap protection.	2-10'x6'x241' RCBC	N/A	11'x29' concrete apron; 5'x33' riprap
29	Wash 23 (W23)	N/A	Construct new bridge and associated construction access.	145'x147'L Bridge (multi-use crossing)	N/A	N/A
30	Wash 24 (W24)	N/A	Construction access for new bridge at W23.	N/A	N/A	N/A

Table 1 – Construction Activities in WUS

Count	Wash Name and Number	Existing Structure[1]	Primary Construction Activities	Proposed Structure[1]	Inlet Protection	Outlet Protection
31	Wash 25 (W25)	N/A	Construct new culvert with inlet and outlet riprap protection.	1-36"x337' CMP	43'x20' riprap	5'x20 riprap
32	Wash 26 (W26)	N/A	Construct new culvert with inlet riprap protection and outlet concrete apron and riprap dissipater.	1-10'x4'x355' RCBC	28'x20' riprap	8'x19' concrete apron; 50'x32' grouted riprap
33	Wash 28 (W28)	N/A	Construct new bridge, 329'x74' earthen channel with 43' bottom width and 3:1 side slopes, and 120'x400' spreader basin.	145'x157' Bridge (multi-use crossing)	N/A	27'x62' riprap; 30'x127' riprap
34	Wash 29A (W29A)	N/A	Construct grader ditch to redirect flows via a 160' long earthen channel to W29.	18'x140' GD	N/A	N/A
35	Wash 29 (W29)	N/A	Construct new culvert with inlet grading and concrete apron, and outlet concrete apron, riprap outlet protection, and spreader basin.	1-10'x4'x215' RCBC	7'x18' concrete apron	7'x17' concrete apron; 16'x39' riprap
36	Wash 30 (W30)	N/A	Construct new culvert with inlet grading and outlet riprap protection.	1-36"x243' CHDPEPP	N/A	12'x16' riprap
37	Wash 31 (W31)	N/A	Construct new culvert with inlet grading and concrete apron, and outlet concrete apron, riprap protection, and spreader basin.	5-54"x200' CMP	9'x47' concrete apron	9'x47' concrete apron; 18'x76' riprap
38	Wash 32 (W32)	N/A	Construct new culvert with inlet grading and outlet concrete apron, riprap protection, and spreader basin.	2-10'x4'x226' RCBC	N/A	10'x35' concrete apron; 16'x67' riprap
39	Wash 33 (W33)	N/A	Construct new at-grade crossing of local street with upstream riprap protection and new culvert with inlet grading, riprap protection, and concrete apron and outlet concrete apron and riprap protection.	2-72"x180' CMP	17'x39' riprap; 36'x63' riprap	11'x21' concrete apron; 24'x40' riprap

Table 1 – Construction Activities in WUS

Count	Wash Name and Number	Existing Structure[1]	Primary Construction Activities	Proposed Structure[1]	Inlet Protection	Outlet Protection
40	Wash 34 (W34)	N/A	Construct new culvert under local street with riprap inlet protection and a new culvert under SMF with inlet and outlet protection.	4-30"x48'CMPA; 1-10'x4'x190' RCBC	10'x30' riprap; 51'x40' riprap; 6'x23' concrete apron	16'x15' concrete apron; 16'x38' riprap
41	Wash 35 (W35)	N/A	Construct new at-grade crossing of local street with upstream riprap protection and new culvert with inlet grading and concrete apron and outlet riprap protection.	1-10'x4'x204' RCBC	5'x19' concrete apron	7'x15' concrete apron; 16'x38' riprap
42	Wash 36 (W36)	N/A	Construct new culvert with inlet and outlet grading and riprap protection.	2-10'x5'x192' RCBC	35'x37' riprap	37'x45' riprap protection
43	Wash 37 (W37)	N/A	Construct new culvert with upstream channel grading to redirect flow via a 456' long earthen channel to the new culvert with outlet concrete apron and riprap protection.	5-72"x284' CMP	N/A	14'x54' concrete apron; 38'x55' riprap protection
44	Wash 38 (W38)	N/A	Construct new at-grade crossing of local street with upstream riprap protection and new culvert with inlet and outlet riprap protection.	1-36"x250' CHDPEPP	19'x32' riprap; 34'x32' riprap	12'x18' riprap
45	Wash 39 (W39)	N/A	Construct new at-grade crossing of local street with upstream riprap protection and new culvert with inlet and outlet riprap protection.	1-36"x261' CHDPEPP	19'x28' riprap; 30'x34' riprap	12'x16' riprap
46	Wash 40 (W40)	N/A	Construct new culvert with inlet channel grading and outlet riprap protection.	1-36"x332' CHDPEPP	N/A	15'x18' riprap
47	Wash 41 (W41)	N/A	Channel grading to redirect flows via a 225' long earthen channel under new bridge.	145'x134' Bridge (multi-use crossing)	N/A	N/A

Table 1 – Construction Activities in WUS

Count	Wash Name and Number	Existing Structure[1]	Primary Construction Activities	Proposed Structure[1]	Inlet Protection	Outlet Protection
48	Laveen Area Conveyance Channel (LACC)	N/A	Remove existing concrete channel lining and construct new culvert with 10' inlet and outlet concrete transitions from new culvert to existing concrete lining; excavation and backfill for Laveen Area Conveyance Channel siphon to be installed upstream from the new RCBC inlet; channel grading and pump around to be installed during construction.	4-12'x16'x320' RCBC	10' concrete transition	10' concrete transition
49	Salt River Mine Pit (SRMP)	N/A	Construct an EB and WB 16-span 85'x 2660' Precast/Prestressed Concrete BT82 Girder Bridge with 4-72" drilled shafts supporting 60" columns for each pier and 10' of riprap scour protection around the base of each pier. Only piers 11, 12, and 13 on both the EB and WB bridges would be placed within WUS.	85'x2,660' Bridges (2)	N/A	N/A

[1] *Structure Types*: CBC = Concrete Box Culvert; CC = Concrete Channel; CHDPEPP = Corrugated High-Density Polyethylene Plastic Pipe; CMP = Corrugated Metal Pipe; CMPA = Corrugated Metal Pipe Arch; GD = Grader Ditch; RCBC = Reinforced Concrete Box Culvert; RCP = Reinforced Concrete Pipe.

The permanent impact[3] acreages provided in Table 2 below generally represent the footprint of the culvert, bridge, ditch/channel, and any associated erosion protection to be constructed within WUS at each crossing. The temporary impacts provided in Table 2 generally represent the additional area within WUS needed for access and equipment maneuvering in order to construct the culvert, bridge, or ditch/channel. Once construction is complete, all temporary disturbance

[3] *Permanent Impacts* means WUS that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The loss of stream bed includes the linear feet of stream bed that is filled or excavated. 82 FR 2006 (January 6, 2017). *Temporary Impacts* refers to those impacts to WUS which occur when the WUS are temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction. 82 FR 2006 (January 6, 2017).

areas within WUS would be restored to pre-construction ground surface elevations, contours, and conditions as much as possible.

Table 2 – Impacts to WUS

Count	Wash Name and Number	WUS Type	Permanent (Acres)	Temporary (Acres)	TOTAL
1	Wash 1 (W1)	Non-wetland	0.149	0.135	0.284
2	Constructed Channel 1 (C1)	Non-wetland	0.182	0.082	0.264
3	Constructed Channel 3 (C3)	Non-wetland	0.151	0.074	0.225
4	Constructed Channel 4 (C4)	Non-wetland	0.701	0.109	0.810
5	Wash 2 (W2)	Non-wetland	0.340	0.065	0.405
6	Constructed Channel 5 (C5)	Non-wetland	0.115	0.054	0.169
7	Wash 3 (W3)	Non-wetland	0.754	0.139	0.893
8	Wash 4 (W4)	Non-wetland	0.075	0.065	0.140
9	Wash 5 (W5)	Non-wetland	0.112	0.107	0.219
10	Constructed Channel 6 (C6)	Non-wetland	0.113	0.039	0.152
11	Wash 43 (W43)	Non-wetland	0.058	0.000	0.058
12	Truncated Wash West (T2)	Non-wetland	0.040	0.007	0.047
13	Wash 44 (W44)	Non-wetland	0.054	0.004	0.058
14	Wash 6 (W6)	Non-wetland	0.087	0.004	0.091
15	Wash 7 (W7)	Non-wetland	0.092	0.031	0.123
16	Wash 8 (W8)	Non-wetland	0.051	0.051	0.102
17	Wash 9 (W9)	Non-wetland	0.052	0.027	0.079
18	Wash 10 (W10)	Non-wetland	0.064	0.037	0.101
19	Wash 11 (W11)	Non-wetland	0.022	0.024	0.046
20	Wash 12 (W12)	Non-wetland	0.036	0.026	0.062
21	Wash 13 (W13)	Non-wetland	0.028	0.045	0.073
22	Constructed Channel 7 (C7)	Non-wetland	0.094	0.049	0.143
23	Wash 17 (W17)	Non-wetland	0.077	0.013	0.090
24	Wash 18 (W18)	Non-wetland	0.041	0.011	0.052
25	Wash 19 (W19)	Non-wetland	0.041	0.011	0.052
26	Wash 20 (W20)	Non-wetland	0.024	0.013	0.037
27	Wash 21 (W21)	Non-wetland	0.021	0.009	0.030
28	Wash 22 (W22)	Non-wetland	0.136	0.068	0.204
29	Wash 23 (W23)	Non-wetland	0.000	0.104	0.104
30	Wash 24 (W24)	Non-wetland	0.000	0.007	0.007
31	Wash 25 (W25)	Non-wetland	0.046	0.000	0.046
32	Wash 26 (W26)	Non-wetland	0.051	0.008	0.059
33	Wash 28 (W28)	Non-wetland	0.169	0.000	0.169
34	Wash 29A (W29A)	Non-wetland	0.092	0.000	0.092
35	Wash 29 (W29)	Non-wetland	0.187	0.000	0.187
36	Wash 30 (W30)	Non-wetland	0.079	0.000	0.079

Table 2 – Impacts to WUS

Count	Wash Name and Number	WUS Type	Permanent (Acres)	Temporary (Acres)	TOTAL
37	Wash 31 (W31)	Non-wetland	0.156	0.000	0.156
38	Wash 32 (W32)	Non-wetland	0.069	0.000	0.069
39	Wash 33 (W33)	Non-wetland	0.052	0.002	0.054
40	Wash 34 (W34)	Non-wetland	0.053	0.002	0.055
41	Wash 35 (W35)	Non-wetland	0.050	0.020	0.070
42	Wash 36 (W36)	Non-wetland	0.093	0.010	0.103
43	Wash 37 (W37)	Non-wetland	0.167	0.018	0.185
44	Wash 38 (W38)	Non-wetland	0.049	0.004	0.053
45	Wash 39 (W39)	Non-wetland	0.050	0.006	0.056
46	Wash 40 (W40)	Non-wetland	0.034	0.006	0.040
47	Wash 41 (W41)	Non-wetland	0.078	0.014	0.092
48	LACC	Non-wetland	0.370	0.417	0.787
49	Salt River	Non-wetland	0.274	5.213	5.487
		TOTAL	5.829	7.130	12.959

Cumulatively, 12.959 acres of impact to non-wetland WUS would result from implementation of the proposed project within the project limits. All WUS would be conveyed across the freeway under the proposed project and existing drainage configurations would be maintained. No flows would be cut-off resulting in permanent impacts from downstream loss.

2.1. Proposed Maintenance Activities

The applicant has requested to include maintenance activities in their permit, which if approved, would be issued for a period of 10 years. There would be a possibility for renewal at the end of each term, when resource conditions and impacts resulting from maintenance activities would be reevaluated. A maintenance plan was submitted by the applicant which detailed the maintenance activities proposed to occur within the project ROW or permanent drainage easement. The plan was based on the authorizations typically provided through Nationwide Permit 3 (Maintenance Activities) and Regional General Permit 96 (Routine Transportation Activities in Arizona). However, both of these permits often require advance notification of the Corps and further authorization since they are not project-specific and cover a range of activities that may occur in various aquatic resource types. Furthermore, the regional general permit is only valid on projects that are bid and administered by ADOT. Since C202P would be bidding and administering maintenance activities through the DBM mechanism, the regional general permit cannot be used. Because the impacts of the maintenance activities described below do not go beyond those caused by the initial construction of the structures and would occur in a limited geographic area lacking highly functional or rare aquatic resources, the applicant has requested authorization of the following activities under the individual permit without additional notification/authorization requirements. Maintenance activities proposed by the applicant include:

Repair, Rehabilitation, Replacement, or Removal of Structures and Fill:
This activity includes the repair, rehabilitation, replacement, or removal of any fill material authorized by the DA individual permit, unless otherwise determined to be exempt under Section 404 of the CWA, in order to maintain the structural integrity and operational capacity of the fill material authorized by the DA individual permit for adequate drainage, flood hazard reduction, and overall public safety. Deviations in the filled area, including those due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to make the repair, rehabilitation, or replacement may occur. Deviations of the configuration or fill during repair, replacement, or rehabilitation of structures authorized by the DA permit would result in 0.03 acre or less of permanent impacts to WUS. This includes the repair, rehabilitation, replacement, or removal of any fill material in WUS authorized by the DA individual permit destroyed or damaged by storms, floods, fire or other discrete events.

Sediment, Debris, and Obstruction Removal:
The removal of accumulated sediments and debris in the vicinity of fill materials authorized by the DA individual permit. Activities include the removal of deposited sediment, debris, woody and herbaceous vegetation (including exotic/invasive species), or other obstructions which compromise the integrity of the fill and/or impede flows in the vicinity of the fill authorized by the DA permit. This would include removals to re-establish design flow capacity in a watercourse for public safety when flow events do not sufficiently fully flush those materials completely through the system, which may result in flooding or erosion of adjacent property. Removals may be completed by hand, by mechanized equipment, or using a hydrovac or other similar system to liquefy sediment that would then be vacuumed out of the channel.

Erosion Repair using Accumulated Sediment:
These activities include the use of accumulated sediments removed/excavated from WUS to be utilized for the repair of erosion damage in WUS. Sediment would originate from and be placed within ADOT ROW or permanent drainage easement associated with the SMF. The use of the accumulated sediments to repair erosion damage must occur simultaneously with removal activities and accumulated sediments may only be temporarily stockpiled in the channel while removal/replacement activities are concurrently occurring. All excess material not used shall be removed from the watercourse to an upland site.

Temporary Structures or Fills Necessary for Maintenance Activities
This includes temporary fills and other work, including the use of temporary mats, necessary to conduct any of the maintenance activities above. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary discharges, including cofferdams, are necessary for maintenance activities, access fills, or temporary dewatering. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. After conducting the maintenance activity, temporary fills must be removed in their entirety and the affected areas returned to pre-construction contours and elevations.

After each maintenance activity is completed, any temporary fills would be removed in their entirety and the affected areas returned to pre-maintenance or design elevations to the maximum extent possible. All areas disturbed by the maintenance activity would be stabilized and upland areas reseeded to match the conditions that were present prior to the maintenance activity occurring. To monitor the maintenance activities occurring within WUS, ADOT proposes to provide yearly reporting to the Corps. The report would contain information about each activity performed, including the start and end dates of the work, where the work occurred, the approximate area of disturbance, and a description of any necessary restoration activities completed.

2.2. Avoidance, Minimization, and Compensation

Avoidance

It was determined by the applicant that complete avoidance of WUS was not practicable. Spanning WUS would require larger structures that span jurisdictional areas. The roadway profile would likely need to be raised to accommodate the larger structures, resulting in additional logistical and design considerations that would make the project cost-prohibitive. Avoidance was considered by the Corps as an alternative in section 4.2.2.

Minimization

Throughout the extensive planning and design phases of the project, numerous alternatives were considered by the applicant to minimize impacts to WUS. Alternative alignments were considered during the FEIS that reduced environmental impacts (including those to WUS.) while still meeting the project's purpose and need. Later during design, design options were considered to further minimize impacts to WUS. Examples of design considerations that minimized impacts included reducing the number of piers in the Salt River by extending the span width and pier design, reducing construction timelines to reduce temporal loss of resources, and locating multi-use crossings at WUS in order to span drainages. Methods to minimize impacts to flow characteristics were also considered. As mentioned in the introduction, the project is being implemented through a P3 DBM mechanism by C202P on behalf of the applicant, ADOT. The project design and construction contract documents include the following binding requirements for C202P, which help avoid or minimize impacts to WUS:

- C202P shall not permit any increase in water surface elevation from existing conditions upstream or downstream of the project ROW
- Modifications must be made to new or existing drainage features to achieve no rise in water surface elevation outside of the ROW
- Discharge, velocity, or water surface elevation at the outfalls to existing drainage conveyance features must not increase from the existing conditions

- Mitigation to offset any increase of discharge, velocity, or water surface elevation at the outfalls to existing drainage conveyance features must be in the form of providing storage capacity at locations within the ROW

For design purposes, all WUS flowing through the project area[4] are considered "off-site" drainage because they originate outside the freeway ROW. All WUS would pass under the new freeway via drainage structures such as culverts and bridges and exit the freeway ROW in their existing channels as they currently do. Runoff originating from within the ROW is considered "on-site" drainage. A primary contributor to on-site drainage would be runoff from new concrete and pavement associated with the freeway, in addition to natural and landscaped areas within the ROW.

On-site drainage would be captured with catch basins and storm drains and conveyed to first-flush basins, which keeps on-site drainage separate from off-site drainage until the on-site drainage is treated via the first-flush basins. First-flush basins are a commonly used Best Management Practice (BMP) to protect receiving waters from any discharge that may cause or contribute to an exceedance of any Arizona surface water quality standard. These first-flush basins detain the first ½" of pavement runoff (i.e., the first ½" of rain that falls on pavement, which typically contains the highest concentration of pollutants) for a period of time sufficient to reduce peak discharge and allow suspended pollutants to be removed through settling before being slowly released to receiving waters (typically WUS) via the basin spillways.

During construction, impacts would be limited to the minimum necessary to accomplish the project. In the Salt River, the construction timeline was condensed to less than 12 months within WUS to reduce temporal impacts that may result. Since there is no regulatory time limit defining temporary impacts, the Corps has used 12 months to as a reasonable time limit for temporary impacts. It was also determined that the contractor could avoid portions of WUS within the project limits; therefore, the portions of WUS that would not be impacted by project activities will be flagged and signed for avoidance prior to construction activities in those areas. An Individual Section 401 Water Quality Certification has been obtained by the applicant and includes measures to ensure impacts to water quality are minimized. In addition, a Storm Water Pollution Prevention Plan (SWPPP) has been prepared in compliance with the current Arizona Pollutant Discharge Elimination System (AZPDES) Construction General Permit.

Compensation

The proposed action would result in a total of 5.829 acres of permanent impact to WUS. ADOT proposes to purchase 5.829 restoration/enhancement credits from the Arizona Game and Fish Department's (AZGFD) approved In-Lieu Fee Program to compensate for the loss of WUS associated with this project.

[4] Project area as used in this document includes the land surrounding the project, outside but adjacent to the project limits.

3. Basic and Overall Purpose

3.1. Basic Project Purpose and Water Dependency Determination

The basic project purpose comprises the fundamental, essential, or irreducible purpose of the proposed project, and is used by the Corps to determine whether the applicant's project is water dependent (i.e., whether it requires access or proximity to or siting within a special aquatic site). The basic project purpose for the proposed project is transportation, which is not water dependent. As noted in Section 1.1, the Section 404(b)(1) Guidelines at 40 CFR § 230.10(a)(3) set forth two rebuttable presumptions when the activity associated with a discharge is proposed in a special aquatic site, as defined at 40 CFR Part 230, subpart E. Because the proposed project does not discharge dredged or fill material into a special aquatic site, these rebuttable presumptions do not apply.

3.2. Overall Project Purpose

The overall project purpose serves as the basis for the Corps' Section 404(b)(1) alternatives analysis and is determined by further defining the basic project purpose in a manner that more specifically describes the applicant's goals and accounts for logistical considerations for the project, and which allows a reasonable range of alternatives to be analyzed. It is critical that the overall project purpose be defined to provide for a meaningful evaluation of alternatives. It should not be so narrowly defined as to give undue deference to the applicant's wishes, thereby unreasonably limiting the consideration of alternatives. Conversely, it should not be so broadly defined as to render the evaluation unreasonable and meaningless.

The overall project purpose is to help alleviate congestion, travel delays, and limited travel options for the safe transportation of people and goods in the Phoenix region.

4. Alternatives Considered

The FHWA prepared an EIS for the proposed project with the Corps, Bureau of Indian Affairs (BIA), and the Western Area Power Administration (Western) as cooperating agencies. During the FHWA EIS process, a multidisciplinary process was undertaken to identify a range of reasonable alternatives to be studied in detail in the EIS. The process involved identifying, comparatively screening, and eliminating alternatives based on:

- Input from the public
- A comparison of modal choices
- A multidisciplinary set of criteria evenly applied
- The historical context of the proposed action
- Projected conditions with and without the alternatives being considered

This rigorous process included considering non-freeway alternatives such as light rail, commuter rail, expanded bus service, arterial street improvements, and land use controls; however, a freeway was determined to best address the need for the project. Potential freeway corridor locations were then identified and screened, with the Corps participating in the process and the requirements of the Section 404(b)(1) Guidelines considered (FHWA and ADOT 2015). Upon completion of the corridor screening, potential freeway alignments were subject to 5 tiers of screening to arrive at alternatives to be studied in detail in the EIS.

In March 2015, the FHWA issued a Record of Decision (ROD) identifying the preferred alternative analyzed in the FEIS as the selected alternative. After issuance of the ROD, ADOT developed a Final Location/Design Concept Report for the selected alternative. Towards the end of 2015, the P3 DBM contract was awarded to C202P, who made further refinements in the project design that reduced costs and impacts to the environment. The design developed by C202P is ADOT's proposed project described in this 404(b)(1) analysis. Because of the extensive analysis of alternative alignments that was conducted in the FEIS to identify the selected alternative, the applicant did not propose any offsite alternatives for consideration by the Corps.

Three onsite alternatives (Alternatives B, C, and No Corps Action), one offsite alternative (Alternative A), and other alternatives in the FEIS were considered for evaluation as part of this Section 404(b)(1) alternatives analysis and are presented below. Two of the four alternatives considered in this analysis are the designs that were developed by ADOT and C202P as described above. Another alternative was developed to consider the impacts that would result from no Corps action being taken (no permit issued). The analysis for the on-site alternatives primarily discusses design considerations that minimized impacts to WUS, including span length and pier design of the Salt River bridges, alignment of the shared-use path, and location of multi-use crossings under the freeway. An additional offsite alternative (consisting of three sub-alternatives that were analyzed in the FEIS) was developed by the Corps in response to the public comments received. Other alternatives from the FEIS that minimized impacts to the South Mountains were also considered for evaluation under the 404(b)(1) Guidelines, but were not considered in detail due to their feasibility (See Section 4.3). For the purposes of NEPA,

none of the alternatives considered in this document are beyond or outside the scope of analysis of the FEIS. Please refer to the Corps' ROD for further documentation.

The appropriate level of alternatives analysis was developed based on guidelines developed by the Corps and the EPA (EPA 1993). The amount of information needed and the level of scrutiny required are commensurate with the severity of the environmental impact (as determined by the functions of the aquatic resource and the nature of the proposed activity).

4.1. Alternatives Analyzed in Detail

4.1.1. Features Common to All Alternatives Analyzed in Detail

Beginning at its eastern terminus with the existing traffic interchange (TI) between I-10 (Maricopa Freeway) and SR 202L (Santan Freeway), the freeway would extend westward just north of the existing Pecos Road alignment for approximately 8 miles with TIs at 40th Street, 24th Street, Desert Foothills Parkway, and 17th Avenue, and cut sections near the Ahwatukee Foothills Village between 24th Street and 17th Avenue. Depending on the alternative, Pecos Road would be partially removed or completely removed through this segment. Approximately 2 miles west of 17th Avenue, the freeway alignment would head northwest and pass through three ridges of South Mountain that would require cut sections. In the valleys between the ridges, the road profile would be adequately elevated to allow wildlife passage through a total of five multi-use crossings under the freeway. Continuing on the northwest alignment, the freeway would cross over Ivanhoe Street, a TI would be installed at Estrella Drive, and then the alignment turns north near the existing Elliot Road and 59th Avenue intersection. Heading north, a TI would be installed at Elliott Road and Dobbins Road, and the freeway would cross over the LACC via a box culvert. Continuing north, TIs would be constructed at Baseline Road and Southern Avenue, a bridge would span the Salt River and most of its associated floodplain, and TIs would be installed at Broadway Road, and Lower Buckeye Road. North of Lower Buckeye Road, the alignment crosses the Roosevelt Irrigation District (RID) Canal, has a TI at Buckeye Road, crosses over the Union Pacific Railroad, and then shifts to the eastern side of 59th Avenue and continues north to a TI at Van Buren Street. Finally, the proposed freeway reaches its western terminus at I-10 (Papago Freeway) near 59th Avenue and would connect to I-10 (Papago Freeway) as an elevated facility with a new system TI that would replace the existing service TI at 59th Avenue.

The proposed freeway mainline design features a rolling profile with the freeway rising above grade to cross over most crossroads. The roadway typical section for the freeway consists of eight-lanes with three general purpose lanes and one high-occupancy vehicle lane in each direction divided by a closed concrete median barrier. Travel lanes would generally be 12 feet wide and have full inside and outside shoulders. TIs would be constructed at most major intersections. The proposed project would also convert the existing 59th Avenue to two-lane northbound and southbound frontage roads between Van Buren Street and the RID Canal, and a shared-use path will parallel the freeway alignment to the south from 40th Street to 17th Avenue.

There are over 45 bridges along the proposed freeway corridor including: TI bridges, overpasses, flyover ramps at I-10 (Papago Freeway), the EB and WB Salt River bridges which are over 2,500 feet long, and five multi-use crossings under the freeway, of which four will span ephemeral WUS. Off-site drainage would be passed under the freeway by installing new culverts or bridges, or extending or replacing existing culverts to maintain current flow characteristics. To retain on-site flows and treat freeway runoff, small retention basins would be located throughout the freeway corridor east of 51st Avenue. Along the freeway corridor west of 51st Avenue, off-site drainage would be collected and conveyed by a channel on the east side of the freeway to detention basins which outfall to the Salt River once detention capacity is exceeded.

The proposed project is located within the City of Phoenix and unincorporated areas of Maricopa County, and the ADOT will obtain ROW for the entire project limits and drainage easements from adjacent private landowners. Other adjacent landownership includes the Community, City of Phoenix, Bureau of Land Management (BLM), Arizona State Land Department and various private landowners. Construction began in 2016 in upland areas outside of the Corps' jurisdiction and is expected to be complete in late 2019.

4.1.2. Activities in WUS

Work within WUS generally consists of constructing pipe culverts, box culverts, or bridges to pass flows under the freeway. In the Pecos Segment, pipe culverts or box culverts would be constructed at WUS crossings between 48th Street and Chandler Boulevard, with 2 of those culverts designed to serve as small animal crossings. In the Center Segment, pipe culverts or box culverts would also be constructed at most of the natural wash crossings in the South Mountain area between Chandler Boulevard and 51st Avenue, though 4 of these washes would pass under the freeway via bridges that would also serve as multi-use crossings as described below. West of 51st Avenue in the Salt River Segment, the only WUS in the project area are the LACC and the Salt River. Depending on the alternative, the LACC would pass under the freeway via a bridge or box culvert on the same alignment as the existing channel. However for all alternatives, the crossing would include a low flow channel matching the alignment and elevation of the existing low flow channel. During construction, LACC flows would be temporarily diverted around the box culvert work site unimpeded. Once the box culvert is complete, flows would be diverted back to the existing channel through the crossing.

For all alternatives, bridges would be constructed at the Salt River. Concrete and/or riprap aprons would also be constructed at most culvert outlets to protect against erosion. Spreader basins or similar structures would be constructed downstream of some outlets to spread flows and maintain the existing sheet-flow drainage pattern present in some areas of the project. Culverts and bridges would generally be constructed on the same alignment as the drainages, though some channel re-alignment or redirection of flows to other channels may be required, depending on the alternative.

In the South Mountain area between Chandler Boulevard and 51st Avenue, 5 multi-use crossing structures (bridges) designed to function as crossings for both wildlife and people would be constructed. Four of these multi-use crossings are at WUS, three of which would require drainage improvements such as channel grading or riprap placement. The fourth crossing would entail channel realignment to properly direct flows through the multi-use crossing.

Proposed Maintenance Activities

Maintenance activities would include the activities described in Section 2.1, which includes the repair or replacement of structures, sediment and debris removal, erosion repair, and authorize the placement of temporary fills to complete maintenance work. Maintenance activities would be restricted to the project's ROW or permanent drainage easement.

4.1.3. Alternative B – Final Location/Design Concept Report (L/DCR) Design

Alternative B would involve construction of culverts including reinforced concrete box culverts (RCBCs), reinforced concrete pipes (RCPs) and corrugated metal pipes (CMPs) in 31 WUS. However, this alternative does not provide drainage structures for 13 WUS. These drainages would be truncated by the freeway, and the flows would be cutoff or redirected to other drainage structures. Culvert work would include full replacement and extension of existing culverts, primarily along the existing Pecos Road, and installation of new culverts between west end of Pecos Road and 51st Avenue. The majority of culvert extensions associated with Alternative B are due to the conversion of the existing EB Pecos Road into a shared-use path. Where the shared-use path is located, existing culverts under Pecos Road would remain and be extended to the north to accommodate the new freeway.

With the Alternative B design, three of the five multi-use crossings under the freeway would be utilized as conveyance structures to maintain flows along WUS through the project. WUS (Wash 28 and Wash 41) adjacent to two multi-use crossing would be channelized and directed through the multi-use crossings. The fourth multi-use crossing would entirely span 3 drainages (Wash 22, Wash 23 and Wash 24) resulting in only temporary impacts to these drainages.

Three bridge structures for the freeway mainline, and entrance and exit ramps to Baseline Road, would completely span the LACC. Permanent impact (0.03 acre) to the LACC would result from the construction of an outfall for a first-flush detention basin that would capture freeway onsite flows, though the majority of impact at this location would be temporary resulting from the construction access.

The overall design of the bridges through the Salt River and its associated floodplain includes two approximately 3,326-foot long bridges with 22 piers each. Piers would be

constructed atop 72-inch diameter drilled shafts and the average span width between piers would be 127-feet. Design of the Salt River bridges for Alternative B would involve the construction of portions of nine piers in WUS resulting in approximately 0.117 acre of permanent impacts. With this alternative, activity within the Salt River is expected to last up to 18 months. After construction is complete, approximately 2.545 acres of WUS would remain natural ground surface and regain the functions and services of WUS that were present prior to construction.

Cumulatively, 9.286 acres of impact to WUS are estimated to occur as a result of implementing Alternative B. These impacts primarily result from drainage structures such as bridges and culverts in WUS However, this Alternative does not provide drainage structures for 13 WUS. These drainages would be truncated by the freeway design, resulting in a 0.914 acres of permanent impact within the footprint, as well as an unknown amount of additional permanent loss downstream of the project area. Additionally, because this alternative was not developed beyond the DCR, estimated temporary impacts may be higher than reported here.

Proposed Maintenance Activities

Maintenance activities would include the repair or replacement of structures, sediment and debris removal, erosion repair, and authorize the placement of temporary fills to complete maintenance work. Maintenance activities would be restricted to the project's ROW or permanent drainage easement.

Table 3. Alternative B Criteria Comparison.

Overall Project Purpose	Would meet overall project purpose
Cost (Work associated with WUS)	$137 million
Technology	Capable of being done
Logistics	Capable of being done
Environmental Impacts within Corps' Jurisdiction	Permanent impacts to WUS: 7.681 acres Temporary impacts to WUS: 1.605 acres Total impacts to WUS: 9.286 acres

4.1.4. Alternative C – Connect 202 Partners Design (Proposed Project)

A full description of the proposed project can be found in Section 2. Alternative C involves constructing culverts, bridges, and channels/ditches at 49 WUS crossings. Two drainages (Wash 14 and Wash 27) within the project limits would be completely avoided by this alternative. Culverts are the primary proposed structure at 41 crossings, including the LACC. Bridges are the primary proposed structure at six crossings, including four multi-use crossings spanning five WUS, and EB and WB bridges over the Salt River. Channels/ditches are the primary proposed structure at the remaining 2 crossings. Additionally, all WUS would be passed under the freeway with this alternative by installing new culverts or bridges, or replacing existing culverts to maintain current flow characteristics. All new drainage structures would be constructed under this alternative.

In areas where flows are presently characterized by a sheet-flow drainage pattern, some crossings in this alternative would have spreader basins placed downstream of the freeway to redistribute flows back to a sheet-flow pattern. These structures will help in maintaining existing flow patterns in WUS.

The overall proposed design of the bridges through the Salt River and its associated floodplain includes two approximately 2,660-foot long 16-span Precast/Prestressed Concrete BT82 Girder bridges with 15 piers each. The bridge design for Alternative C is 666 feet shorter and has seven less piers than Alternative B. Piers are each supported by four 72-inch diameter drilled shaft columns, and average span widths are approximately 170-feet between the piers. Design of the Salt River bridges would involve the construction of 22 pier columns within WUS supporting portions of six piers (three less than Alternative B). Scour protection aprons would be constructed around each column to protect the structure from erosion and reduce future maintenance needs. The duration of temporary impacts in the Salt River for this alternative have been reduced to less than 12 months, which is 6 months shorter than Alternative B.

At the LACC, freeway onsite drainage would not be discharged into the LACC and no outfall would be constructed. Instead, onsite drainage would be conveyed under the LACC via a siphon and channel to a large first-flush detention basin located just south of the Salt River. Cumulatively, 12.959 acres of impact to WUS would result from Alternative C within the project limits, but it would result in 1.852 fewer acres being permanently impacted when compared to Alternative B. All WUS would be conveyed across the freeway under this alternative and existing drainage configurations would be maintained. No flows would be cut-off or redirected as was described in Alternative B, resulting in no permanent impacts from downstream loss. The proposed project would cost $106 million for work associated with WUS.

Proposed Maintenance Activities

Maintenance activities would include the repair or replacement of structures, sediment and debris removal, erosion repair, and authorize the placement of temporary fills to complete maintenance work as described in Section 2.1.

Table 4. Alternative C Criteria Comparison

Overall Project Purpose	Would meet overall project purpose
Cost (Work associated with WUS)	$106 million
Technology	Capable of being done
Logistics	Capable of being done
Environmental Impacts within Corps Jurisdiction	Permanent impacts to WUS: 5.829 acres Temporary impacts to WUS: 7.130 acres Total impacts to WUS: 12.959 acres

4.2. Alternatives Considered But Rejected

4.2.2. Alternative A – North of South Mountain

Alternative A, which actually consists of 3 sub alternatives developed in the FEIS, would entail constructing a freeway north of the South Mountains from the US 60 (Superstition Freeway) terminus at I-10 (Maricopa Freeway) to one of three locations: I-10 at State Route 51, I-17 at the 'Durango Curve' (19th Avenue area), or I-10 (Papago Freeway) between I-17 and Loop 101 (Figure 3). These alternative terminus locations are considered under one alternative for the 404(b)(1) alternatives analysis since the impacts to WUS and the environment are similar for all three routes. Each sub alternative would result in construction of two bridges across the Salt River measuring approximately 900 to 2,700 feet long (to accommodate the different widths of the Salt River floodway at each location). The bridges would likely be Precast/Prestressed Concrete BT82 Girder bridges supported by piers that would be constructed atop 72-inch diameter drilled shafts. Design of the Salt River bridges for Alternative A would involve the construction of portions of six to nine piers in waters of the US, resulting in an average of 0.409 acre of permanent impacts and 6.836 acre of temporary impacts. No other WUS would be impacted with the construction of this alternative. Because the area is urbanized and consists of primarily residential and commercial areas, thousands of properties would have to be acquired along the entire route and the current residents would need to be relocated. This alternative would also cause substantial disruption to community character and cohesion, splitting South Mountain Village and constructing a barrier between schools, parks, and residences.

Although Alternative A would permanently impact the least amount of WUS, it would not achieve the overall project purpose. Congestion and travel delays would still occur on I-10 (Maricopa Freeway) and US 60 (Superstition Freeway), extending to the east to the SR 101L (Price Freeway). There would also continue to be limited travel options through the Phoenix region, as all traffic would still be routed through central Phoenix as well as on existing arterial streets in areas where no freeway exists (particularly in southwest Phoenix). With the population in the area projected to continue increasing, congestion and travel delays would increase in the future, decreasing the networks ability to provide for the safe transportation of people and goods in the region. Furthermore, Alternative A would result in other significant adverse environmental impacts to South Mount Village. Therefore, Alternative A does not meet the requirement of the Guidelines and is not considered in further detail.

Table 5. Alternative A Criteria Comparison

Overall Project Purpose	Would not meet the overall project purpose.
Cost (Work associated with WUS:	$31.4 million
Technology:	Capable of being done
Logistics:	Capable of being done, though with significant indirect logistical considerations associated with property acquisition and relocation of residents
Environmental: (Impacts within Corps Jurisdiction)	Permanent Impacts to WUS: 0.409 acre Temporary impacts to WUS: 6.836 acres Total impacts to WUS: 7.245 acres

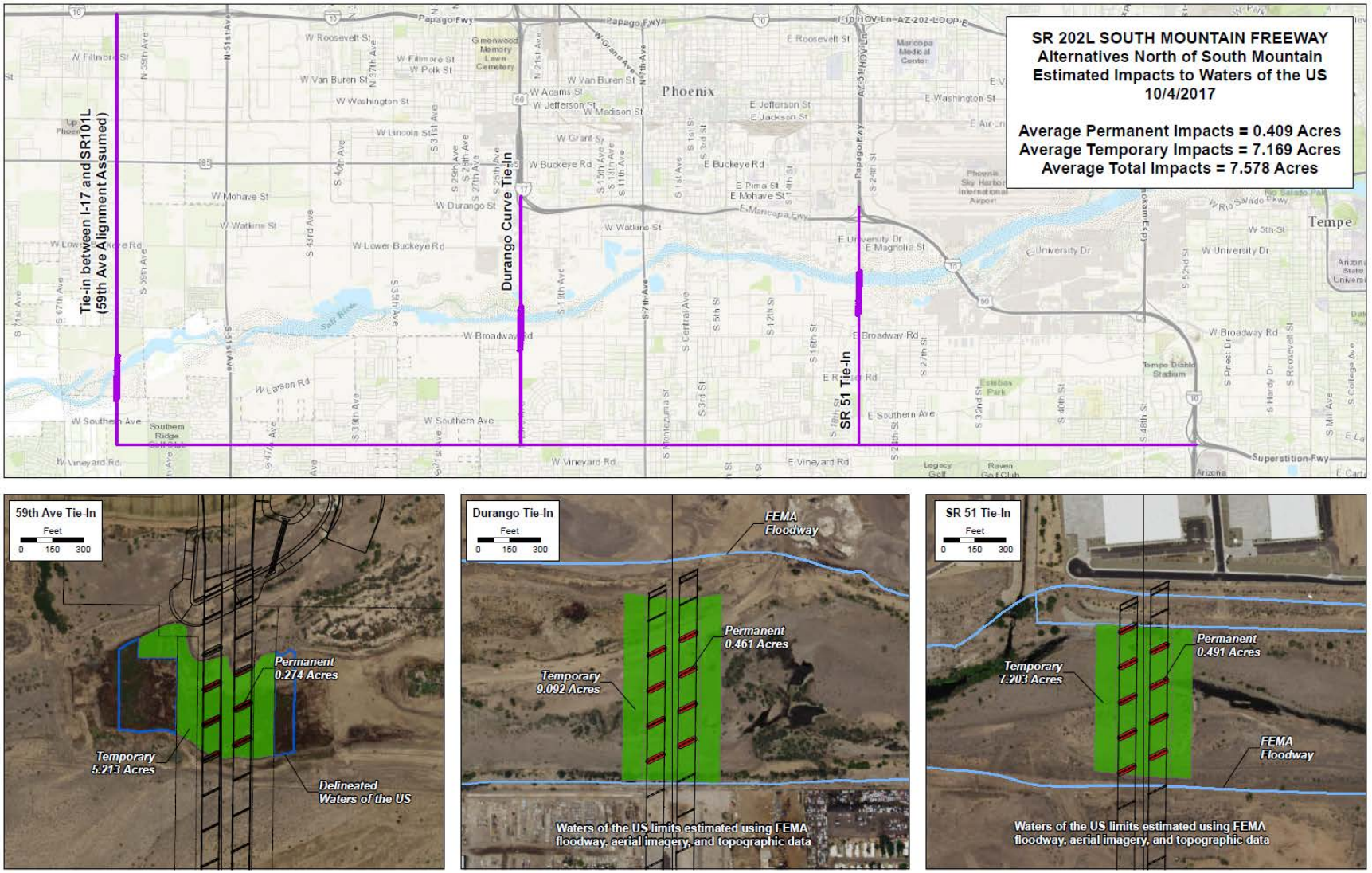

Figure 3. Potential crossing locations associated with Alternative A- North of South Mountain. Source: Connect 202 Partners.

4.2.2 No Corps Action Alternative

The No Corps Action Alternative would result in construction of the freeway in upland areas as described in Section 4.1.1. However, all WUS would be spanned completely by constructing bridges or placing oversized arch culverts. In order to span the Salt River, an unconventional bridge structure would need to be designed which would significantly increase engineering, design, construction, and maintenance costs. Activities such as vegetation removal, equipment operation, and excavation, in a manner not regulated by the Corps, would still occur within WUS. More of the freeway alignment would need to be raised to accommodate the crossing structures, which would require significantly more fill material and would expand the footprint of the project. Additional property may need to be acquired and additional residences or businesses relocated to accommodate the larger footprint. Increasing the project footprint would likely result in increased impacts to most resource categories.

Table 6. No Corps Action Alternative Criteria Comparison.

Overall Project Purpose	Would meet overall project purpose.
Cost (Work associated with WUS)	$700 million
Technology	Capable of being done but would require significantly more design effort
Logistics	Capable of being done but would significantly increase the need for materials originating off-site (e.g., dirt fill, concrete, steel)
Environmental Impacts within Corps Jurisdiction	No impacts to WUS within the Corps' jurisdiction.

This alternative is not practicable due to cost associated with constructing structures to span all WUS. The cost of drainage work is approximately 6 times higher than the two action alternatives. The increased cost results from the higher costs of bridges compared to culverts in addition to changes in the road profile needed to accommodate bridge structures, which typically requires more fill material. Bridges also typically require more scour protection measures, such as hard bank protection at the abutments. Also, the unconventional bridge structure that would be required to completely span the Salt River would likely result in increased engineering, design, and maintenance costs. Therefore, this alternative was rejected from further consideration.

4.2.3. Other Alternatives

The FEIS also considered a range of other alternatives that were eliminated during the study and the Section 4(f) review, which are summarized here but are not considered further for the purposes of the 404(b)(1) Guidelines. Alternatives that would completely avoid the South Mountains to the south would have to be at least partially located on Community land to achieve the overall project purpose, and permission to develop such alternatives was not granted by the Community government. In addition, some South

Mountain resources extend south onto Community land, preventing complete avoidance of those resources without going further south to completely avoid the South Mountains. Therefore, the Corps does not consider any alternative on Community lands as practicable and did not develop or consider them in detail.

As proposed, the new freeway would pass through the southwestern edge of the South Mountains. This alignment, similar to that planned since the late 1980s, would follow existing terrain except where cuts to the hillsides would be needed to pass through the ridgelines. Local residents and representatives from the City of Phoenix, Ahwatukee Foothills Village, the Community, and the South Mountain Citizens Advisory Team expressed concerns during EIS development that these cuts would substantially and adversely affect the South Mountains' valued resources. In response, design options were developed in an effort to avoid and/or reduce impacts on the mountains. Design options considered fell into two categories; build a bridge over the South Mountains, or build a tunnel under the South Mountains. However, assessment of these design options concluded (FHWA and ADOT, 2014):

- "Options to build a bridge over the South Mountains were eliminated from further study because of incident management and homeland security concerns, constructability and maintenance issues, future expansion limitations, substantially higher estimated construction costs, and undesirable intrusion-related impacts

- Building a tunnel under the South Mountains as a design option was also assessed and, based on safety and constructability, undesirable intrusion-related impacts, maintenance, and construction cost, it was eliminated from further study"

For the purposes of the 404(b)(1) Guidelines, options that include building a bridge or tunneling under the South Mountains are not considered practicable. While the technology exists for both of these alternatives to be constructed, the logistical and cost considerations described above make these alternatives very difficult to implement with little benefit to the resources since these alternatives would still result in impacts to the South Mountain Park and Preserve (SMPP), the South Mountains, and a comparable amount of WUS.

Table 7. 404(b)(1) Alternatives Summary

Alternative	Criterion 1: Overall Project Purpose	Criterion 2: Cost (estimated cost of work within WUS)	Criterion 3: Technology	Criterion 4: Logistics	Criterion 5: Environmental	Practicable*? (Y/N)
No Corps Action (Spanning all WUS)	Yes	$700 million	Capable of being done	Capable of being done	No impacts to WUS, though spanning all WUS would require bridges or other structures that typically require raising the roadway profile, which requires more fill material and consequently increases the project footprint. Increasing the project footprint would likely result in increased impacts to most resource categories. Non-regulated activities would still occur in WUS	No
Alternative A – North of South Mountains	No	$ 31.4 million	Capable of being done	Capable of being done	Permanent impacts to WUS: 0.409 Temporary impacts to WUS: 6.836 Total impacts to WUS: 7.245 Impacts to the South Mountains would be eliminated, but significant adverse environmental effects would occur with thousands of residences and over 100 businesses being acquired and relocated.	No
Alternative B – Final L/DCR Design	Yes	$137 million	Capable of being done	Capable of being done	Permanent impacts to WUS: 7.681 acres Temporary impacts to WUS: 1.605 acres Total impacts to WUS: 9.286 acres Impacts to other resource categories would be similar to that of Alternative C	Yes
Alternative C – Connect 202 Partners Design	Yes	$106 million	Capable of being done	Capable of being done	Permanent impacts to WUS: 5.829 acres Temporary impacts to WUS: 7.130 acres Total impacts to WUS: 12.959 acres	Yes

*Per the 404(b)(1) Guidelines under 40 C.F.R. 230, this alternatives analysis based practicability on an alternative's capability "of being done after taking into consideration cost, exiting technology, and logistics in light of overall project purposes."

4. Existing Site Conditions

In order to evaluate the potential short-term and long-term effects of the proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment in light of subparts C through F of the Section 404(b)(1) Guidelines, this section provides an overview of the baseline conditions of the aquatic resources present in the proposed project area. More detailed discussions of existing conditions are contained in the FEIS.

The project area is located in the Salt River Basin within the Gila River watershed, which encompasses an area of approximately 57,900 square miles in Arizona and New Mexico. WUS in the project limits consist of the Salt River, LACC, and 51 small ephemeral desert washes averaging 5-15 feet wide. There are no wetlands or other special aquatic sites in the project area.

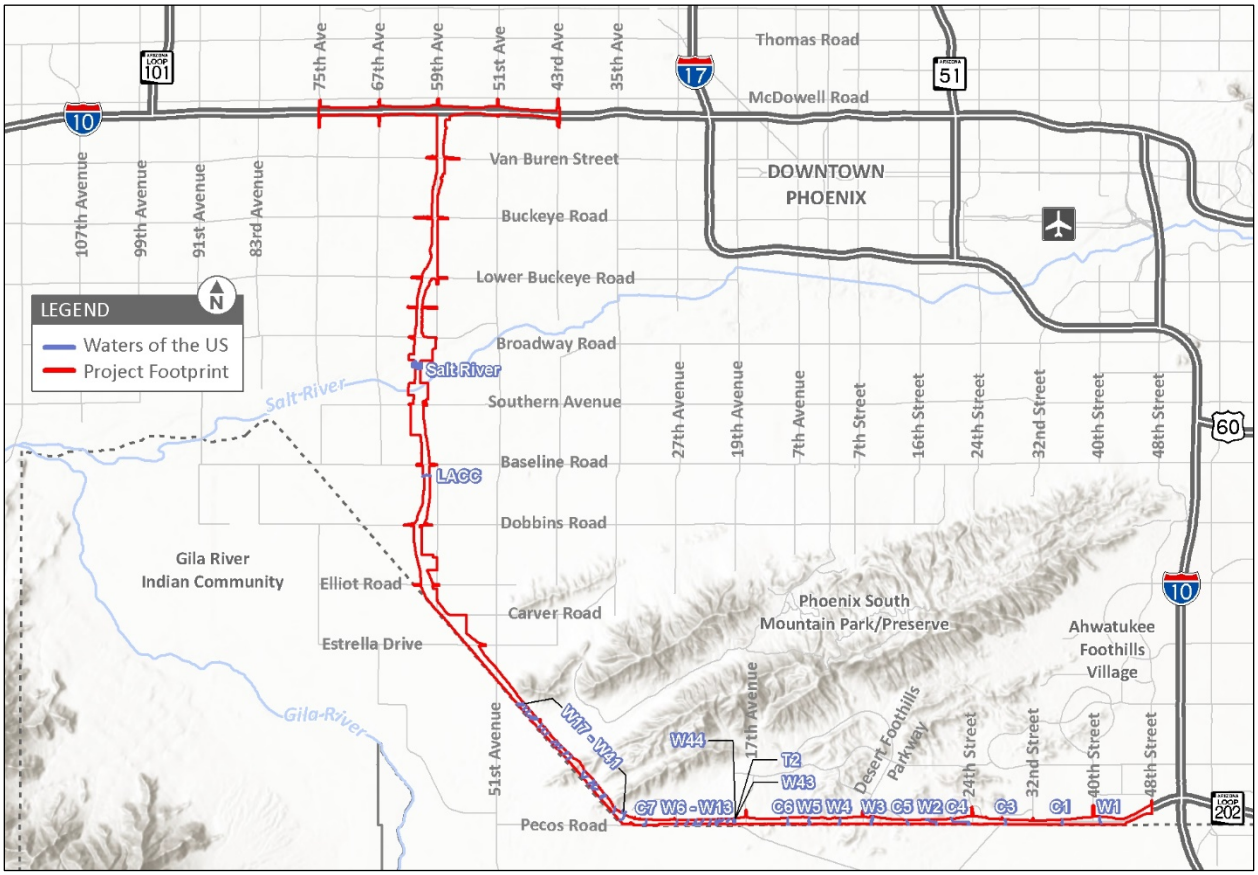

Figure 4. WUS in the project footprint. Source: Connect 202 Partners.

The Salt River crosses the project limits between Southern Avenue and Broadway Road and is the major WUS feature in the project area. The Salt River Basin encompasses approximately 5,980 square miles in eastern and central Arizona and includes the Phoenix metro area. The majority of Salt River flows are captured by reservoirs and dams/diversion structures upstream of the Phoenix metro area, including (from upstream to downstream) Roosevelt, Apache, Canyon, and Saguaro lakes and the Granite Reef Dam and Diversion

Structure. Greater than 90 percent of Salt River flow enters the system upstream of Roosevelt Lake.

The Salt River is the primary source of domestic and agricultural water for the Phoenix metro area. The Granite Reef Dam and Diversion Structure, located approximately 23 miles northeast of the project, diverts the majority of flows from the Salt and Verde rivers (including releases from the upstream reservoirs) into an extensive canal system. The canal system is funded and owned by the US Bureau of Reclamation and operated by the Salt River Project (SRP) for the purposes of delivering water for agricultural and domestic use.

Flow characteristics of the Salt River in the Phoenix metro area vary and are determined by canal diversions, groundwater withdrawals, and the magnitude of releases from upstream reservoirs, which in turn depend on snow and rainfall conditions in the watershed. Sources of surface flow in the Salt River through Phoenix are primarily limited to periodic releases from the upstream reservoirs, wastewater treatment plant discharges, agricultural return flows, "dry" flows from storm water outfalls (e.g., landscape irrigation runoff), and runoff from storms in the watershed below the reservoirs. Because of this, surface flows in the Salt River in the Phoenix metro area are generally ephemeral, intermittent, or seasonal depending on the specific location.

The Salt River in the project area is highly disturbed primarily due to sand and gravel mining and typically does not support surface flow. Within the project limits, the jurisdictional limits of the Salt River are confined to an inactive mining pit which captures the infrequent flows that persist temporarily until the water recedes/percolates and the pit dries. The Salt River within the project area is considered ephemeral since the channel may be dry for years at a time until a release is made from upstream reservoirs in such a quantity that it reaches the project area and charges the mine pit.

Aside from the Salt River, the only other WUS in the project limits west of 51st Avenue is the LACC, which crosses the project area between Baseline Road and Dobbins Road. The LACC was designed and built as a flood control structure but also collects irrigation tail water and other local runoff. Within the project limits, the LACC is grass-lined with a narrow concrete low-flow channel that typically supports some surface flow most of the year. The LACC discharges into the Community's Pee Posh Wetland Restoration project and subsequently into the Salt River approximately 3 stream miles downstream of the project. The wetlands support a cottonwood-willow gallery and provides habitat for an array of wildlife.

In the eastern portion of the project (east of 51st Avenue), WUS consist of 49 smaller ephemeral desert washes and constructed channels that collect runoff from the South Mountains. These channels consist of sandy or rocky alluvium and typically consist of the same desert scrub vegetation that occurs in upland areas. Between 51st Avenue and Chandler Boulevard, these washes flow to the southwest through native desert to Community lands and toward the Gila River. East of Chandler Boulevard, the washes flow through existing drainage culverts along Pecos Road and more to the south toward Community lands and the

Gila River. Vegetation in this area tends to occur at higher densities due to the increased surface runoff from urban development located upstream of the project. Most of these drainages appear to be intercepted by agricultural fields and associated irrigation ditches or development on Community lands.

As described above, many of the WUS in the project area have been altered or disturbed to some extent, and all but the concrete and grass-lined LACC are ephemeral. Generally, the type of aquatic resources in the project area are common throughout the region and are relatively low in quality. However, they do exhibit the following functions[5] and services[6]:

Surface water storage: Surface water storage refers to the ability of a watercourse to provide long and short-term surface storage which allows soil saturation (moisture), provides seasonal ponding for nutrient cycling and habitat for aquatic organisms, reduces the peak flood discharge, and improves downstream water quality through detention of flows. Within the project area, the Salt River provides some surface water storage functions due to the mine pit's capacity to temporarily store flows and the width of the floodplains within the project area. Other ephemeral washes in the project area may provide some surface water storage, but it would be limited by what is provided by soil saturation.

Subsurface flow: Subsurface flow refers to the ability of ephemeral watercourses to store and allow subsurface flow which maintains biogeochemical processes, soil moisture, and habitats (Fischenich, 2006). Functions are higher in areas, such as lower gradient streams, where subsurface flows interact with groundwater and is dependent on amount of substrate. Due to the degree of bedrock typically found in headwater streams, they tend to play less a role in subsurface flow functions. Subsurface flow functions in Salt River within the project area are likely to be moderate to high due to the shallow groundwater and the discharges of treated effluent and irrigation tailwater occur in the area. Infrequent releases from upstream reservoirs also provide a short-term increase in this function. However, if subsurface flows occur they are likely infrequent or at a depth that does not support riparian vegetation within the project limits. In other watercourses in the project, this function is likely minimal due to concrete lining of the channel (such as the LACC), shallow depth of the substrate, or the limited time that flows are present within the channel.

Energy dissipation: The degree of the energy of water is determined by slope, geometry, and the roughness of the stream. Lower stream energy is associated with lower velocity which, in turn, reduces the movement of particulates, prevents high erosion, and improves water quality (Levick et al., 2008). As flow velocity decreases from higher gradient to lower gradient streams with larger floodplains, more energy dissipation occurs. Energy dissipation functions within the project area are variable depending on the location. In the washes in the Pecos and Center Segment, moderate to minimal energy dissipation likely occurs due to the slope of land near South Mountain, lack of substantial vegetation and channel roughness, and modified geometry that is a result from development along Pecos Road. At the LACC, little

[5] *Function* means the "physical, chemical, and biological processes that occur in ecosystems." 33 C.F.R. § 332.2

[6] *Services* means the "benefits that human populations receive from functions that occur in ecosystems." 33 C.F.R. § 332.2.

to no dissipation occurs since the purpose of the channel is to convey storm flows and prevent flooding of the surrounding neighborhood. In the Salt River, a wider floodplain is present and increased storage areas results in higher energy dissipation.

Groundwater recharge: Recharge of groundwater by streams functions to maintain groundwater dependent (riparian) habitat. Groundwater recharge is the amount of surface water which infiltrates to deep groundwater storage basins. It is dependent on porosity and depth of substrate beneath the wetted portion of the stream as well as stream gradient. Recharge is the highest in mountain front recharge areas (Levick et al., 2008), lower in higher reaches contained by bedrock, and lower in downstream low-gradient reaches which experience increased evapotranspiration. Recharge of groundwater occurs within the Salt River when releases from upstream reservoirs occur. However, these releases may not occur for years at a time so much of the recharge that occurs is localized and is a result of treated effluent or irrigation tailwater that is discharged upstream or downstream of the project. Groundwater recharge in all other WUS impacted by the project is minimal due to the short duration of flows or concrete lining that is present in the channel. This is evident by the lack of riparian vegetation within the entire project area.

Sediment transport: The capacity of the streams to transport sediment is determined by sediment mobility, flow magnitudes, and flow frequency (Fischenich, 2006). Higher watershed streams are typically bedrock and, individually, generally provide less sediment transport functions (Levick et al., 2008); however, collectively these higher gradient streams provide a good source of sediment. Lower gradient streams store sediment in low to medium flow events but provide more significant sources of sediment during high events. Typical of the ephemeral systems found in desert regions, the drainages found in the project area both supply and carry a high amount of sediment when flows occur. Sedimentation can be problematic and often occurs in lowland areas or near constructed structures where velocities are reduced and the sediment load is dropped.

Biogeochemical nutrient cycling: Specific functions of biogeochemical processes include nutrient cycling and removal, detention, and exportation of elements, compounds, and particulates (Levick et al., 2008) and is dependent on organic matter inputs and water/sediment contact. The greater the organic matter input and water/sediment contact, the greater the occurrence of biogeochemical processes. Particulates detained in depositional areas within the floodplain allow for increased storage of elements, compounds, and particulates and increased nutrient processing (Levick et al., 2008). Biogeochemical nutrient cycling is typically greater in lower gradient streams due to the increased length of time water and sediment are in contact. As mentioned earlier, flows in drainages impacted by the project often contain high amounts of sediment, which likely aids in nutrient cycling and transport to lowland areas were flows subside. However, organic matter is limited outside of the developed areas along Pecos Road due to the arid desert climate and lack of flows needed to sustain denser vegetation. Many of the washes are first or second order streams, which experience less flow volume and duration when compared to higher order streams. While Biogeochemical nutrient cycling does occur in the project area, the processes are much less

than those found in other locations where an organic source is more readily available and flows occur more frequently or for longer periods of time.

Organic carbon export: Export of organic carbon provides a primary source of energy for downstream food chains (Levick et al., 2008). Headwater streams and floodplain channels store large amounts of carbon from plant matter which is, subsequently, transported downstream during higher storm event flows. Upland and riparian vegetation adjacent to these headwater streams and their associated floodplains is the primary source of carbon. However, in the project area, vegetation is lacking and the amount of available carbon is likely limited due to the arid desert climate. The highest amount of carbon transport likely occurs in the LACC (and the Salt River when flows occur) since the water in these channels support aquatic organisms and originate or pass through areas with much more vegetative organic material available (forested and riparian areas or agricultural areas).

Habitat connectivity/structure: Streams which support riparian habitat provide diversity for plant and animal communities. These communities are distinct from upland habitats and provide corridors for wildlife (Levick et al., 2008; Fishenich, 2006). Levick et al. (2008) states that species composition and diversity increase as from smaller, headwater streams to larger, downstream streams as the availability of water increases in the downstream areas. Within the project area, no riparian habitat exists due to the lack of sustained flows and in many areas, there is little difference between the uplands and WUS. While there are perennial flows within the LACC, the channel is partially lined with concrete and any vegetation present is limited to landscaped grass or bare ground. Many of the areas along Pecos Road have also been modified, but some WUS contain higher amounts of vegetation than the uplands due to the additional runoff available from surrounding developments. While these drainages do much provide much in terms of diversity, these washes likely provide an important migration corridor for wildlife to travel between the South Mountains and the Gila River floodplain or the Sierra Estrella Mountains, which would be separated by the proposed project. The Gila River floodplain, while lacking riparian habitat in most areas, still contains a high amount of woody vegetation and groundcover that likely provides an important habitat type and a food source not readily available in the South Mountains. Therefore, the connections that the drainages in the project area provide between the lowlands and the mountains are likely important to maintain healthy wildlife populations in the area.

5. Impact Analysis

The following discussion evaluates the direct and secondary impacts of Alternatives B and C on environmental resources identified in subparts C through F of the Section 404(b)(1) Guidelines.

5.1. Physical and Chemical Characteristics of the Aquatic Ecosystem

Pursuant to 40 CFR Part 230 subpart C these characteristics consist of substrate, current patterns and water circulation, suspended particulates, water, and normal water fluctuations.

5.1.1. Substrate

As discussed in Section 5 above, the Salt River in the project area is highly disturbed primarily due to sand and gravel mining. At the SMF crossing of the Salt River, substrate within WUS is a sand and cobble mix with low vegetation consisting mostly of annuals and shrubs. The LACC is grass-lined with a narrow concrete low-flow channel. Substrate of the desert washes and constructed channels east of 51st Avenue is sandy or rocky alluvium that typically supports some of the same desert scrub vegetation occurring in adjacent upland areas.

Impacts Common to Both Alternatives: Both alternatives considered in detail would have similar impacts to WUS substrate as both alternatives follow essentially the same alignment and would impact most of the same drainages in similar locations. The primary direct and permanent impact to substrate for both alternatives is replacement of existing native substrate with material such as concrete, steel, plastic, or rip-rap for the culverts, bridges, channels, and associated erosion protection features that would be constructed to pass WUS under the freeway. During construction of either alternative, existing substrate will also be temporarily disturbed due to equipment maneuvering and over-excavation necessary to construct the culverts, bridges, and channels. However, native substrate temporarily disturbed during construction would be restored to preconstruction conditions and elevations as much as possible.

Converting natural substrate to hard surfaces also has the indirect impact of reducing the rate of water infiltration and soil moisture, which would impact the vegetation in the immediate area of each structure. These changes in the substrate may also result in changes to the currents, circulation, and drainage patterns in these areas due to the change in surface roughness, elevation and contours at each crossing. As a result, there may be some erosion, slumping, scour, or sedimentation upstream or downstream of the hardened areas associated with both alternatives, but properly designed scour protection or energy dissipation measures would mitigate these impacts as well as ongoing maintenance activities such as sediment removal and erosion repair. In some cases, removal of native accumulated sediments would be excavated and then could be discharged in another location to repair erosion. Placement of these sediments in the scoured or eroded areas would result in a more stable channel.

The ephemeral washes east of Chandler Boulevard already have concrete or metal pipe substrates at their crossings under Pecos Road, though for both alternatives, more native

substrate would be converted to concrete or other hard surfaces to accommodate the increased width of the freeway compared to that of Pecos Road.

Maintenance activities for both alternatives may include the repair or replacement of structures, sediment and debris removal, erosion repair, and placement of temporary fills to complete maintenance work, all of which would be limited to the ROW. All these activities involve disturbance to substrate, and may result in minor increases in permanent impacts if deviations occur. The specific maintenance activities required and their associated impacts are difficult to predict as they depend on unpredictable circumstances such as weather events. However, impacts to substrate due to maintenance are expected to be minor and would be similar for both alternatives. A special condition limited the amount of additional permanent impact that may occur as a result of a deviation in the fill area would minimize additional impacts.

Overall, because the project is a linear transportation project with mostly perpendicular crossings of WUS, the modification of substrate at each crossing is small in relation to the overall drainage length, so direct and indirect impacts are expected to be localized and minimal for both alternatives.

Alternative B – L/DCR Design: Total replacement of existing substrate for this alternative would be 5.136 acres. An additional 2.545 acres would remain disturbed for more than 12 months for construction access and temporary fill impact in the Salt River. However, this area would remain natural ground surface. Total temporary impacts to substrate would be 1.605 acres.

For this alternative, the Salt River bridge design would require nine piers to be constructed within WUS, resulting in 0.117 acre of direct permanent impact. However, as provided above, an additional 2.545 acres would remain disturbed for more than 12 months, but would be restored to preconstruction conditions and elevations as much as possible.

At the LACC, the L/DCR design called for a bridge that would span the LACC and there would be no permanent replacement of substrate at the LACC, only 0.788 acre of temporary substrate disturbance during construction, which includes removal of any sediment and other debris or obstructions that may be transported into the work site to maintain LACC flows during construction.

At the desert washes and constructed channels east of 51st Avenue, 4.08 acres of substrate would be permanently replaced and 0.842 acres would be temporarily disturbed.

Alternative C – C202P Design: Total replacement of existing substrate for this alternative would be 5.829 acres and total temporary impacts to substrate would be 7.130 acres. For this alternative, the Salt River bridge design would only require six piers to be constructed within WUS, but calls for scour protection around each of those piers, which increases the direct permanent substrate impact for this crossing to 0.274 acres. An additional 5.213 acres of temporary disturbance to substrate would result from access and

temporary fill for crane pads. However, this additional 5.213 acres would remain disturbed for less than 12 months, and would be restored to preconstruction conditions and elevations as much as possible.

At the LACC, a box culvert would be constructed on the same alignment as the existing channel for this alternative. The box culvert includes a concrete low flow channel matching the alignment and elevation of the existing concrete low flow channel, though a portion of the grassy substrate of the LACC would be replaced with concrete. In total 0.370 acres of substrate would be permanently impacted at the LACC and 0.417 acres would be temporarily disturbed. The temporary disturbance includes removal of any sediment and other debris or obstructions that may be transported into the work site to maintain LACC flows during construction.

At the desert washes east of 51st Avenue, 5.185 acres of substrate would be permanently replaced and 0.632 acres would be temporarily disturbed.

Conclusions: Cumulatively, Alternative B would result in 0.693 acre less permanent substrate replacement and 4.657 acres less temporary substrate disturbance than Alternative C. At the Salt River, Alternative B would result in less permanent substrate replacement, but activities would occur over a longer period of time (18 months instead of 12 months). At the LACC, Alternative B would also result in fewer impacts to substrate; though this drainage is grass-lined with a concrete low-flow channel and is not a natural drainage feature. At the desert washes east of 51st Avenue, Alternative B would result in fewer permanent impacts than Alternative C, but more temporary impacts than Alternative C. As discussed above, indirect impacts to substrate are expected to be similar for both alternatives; however, indirect impacts are likely to be commensurate with direct impacts; therefore, Alternative B would like result in slightly fewer indirect impacts than Alternative C. However, as discussed above the modification of substrate at each crossing is small in relation to the overall drainage length, so direct and indirect impacts to functions and services are expected to be localized and minimal for both alternatives. Permanent impacts to substrate would be mitigated through compensatory mitigation, regardless of the alternative.

5.1.2. Suspended Particulates/Turbidity

Flows that occur in desert ephemeral washes typically have a high level of turbidity when flow events occur. This is further exacerbated by runoff from upland residential and industrial sources. Such is the case for the Salt River and drainages east of 51st Avenue. However, the LACC has a concrete-lined low-flow channel and normal flows in the LACC are slow enough that most suspended particulates settle out, thus turbidity is typically lower.

Impacts Common to Both Alternatives: Both alternatives considered in detail would have similar impacts to suspended particulates/turbidity as both alternatives follow essentially the same alignment and would impact most of the same drainages in similar locations. The primary direct impact to particulates/turbidity for both alternatives would

be temporary increases in suspended particulates in WUS during construction and during maintenance activities such as erosion repair or sediment removal. The temporary increase is not expected to have a noticeable impact to the suspended particulates or turbidity that already exists when flows occur in the Salt River or the desert washes east of 51st Avenue. To minimize impacts, no work would occur in any of the ephemeral washes if water is present. As provided above, turbidity is typically lower at the LACC, though measures would be implemented to prevent increases in particulates for both alternatives as described below. This would also apply to potential temporary increases at the LACC due to removal of any sediment and other debris or obstructions that may be transported into the work site to maintain LACC flows during construction.

A more indirect and permanent impact common to both alternatives after construction is complete would be potential increases in particulates/turbidity in runoff from the freeway facility. However, ADOT is required per the stipulations of their Municipal Surface Storm Sewer System (MS4) Permit to "protect water quality by reducing, to the maximum extent practicable, any discharge that may cause or contribute to an exceedance of any surface water quality standard (SWQS) of the State of Arizona (A.A.C. Title 18, Chapter 11, Article 1), applicable to receiving waters of the MS4." Receiving waters applicable to this project are generally the WUS in the project area.

As part of ADOT's MS4 compliance, on-site drainage for both alternatives would be captured with catch basins and storm drains and conveyed to first-flush basins to keep on-site drainage separate from off-site drainage until the on-site drainage is treated via the first-flush basins. This also prevents impacts to discharge, velocity, or surface elevation to WUS flowing through the project limits, all of which helps avoid or minimize increases in suspended particulates/turbidity.

Both alternatives would require a Section 401 water quality certification from the Arizona Department of Environmental Quality (ADEQ), which includes special conditions to protect water quality. A SWPPP would also be developed and implemented for either alternative to protect water quality during construction. The SWPPP specifies BMPs to control erosion and sediment due to construction-related activities. Examples of BMPs include erosion control mats, straw waddles, earthen berms, and rock check dams that are placed to intercept runoff from areas disturbed by construction to reduce particulates in the runoff before it enters WUS.

Alternative B – L/DCR Design: At the Salt River, Alternative B would result in overall less disturbance to natural ground surfaces, which may reduce the potential for increases in particulates/turbidity if a flow event occurred during construction; however, as provided above, any contribution of particulates due to construction would be insignificant compared to that of normal Salt River flow events.

At the LACC, this alternative involves constructing a bridge to span the LACC and an outfall spillway from a first-flush basin. Though the associated temporary disturbance in the LACC has the potential to introduce particulates into LACC flows, implementation of

SWPPP BMPs such as straw wattles would likely reduce that impact. While the first-flush basin would treat onsite drainage from the freeway prior to discharging into the LACC, there is potential that the basin would increase the amount of particulates/turbidity in LACC flows when discharges occur. The first-flush basins are designed to collect and treat the first ½ inch of runoff, thus a large precipitation event could overwhelm the first-flush basin's capacity, resulting in a temporary increase in suspended particulates/turbidity of discharge into the LACC. However, this temporary increase would likely be consistent with increases typically experienced during large precipitation events.

For the desert washes and constructed channels east of 51st Avenue, impacts to particulates/turbidity during construction for this alternative would be similar to that of Alternative C and would be minimized through implementation of the Section 401 water quality certification conditions and SWPPP BMPs.

Long term, the Alternative B design calls for fewer and/or smaller first-flush basins than Alternative C, which may result in Alternative B having a greater indirect and permanent impact to water quality by introducing more particulates into WUS via runoff from the freeway facility after construction is complete.

Alternative C – C202P Design: This alternative requires more area to be disturbed at the Salt River than Alternative B, which may increase the potential for particulate introduction if a flow event occurred during construction. However, this disturbance would occur over a reduced timeframe compared to Alternative B (12 months for Alternative C versus 18 months for Alternative B), which may negate the potential increase in impacts. As provided above, any contribution of particulates due to construction would be insignificant compared to that of normal Salt River flow events.

At the LACC crossing, a box culvert would be constructed for this alternative. A siphon would also be constructed east of the box culvert to convey onsite drainage from the freeway under the LACC to a channel that continues north to a large first-flush basin that outfalls to the Salt River. During construction, LACC flows would be bypassed around the construction site. Depending on the bypass method, there is potential for an increase in turbidity if the water is conveyed or discharged on loose substrates (such as an unlined channel) or at a velocity that creates scour or erosion at the discharge point. However, this can be avoided by conveying the bypass flow using hoses or a lined channel, discharging the water into a stilling basin or riprap lined area, and using settling basins allow suspended particulates to drop out of the water. Upon project completion, flows at the LACC would be returned to the concrete channel and conveyed through a concrete box culvert under the freeway. It is expected that no permanent change in suspended particulates or turbidity from preconstruction levels would occur.

As provided above for the desert washes and constructed channels east of 51st Avenue, impacts to particulates/turbidity during construction for this alternative would be similar

to Alternative B and would be minimized through implementation of the Section 401 water quality certification conditions and SWPPP BMPs.

On February 21, 2017, the ADEQ issued an individual Section 401 water quality certification[7] for Alternative C, which includes special conditions to protect water quality. A SWPPP has also been developed and is being implemented to protect water quality during construction.

Conclusions: As provided above, both alternatives would have similar direct impacts to suspended particulates/turbidity, which are primarily temporary impacts during construction and maintenance activities. However, the Alternative B design calls for fewer and/or smaller first-flush basins than Alternative C, which may result in Alternative B having a greater indirect and permanent impact by introducing more particulates into WUS via runoff from the freeway facility after construction is complete. Regardless of the alternative, a SWPPP would be developed and implemented to minimize suspended particulates/turbidity. Impacts to functions and services such as sediment transport, organic transport, biogeochemical nutrient cycling would be minimized by implementing the BMPs described above and in the SWPPP.

5.1.3. Current patterns and water circulation:

As described in Section 5 above, potential WUS in the project limits consist of the Salt River, LACC, and 49 small desert ephemeral washes or constructed channels. The Salt River flows westerly towards the Gila River, as does the LACC, which outfalls into the Salt River approximately 3 miles east-southeast of the project footprint. The desert washes and constructed channels east of 51st flow south and southwesterly towards the Gila River. Since all these water courses are lotic (flowing), the overall general current patterns are downstream to the west and southwest and there is no water circulation in the project area. At the Salt River however, the ordinary high water mark is within an abandoned mine pit and water remains in the pit as a large still pond for some time once flows subside until it percolates into the riverbed and/or dries due to evaporation.

Impacts Common to Both Alternatives: Both alternatives considered in detail would have similar impacts to current patterns as both alternatives follow essentially the same alignment and would impact most of the same drainages in similar locations. At the drainages where no crossing structures currently exist, there may be some modification of velocities and flow direction as result of the conversion of the natural channel to a straight and smooth manmade structure. However, installing scour protection and energy

[7] On October 13, 2017, ADOT provided ADEQ updated information for the WQC regarding changes in design that had occurred since the issuance of the WQC (ADOT also provided this information to the Corps in a revised DA permit application package on October 4th, 2017). In its initial response, ADEQ did not provide any comments or concerns and stated that it would note the impact changes to their files. On October 31, 2017 ADEQ followed up their response by stating that the modifications did not require recertification and that the February 2017 WQC adequately certifies that the project will not violate applicable surface water quality standards.

dissipation measures would reduce the impacts that would occur outside of the project limits. At the LACC, both alternatives would involve removal of any sediment and other debris or obstructions that may be transported into the work site to maintain LACC flows during construction, which may have minor temporary impacts to LACC current patterns.

Maintenance activities for both alternatives would include the repair or replacement of structures, sediment and debris removal, erosion repair, and placement of temporary fills to complete maintenance work, all of which would be limited to the ROW. Although these activities may result in temporary and permanent impacts to current patterns, the specific maintenance activities required and their associated impacts are difficult to predict as they depend on unpredictable circumstances such as weather events. However, impacts to current patterns due to maintenance activities are expected to be minor and would be similar for both alternatives.

Generally, construction and maintenance activities for both alternatives may temporarily influence drainage patterns, but would not permanently modify existing overall drainage patterns of WUS flowing through the project area.

As previously discussed, on-site drainage would be captured with catch basins and storm drains and conveyed to first-flush basins to keep on-site drainage separate from off-site drainage until the on-site drainage is treated via the first-flush basins. This also prevents impacts to discharge, velocity, or surface elevation of WUS flowing through the project limits, which helps avoid or minimizes impacts to drainage patterns, circulation, and fluctuation. Ongoing maintenance activities such as sediment removal or erosion repair would maintain the current patterns and water circulation through the project site, which would ensure that drainage would continue to flow through the project area as designed.

Alternative B – L/DCR Design: The Salt River bridge piers would be spaced approximately 128’ apart under Alternative B, which is closer together than for Alternative C piers at 170’ apart. This results in nine piers located in WUS for Alternative B as opposed to 6 piers for Alternative C. More piers spaced closer together may have a greater permanent influence on current patterns in the river when flows are present. However, less area would be temporarily disturbed under Alternative B, which may reduce temporary impacts to current patterns if a flow event occurred during construction.

The LACC would be spanned by bridges under Alternative B with no bridge piers in the ordinary high water mark, thus Alternative B would likely result in fewer temporary and permanent direct impacts to LACC current patterns.

East of 51st Avenue, Alternative B design does not provide culverts or other pass-through structures for 13 drainages, resulting in 0.914 acre of permanent impact to WUS within the project footprint, as well as an unknown amount of additional permanent loss downstream of the project. This would permanently impact current patterns downstream of the project footprint during flow events. Current patterns would be impacted since it is expected flows would be redirected to other drainages and passed under the freeway.

Alternative C – C202P Design: As provided above, there would be fewer bridge piers spaced farther apart within WUS at the Salt River, which may have less of a permanent influence on current patterns during a flow event. However, more area would be disturbed during construction, which may increase temporary impacts over Alternative B.

A box culvert would be constructed at the LACC under this alternative, which has the potential to impact current patterns both temporarily during construction and permanently inside the culvert once construction is complete. However, normal flows in the LACC are limited to a concrete low-flow channel, which would be matched at the inlets and outlets of the new box culvert; thus, permanent impacts to normal flow current patterns upstream and downstream of the culvert are not anticipated. In addition, LACC flow would not be impeded during construction because it would be bypassed around the work site.

Under Alternative C, although some WUS may be realigned within the ROW, all would be passed under the new freeway via drainage structures such as culverts and bridges and exit the freeway ROW in their existing channels as they currently do. To reduce impacts, ADOT is requiring C202P to ensure that discharge, velocity, or water surface elevation at the outfalls to existing drainage conveyance features must not increase from the existing conditions.

The Corps has received drainage data for the Pecos Segment where design is complete to verify that the proposed project would not result in increases in velocity downstream of the project. The hydrologic and hydraulic review evaluated the general procedures and the result of the analyses, and considered if the flow patterns and velocities were being modified to an extent that would cause downstream impacts. In the review, it was assumed that flow velocities (i.e. currents) of less than 3.0 feet per second (fps) would not result in erosion effects. This was determined by consulting the the Maricopa County Drainage design manual to determine the non-erosive velocity for the soil conditions in the Pecos Segment. In some drainage, existing velocities are greater than 3.0 fps, however an increase of 0.5 fps or less is not believed to noticeably increase erosion or cause a downstream adverse impact. The review found that the proposed project would result in either: 1) velocities in WUS that are less than 3.0 fps and not likely to cause erosion; or 2) result in increases no more than 0.5 fps greater in drainages with existing velocities of 3.0 fps or more, and therefore not likely to increase the rate of erosion (Corps, 2017).

For the Center Segment, only designs and impact sheets for structures proposed in WUS have been provided to the Corps, and no hydraulic and hydrology review has been conducted. Through the DBM process, drainage structures in this Segment were revised in October 2017 to address flooding concerns of the Community and drainage reports have not been made available to date. If the permit is issued, a special condition would be included in the permit to ensure no discharges of fill material in WUS within the Center Segment are allowed to occur unless and until ADOT 1) considers the information provided in the Komatke Area Drainage Master Study 2) conducts a drainage analysis

acceptable to the Corps, 3) submits the drainage reports and hydrologic data to the Corps, and 4) receives written notice to proceed from the Corps.

Conclusions: As provided above, both alternatives would have similar direct impacts to current patterns, which are primarily temporary impacts during construction and maintenance activities. However, Alternative B would truncate 13 smaller ephemeral washes, resulting in 0.914 acre of permanent impact to WUS within the project footprint, as well as an unknown amount of additional permanent loss downstream of the project area. Alternative C provides passage structures for all WUS; therefore, Alternative C would have less of a direct and permanent impact on current patterns in the project area. Under both alternatives, installing scour protection and energy dissipation measures at drainage structures would reduce impacts. Review of hydrologic and hydraulic information by the Corps would verify that impact to current patterns would be minimized.

5.1.4. Normal Water Level Fluctuations

As previously discussed, WUS in the project area are ephemeral except the LACC. At the LACC, normal flows are generally consistently low on a daily, seasonal, and annual basis but can increase substantially during precipitation events in the surrounding area. In the Phoenix area, most precipitation occurs in the winter months and during the Arizona monsoon season that occurs between June 15 and September 30 each year. The Salt River within the project area is ephemeral and the channel may be dry for years at a time until a release is made from upstream reservoirs in such a quantity that it reaches the project area, or there is enough runoff from storms in the watershed below the reservoirs. Within the project limits, the jurisdictional limits of the Salt River are confined to an inactive mining pit which captures the infrequent flows that persist temporarily until the water recedes/percolates and the pit dries. The ephemeral washes and constructed channels east of 51st Avenue only flow due to storm water runoff, which as discussed above typically occur in the winter months and the Arizona monsoon season.

Impacts Common to Both Alternatives: Both alternatives considered in detail would have similar potential impacts to water level fluctuations as both alternatives follow essentially the same alignment and would impact most of the same drainages in similar locations and in a similar manner. At the Salt River, both alternatives cross the abandoned mine pit in the same location and neither would likely have a permanent effect on water level fluctuations during flow events in the river or the rate of percolation/evaporation of water that remains temporarily once flows subside. For the LACC crossing, neither alternative is expected to permanently effect water level fluctuations. However, water level fluctuations in the immediate vicinity of work areas may be influenced temporarily during construction and maintenance activities for both alternatives. At the LACC, both alternatives would involve removal of any sediment and other debris or obstructions that may be transported into the work site to maintain LACC flows during construction, which may have minor temporary impacts to LACC water level fluctuations.

Alternative B – L/DCR Design: For this alternative, the Salt River bridge construction work area is smaller than for Alternative C, which may have a commensurate decrease in potential impacts to water level fluctuations should a flow event occur during construction. Bridges would be constructed at the LACC under Alternative B and no temporary pump-around would be required; however, temporary disturbance to the LACC would still be required, which could impact water level fluctuations. Fort the washes east of 51st Avenue, no work would occur when flows are occurring, though temporary fills during construction may temporarily influence water level fluctuations of these washes should a flow even occur during construction. In addition, 13 drainages would be truncated under this alternative, which would likely impact water level fluctuations upstream and downstream of the freeway.

Alternative C – C202P Design: The Alternative C drainage system is designed to prevent impacts to discharge, velocity, or surface elevation of WUS flowing through the project area, all of which helps avoid or minimize impacts to normal water level fluctuations.

At the Salt River, this alternative would involve a larger work area than Alternative B and temporary fill would be placed for access roads, equipment pads, and other purposes, which may temporarily influence water levels in the immediate vicinity of work areas if surface water is present during construction. However, work in the Salt River under this alternative would occur over a reduced timeframe compared to Alternative B (12 months for Alternative C versus 18 months for Alternative B), which may negate the potential increase in impacts. Furthermore, temporary culverts would be placed under access roads to minimize impacts to water level fluctuations.

At the LACC, a new box culvert would be constructed on the same alignment as the existing channel, and includes a low flow channel matching the alignment and elevation of the existing low flow channel; therefore, Alternative C would not permanently alter water level fluctuations in the LACC. During construction, a temporary pump-around would be employed to divert LACC flows around the box culvert work site. Once the box culvert is complete, flows would be diverted back to the low-flow channel through the new box culvert. This may influence water levels in the LACC in the immediate work area during construction, but would not impact the Pee Posh Wetlands Restoration project downstream.

For the washes east of 51st Avenue, no work would occur when flows are occurring, though temporary fills during construction may temporarily influence water level fluctuations of these washes should a flow even occur during construction.

Conclusions: Neither alternative is anticipated to permanently affect daily, seasonal, or annual fluctuations in water level but may temporarily influence water level fluctuations in the immediate vicinity of work areas during construction and maintenance activities. Because Alternative C would require a larger work area in the Salt River and will involve a pump-around at the LACC, Alternative C may have greater temporary impacts to water

level fluctuations. However, work in the Salt River under Alternative C would occur over a reduced timeframe compared to Alternative B, and Alternative B would still require temporary disturbance at the LACC, all of which may negate any reduction in impacts over Alternative C. Regardless of the alternative, these temporary impacts to water level fluctuations would be minor and localized and special conditions for maintenance of flows and removal of temporary fills would be required to minimize impacts. Impacts to functions and services such as surface water storage, subsurface flows and groundwater recharge are likely to be minimal, but would be mitigated by requiring compensatory mitigation.

5.1.4.1. Flood Fluctuations

As previously described, the Salt River has been substantially altered from its natural condition. Control of flow by upstream dams and reservoirs has resulted in the channel being dry most years. Major flow occurs only when water is released from the upstream reservoir dams or there is a significant precipitation event in the watershed below the reservoirs.

The Center Segment watershed primarily consists of the South Mountains and a small rural residential development in the Dusty Lane area. The Center Segment alignment cuts through three mountain ridges and two alluvial fan valleys. There are no existing drainage structures in the Center Segment.

The Pecos Segment watershed is bounded by the existing Pecos Road to the south, South Mountain to the north, the Dusty Lane alignment to the west, and 40th Street to the east. The north portion of the Pecos Segment watershed is within the SMPP. South of the SMPP, most of the land has been developed. With this development, channels, storm drains and culverts were constructed to collect and convey runoff under the existing Pecos Road; however, most of the existing culverts under Pecos Road are not designed for 50-year or 100-year events and Pecos Road is currently overtopped during less frequent storm events.

Two areas of particular concern are the community of Komatke and the Pecos Road area, which have experienced flooding issues in the past. In particular, flooding in Komatke has had significant impacts to residences and businesses located there. Through tribal consultation and comments received regarding the project, the Community has expressed concerns regarding the project's potential to result in increased flooding frequency on their lands, which are located downstream of the project and just below the foothills of the South Mountains. The Community has made significant investments in protecting businesses and residences in Komatke. At the Vee Quiva Casino, a large apron surrounding the casino has been constructed to intercept and reroute natural surface and jurisdictional flows around the property. The Community has also developed a drainage master study for the Komatke area (Community Department of Land Use Planning, 2016) and recently authorized implementation of the Komatke Area Drainage Master Plan, which proposes control

measures that would help resolve short-term and long-term flooding in the Komatke Area (Community Department of Land Use Planning, 2017).

In the Pecos Road area, residential developments have been built upstream of the road and the project site. Community has stated that flooding of the fields downstream of the road became an issue when the City of Phoenix originally constructed Pecos Road, which would be replaced by the freeway. They have stated that the road acts as a berm and directs surface sheet flows coming off of South Mountain to drainages that cross under the road, concentrating flows in these drainages which are intercepted by fields and the canal located on Community lands. However, the housing developments mentioned above were also built around the same time which resulted in an increase of impervious surfaces and likely contributes to an increase in the storm flows that occur in the area. As mentioned above the existing culverts under Pecos Road are undersized which results in overtopping of the road during significant storm events.

Impacts Common to Both Alternatives: Both alternatives considered in detail would have similar potential impacts to flood fluctuations as both alternatives follow essentially the same alignment and would impact most of the same drainages in similar locations and in a similar manner. In addition, both alternatives include design features to reduce the freeway's impact on flows, such as providing culverts, bridges, and channels to pass off-site flow under the freeway to maintain flow characteristics in these drainages. Another design feature common to both alternatives is the use of an on-site drainage system to capture on-site runoff and convey it to first-flush basins where it is slowly released into off-site drainage features, which are typically WUS This not only avoids or minimizes water quality impacts, it also prevents impacts to discharge, velocity, or surface elevation of WUS flowing through the project limits by metering releases of onsite flows, which helps avoid or minimizes impacts to flood fluctuations.

West of 27th Avenue, the SMF alignment adversely impacts existing retention basins. To mitigate this impact, a series of retention and detention basins are proposed in this area under both alternatives to compensate the lost retention volumes and to attenuate the flow to not adversely impact downstream properties. At the LACC, both alternatives would involve removal of any sediment and other debris or obstructions that may be transported into the work site to maintain LACC flows and reduce flood risk during construction. Both alternatives would also require maintenance, and regular sediment and debris removal from drainage structures would also ensure that flows continue to pass through the structures as designed, reducing the potential for flood risks to develop over time. Although design features common to both alternatives help prevent the potential for flooding due to the freeway, there are some differences in design that may influence flood fluctuations differently as described below.

Alternative B – L/DCR Design: The Salt River bridge piers would be spaced approximately 128' apart under Alternative B, which is closer together than for Alternative C piers at 170' apart. This results in nine piers located in WUS for Alternative B as opposed to 6 piers for Alternative C. More piers spaced closer together may have a greater permanent influence on flood fluctuations in the river when flows are present, particularly during very large (i.e., > 100-year) events.

At the LACC, bridges would be constructed under this alternative. Bridges generally have greater capacity to pass floods due to their typically larger openings compared to other drainage structures such as a culvert.

For the desert washes east of 51st Avenue, this Alternative does not provide drainage structures for 13 of those WUS crossings, 12 of which are located in the Center Segment. These drainages would be truncated by the freeway design, requiring redirecting their flows to other drainages that would be passed under the freeway via bridges or culverts. This would concentrate flows at some drainages, likely causing permanent increases in surface elevations of WUS upstream of the freeway and increases in discharge, velocity, and surface elevation downstream of the freeway.

Alternative C – C202P Design: As discussed above, the Alternative C Salt River bridge piers would be spaced approximately farther apart than for Alternative B, resulting in only 6 piers within WUS. Fewer piers spaced farther apart may have less of a permanent influence on flood fluctuations in the river when flows are present, particularly during very large (i.e., > 100-year) events.

At the LACC, a box culvert would be constructed instead of a bridge. Bridges generally have greater capacity to pass floods due to their typically larger openings compared to other drainage structures such as culverts. However, all drainage structures under Alternative C are designed to convey the 50-year flow event, including the LACC box culvert. For the 100-year event, all culverts are designed to cause no increase in water surface elevation from existing condition upstream or downstream of the project ROW or drainage easement.

For the ephemeral drainages east of 51st Avenue, although some WUS may be realigned within the ROW for Alternative C, all would be passed under the new freeway via drainage structures such as culverts and bridges and exit the freeway ROW in their existing channels as they currently do.

To avoid impacts to flood fluctuations, ADOT has placed the following binding requirements on C202P:

- The Developer shall not permit any increase in water surface elevation from existing conditions upstream or downstream of the project ROW
- Modifications must be made to new or existing drainage features to achieve no rise in water surface elevation outside of the ROW
- Discharge, velocity, or water surface elevation at the outfalls to existing drainage conveyance features must not increase from the existing conditions

The Corps has worked to facilitate discussions between ADOT and the Community Land Use Planning and Zoning Department's Flood Control Section in order to address the Community's concerns along Pecos Road and at the Vee Quiva Casino. ADOT has shared drainage reports and hydrologic data for the Pecos Segment with the Community and the Corps. Based on these discussions, several design modifications have been made to drainage structures, particularly near the Vee Quiva Casino and upstream of Komatke. More culverts were added in this area along with spreader basins on the downstream side of the freeway in order to maintain the sheet-flow characteristics of off-site drainage in this area after it is passed under the freeway.

Alternative C would replace the existing Pecos road and associated drainage structures. New larger culverts would be constructed to convey off-site flow under the freeway. The design frequency for these culverts is 50-year. For the 100-year event, the design shall cause no increase in water surface elevation from existing condition upstream or downstream of the project ROW or drainage easement. These larger structures would accommodate larger flows and may reduce the flooding impacts that preexist the freeway. However, in areas where overtopping currently exists, the multi-use path would be designed to be overtopped to spread flows and preserve the existing sheet-flow pattern that occurs when Pecos Road is overtopped. The Corps has received drainage data for the Pecos Segment where design is complete to verify that the proposed project would not result in flooding and drainage impacts downstream of the project on Community lands (ADOT and C202P, 2017 and 2017a). The review evaluated the general procedures and the result of the analyses, and considered if the flow patterns and velocities were being modified to an extent that would cause downstream impacts. The review found that for all but one WUS crossing (Wash C4) in the Pecos Segment, existing flow patterns were being maintained (Corp, 2017). In C4, existing flows presently overtop Pecos Road, forming a sheet flow as described earlier. At the time of analysis, ADOT and C202P elected to redesign the channel downstream of the freeway mainline to maintain the sheet-flow patterns characteristics and reduce the impacts of concentrating flows within the drainage. However, the modification in design would not change in the area of WUS permanently impacted in Drainage C4 would occur, and impacts would be minimal since the purpose of the modification is to maintain existing flow conditions. The Corps would require submittal of the design and re-verification of the drainage analysis prior to authorizing construction in Drainage C4 downstream of the freeway mainline toe slope.

For the Center Segment, only designs and impact sheets for structures proposed in WUS have been provided to the Corps, and no hydraulic and hydrology review has been conducted. Through the DBM process, drainage structures in this Segment were revised in October 2017 to address flooding concerns of the Community and drainage reports have not been made available to date. Corps-authorized work in the Center Segment would not occur unless and until the Corps can make that verification. If the permit is issued, a special condition will be included in the DA permit to ensure no

discharges of fill material in WUS within the Center Segment are allowed to occur unless and until ADOT 1) considers the information provided in the Komatke Area Drainage Master Study 2) conducts a drainage analysis acceptable to the Corps, 3) submits the drainage reports and hydrologic data to the Corps, and 4) receives written notice to proceed from the Corps. Since no downstream impacts would be occurring and all existing flow patterns and drainage configurations would preserved, there would likely be little to no impact on the projects proposed in the Komatke Area Drainage Master Plan.

Furthermore, maintenance activities would be conducted in order to properly maintain drainage structures and associated features, such as sediment, debris, and obstruction removal. Maintenance would ensure that the structures convey water as designed which reduces the potential for flood hazards as a result of such obstructions.

Conclusions: At the Salt River, both alternatives cross the abandoned mine pit in the same location and neither would likely have a permanent effect on flood fluctuations at the river or downstream. For the LACC crossing, neither alternative is expected to permanently effect typical flood fluctuations, though the box culvert under Alternative C has the potential to influence flood fluctuations during very large (i.e., > 100-year) events. However, all the concern regarding flooding has been with the desert washes and constructed channels east of 51st Avenue in the Center and Pecos Segments. Alternative B does not provide drainage structures for 13 WUS crossings in this area, which as described above would likely result in permanent increases in surface elevations of WUS upstream of the freeway and increases in discharge, velocity, and surface elevation downstream of the freeway. Under Alternative C, all WUS would be passed under the new freeway via drainage structures such as culverts and bridges and exit the freeway ROW in their existing channels as they currently do. As mentioned earlier, The Corps' hydraulic and hydrology review found that for the Pecos Segment, the project is not likely to cause flow velocities to increase to a rate that would cause impacts downstream in WUS in the segment. In addition, the review found that flow patterns were being maintained in all WUS except for Wash C4. Based on the review of the information presently available to the Corps, it is reasonable to believe that Alternative C would have less of an impact on flood fluctuations overall. However, documentation has not been provided by ADOT and C202P to demonstrate this in Wash C4 or the Center Segment. Furthermore, consideration of the project's impacts on the Komatke Area Drainage Master Plan by ADOT and C202P would also need to occur to ensure that the freeway would not impact the proposed solutions identified in the plan, some of which, according to the Community, already have received funding to begin implementation. Therefore, if a permit is issued, a special condition would be included that would require ADOT to provide revised designs for Wash C4 and provide the additional drainage information for the Center Segment for review. ADOT would also need to demonstrate that they

have considered the Komatke Area Drainage Master Study and Plan in their drainage designs. No work would be authorized in these areas until ADOT and C202P have provided information and demonstrated that the project would not result in adverse downstream impacts.

5.1.5. Water

"Water quality limited waters" are water bodies assessed by the ADEQ as having impaired quality and that need more than existing technology and permit controls to achieve or maintain water quality standards for intended uses in accordance with Section 303(d) of the CWA. ADEQ assessments consider water parameters such as pH, dissolved oxygen, nutrient concentrations, as total dissolved solids, measures of clarity such as suspended sediment concentration, and levels of pollutants such as metals and pesticides. The CWA Section 303(d) list identifies those waters that are impaired and the pollutant(s) causing impairment (ADEQ 2011). There are no ADEQ or EPA CWA Section 303(d) impaired or non-attaining waters within 10 miles downstream of the project.

As previously discussed, the only semi-perennial or perennial watercourse in the project limits is the LACC. The Salt River and the desert washes and constructed channels east of 51st Avenue are all ephemeral and flow events are typically high in sediment and other particulate matter.

Impacts Common to Both Alternatives: Both alternatives considered in detail would have similar impacts to water quality as both alternatives follow essentially the same alignment and would impact most of the same drainages in similar locations. Once construction is complete, pavement for the new freeway would increase the amount of impervious surface area, which can increase runoff quantities and peak flows during storms. The increased runoff from the new impervious freeway surfaces would increase the transport of pollutants generated by vehicles using the freeway. This runoff would be transported from the road surface by the initial runoff generated during a storm. The most common impact would be the increase in pollutant loading into receiving waters. The new freeway would concentrate vehicular traffic and the associated accumulation of pollutants throughout the road corridor (FHWA and ADOT 2014). However, ADOT is required per the stipulations of their MS4 Permit to "protect water quality by reducing, to the maximum extent practicable, any discharge that may cause or contribute to an exceedance of any SWQS of the State of Arizona (A.A.C. Title 18, Chapter 11, Article 1), applicable to receiving waters of the MS4."

Receiving waters applicable to this project include WUS flowing through the project area. In order to minimize impacts to water quality, the design for both alternatives call for first-flush basins to be constructed along the project to treat the runoff from the road surface before releasing it into receiving waters. These first-flush basins detain the first ½" of pavement runoff (i.e., the first ½" of rain that falls on pavement, which typically contains the highest concentration of pollutants) for a period of time sufficient to reduce peak discharge and allow suspended pollutants to be removed through settling before

being slowly released to receiving waters (typically WUS) via the basin spillways. This also prevents changes in discharge, velocity, or surface elevation of WUS flowing through the project area, all of which helps avoid or minimize impacts to water quality.

Fill material to be discharged into WUS under Alternatives B and C includes natural dirt fill and rock rip-rap, concrete, plastic, and metal (pipe and rebar). No fill material would be obtained from any contaminated sources for either alternative. For the natural fill, only clean fill from on-site or from materials sources that have been environmentally-approved by ADOT would be used. Concrete is known to leach contaminants and can affect water pH levels, especially while the concrete is curing. Metal used may have residues from the manufacturing process that could be also considered contaminants. However, the surface area of concrete and steel that would contact surface or ground water is minor and any impact due to release of contaminants from concrete and metal used as fill in WUS would be negligible.

Both alternatives would involve maintenance activities, and at the LACC, removal of any sediment and other debris or obstructions that may be transported into the work site to maintain LACC flows during construction. These activities would likely temporarily impact water characteristics immediately downstream, such as increasing suspended sediment and total dissolved solids which reduces water clarity.

Both alternatives would be subject to an individual Section 401 water quality certification and an AZPDES permit, both of which include requirements to protect water quality during construction. As part of the AZPDES permit, a SWPPP would also be developed and implemented to protect water quality during construction. An SWPPP specifies BMPs to control erosion and sediment due to construction-related activities, in addition to waste discharges of construction-related contaminants and appropriate hazardous materials handling, storage, and spill response practices. The SWPPP is updated regularly as construction progresses and the functionality of BMPs are monitored and assessed daily. No work would occur in flowing water.

Alternative B – L/DCR Design: At the Salt River, Alternative B would result in overall less disturbance to natural ground surfaces, which may reduce the potential for water quality impacts if a flow event occurred during construction. However, Salt River bridge construction would take place over a longer timeframe than Alternative C, which may increase the chance of a hazardous material spill occurring that could impact water quality. Furthermore, nine bridge piers would be located in waters of the US for Alternative B as opposed to 6 piers for Alternative C, which may result in a slight increase in leachates from the concrete and steel used for the drilled shafts that make up the bridge piers.

At the LACC, this alternative involves constructing a bridge to span the LACC, though the associated temporary disturbance in the LACC has the potential to impact LACC water quality. Implementation of SWPPP BMPs at the LACC would likely reduce that impact.

For the desert washes and constructed channels east of 51st Avenue, impacts to water quality during construction for this alternative would be similar to that of Alternative C and would be minimized through implementation of the Section 401 water quality certification conditions and SWPPP BMPs.

Long term, the Alternative B design calls for fewer and/or smaller first-flush basins than Alternative C, which may result in Alternative B having a greater indirect and permanent impact to water quality by introducing more pollutants into WUS via runoff from the freeway facility after construction is complete.

Alternative C – C202P Design: This alternative requires more area to be disturbed at the Salt River than Alternative B, which may increase the potential for water quality impacts if a flow event occurred during construction. However, this disturbance would occur over a reduced timeframe compared to Alternative B (12 months for Alternative C versus 18 months for Alternative B), which may negate the potential increase in impacts. Furthermore, under this alternative, 6 piers would be constructed in WUS at the Salt River, which reduces contact with concrete and steel over Alternative B.

At the LACC crossing, a box culvert would be constructed for this alternative; however, water in the channel would be bypassed around the construction site during construction, which reduces water contact with concrete and steel during construction. Depending on the bypass method, there is potential for water quality impacts if the water is conveyed or discharged on loose substrates (such as an unlined channel) or at a velocity that creates scour or erosion at the discharge point. However, this can be avoided by conveying the bypass flow using hoses or a lined channel, discharging the water into a stilling basin or riprap lined area, and using settling basins to allow suspended pollutants to drop out of the water. Upon project completion, flows at the LACC would be returned to the concrete channel and conveyed through a concrete box culvert under the freeway. No permanent change in water quality from preconstruction conditions would occur at the LACC.

As provided above for the desert washes and constructed channels east of 51st Avenue, impacts to water quality during construction for this alternative would be similar between the two alternatives and would be minimized through implementation of the Section 401 water quality certification conditions and SWPPP BMPs.

Long term, the Alternative C design calls for more and/or larger first-flush basins than Alternative B, which may result in Alternative C having less of an indirect and permanent impact to water quality by introducing fewer pollutants into WUS via runoff from the freeway facility after construction is complete.

On February 21, 2017, the ADEQ issued an individual Section 401 water quality certification for Alternative C, which includes special conditions to protect water quality. A SWPPP has also been developed and is being implemented to protect water quality during construction. On October 13, 2017, ADOT provided ADEQ updated information for the WQC regarding changes in design that had occurred since the issuance of the

WQC (ADOT also provided this information to the Corps in a revised DA permit application package on October 4th, 2017). In its response, ADEQ did not provide any comments or concerns and stated that it would note the impact changes to their files. On October 31, 2017 ADEQ followed up their response by stating that the modifications did not require recertification and that the February 2017 WQC adequately certifies that the project will not violate applicable surface water quality standards.

Conclusions: As provided above, both alternatives would have similar direct impacts to water quality, which are primarily temporary impacts during construction. Maintenance activities would also result in these impacts, but on a smaller scale and on an infrequent basis. By complying with all permits and their conditions, neither alternative is expected to have a significant impact on water quality parameters or cause or contribute to violations of any applicable state water quality standard. Impacts to the existing functions and services would be minimal. However, the Alternative B design calls for fewer and/or smaller first-flush basins than Alternative C, which may result in Alternative B having a greater indirect and permanent impact to water quality by introducing more particulates into WUS via runoff from the freeway facility after construction is complete. Regardless of the alternative, BMPs would be implemented during construction to mitigate the introduction of contaminants, such as having spill response kits in refueling vehicles and designating concrete wash out locations that are outside WUS In addition, while equipment would be working within WUS, no staging, maintenance, or refueling of the equipment or vehicles would occur in these areas, except for large equipment and materials used to construct the Salt River bridges that cannot be moved easily, such as cranes and re-bar cages for drilled shafts.

5.2. Biological Characteristics of the Aquatic Ecosystem

Pursuant to 40 CFR Part 230 subparts D and E, these characteristics consist of special aquatic sites, fish, crustaceans, mollusks, and other aquatic organisms, and wildlife values. This section also discusses the biological availability of contaminants which has impacts to biological characteristics as well as human use characteristics.

5.2.1. Special Aquatic Sites (wetlands, mud flats, vegetated shallows, riffle and pool complexes, coral reefs, sanctuaries, and refuges)

There are no special aquatic sites in the project limits. As described in Section 5, the Community has constructed the Pee Posh Wetlands Restoration project, which is located offsite downstream of the project and is supported by water from the LACC. A separate PJD prepared in 2013 identified potential wetland areas within this restoration project (Corps file number SPL-2010-01148-KAT). The PJD was completed solely on the Pee Posh Wetlands, but a search of the Corps' database resulted in no other jurisdictional determinations indicating that potential wetlands exist downstream of the project areas until they reach the Gila River floodplain on Community lands. If wetland areas occur within the floodplain, they are likely primarily supported by artificial water sources or high water tables and would not be indirectly impacted by the project since most of the

washes that cross the project limits have interrupted or discontinuous flow paths downstream of the project.

Impacts Common to Both Alternatives: Both alternatives considered in detail would have no direct construction or maintenance impacts to special aquatic sites as none exist in the footprint of either alternative. Potential indirect effects discussed for each alternative below are focused on the Pee Posh Wetlands as it is the only special aquatic site immediately downstream of the project area. At the LACC, both alternatives would involve removal of any sediment and other debris or obstructions that may be transported into the work site to maintain LACC flows, which would also maintain flows to the Pee Posh Wetlands during construction.

Alternative B – L/DCR Design: No direct impacts to the amount of water reaching the Pee Posh Wetlands would occur with this alternative as bridges spanning the LACC would be constructed and flows would be maintained during and after construction and during maintenance activities. However, the design for this alternative includes an outfall for on-site drainage into the LACC. Although this on-site drainage would be treated via first-flush basins prior to being discharged into the LACC, there is no complete separation of on-site drainage from off-site drainage at the LACC under this alternative, which may increase the potential for indirect impacts to water quality downstream at the Pee Posh Wetlands. Temporary impacts to water quality during construction and maintenance activities would be avoided or minimized by implementing BMPs as prescribed by the SWPPP.

Alternative C – C202P Design: No direct impacts to the amount of water reaching the Pee Posh Wetlands would occur with this alternative as a box culvert would be constructed at the LACC and flows would be maintained during and after construction. A temporary pump-around would be employed to divert LACC flows around the box culvert work site during construction. Once the box culvert is complete, flows would be diverted back to the low-flow channel through the new box culvert. The design for this alternative includes a siphon under the LACC to convey freeway on-site drainage further north into a large first-flush detention basin just south of the Salt River and thus would not discharge on-site drainage into the LACC. Temporary impacts to water quality during construction and maintenance activities would be avoided or minimized by implementing BMPs as prescribed by the SWPPP.

***Conclusions*:** Neither alternative is anticipated to impact the amount of water that reaches the Pee Posh Wetlands, either temporarily during construction or permanently after construction is complete. Temporary impacts to water quality during construction of both alternatives would be avoided or minimized by implementing BMPs as prescribed by the SWPPP. Alternative B would discharge on-site drainage into the LACC, whereas Alternative C would not. Therefore, Alternative C would decrease the potential for indirect impacts to water quality downstream at the Pee Posh Wetlands once the freeway is constructed.

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

The only semi-perennial or perennial WUS in the project area is the LACC, which does support small non-native fish and other aquatic organisms. The Salt River is ephemeral in the project area, though fish and other aquatic organisms are present in the river basin further upstream and can be washed into the project area due to upstream dam releases or excessive precipitation in the watershed below these dams. When water does flow in the Salt River in the project limits, it collects in the abandoned mining pit where fish and other aquatic organisms may persist temporarily until the water recedes. All other WUS in the project area are ephemeral desert washes or constructed channels and do not support fish or other aquatic organisms.

Impacts Common to Both Alternatives: Both alternatives considered in detail would have similar impacts to aquatic organisms because of construction or maintenance activities as both alternatives follow essentially the same alignment and would impact most of the same drainages in similar locations and in a similar manner. At the Salt River, both alternatives cross the abandoned mine pit in the same location and neither would likely have a temporary or permanent effect on the rate of percolation/evaporation of water that remains temporarily once flows subside. As provided above, the ephemeral washes and constructed channels east of 51st Avenue do not support aquatic organisms therefore no impacts are anticipated. At the LACC, both alternatives would result in direct and temporary impacts to aquatic organisms during construction and maintenance activities, such as temporary habitat disruption or fish being injured or killed by equipment. Both alternatives involve removal of any sediment and other debris or obstructions that may be transported into the LACC work site to maintain LACC flows, which would have similar impacts. However, all these impacts would be minor and localized. Minor differences in potential permanent indirect impacts to aquatic organisms for the two alternatives at the LACC crossing are discussed below.

Alternative B – L/DCR Design: Under this alternative, bridges would be constructed that span over the LACC with no piers in the low-flow concrete-lined channel. This design would be more similar to the existing condition than the box culvert of Alternative C because the bridges would be more open, allowing more sunlight to reach surface flow as it does now, although with some shading. Maintaining the existing baseline conditions as much as possible at the LACC crossing would likely reduce permanent indirect impacts to aquatic organisms.

Alternative C – C202P Design: A 4-12'x16'x320' long concrete box culvert would be constructed at the LACC for this alternative, which would drastically change existing conditions for aquatic organisms at the crossing. The box culvert would shade a 320’ length of surface flow and reduce contact with outside air flow, which will likely create both a micro-climate and micro-habitat inside the box culvert that may be favorable for some aquatic organisms, in addition to providing a refugia to escape predators. This would increase habitat diversity that may lead to an increase in species diversity, which would be a beneficial permanent indirect impact to aquatic organisms in the LACC.

Conclusions: Neither alternative is anticipated to have a substantial impact on aquatic organisms, either temporarily during construction or permanently after construction is complete. However, the box culvert at the LACC for Alternative C would increase habitat diversity that may lead to an increase species diversity, which would be a beneficial permanent indirect impact to aquatic organisms in the LACC. Regardless of the alternative, temporary impacts to aquatic organisms would be minor and localized and special conditions for maintenance of flows and removal of temporary fills would be required to minimize impacts to aquatic organisms.

5.2.3. Wildlife Values

Though much of the project area is developed or disturbed, the undeveloped areas primarily east of 51st Avenue support native vegetation along the desert washes that provides cover and foraging opportunities for wildlife. However, the agricultural fields in the western section of the project area also provide some wildlife habitat value, as does the LACC and the Salt River. Agricultural fields provide habitat for small mammals and birds, as well as their predators such as raptors. The LACC supports surface flow and aquatic organism such as small non-native fish, which attracts wading birds, waterfowl, and other wildlife. The Salt River is highly disturbed, though the upper floodplain terraces provide a sandy substrate that supports habitat-specialists such as the desert iguana, as well as small burrowing mammals and their predators like raptors and snakes. When water does flow in the Salt River in the project area, it collects in the abandoned mining pit where fish and other aquatic organisms washed down from further upstream persist until the water recedes. This provides temporary habitat and food sources for waterfowl.

Impacts Common to Both Alternatives: Both alternatives considered in detail would have similar impacts to wildlife values of WUS as both alternatives follow essentially the same alignment and would impact most of the same drainages in similar locations and in a similar manner. Construction, operation, and maintenance of a new freeway would involve vegetation removal; would diminish habitat, foraging, and nesting resources for general wildlife; and would continue the trend of increasing habitat fragmentation as urbanization continues around SMPP. Most impacts on wildlife and native plant communities would occur in the eastern section where there is more undeveloped natural desert along the SMPP and Community boundaries. However, the project would impact agricultural fields in the western section, which also provide wildlife habitat.

Both alternatives would be constructed between the South Mountains and the Estrella Mountains. The Gila River is located at the base of the Estrella Mountains between the South Mountains and the Estrella Mountains. Wildlife movement is expected to occur between the South Mountains and Sierra Estrella through the Gila River Basin and ephemeral washes; WUS are often used as movement corridors by wildlife in the desert. Both alternatives would disrupt these movement corridors to some degree as discussed for each alternative below. However, five locations that could accommodate potential wildlife crossings of the freeway were identified by ADOT/FHWA during the EIS

process. The design of these five wildlife crossings has been developed through ADOT/FHWA coordination with the Community, AZGFD, and consultant biologists based on current AZGFD guidelines, general knowledge of wildlife movement gained through years of research, site characteristics such as topography, and data collected by AZGFD in the project area on wildlife movement and road kill. The coordination has involved several meetings and design reviews and will continue throughout the design process. Based on this coordination, four of the drainage structures would be multi-use crossing structures (bridges) located at WUS that facilitate both people and wildlife to cross under the freeway in the South Mountain area (a fifth would be built at a crossing which is not a WUS).

During construction, noise disturbance would represent a short-term impact on wildlife that would vary by location and intensity and that may affect bird and mammal activities such as nesting and foraging. Similar impacts would be expected during maintenance activities, although at a shorter duration. At the Salt River, water may be present within the inactive mine pit located within the Corps' jurisdiction, which may provide a source of water for wildlife. This pit extends well upstream and downstream of the bridges and the bottom of the pit is the lowest elevation in the general area. Although bridge piers would be constructed within the pit and the riverbed near the piers, the pit would be temporarily disturbed during construction, and the pit would be returned to the existing ground surface elevations and contours as much as possible once construction is complete, thus neither alternative is anticipated to impact the pit's function as a temporary water supply for wildlife. After construction is complete, the area within the Salt River would be returned back to preconstruction ground elevations and contours and water will continue to be available during periods when flows occur in the Salt River or when groundwater levels are high enough to fill the bottom of the pit. Maintenance activities which would occur during operations would also result in similar impacts to wildlife, but would be much shorter in duration.

At the LACC, both alternatives would involve removal of any sediment and other debris or obstructions that may be transported into the work site to maintain LACC flows during construction, which may have minor temporary impacts to wildlife but will help ensure flows are maintained for wildlife downstream.

An issue of concern raised by commenters during the public notice and public hearing was the potential for indirect impacts to the proposed Rio Salado de Oeste Ecosystem Restoration and Recreation Project (RSO). This project is a Civil Works project originally proposed in 2006 by the Corps and the City of Phoenix to restore the Salt River channel to a more natural state between 19th Avenue and 83rd Avenue. The project would connect to the Rio Salado Habitat Restoration Area at 19th Avenue, and would extend nearly to the Tres Rios Ecosystem Restoration and Flood Control Project, which begins at 99th Avenue. Both of these existing projects are also Civil Works projects that were implemented by the Corps and the City of Phoenix. Original plans for the project included restoration of a riverine habitat consisting of both riparian and wetland habitat

types, which would be supported by treated effluent water. Restoration of the upland areas were also proposed, along with recreation facilities such as multipurpose trails, picnic shelters, and restroom facilities. However, current proposals for the RSO call for a reduced footprint consisting only of a low flow channel and associated habitat within the vicinity of the SMF. However, no designs have been developed for the segment between 51st Avenue and 83rd Avenue and the project currently lacks funding as of October 2017. The freeway would likely be completed well before design and construction of the RSO occurs and no conflicts are expected to occur between the two projects. If the RSO is implemented in the future, the freeway would be an existing/baseline feature that would preexist any habitat for wildlife associated with the RSO. A special condition would be placed on the permit requiring the applicant to consult with the Corps before undertaking maintenance activities in the Salt River if the RSO is implemented to allow the Corps to re-evaluate the impacts of future maintenance activities to WUS and the RSO as well as determine the need for any additional mitigation. However, based on observations at other locations on the Salt River in Phoenix (such as the Loop 101/Loop 202 interchange near Tempe Town Lake), conflicts or impacts to wildlife values resulting from the freeway over the RSO are expected to be minimal.

Alternative B – L/DCR Design: As described above, impacts to wildlife values at the Salt River would be similar between the alternatives; however, Alternative B would result in less temporary disturbance in the riverbed but for a longer duration than Alternative C.

Under this alternative, bridges would be constructed that span over the LACC with no piers in the low-flow concrete-lined channel. As previously discussed, this design would maintain the existing baseline conditions more than Alternative C, which would likely reduce permanent indirect impacts to aquatic organisms and better maintain existing wildlife values.

For the desert washes and constructed channel east of 51st Avenue, a primary wildlife value concern is wildlife movement. As previously discussed, Alternative B does not provide drainage structures for 13 WUS crossings, 12 of which are in the center segment, which reduces the freeway's permeability for wildlife crossings. Like Alternative C, the Alternative B design includes 5 multi-use crossing structures, though only one would span WUS No small animal crossings were identified in the L/DCR design.

Alternative C – C202P Design: At the Salt River, Alternative C would result in more temporary disturbance in the riverbed but for a shorter duration than Alternative B.

At the LACC, Alternative C calls for a box culvert, which as previously discussed would increase habitat diversity that may lead to an increase species diversity, which would be a beneficial permanent indirect impact to aquatic organisms and hence wildlife value of the LACC.

For the ephemeral drainages east of 51st Avenue, although some WUS may be realigned within the ROW for Alternative C, all would be passed under the new freeway via drainage structures such as culverts and bridges and exit the freeway ROW in their

existing channels as they currently do. Alternative C also includes 5 multi-use crossing structures, and three of these multi-use crossings would span WUS In addition, 2 small animal crossing culverts are identified for this Alternative at two WUS crossings along Pecos. Fencing designed to funnel wildlife to these crossings while reducing the potential for wildlife-vehicle collisions will also be constructed.

The Alternative C design and construction contract documents include binding requirements to protect wildlife and wildlife habitat during construction, such as native plant inventory and salvage; measures to minimize the spread of invasive species and general impacts to habitat; conducting pre-construction surveys for special status species such as burrowing owl and Sonoran desert tortoise; requiring a biological monitor for ground disturbing activities between 24th Street and 51st Avenue; and avoidance of active migratory bird nests.

***Conclusions*:** Overall, impacts to wildlife values and habitat connectivity would be similar for both alternatives; however, Alternative C would provide more opportunity for wildlife movement across the freeway corridor at WUS crossings than Alternative B. Regardless of the alternative, habitat impacts would be minimized by restricting construction activities to the minimum area necessary to perform the activities and by maintaining natural vegetation where possible. Compensatory mitigation would also offset remaining impacts caused by the project.

5.2.4. Threatened and Endangered Species

The US Fish and Wildlife Service (USFWS) Information, Planning, and Conservation (IPaC) system was accessed by the applicant several times during the project development process to identify any ESA-protected species or habitat potentially occurring within the project area, most recently on September 1, 2017. The IPaC system did not identify any proposed or designated critical habitat within or near the project area, but did identify the following threatened or endangered species as potentially occurring within the project area:

- California least tern (Endangered)
- Lesser long-nosed bat (Endangered)
- Roundtail chub (No longer protected[8])
- Sonoran pronghorn (Endangered)
- Southwestern willow flycatcher (Endangered)
- Yellow-billed cuckoo (Threatened)
- Yuma clapper rail (Endangered)

Impacts Common to Both Alternatives: Both alternatives considered in detail would have the same impacts to threatened and endangered species at WUS as a result of

[8] The roundtail chub was included in the July 2014 BA but excluded from detailed evaluation due to lack of suitable habitat and range considerations. USFWS withdrew the proposed rule to list the DPS of roundtail chub in the Lower Colorado River watershed via Federal Register 82(66):16981-16988 published 4/7/2017 so it no longer receives any protection under the ESA but was still identified in the IPaC report.

construction and maintenance activities as both alternatives follow essentially the same alignment and would impact most of the same drainages in similar locations and in a similar manner. A Biological Assessment (BA) to address the anticipated project impacts was completed in July 2014 by FHWA as the lead federal agency. All ESA-protected species identified in the September 1, 2017 IPaC resource list were considered in the July 2014 BA, and are listed below. It was determined by FHWA through the BA that the project will have no effect to any species or habitat protected by the federal ESA.

Table 8. Threatened, Endangered, and Species proposed for listing with potential to occur in the project area.

Species Name	ESA Status	Habitat Requirements	Exclusion Justification
California least tern (*Sterna antillarum browni*)	Endangered	Open, bare or sparsely vegetated sand, sandbars, gravel pits, or exposed flats along shorelines of inland rivers, lakes, reservoirs, or drainage systems below 2,000 feet.	No suitable habitat in the project area; most likely to occur as migrants; lack of adequate water features in project area to support nesting and feeding areas.
Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*)	Endangered	From desert scrub to oak transition areas with agave and columnar cacti below 6,000 feet.	No suitable habitat in the project area; only scattered landscaped areas with limited agaves and columnar cacti present.
Roundtail Chub (*Gila robusta*)	No longer protected	Cool to warm waters of rivers and streams, often will occupy the deepest pools and eddies of large streams, at elevations of 1,000 to 7,500 feet.	No suitable habitat occurs in the project area; populations in the Salt River occur upstream, above dams.
Sonoran pronghorn (*Antilocapra americana sonoriensis*)	Endangered	Broad intermountain alluvial valleys with creosote-bursage and paloverde mixed cacti associations from 2,000 to 4,000 feet.	Suitable habitat in the project area, but species will not be affected as area is close to urban development; species is not known to occur in the project vicinity[9].
Southwestern willow flycatcher (Empidonax traillii extimus)	Endangered	Dense riparian vegetation near a permanent or semi-permanent source of water or saturated soil below 8,500 feet.	No suitable riparian habitat within the project area.

[9] For the purposes of this document, project vicinity is used to describe the area in a more expansive, landscape context than project area.

Table 8. Threatened, Endangered, and Species proposed for listing with potential to occur in the project area.

Species Name	ESA Status	Habitat Requirements	Exclusion Justification
Yellow-billed Cuckoo (*Cocyzus americanus*)	Threatened	Large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries) below 6,500 feet.	The proposed project will have no effect on the yellow billed cuckoo or its habitat as: there are no documented occurrences of the species within 2.5 miles of the project area, no suitable habitat occurs for the species in or adjacent to the project area, and only marginally suitable habitat occurs adjacent to the project area.
Yuma clapper rail (*Rallus longirostris yumanensis*)	Endangered	Fresh water and brackish marshes, associated with dense emergent riparian vegetation below 4,500 feet.	The proposed project will have no effect on the Yuma clapper rail or its habitat as: there are no documented occurrences of the species within 2.5 miles of the project area and no suitable habitat occurs for the species in or adjacent to the project area.

Since July 2014, the two candidate species also analyzed in the BA (Sonoran desert tortoise and Tucson shovel-nosed snake) have been removed from the candidate list due to a review which found listing those species as endangered or threatened was not warranted. Additional species status changes since the July 2014 BA include the roundtail chub being changed from candidate to proposed threatened, and the yellow-billed cuckoo being changed from proposed threatened to listed threatened. However, in April 2017, the USFWS withdrew its proposal to list the roundtail chub as threatened and this species no longer receives any protection under the federal ESA. Habitat conditions in the project area have not changed substantially.

In response to a request from FEMA related to the CLOMR, in a letter dated April 26, 2017, FHWA stated to FEMA that they maintain the finding of no effect. The letter states, in part, “The USFWS Information, Planning and Conservation (IPaC) system was accessed on February 21, 2017, to identify any new ESA-protected species or habitat potentially occurring within the project area since the ROD. No additional ESA-protected species or habitats were identified in the IPaC resources list beyond those considered in the ROD. Habitat conditions in the project area have not changed substantially. Therefore, FHWA has determined that a finding of “no effect” to threatened or endangered species or their habitat is appropriate for this project.”

There has been no changes to the IPaC since February 2017. Thus, FHWA’s no effect determination remains valid.

Alternative B – L/DCR Design: There would be no difference in impacts to threatened and endangered species between the two alternatives.

Alternative C – C202P Design: There would be no difference in impacts to threatened and endangered species between the two alternatives.

***Conclusions*:** Due to the lack of suitable or critical habitat for ESA-protected species identified in the project area, FHWA has determined that both alternatives would have no effect to any species or critical habitat protected by the federal ESA. The Corps agrees with this determination.

5.2.5. Biological Availability of Possible Contaminants in Dredged or Fill Material

As part of the FEIS, hazardous materials investigations were conducted to identify:

- Contaminated soils adjacent to potential hazardous materials sites
- Underground storage tanks in conflict with freeway construction
- Wells and dry wells that could provide unintended conduits for preexisting or accidental releases to groundwater supplies
- During construction activities, workers could encounter Previously unidentified soil contaminated with hazardous materials

The identified hazardous materials sites were classified as low-priority, medium-priority, and high-priority, as follows:

- *Low-priority sites* are those with the least potential for release of hazardous materials. Sites that have had a hazardous materials issue in the past but have been remediated with approval of the ADEQ or EPA may qualify as low-priority. Examples of low-priority sites include undeveloped or agricultural land uses, residential property, or benign commercial properties such as office buildings, warehouses, distribution facilities, or municipal facilities with no listed violation.

- *Moderate-priority sites* are those with possible hazardous materials issues. A moderate-priority site example would be a property listed in a database as having a hazardous materials handling permit, but has recorded no violations to date. Another example of a moderate priority would be an auto repair facility that is not listed in a database but visible surface staining is evident. Examples of moderate-priority sites include auto repair garages, welding shops, or manufacturing facilities with minor listings in an environmental database.

- *High-priority sites* are those with greatest potential for releasing hazardous materials and contaminating soil or groundwater, or those that have already done so. Examples of high-priority sites include current service stations, bulk fueling terminals, sites listed in the environmental database, or open cases that have not been remediated.

Impacts Common to Both Alternatives: Both alternatives considered in detail would have similar implications for contaminants in dredged or fill material as a result of

construction and maintenance activities as both alternatives follow essentially the same alignment, and would likely get material to be used as fill from the same or similar sources.

Both alternatives would affect 8 low-priority sites, 3 medium-priority sites, and 5 high-priority sites (FHWA and ADOT 2014). Each site is located outside of WUS but within the project footprint or within a buffer area around the footprint in the western section. Consideration of buffer zones is important because contaminants may travel laterally in the subsurface.

Three high-priority sites are service stations (Pilot Travel Center, Petrostop, and Circle K) and one is a Resource Conservation and Recovery Act large-quantity generator (Onyx Environmental Services). Another high-priority site is the West Van Buren Water Quality Assurance Revolving Fund (WQARF) site, found within the area examined for hazardous materials sites but not within the construction zone. The West Van Buren site contains six contaminants in the groundwater at a depth of 30 to 60 feet. The contaminants with concentrations that exceed regulatory standards are tetrachloroethylene; trichloroethylene; 1,1-dichloroethylene; cis-1,2-dichloroethylene; 1,1-dichloroethane; and chromium. The depth of construction for the proposed project would not reach the depth of the soil and groundwater affected by the West Van Buren WQARF site's plume of contamination. The estimated plume boundary for this site extends from approximately Van Buren Street south to just north of Buckeye Road (ADEQ 2015) and does not extend to WUS in the project area.

Fill material to be discharged into WUS under Alternatives B and C includes natural dirt fill and rock rip-rap, concrete, plastic, and metal (pipe and rebar). No fill material would be obtained from any of the hazardous material sites described above for either alternative either during construction or for maintenance activities. For the natural fill, only clean fill from on-site or from materials sources that have been environmentally-approved by ADOT would be used. Concrete is known to leach contaminants and can affect water pH levels, especially while the concrete is curing. Metal used may have residues from the manufacturing process that could be also considered contaminants. However, the surface area of concrete and steel that would contact surface or ground water is minor and any impact due to release of contaminants from concrete and metal used as fill in WUS would be negligible. The applicant would implement BMP's during construction to mitigate the introduction of contaminants, such as having spill response kits in refueling vehicles and designating concrete wash out locations that are outside WUS In addition, while equipment would be working within WUS, no staging, maintenance, or refueling of the equipment or vehicles would occur in these areas, except for large equipment and materials used to construct the Salt River bridges that cannot be moved easily, such as cranes and re-bar cages for drilled shafts.

At the LACC, both alternatives would involve removal of any sediment and other debris or obstructions that may be transported into the work site to maintain LACC flows during construction, which could result in a minor temporary release of possible contaminants in the sediment into the water column. However, if debris or obstructions suspected to contain hazardous materials are encountered, work will cease at that location and the C202P Hazardous Materials Manager will arrange for proper assessment, treatment, or disposal of those materials.

In addition to the MS4 and 404 permitting requirements, both alternatives would be subject to an individual Section 401 water quality certification, and an AZPDES permit, all of which include requirements to protect water quality.

Alternative B – L/DCR Design: At the Salt River, nine bridge piers would be located in waters of the US for Alternative B as opposed to 6 piers for Alternative C, which may result in a slight increase in leachates from the concrete and steel used for the drilled shafts that make up the bridge piers. However, at the LACC, this alternative calls for a bridge spanning the LACC without any piers located in waters of the US.

For the desert washes and constructed channels east of 51st Avenue, Alternative B would involve less concrete and steel contact with waters of the US, partly because Alternative B does not provide drainage structures for 13 WUS.

Alternative C – C202P Design: Under this alternative, 6 piers would be constructed in WUS at the Salt River, though at the LACC, a box culvert would be constructed, which requires more WUS contact with concrete and steel than Alternative B. In addition, for the desert washes and constructed channels east of 51st Avenue, Alternative C would involve more concrete and steel contact with WUS than Alternative B.

A hazardous materials manager has been designated by ADOT and a hazardous materials management plan was prepared and is being implemented for the proper treatment of hazardous materials at the known sites, and for any suspected hazardous materials encountered during construction.

On February 21st, 2017, ADEQ issued an individual Section 401 water quality certification for Alternative C. A SWPPP has also been developed for the project and is being implemented to protect water quality during construction. The SWPPP specifies BMPs to control erosion and sediment due to construction-related activities, in addition to waste discharges of construction-related contaminants and appropriate hazardous materials handling, storage, and spill response practices.

Conclusions: Overall, potential contaminants in dredged or fill material used for construction or maintenance activities would be minimal regardless of the alternative. Fill material to be discharged into WUS under both alternatives includes natural dirt fill and rock rip-rap, concrete, plastic, and metal. No fill material would be obtained from any hazardous material sites for both alternatives, and natural fill would either

be from on-site or materials sources that have been environmentally-approved by ADOT. Concrete and metal may leach contaminants, and difference in design between the two alternatives would result in slight difference in the amount of concrete and metal that would have contact with WUS. However, as noted above, the surface area of concrete and steel that would contact surface or ground water is minor and any impact due to release of contaminants from concrete and metal used as fill in WUS would be negligible for either alternative. If suspected hazardous materials are encountered, work will cease at that location and the C202P Hazardous Materials Manager will arrange for proper assessment, treatment, or disposal of those materials, which would also minimize the potential for contaminants in dredge or fill material.

5.3. Human Use Characteristics of the Aquatic Ecosystem

Pursuant to 40 CFR Part 230 subpart F, these characteristics consist of water supply, recreational and commercial fisheries, water related recreation, aesthetics, and parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves.

5.3.1. Water Supply

There are no reservoirs or surface water features within or immediately downstream of the project area that supply water for human use. However, the project area does contain ground water wells and irrigation ditches used primarily for agricultural purposes, all of which are not located within the Corps' area of jurisdiction.

Major sources of surface water for human use in the Phoenix metro area include the Salt River reservoirs upstream and east of Phoenix, and the Central Arizona Project Canal, which delivers water to the Phoenix area from the Colorado River (University of Arizona 2012). Groundwater is also a source of public water supply. In 1995, groundwater withdrawal in the Phoenix Active Management Area (AMA) supplied 39 percent of the total consumption of 2.29 million acre-feet (Arizona Department of Water Resources [ADWR] 1999). About 64 percent of the groundwater withdrawal was used for agriculture. The remainder was used for public water supply, industrial, domestic, and other purposes. Rapid population growth has resulted in the redevelopment of agricultural land and the conversion of agricultural groundwater supplies to urban uses.

Irrigation districts in the project vicinity include the Roosevelt Irrigation District (RID) and SRP. These irrigation districts use groundwater wells and have both surface (canals) and subsurface (pipes) conveyance infrastructure associated with their operations in the project area. There are private, municipal, utility, and corporate-owned groundwater wells in the project area.

The RID distributes surface water and groundwater supplies and receives treated waste water effluent from the City of Phoenix. Of the total amount of groundwater pumped by RID, approximately 85 percent is pumped from its well field in the southwestern portion of the SRP service area, east of the Agua Fria River. RID annually purchases about 5,000 acre-feet of effluent from the City of Phoenix's 23rd Avenue Waste Water Treatment

Plant. In addition, RID began taking 30,000 acre-feet of effluent annually from the City of Phoenix in 1995 through a water exchange agreement (City of Phoenix 2000). SRP uses both surface water and groundwater pumped from its wells to meet its delivery obligations.

Impacts Common to Both Alternatives: Both alternatives considered in detail would have similar impacts to water supply as both alternatives follow essentially the same alignment and would impact the only potential water supply resource within the Corps' area of jurisdiction, the Salt River, in a similar location. As previously discussed, the jurisdictional limits of the Salt River in the project limits are confined to an inactive mining pit that impounds the infrequent flows until the water recedes/percolates and the pit dries. This pit may be functioning as a recharge basin. The project involves the construction of bridges over the Salt River, but the pit would not be filled in either alternative and its potential to function as a recharge basin would not be impacted as a result of construction or maintenance activities. In addition, neither alternative would have an impact on the aquifer recharge functions of the RSO, if it is implemented in the future.

Alternative B – L/DCR Design: There would be no difference in impacts to water supply between the two alternatives.

Alternative C – C202P Design: There would be no difference in impacts to water supply between the two alternatives.

***Conclusions*:** Neither alternative would impact aquifer recharge functions in the Salt River or the future RSO, if it is implemented in the future.

5.3.2. Recreational and Commercial Fisheries

There are no recreational fishing opportunities or commercial fisheries in the project area. Recreational fishing does occur downstream of the project area near the confluence of the Salt River with the Gila River approximately 6 miles west of the project area.

Impacts Common to Both Alternatives: Both alternatives considered in detail would have similar impacts to downstream recreational fishing opportunities as both alternatives follow essentially the same alignment and would impact most of the same drainages in similar locations. As discussed elsewhere in Section 6, neither alternative is anticipated to have downstream impacts to the physical/chemical characteristics of aquatic resources such as drainage patterns, baseflow, aquifer recharge, or water quality in a manner that would impact downstream recreational fishing.

Alternative B – L/DCR Design: There would be no difference in impacts to recreational and commercial fisheries between the two alternatives.

Alternative C – C202P Design: There would be no difference in impacts to recreational and commercial fisheries between the two alternatives.

***Conclusions*:** Neither alternative is anticipated to have downstream impacts to the physical/chemical characteristics of aquatic resources such as drainage patterns, baseflow, aquifer recharge, or water quality in a manner that would impact downstream recreational fishing.

5.3.3. Water Related Recreation

No water sources occur in the area that would support water related recreation. The LACC contains perennial water and the channel has been developed as a recreational facility, but no water-related recreation occurs since the water is irrigation tail water and does not flow at a sufficient amount to support recreation. All other water bodies in the project area are ephemeral and only flow in response to discrete storm events.

Impacts Common to Both Alternatives: There would be no impacts to water related recreation.

Alternative B – L/DCR Design: There would be no difference in impacts to water related recreation between the two alternatives.

Alternative C – C202P Design: There would be no difference in impacts to water related recreation between the two alternatives.

***Conclusions*:** Due to the lack of water related recreation opportunities in the project area, neither alternative would impact water related recreation.

5.3.4. Aesthetics

The aesthetic value of the Salt River in the project area is low as it highly disturbed, typically does not support surface flow, and is sparsely vegetated. The LACC is grass-lined with a narrow concrete low-flow channel that typically supports some surface flow most of the year, which is an uncommon feature in the Phoenix metropolitan area and thus has aesthetic value. Within the project area, a concrete pathway parallels the LACC to the north, providing access for residents to enjoy the LACC. The desert washes between 51st Avenue and Chandler Boulevard are relatively undisturbed and offer aesthetic value as they provide a contrast with the uplands and typically support denser desert vegetation along their banks. East of Chandler Boulevard, the washes and drainages become more disturbed moving east into the developed areas, though these drainages still provide similar aesthetic value as those between 51st Avenue and Chandler Boulevard and are accessible to local residents.

Impacts Common to Both Alternatives: Both alternatives would introduce a substantial human-made feature (a new freeway) at WUS crossings in similar locations. At the Salt River, bridges would be constructed for both alternatives in an area that is currently an inactive mine pit with active mining operations in the vicinity. Currently, the area is not accessible to the public and is not visible from public roads due to topography. The freeway would not provide access to the river but would be a new crossing of the Salt River with views of the river from the bridges. However, due to the existing degraded

state of the river in the project vicinity, the bridges would not substantially impact aesthetic value of the Salt River.

At the LACC, although there are 3 local road crossings within 0.5 mile of the freeway alignment, the freeway would permanently reduce the aesthetic value of the LACC in the project area by introducing an additional, much larger man-made feature that would reduce views of the LACC along the pathway and result in increased noise levels. However, both alternatives would provide a means for the pathway on the north side of the LACC to cross under the freeway as discussed below.

The freeway would also permanently degrade the aesthetic value of the desert washes and drainage channels east of 51st Avenue near the freeway. This would be more pronounced in the SMPP area as it is relatively undisturbed and some of the freeway wash crossings will be visible from certain vantage points within the park, such as along the Bursera Trail. East of Chandler Boulevard, the freeway under both alternatives would replace an existing four-lane arterial Pecos Road at the southern edge of a primarily built-out residential community. However, the freeway would be more intensive than the visual effect created by Pecos Road at WUS crossings, and in would limit views of washes and drainage channels across the freeway.

Alternative B – L/DCR Design: Bridges spanning the LACC would be constructed under this alternative, which would provide a more open visual effect and allow views of the LACC under the freeway from the pathway compared to the Alternative C box culvert. The path on the north side of the LACC would cross under the bridges in approximately the same location as it currently does. However, this alternative would truncate 13 washes east of 51st Avenue, which would eventually result in downstream loss of vegetation along these washes and other negative permanent changes to their visual characteristics that would increase this alternative's aesthetic impact to WUS in the SMPP area.

Alternative C – C202P Design: A box culvert would be constructed at the LACC under this alternative, which would block views of the LACC across the freeway from the pathway compared to the Alternative B bridges. The path on the north side of the LACC would cross under the freeway through the north side of the box culvert on a similar alignment as it currently does. Alternative C would not truncate washes east of 51st Avenue, which reduces this alternative's aesthetic impact to WUS in the SMPP area compared to Alternative B.

***Conclusions*:** Both alternatives would introduce a substantial human-made feature (a new freeway) at WUS crossings, which would be a negative impact to aesthetics. Impacts would be similar at the Salt River between the alternatives. Alternative B would have less of an impact at the LACC, but a greater impact at the washes east of 51st Avenue when compared to Alternative C; therefore, overall impacts would be similar for both alternatives. Native desert vegetation and neutral-colored hardscaping, similar to that found on other Phoenix freeways would be used along the freeway. Further, ADOT is

working with municipalities' staff to incorporate aesthetically pleasing features into the project to offset impacts (FWHA and ADOT 2014). While the aesthetics in WUS would be impacted through introduction of a man-made feature, impacts would be reduced by these offsets.

5.3.5. Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Areas

There are no national parks, historical monuments, seashores, wilderness areas, or research sites in the project area, though the freeway alignment would cross a recreational pathway at the LACC and cut through the ephemeral desert washes at the southwestern edge of the SMPP. The SMPP is a municipal park that was established by the City of Phoenix in 1933.

Impacts Common to Both Alternatives: As provided in the Aesthetics section above, both alternatives would permanently reduce the aesthetic value of the LACC in the project area by introducing an additional, much larger man-made feature that would reduce views of the LACC along the pathway and result in increased noise levels. Although both alternatives would provide a means for the pathway to cross under the freeway, the aesthetic impacts resulting from the discharge may reduce the recreational value of the LACC for some area residents.

Both alternatives would impact approximately 31.3 acres of the SMPP that contain WUS in the form of desert washes. ADOT currently has possession of the former SMPP land within the project ROW by order of immediate possession, but will ultimately own the land in fee. The context and attributes of the South Mountains are described in the FHWA FEIS. The SMPP discussion recognizes that many unique attributes and features of the park contribute to its value. The desert washes are features that contribute to the park's value, and as provided in the Aesthetics section above, discharges associated with the freeway would permanently degrade aesthetic value of these desert washes at the wash crossings, some of which will be visible from certain vantage points within the park, such as along the Bursera Trail.

The US Department of the Interior reviewed the FHWA FEIS and commented, "The Department agrees that the SMPP is a LWCF [Land and Water Conservation Fund] assisted site that will be directly impacted by the subject project. These documents assess the direct use of park land for freeway purposes to be 31.3 acres. We agree with the conclusions stated. We note that the "Measures to Minimize Harm" on the Section 4(f) Statement pages 5-23, 5-24, and 5-25 have annotated a commitment to provide replacement land for the converted park land. The Department concurs with the assessment of the impacts to the LWCF-assisted resource and acknowledges the mitigation commitment."

Alternative B – L/DCR Design: As previously provided, bridges spanning the LACC would have less of an impact to LACC aesthetics than the Alternative C box culvert, which would also lessen impacts to the recreational value of the LACC. The path on the

north side of the LACC would cross under the bridges in approximately the same location as it currently does. As also previously noted, Alternative B does not provide drainage structures for 13 WUS crossings in the SMPP area, 3 of which currently cross the freeway corridor immediately south of the SMPP boundary. This may have the indirect impact of causing erosion and other drainage issues along these washes upstream within SMPP, which would be a potential negative indirect and permanent impact of this alternative that would not occur under Alternative C.

Alternative C – C202P Design: A box culvert would be constructed at the LACC under this alternative, which as previously noted would have more of an aesthetic impact to the LACC compared to the Alternative B bridges. This may also have a greater impact on the recreational value of the LACC pathway over Alternative B. However, the path on the north side of the LACC would cross under the freeway through the north side of the box culvert on a similar alignment as it currently does. Although some WUS in the SMPP area may be realigned within the ROW for Alternative C, all would be passed under the new freeway via drainage structures such as culverts and bridges and exit the freeway ROW in their existing channels as they currently do. Therefore, Alternative C would not result in the indirect upstream impact to SMPP as identified for Alternative B.

***Conclusions*:** Both alternatives would impact the aesthetic values of the LACC and may reduce its recreational value to some residents, though Alternative C would have less of an impact on aesthetic value when compared to Alternative B. Both alternatives would impact approximately 31.3 acres of the SMPP that contain desert washes, though Alternative B does not provide drainage structures for 3 WUS crossings immediately south of the SMPP boundary. This may have the indirect impact of causing erosion and other drainage issues along these washes upstream within SMPP, which is a potential negative indirect and permanent impact to the aesthetic and recreational values that would not occur under Alternative C. Both alternatives include the following measures to minimize harm to the park, which would also minimize impacts to the desert washes that contribute to the values of the park:

- Reducing the freeway's footprint within the park from the original 40 acres as proposed in 1988 to the 31.3 acres
- Skirting the park as much as possible to avoid bisecting the 16,000-acre park
- Providing replacement lands to compensate for the use of 31.3 acres of the park
- Using slope treatments, rock sculpting, native vegetation landscaping and buffering, and native vegetation transplanting to blend the appearance of the freeway and slope cuts with the surrounding natural environment, as feasible
- Working with park stakeholders through the City of Phoenix in finalizing these improvements

5.4. Evaluation and Testing

To minimize potential to impact WUS, only fill material composed of sand, soil, gravel, or other naturally occurring inert material from uncontaminated sources would be used. The extraction site would be examined to assess whether it is sufficiently removed from

sources of pollution to provide reasonable assurance that the discharge material is not a carrier of contaminants. If the evaluation described above indicates the material is not a carrier of contaminants, then the required determinations pertaining to the presence or absence of contaminants can be made without testing. Evaluation must be in accordance with the requirements of 40 CFR § 230.60 and, if testing is required, it must comply with the requirements of 40 CFR § 230.61. No contaminated material would be deposited in WUS.

The SMF would generate surplus cut material that would be used as fill to construct the project, so all suitable cut material would likely be reused on-site for roadway fill, if possible. During maintenance activities, accumulated sediment would be removed from the vicinity of existing structures. Unless the material is going to be used to repair erosion within 100 feet of the structure from where it was removed, all material would either be placed in upland areas in such a manner that there would be no return flow to WUS, or disposed of appropriately in an upland landfill with no possibility of return to WUS. If the material is going to be reused for erosion repair, it would also need to be naturally occurring inert material free of contaminants.

5.5. Cumulative Impacts

Cumulative impacts are the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material. Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems. 40 CFR § 230.11(g). This section presents the requirements for cumulative impact analysis, and analyzes the potential for impacts for Alternatives B – L/DCR Design and Alternative C – C202P Design to combine with impacts of other past, present, and reasonably foreseeable future projects in each resource area's cumulative geographic scope, to result in cumulative impacts.

The proposed project is located near the confluence of the Gila and Salt Rivers, and is located within three 8-digit watersheds. The geographic area for this assessment is the Agua Fria (HUC 15070102), Lower Salt (HUC 15060106B) and Middle Gila (HUC 15050100) watersheds which cumulatively cover 6,644 square miles or 4,252,245 acres. All three 8-digit watersheds, which include much of Maricopa County, were considered in this analysis.

Past and Current Actions: Past actions which have potentially involved the discharge of dredged/fill material into WUS, within the proposed project area, primarily include the construction of housing/commercial developments and agriculture. Impacts associated with these activities has varied from complete loss to preservation. Due to the length of history involved and lack of records, it is speculative as to whether or to what degree impacts to WUS occurred. Historically, humans have been present and active within the project area for an expansive period of time. Within the Gila and Salt River valleys, evidence of an elaborate irrigation canal system constructed by various Native American

cultures (which may have involved discharges of fill material to control and divert river water into the system) dates back as early as AD 800. In the mid-1800's, the U.S. Army established a camp on the Salt River and the towns of Phoenix and Tempe were founded shortly after. After the arrival of the railroad, the population of the area continued to grow, increasing the rate of development in the area as open desert, including WUS, was converted to agriculture and urban development. In the early 1900's, the U.S. Bureau of Reclamation constructed many of the dams along the upper Gila and Salt Rivers, which ceased perennial flows within these systems in the project vicinity.

In the last five years (September 2012 to September 2017) for the three watersheds, DA permits have authorized fill in 91.75 acres of WUS. Maricopa County, which is located within these three watersheds and includes the Phoenix metropolitan area, has historically seen large population growth for many decades. During the housing market crisis and recession that occurred in the late 2000's, economic development within the region slowed and permit actions processed by the Corps subsequently decreased. However, development has recently increased, with Maricopa County being estimated to be one of the fastest growing counties in the country in 2016 (Hanson, 2016; Sanders 2017). Most WUS in the Phoenix area have been impacted in some form or another or are influenced by activities in upland areas. Sand and gravel operations, while not typically regulated under Section 404 of CWA, have been active in the Salt River and other river systems resulting in significant modifications of these systems. In upper areas of these watersheds outside of the Phoenix metropolitan area, impacts are less concentrated for the most part, but copper mining has had substantial impacts in the Middle Gila watershed. As a result of the past actions described here, aquatic resources in the project vicinity have varying levels of erosion, flooding, and down cutting present and represent a variety of conditions.

Reasonably Foreseeable Actions: As of September 2017, the Arizona Branch of the Los Angeles District Regulatory Division is currently reviewing permit applications or is involved in pre-application consultations for a variety of projects proposed within the three 8-digit HUC watersheds. One of the pending permit actions, which are listed on the following table, is a local transportation project in Pinal County. The remaining pending permits are associated with copper mining operations in the far eastern part of the watershed and include a tailing facility, a transportation-related project, and an infrastructure project. Additionally, there are also nine pre-application consultations currently underway that are associated with proposed developments within the Phoenix region. However, pre-application consultations occur in the early planning stages of a project and may not result in a permit action or impacts to WUS. Population growth is expected to continue and even increase in the area, which will continue to impact aquatic resources within the three watersheds.

Table 9. Pending Permits within the Agua Fria (HUC 15070102), Lower Salt (HUC 15060106), and Middle Gila (HUC 15050100) watersheds

Project File Number	**Action Type**	**Project Name**	**County**	**HUC8**
SPL-2011-01005-MWL	Individual Permit	Ray Mine Tailings Storage Facility	Pinal	15050100
SPL-2016-00683	Nationwide Permit	ASARCO Fresh Water Pipeline	Pinal	15050100
SPL-2016-00736-MWL	Nationwide Permit	Copper Basin Railway UA	Pinal	15050100
SPL-2017-00409	Nationwide Permit	Camino Rio Road Pinal County	Pinal	15050100

In addition to these actions, the Corps is involved and has provided information for the draft tier 1 EISs being developed by FHWA and ADOT for two unfunded highway projects. These include the North-South Corridor, which is proposed roughly between Picacho and Apache Junction west of Phoenix, and the I-11 Corridor, which is currently proposed between Nogales and Wickenburg. The purpose of these Tier 1 EISs are to identify the preferred corridor for future transportation projects, and may consist of a mixture of new facilities or upgrades to existing facilities. At this time, no specific facilities are being identified and it is unclear what the impacts to aquatic resources would be, if any. However, the Corps has recommended that corridor alternatives which avoid or minimize impacts to aquatic resources be further analyzed. Future Tier 2 NEPA analyses will occur when funding becomes available, which will provide more detail on the impacts to aquatic resources.

In regard to the overall project cumulative effects, discussion on the past, present, and reasonably foreseeable actions are presented in Chapter 4 of the FEIS. The cumulative effects analyses within the FEIS attributable to the discharge of dredged or fill material into WUS as identified within this document are discussed below. Alternatives B and C would have similar potential cumulative impacts as both alternatives follow essentially the same alignment and would impact most of the same resources in similar locations and in a similar manner. Therefore, the resource category analyses below only include comparisons between the alternatives where differences in impacts are reasonably expected to occur.

Substrate: Substrate would continue to be impacted by development within the project area through conversion from a native substrate to a hard surface. Impacts from road crossings would be relatively minor and would in most cases constitute an activity that would likely be verified by a Nationwide Permit No. 14 if it were the sole impact to WUS. Residential and commercial developments would result in impacts varying from complete preservation to complete conversion of substrate.

Water: Existing sources of water affecting water quality include drainage from the South Mountains through development areas, Gila Drain Floodway discharge, sand and gravel pit operations in and upstream of the project vicinity, and the 91st Avenue Waste Water Treatment Plant (WWTP) treatment ponds. The proposed action, along with other planned roadway improvements (e.g., local arterial roadway widening and new roadway projects such as the proposed SR 30 and Avenida Rio Salado (ARS)), would contribute to cumulative impacts on water quality. Regionally, the presence of urban uses near water courses has increased by 8 percent from 1975 to 2000 (EPA 2004). Specifically, storm water flow from other projects or other physical jurisdictions would combine with storm water flow originating directly from the proposed action. Runoff from the freeway during infrequent rain storms would likely include lead, zinc, filterable residue, and total nitrogen. Other projects may include transportation, commercial, and residential development, which would result in fewer permeable surfaces to accommodate recharge and more impervious surfaces that act as pollution collection surfaces. This associated development would result in higher runoff volumes and a higher potential for pollutant discharges into receiving streams. However, these impacts would be minimized by providing BMPs during construction, following current design standards for detention facilities, and complying with federal and State permits for storm water discharges. It is not expected that these impacts would cause or contribute to violations of any applicable State water quality standard, and the differences between the alternatives are not anticipated to have a measurable difference in cumulative impacts on contaminants from storm water runoff.

Wildlife Values: Construction and maintenance of the new freeway would irrevocably convert existing natural habitat in WUS to a transportation use and, therefore, contribute to a reduction in the amount of wildlife habitat in the watershed. From 1975 to 2000, the proportion of land in human-related uses (e.g., urban) increased by an estimated 15 percent (the rate of increase to human-related uses was greatest during the period between 1975 and 1986, before freeways were constructed in the Phoenix metropolitan area) (EPA 2004). During this period, natural land uses decreased by 5 percent. Ongoing planned and permitted residential, commercial, and transportation development would likely further this trend of habitat loss, including within WUS, through direct conversion, habitat isolation (addressed below), and native plant loss (addressed below). Also, wildlife typically is displaced, causing either increased competition among species members and/or population reduction. The differences between the alternatives are not anticipated to have a measurable difference in cumulative habitat loss.

As part of the SMF project, bridge piers would be placed in the Salt River through the eastern half of a 192-acre BLM parcel leased to the City of Phoenix under provisions of the Recreation and Public Purposes Act for inclusion in the proposed RSO project. The City of Phoenix is aware of, has planned for, and has incorporated the proposed freeway in its General Plan. The City has designated the RSO project as incorporating the proposed freeway. Although the lease does not include a reference to the proposed freeway, BLM

would support working with the City of Phoenix to take the steps necessary to amend the lease in a manner that would allow the freeway to pass through the property. Both parties concurred with this approach in August 2005. As a result of this coordination and cooperative planning, no impacts on the proposed uses of this land or other planned wetlands and riparian restoration projects would occur.

The physical impacts of the freeway across lands that will be developed as wildlife habitat for the RSO project would be limited to the intrusion of the foundations and substructure for the new Salt River bridges. Because the bridges would span the River supported by columns, the area subtracted from what would otherwise be available to develop as habitat would be small and impacts from shading would not have a meaningful impact on the vegetation and habitat surrounding the bridges. These impacts are expected to be of a similar magnitude to those at the Corps' Rio Salado project located along the Salt River between 24th Street and 19th Avenue by the five arterial street bridges that cross it. The bridges crossing the Rio Salado Habitat have not impacted its viability. Similar circumstances will likely emerge at the RSO project site from current and future transportation infrastructure development and are unlikely to impact that project. Furthermore, bridges can provide wildlife habitat in the form of a nesting substrate for birds such as cliff swallows, as well as roost sites for bats. Many bridges across the Salt River in the Phoenix metropolitan area support breeding colonies of cliff swallows and are used by bats, typically as temporary day roosts. The differences between the alternatives in bridge pier spacing are not anticipated to have a measurable difference in cumulative impacts to the RSO project.

Construction of the new freeway would also bisect existing natural habitat along WUS for the purposes of a transportation use and, therefore, would contribute to habitat isolation, inhibiting the movement of wildlife for life requirements. This effect would likely be most prevalent in the areas between the South Mountains and Sierra Estrella as wildlife utilizes the desert washes between these areas as movement corridors. Ongoing planned residential, commercial, and transportation development is reviewed and permitted by local jurisdictions on a case-by-case basis; however, most developments are too small to consider their individual contributing effects on habitat connectivity. However, when considered together, these ongoing developments would contribute to continued adverse effects on habitat connectivity, including along WUS. The provision of mitigation for the proposed action in the form of multi-use crossings to be situated in cooperation with federal and State wildlife officials would minimize impacts attributable to the proposed action. Proper maintenance of these crossings would ensure that they remain open and useable to wildlife. Alternative B does not provide drainage structures for 13 WUS crossings, 12 of which are in the Center Segment, which reduces the freeway's permeability for wildlife crossings at WUS. Like Alternative C, the Alternative B design includes 5 multi-use crossing structures, though only one would span WUS. No small animal crossings were identified in the L/DCR design. Therefore, Alternative B may contribute more to continued adverse effects on habitat connectivity at waters of the U.S. than Alternative C.

Threatened and Endangered Species:

FHWA determined that the proposed project would have no effect to any species or habitat protected by the federal ESA. Cumulative impacts resulting from future state or private actions may include noise impacts and general human disturbance resulting from continuing development, which often results in impacts to WUS. No critical habitat is designated within the project area for any listed species. The differences between the alternatives are not anticipated to have a measurable difference in cumulative impacts to threatened and endangered species.

Several other projects in the project vicinity that would likely involve discharge of dredge or fill material in WUS could contribute to cumulative effects on the Yuma clapper rail and yellow-billed cuckoo. The proposed SR 30 freeway, from SR 303L to SR 202L (proposed SMF), would be located between the Gila and Salt rivers and Lower Buckeye Road; NEPA requirements will be addressed in an environmental assessment for that federally funded project. Also, the RSO and Tres Rios wetlands projects will help restore wetlands and riparian areas along the Salt and Gila rivers from 83rd Avenue to the west. The restoration of the Salt and Gila rivers' riparian and wetland habitat could improve habitat conditions for the Yuma clapper rail and yellow-billed cuckoo. Effects on the Yuma clapper rail and yellow-billed cuckoo would be addressed in NEPA documentation for these projects as well.

Water Supplies: Groundwater is a source of public water supply in Arizona. In 1995, groundwater withdrawal in the Phoenix AMA supplied 39 percent of the total consumption of 2.29 acre-feet (ADWR 1999). About 64 percent of the withdrawal was used for agriculture. The remainder was used for public water supply, industrial, domestic, and other purposes. Population growth has resulted in the retirement of agricultural land and the conversion of the intended use of groundwater supplies to urban uses. Issues created by groundwater overdraft include decreased water levels in aquifers and increased well drilling and pumping costs.

As previously discussed, the only potential water supply resource in the project area that is within the Corps' area of jurisdiction is the Salt River. Both alternatives cross the Salt River at an inactive mine pit that may be functioning as a recharge basin, though construction and maintenance in the river is not expected to impact this function under either alternative. Sand and gravel mining in the Salt River in the project vicinity will likely continue in the future to supply sand and gravel for area development projects. Mining the riverbed will create more pits, which may also provide aquifer recharge functions by capturing infrequent Salt River flows that would normally go downstream to allow percolation into the aquifer.

The drainage system for the new freeway includes first-flush basins and other basins to prevent impacts to discharge, velocity, surface elevation, and water quality of WUS flowing through the project area. These basins, some of which require discharge of fill material into WUS, would also contribute positively to groundwater recharge. The

differences between the alternatives are not anticipated to have a measurable difference in cumulative impacts to water supplies. The discharge of dredge or fill material associated with either alternative is expected to have little cumulative effect on water supplies.

Aesthetics: The area has experienced and will continue to experience a rapid transition in land use from low-density, open uses to residential, commercial, and light industrial uses. Large subdivisions have been developed in open agricultural land, and residential development has encroached onto the southern side of the South Mountains. These actions would all generally contribute to the continuation of the rapid development of the southwestern Phoenix metropolitan area from an agricultural-oriented past to a suburban- and urban-appearing present and future. The proposed freeway and its associated discharges would be a part of this trend. In the western portion of the project vicinity the only WUS are the Salt River and the LACC. Some development in this area may involve discharges of dredge or fill into these watercourses for new crossings of the Salt River and LACC. These discharges would further contribute to aesthetics degradation of these WUS in the vicinity. Likewise, present and future development in the South Mountain area outside of the SMPP boundary would likely result in discharge to WUS for road crossings and other features, which would also contribute to degradation of WUS aesthetics in the vicinity. The differences between the alternatives are not anticipated to have a measurable difference in cumulative impacts to aesthetics.

Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, And Similar Preserves: Recreational lands and facilities are valued in the Phoenix metropolitan area. This value is established through identification of recreation as an important and key element in local and regional land use plans and through recognition of its role as an important component of the region's tourism industry. In the region, recreational resources take the form of a wide array of facilities such as neighborhood, community, and regional parks; active playfields (e.g., baseball fields); equestrian, bicycle, and multi-use trails; and mountain preserves and open space. In the past, some of these resources have been converted to residential, commercial, and transportation uses. The enactment of the Phoenix Mountain Preserve Act in 1990 was intended to curb the loss of mountain preserve resources from land development encroachment. The proposed action, by design, takes measures to minimize its contribution to further loss of recreational resources. With the exception of SMPP (where avoidance was determined not feasible), all recreational resources were avoided. Measures to minimize harm to SMPP, including the provision of replacement lands, would reduce impacts to the lowest level possible and would ensure that active recreational areas within SMPP would not be affected. As development continues in the project area and surroundings, it is reasonable to conclude that such developments (as permitted by local jurisdictions on a case-by-case basis) may use recreational land in the future. Conversely, many new residential developments are setting aside land for future park development, some of which may be transferred to public ownership and access. Transportation projects in the region have resulted in uses of some recreational facilities, but in many cases these projects have resulted in improved access or provided additional protection to recreational lands. The differences between the

alternatives are not anticipated to have a measurable difference in cumulative impacts to recreation.

Overall Cumulative Impacts Conclusions

The various activities affecting resources and people in the project area as well as the proposed action could have localized variations at the project level. When viewed cumulatively, however, a broader view of each resource should be considered. The project occurs in an already rapidly urbanizing area (most noticeably in the western section of the project area – note that the recession slowed growth) which has been planned for urban growth as established in local jurisdictions' land use planning activities for the last 25 years.

Cumulative effects of most concern on aquatic resources associated with the above listed reasonably foreseeable projects may include an increase in the loss of WUS, detrimental impacts to fish and wildlife resources, loss of substrate, changes in water level fluctuations and water quality, impacts to aesthetic values, parks and other protect areas, and the discharge of pollutants. However, proper application of avoidance and minimization techniques would reduce the potential impacts that may occur. Compensatory mitigation for unavoidable impacts would reduce the cumulative impacts by maintaining and improving the quality and quantity of aquatic resources within the area. There would be no difference between the alternatives regarding current and reasonably foreseeable future projects impacting WUS.

6. Actions to Minimize Adverse Effects

6.1. Planning and Design

As stated in Section 2.2, numerous alternatives were evaluated throughout the extensive planning and preliminary design phases of this project. During the development of the FEIS, alternatives were considered in regards to how well they achieved the purposed and need of the project while minimizing adverse impacts to the environment. Further revisions were made during the development of the Design Concept Report (Alternative B) and continued when C202P became involved with the project (Alternative C). Ongoing consultation with stakeholders such as the Corps, AZGFD, the Community, and others also resulted in further design refinements by ADOT and C202P. As a result, several measures would be implemented to ensure that adverse impacts are minimized, particularly to WUS. The following is a summary of the features that would be implemented to minimize adverse effects.

To reduce the acreage of WUS impacted, the shared-use path proposed in the Pecos Segment was moved closer to the freeway to reduce the length of the culverts that convey WUS through the alignment. To minimize impacts to water quality and flows during storm events, first-flush basins would be constructed to collect and treat onsite flows from the freeway. These basins would minimize impacts to water quality, normal water fluctuations and flood fluctuations within WUS. Crossings over WUS would be constructed to convey the 50-year flow event. During the 100-year event, no water surface elevation increases would occur upstream or downstream of the project ROW. Flows within drainages are not being redirected or truncated, ensuring that the existing drainage configuration is maintained. Drainage structures have been designed to ensure that discharge, velocity, or water surface elevation at the outfalls to existing drainage conveyance features are maintained and do not increase to a level that would result in scour, erosion, or flooding downstream of the project. In areas where existing flows currently occur as sheet-flows, spreader basins would be constructed downstream of the drainage crossing to redistribute flows that may have been concentrated by the freeway. The Corps has conducted a hydraulic and hydrology review of the drainage reports, modeling data, and crossing designs proposed in WUS on the Pecos Segment, which is one of two segments where downstream impacts could potentially have adverse impacts to infrastructure, residences and businesses. The review confirmed that downstream drainage conditions would be maintained, with the exception of Wash C4 (modification of the design is needed here to maintain flow patterns). In the Center Segment, only designs have been provided to the Corps and no drainage reports have been provided since they have not been finalized. Because the Corps has not completed a review in this segment, should a permit be issued, special conditions would be added to ensure no work in WUS occurs in the Center Segment until the review is completed and the Corps has verified that downstream conditions would be maintained. ADOT would also need to consider the impacts of the freeway on the actions proposed in the Komatke Area Drainage Master Plan to ensure that both actions are compatible

Four of the five multi-use crossings and two small-animal crossings would be constructed in WUS. These structures would maintain connectivity for wildlife that travel between the

South Mountains and areas to the west, including the Gila River floodplain and the Sierra Estrella Mountains. The multi-use crossings would also accommodate use by Community members wishing to access the mountains.

At the Salt River, the span width and pier design were modified to reduce the number of piers needed for the bridges, reducing impacts within the channel. The duration of construction activities associated with the bridges was reduced from 18 months to 12 months to minimize temporal losses associated with long term disturbances to WUS.

During construction, actions would be taken to reduce impacts to water quality. For example, during dewatering activities at the Salt River and the LACC, measures would be taken to ensure that increased turbidity, erosion or sediment transport does not occur. In other WUS, no work would be authorized when flows are occurring. Implementation of the measures identified in the project's SWPPP and the Section 401 water quality certification would minimize impacts to water quality. These measures would also apply during maintenance activities. Areas that are temporarily impacted by construction activities would be stabilized and restored as appropriate. Areas that have not been identified as being temporarily or permanently impacted would be avoided. Ensuring that workers are aware of the boundaries of the work area will ensure that additional, unanticipated impacts do not occur.

Throughout the nation, the Corps has issued DA permits for various types of design-build projects. Frequently, these projects undergo design changes after permit issuance. Any changes in design that involved WUS would need to be reviewed by the Corps so that it can consider the implications of the changes. Modification of any permit issued or additional authorization may be required, along with compensatory mitigation if the additional impacts could not be avoided or minimized. If the proposed changes do not comply with the 404(b)(1) Guidelines or are not in the public interest, the modifications may be denied.

Allowing for maintenance activities such as sediment removal, erosion repair, and replacement or repair of the structures in WUS after initial construction would minimize the potential for future adverse impacts such as flooding or failure of the crossing or drainage structure. Regular maintenance of the structures, such as sediment/debris removal and erosion repair would ensure that flows are conveyed through the ROW as designed. To minimize impacts from future maintenance, these activities would be limited to the project ROW and its associated permanent drainage easement. Much of the WUS would in these areas would already be impacted by initial construction, and maintenance activities would only be restoring it back to the as-built elevations and capacities. As-built drawings would be provided to the Corps after initial construction in order to establish a record of the design elevations and capacities. Deviations in the filled area, including those due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to make the repair, rehabilitation or replacement, may need to occur. In order to ensure that deviations in fill area do not result in additional impacts to function and services, the modifications would need to be limited in scope. ADOT would need to report annually on the maintenance activities that were

undertaken, and compliance inspections by the Corps would ensure that the maintenance activities were conducted as specified by the permit. If the RSO is implemented in the future, authorization of the maintenance activities would be suspended within the RSO project area until the Corps has been consulted and has provided authorization to resume the activities, if appropriate.

6.2. Environmental Commitments Record

ADOT and FHWA have committed formally to several other measures that would minimize adverse effects on natural resources, including WUS. Below is a list of the most relevant actions taken to minimize adverse effects to aquatic resources; refer to the FEIS ROD for a complete list.

Table 10. FHWA ROD Environmental Commitments most applicable to aquatic resources.

ROD Commitment Code	Description
AQ-3	Post-construction • Revegetate or use decomposed granite or rock mulch on all disturbed land. • Remove dirt piles and unused materials. • Revegetate all vehicular paths created during construction to avoid future off-road vehicular activities. • Include control of access fence to prevent vehicle traffic on unpaved surfaces.
WRE-1	The proposed freeway will have properly designed drainage channels to resist erosion, energy-dissipating structures at all culverts where discharge velocity may cause downstream erosion, and sediment-trapping basins strategically located to maximize sediment removal and to function as chemical-spill containment structures.
WRE-2	Vegetative or mechanical means will be used to minimize erosion from cut and fill slopes.
WRE-3	Runoff discharge from the roadway to the irrigation district canals and conveyance ditches will be minimized by roadway design and the use of permanent BMPs.
WRE-4	To reduce the potential impact of contaminants such as oil, grease, soil, and trash, settling basins will be used to collect water and allow materials to settle. The basins could also serve to contain chemical spills resulting from vehicle accidents. Each basin will be designed to contain an initial rainfall runoff volume before allowing discharge. If an accident occurs, and the basins are dry at the time of the accident, the spill volume, in most cases, will be accommodated.

Table 10. FHWA ROD Environmental Commitments most applicable to aquatic resources.

ROD Commitment Code	Description
WRE-5	A construction AZPDES permit, for ground-disturbing activities exceeding 1 acre, will be obtained from ADEQ for the project in accordance with the provisions set forth in Section 402 of the CWA. The AZPDES permit must be consistent with discharge limitations and water quality standards established for the receiving water. The contractor shall coordinate with ADOT before filing a Notice of Intent and a Notice of Termination with ADEQ in accordance with Section 402 of the CWA and shall provide copies of the permit authorization to ADOT.
WRE-6	A SWPPP shall be prepared by the contractor in accordance with the AZPDES construction general permit. Upon construction completion, all contaminated material (e.g., concrete wash water) will be removed and disposed of in accordance with local, regional, and federal regulations. The contractor will comply with ADOT's Post-Construction Best Management Practices Program.
WRE-7	ADOT will coordinate with appropriate governmental bodies such as flood control districts and the Community when designing drainage features for the proposed action.
FLD-1	Bridge structures will be designed to cross floodplains in such a way that their support piers and abutments will not contribute to a rise in floodwater elevation of more than a foot.
FLD-2	Floodplain impacts will be minimized by implementing transverse crossings of the floodplain and avoiding longitudinal encroachments.
FLD-4	On-site drainage design shall be performed using the procedures in FHWA's *Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22* (2009b, with revisions).
FLD-5	The hydraulic design of culverts shall be performed using the procedures in FHWA's *Hydraulic Design Series No. 5, Hydraulic Design of Highway Culverts* (2012). Other criteria include:

Table 10. FHWA ROD Environmental Commitments most applicable to aquatic resources.

ROD Commitment Code	Description
	• Culverts will be sized, at a minimum, based on the design discharge of a 50-year storm. • With the 100-year storm, water levels should not significantly increase the flood damage potential on areas outside of the proposed R/W or as noted in accordance with ADOT's *Roadway Design Guidelines* (2012a), Section 611.3.C. • Reinforced concrete box culvert and reinforced concrete pipe will be provided with adequate cover. • Outflow discharges from detention basins shall not cause peak discharges downstream greater than peak discharges without the project.
WUS-10	Prior to initiating construction activities under the permit, ADOT will ensure that all appropriate contractors and subcontractors have been provided with a copy of the Section 404 authorization. This will be intended to confirm that the contractor(s) will comply with the terms and conditions of the Section 404 authorization and that a copy of the permit will be maintained on-site.
WUS-11	After completion of the proposed project, the washes will be returned to a preconstruction elevation.
WUS-12	Pollution from the operation of equipment in the floodplain shall be cleaned up and removed by the contractor before it can be washed into a watercourse. Spills will be promptly cleaned and properly disposed.
WUS-13	Temporary erosion and sediment control measures will be installed, at a minimum, according to ADOT's *Standard Specifications for Road and Bridge Construction* (2008) and *Erosion and Pollution Control Manual* (2012b), prior to construction and will be maintained as necessary during construction and will not be installed in a manner that causes noncompliance with the Section 404 permit.
WUS-14	If permanent erosion and sediment control measures are required, they will be installed as soon as practicable, preferably prior to construction activities, and will be maintained throughout the life of the project. Permanent erosion and sediment control measures will be located to protect downstream entities from construction impacts when there will be a flow in watercourses within the project boundary.

Table 10. FHWA ROD Environmental Commitments most applicable to aquatic resources.

ROD Commitment Code	Description
WUS-15	Any soil contaminated as a result of contractors' operations shall be assessed and then disposed of in an appropriate, approved disposal facility.
WUS-16	No excavation, fill, or leveling will be permitted in the watercourses outside the boundaries of the permitted work area.
WUS-17	No fill will be taken from any watercourse outside the boundaries of the permitted work area. Fill will come from an area outside the OHWM of any watercourses and will be free of any contaminants or pollutants.
WUS-18	Heavy equipment traffic shall be restricted from entering the watercourses outside the boundaries of the permitted work area. Appropriate barricades shall be installed to preclude this activity.
WUS-19	During construction, the work sites shall be maintained such that no construction debris or material spillover shall be allowed in the watercourses. Upon completion of the work, all construction debris and excess material shall be removed from the job sites and disposed of appropriately outside the USACE jurisdictional areas.
WUS-20	During construction, appropriate measures shall be taken to accommodate flows within the watercourses, such that waters will not be diverted outside the OHWM.
WUS-21	ADOT will fence, stake, or flag the construction limits for work within waters of the United States.
BIO-2	The freeway will be designed to protect and maintain opportunities for wildlife movement between the South Mountains, the Gila River, and the Sierra Estrella. These opportunities will be located in the region where the freeway will intersect the southwestern portion of the South Mountains. The project will include the five multi-use crossings (bridge structures). Multi-use crossing 4 is aligned with the Maricopa County Regional Trail/Sun Circle Trail/National Trail (see Figure 5-5 on page 5-8 of the Final Environmental Impact Statement). Multi-use crossings 1, 2, 3, and 5 will facilitate wildlife movement and provide access by Community members to the South Mountains. These crossing structures and associated fences will be designed to reduce the incidence of vehicle-wildlife collisions and to reduce the impact of the proposed action on wildlife connectivity between the South Mountains, the Gila River, and the Sierra Estrella. ADOT will coordinate with

Table 10. FHWA ROD Environmental Commitments most applicable to aquatic resources.

ROD Commitment Code	Description
	USFWS, AGFD, and the Community's Department of Environmental Quality during the design phase regarding the location and design of wildlife-sensitive roadway structures.
BIO-3	For drainage structures, such as culverts located in potential wildlife movement corridors, ADOT will coordinate with USFWS, AGFD, and the [Gila River Indian] Community's Department of Environmental Quality during the design phase regarding the location and design of wildlife-sensitive roadway structures based on the results of species surveys.
BIO-6	If new species or critical habitat are listed following completion of the ROD, or if the potential effects on species or critical habitat from the project have changed from those described in the Biological Evaluation, an update to the Biological Evaluation will be prepared and any required consultation with USFWS will be completed. ADOT will coordinate with USFWS, AZGFD, and the Community's Department of Environmental Quality to determine whether any additional species-specific mitigation measures will be required.
BIO-9	If vegetation clearing will occur during the migratory bird breeding season (March 1 to August 31), the contractor shall avoid any active bird nests. If the active nests cannot be avoided, the contractor shall notify the ADOT Engineer to evaluate the situation. During the non-breeding season (September 1 to February 28), vegetation removal is not subject to this restriction. If any active bird nests cannot be avoided by vegetation clearing or construction activities, the ADOT Engineer will contact the EPG Biologist (602-712-6819 or 602-712-7767) to evaluate the situation.
BIO-10	Invasive species surveys will be conducted during the design phase. If noxious or invasive species are found to be present in the project footprint during that survey, the contractor will develop and implement an invasive and noxious species control plan.
BIO-11	To prevent the introduction of invasive species seeds, the contractor shall inspect all earthmoving and hauling equipment at the equipment storage facility and the equipment shall be washed prior to entering the construction site.
BIO-12	To prevent invasive species seeds from leaving the site, the contractor shall inspect all construction equipment and remove all attached plant/vegetation and soil/mud debris prior to leaving the construction site.

Table 10. FHWA ROD Environmental Commitments most applicable to aquatic resources.

ROD Commitment Code	Description
BIO-13	Habitat impacts shall be minimized by restricting construction activities to the minimum area necessary to perform the activities and by maintaining natural vegetation where possible.

7. Compensatory Mitigation

To compensate for unavoidable permanent impacts to 5.829 acres of WUS associated with the proposed project, ADOT proposes to purchase 5.829 restoration/enhancement credits from the Arizona Game and Fish Department's (AZGFD) approved In-Lieu Fee (ILF) Program.

To determine the sufficiency of the compensatory mitigation proposed by ADOT, the Corps completed a Mitigation Ratio Setting Checklist (MRSC) using the procedures described in the South Pacific Division's Regulatory Program Standard Operating Procedure for Determination of Mitigation Ratios. The checklist is a method used to determine the amount of mitigation required based on the consideration of factors such as the location and quality of the mitigation site, quality of the areas being impacted, risk and uncertainty of the mitigation's success, and temporal loss. Based on the checklist, the mitigation ratio for impacts from the project would have resulted in 1:3.60 (1 acre replaced for every 3.6 acres impacted). As shown on the attached checklist, this ratio was largely a result of the mitigation site having higher functions and values than the impact sites and the type conversion that would occur (common habitat type to a rare and regionally significant habitat type). However, under 33 CFR 332.3(f), replacement ratios that are less than 1:1 are allowable only if a functional or condition assessment was used. No functional or condition assessment has been developed for Arizona, so compensatory mitigation for all impacts within the state must occur at a 1:1 replacement ratio. ADOT's proposed compensatory mitigation provides a 1:1 mitigation ratio.

AZGFD anticipates generating credits associated with the sale of advance credits to ADOT via an ILF project within the Arlington Wildlife Area. This site is located on the Gila River approximately 35 miles downstream from the project. The ILF program's instrument has not been modified to include this site at the time of analysis, but AZGFD has been authorized to offer advance credits in order to raise capital to begin planning an ILF project within the Arlington Wildlife Area. Temporal losses as well as the risk and uncertainty associated with using this potential ILF site were accounted for when the MRSC was completed. We have determined ADOT's proposed compensatory mitigation would adequately offset unavoidable impacts to WUS.

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Appendix A
Mitigation Ratio Setting Checklist

Attachment 12501.6 - SPD Mitigation Ratio Setting Checklist (See 12501-SPD for Revisions Sheet)

1	Date: September 20, 2017	Corps File No.:	SPL-2002-00055	Project Manager:	Jesse Rice				
	Impact Site Name:	Multiple-See IP Application	ORM Resource Type:	Stream		Hydrology:	Ephemeral		
	Impact Cowardin or HGM type:	Riverine	Impact area :	5.829	acres	Impact distance:		linear feet	
		Column A		**Column B**			**Column C**		
		Mitigation Site Name:		Mitigation Site Name:			Mitigation Site Name:		
		Mitigation Type:		Mitigation Type:			Mitigation Type:		
		ORM Resource Type:		ORM Resource Type:			ORM Resource Type:		
		Cowardin/HGM type:		Cowardin/HGM type:			Cowardin/HGM type:		
		Hydrology:		Hydrology:			Hydrology:		
2	**Qualitative impact-mitigation comparison**:	Starting ratio:	**1.0 : 1.0**	Starting ratio:	**1.0 : 1.0**		Starting ratio:	**1.0 : 1.0**	
		Ratio adjustment:	**-1.5**	Ratio adjustment:			Ratio adjustment:		
		Baseline ratio:	**1.00 : 2.50**	Baseline ratio:	**1.00 : 1.00**		Baseline ratio:	**1.00 : 1.00**	
		PM justification:	see tab 2	PM justification:	see tab 2		PM justification:	see tab 2	
3	**Quantitative impact-mitigation comparison**:	Ratio adjustment from BAMI procedure (attached):	**#DIV/0! : #DIV/0!**	Ratio adjustment from BAMI procedure (attached):	**#DIV/0! : #DIV/0!**		Ratio adjustment from BAMI procedure (attached):	**#DIV/0! : #DIV/0!**	
4	**Mitigation site location**:	Ratio adjustment:	**0**	Ratio adjustment:			Ratio adjustment:		
		PM justification: Arlington ILF site was used, even thought Impact sites are in a different ILF service area (San Pedro). The project is located near the confluence of the Gila and Salt Rivers and is 40 miles upstream from Arlington ILF. The project is in three HUC 8 watershed and two service areas. Ecologically, Arlington is preferred since much of the impact will be on the Salt River, mitigation will be closer to the impact site and in the same setting (urban interface area)		PM justification:			PM justification:		
5	**Net loss of aquatic resource surface area**:	Ratio adjustment:	**0.5**	Ratio adjustment:			Ratio adjustment:		
		PM justification:Restoration objectives for the Arlington describe activities that result in both gain in aquatic resource area (+0) and enhancement of existing areas (No gain, +1). Since both activities are proposed to occur, 0.5 was given.		PM justification:			PM justification:		
6	**Type conversion:**	Ratio adjustment:	**-3**	Ratio adjustment:			Ratio adjustment:		
		PM justification: The vast majority of the aquatic resources impacted are ephemeral drainages with minimal functions. The Laveen Conveyance Channel has perennial water in a concrete ditch lined surrounded by landscaped grass. The Salt River is ephemeral, but does occasionally have a ground water connection during wet years. The mitigiation site will provide highly functional aquatic resources that are rare and regionally significant.		PM justification:			PM justification:		
7	**Risk and uncertainty**:	Ratio adjustment:	**0.4**	Ratio adjustment:			Ratio adjustment:		
		PM justification: Artificial Hydrology: +0.3 Planned Maintenance: +0.1		PM justification:			PM justification:		
8	**Temporal loss**:	Ratio adjustment:	**1**	Ratio adjustment:			Ratio adjustment:		
		PM justification: April 2017 to December 2018: 20 months x 0.05=1		PM justification:			PM justification:		
9	**Final mitigation ratio(s):**	Baseline ratio from 2 or 3:	1.00 : 2.50	Baseline ratio from 2 or 3:	#DIV/0! : #DIV/0!		Baseline ratio from 2 or 3:	#DIV/0! : #DIV/0!	
		Total adjustments (4-8):	-1.1	Total adjustments (4-8):	0		Total adjustments (4-8):	0	
		Final ratio:	**1.00 : 3.60**	Final ratio:	**#DIV/0! : #DIV/0!**		Final ratio:	**#DIV/0! : #DIV/0!**	
		Proposed impact (total):	5.829 acres	Remaining impact:	acres		Remaining impact:	acres	
			0 linear feet		#VALUE! linear feet		Remaining impact (linear feet):	#VALUE! linear feet	
		to Resource type:	0	to Resource type:	0		to Resource type:	0	
		Cowardin or HGM:	Riverine Ephemeral	Cowardin or HGM:	Riverine		Cowardin or HGM:	Riverine	
		Hydrology:		Hydrology:	Ephemeral		Hydrology:	Ephemeral	
		Required Mitigation*:	1.62 acres	Required Mitigation*:	#DIV/0! acres		Required Mitigation:	#DIV/0! acres	
			0 linear feet		#DIV/0! linear feet			#DIV/0! linear feet	
		of Resource type:	0	of Resource type:	0		of Resource type:	0	
		Cowardin or HGM:	0	Cowardin or HGM:	0		Cowardin or HGM:	0	
		Hydrology:	0	Hydrology:	0		Hydrology:	0	
		Proposed Mitigation**:	acres	Proposed Mitigation**:	acres		Proposed Mitigation**:	acres	
			linear feet		linear feet			linear feet	
		Impact Unmitigated:	%	Impact Unmitigated:	%		Impact Unmitigated:	%	
			acres		acres			acres	
		Additional PM comments: Per 33 CFR 332.3(f), the minimum ration allowed is 1:1 since no functional assessment was used/available.		Additional PM comments:			Additional PM comments:		
10	**requirements:**	Final requirement is for 5.829 acres of mitigation at a 1:1 ratio.							

*At PM's discretion, if applicant's proposed mitigation is less than checklist requirement and additional mitigation type(s) proposed, complete additional columns as needed.

**Only enter proposed mitigation into spreadsheet if accepting applicant's lower (than required ratio) proposal.

Step 2: Qualitative comparison of functions (functional loss vs. gain)

Functions (Column A)	Impact site	Mitigation site
Short- or long-term surface water storage	No Loss	Gain
Subsurface water storage	No Loss	Gain
Moderation of groundwater flow or discharge	No Loss	Gain
Dissipation of energy	Minimal Loss	Gain
Cycling of nutrients	Minimal Loss	Gain
Removal of elements and compounds	No Loss	Gain
Retention of particulates	Minimal Loss	Gain
Export of organic carbon	No Loss	Gain
Maintenance of plant and animal communities	Moderate Loss	Gain

Adjustment: -1.5

PM Justification: Most of these functions minimally occr at most of the impact sites, as they are ephemeral drainages consisting of sparse upland vegetation. Minimal loss of energy dissipation would occur at each crossing, but will be counteracted by riprap outlets designed to address this. Maintenance of plant and animal communities will be impacted by the loss of connectivity caused by the freeway, but some crossings have been designed in consultation with AZGF to accomodate wildlife. At the Salt River, water is present in the gravel pit during wet years when the water table is charged. However, construction of the bridge will not have an impact on the storage or discharge of groundwater. There are unfunded plans to restore wetland habitat to the Salt River in this reach, but design has not been finalized and it is unknown if/when construction would occur. The permittee has taken this into consideration, and it is expected that the bridge would not preclude future wetland development.

Function (Column B)	Impact site	Mitigation site
Short- or long-term surface water storage		
Subsurface water storage		
Moderation of groundwater flow or discharge		
Dissipation of energy		
Cycling of nutrients		
Removal of elements and compounds		
Retention of particulates		
Export of organic carbon		
Maintenance of plant and animal communities		

Adjustment:

PM Justification:

Function (Column C)	Impact site	Mitigation site
Short- or long-term surface water storage		
Subsurface water storage		
Moderation of groundwater flow or discharge		
Dissipation of energy		
Cycling of nutrients		
Removal of elements and compounds		
Retention of particulates		
Export of organic carbon		
Maintenance of plant and animal communities		

Adjustment:

PM Justification:

Instructions:
1. Describe amount of functional loss (impact) and gain (mitigation) in each respective column. Gain and loss can be
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)